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factors and tourism factors. A  
quantitative point of view**

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### **INTERRELATIONS BETWEEN DEVELOPMENT FACTORS AND TOURISM FACTORS. A QUANTITATIVE POINT OF VIEW.**

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#### **ABSTRACT**

*The tourism development analysis is of maximum importance in the context of increasing the integration level of the Romania's economy into of the European one. Various methods are used by specialists for evaluating and disseminating data on the evolution, in order to provide information to policy makers. The regional structure of Romania's tourism is one of the basic elements for designing its economic prelaunch and development strategies, integration into the European economy and of course for establishing tourism policies. In the selection of the better way for the analysis an important place, has the multiple factor analysis that focused on disseminate the correlations between the specific tourism indicators and the indicators of economic growth. Consequences, the tourism policies could be seen as an instrument for providing the structure stability and as a way of harmonizing the European and national commercial interests through the use of promotion and protection measures.*

*Regional structural are utilized like criteria for the utilization of multiple factor analysis or canonical analysis. We are proposing hereby such a unified method. Our proposed model defines of structure of the tourism regions, the stability degree and the intensity of the measures to be used for restructuring the tourism offer structure (existing and estimated). The case study was made on Romania's tourism statistics. The modification of the tourism structure can be done only through several promotion and protection measures strong enough to facilitate the new trends.*

#### ***Jel Clasification:***

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Measurement and Data on National Income and Product Accounts and Wealth E01,  
Regional Economic Activity: Growth, Development, and Changes R11***

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## **1. INTRODUCTION**

The last year reflect, in term of macroeconomic development, the continuing advances in market-oriented reforms in most countries of Central and Eastern Europe. The results are different from country to country, because of various growth trends, as affect of relatively various conditions and economic performances. Tourism is an important component of economic growth and is an objective for central and local administration.

State Sector is imply direct and indirect in tourism, motivated from economic considerations (improvement of payment balance, regional development, economic diversification, increase of revenues, increase of employments, stimulation of investments, etc).

Actually, at international level, is a constant interest for tourism development like a parte of administrations politics or target for intervention programs with implications to sustainable development. Extension of public intervention is different from the country to country, and is in a large measures determined from the specifics of governmental strategies.

## **2. ROMANIAN TOURISM SECTOR**

The experiences of the countries with a generous tradition in tourism, show on the other part, that the identification of the tourism causalities at the all levels of management. In this context, in Romania acquire importance the definition of the directions in the field of the tourism development, in concordance with the conditionality's of EU.

The strategies of the tourism development are characterized from:

- Identification of position in the economic growth strategies [BB06];
- Identification of EU politics connected directly or indirectly, with effects that generate increase or decrease of tourism sector;
- Evaluation of ways and methods utilized for the assurance of competitiveness advantage of Romanian tourism;
- Characterization of the relation between the tourism and natural resources; European market of tourism is in continuous changes and the offensive the states from East Europe perhaps demand reorientation to the other touristic destinations [CP06].

In this context, the Romanian tourism has an increasing evolution with 24% for number of companies, 26% for number of employees and 40% for average turnover per employee (see table 1), but average of contribution of tourism sector in GDP decrease with 41%.

**Table 1**

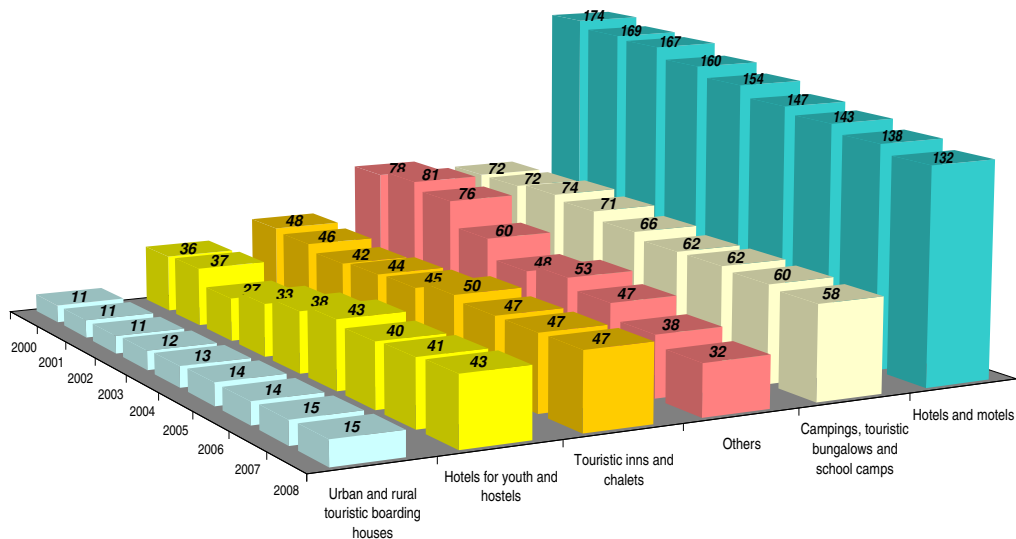
		2003	2006	2006/2003
No. of companies		15,459	20,579	133%
Employees		81,000	93,000	115%
Contribution in GDP/	euro	12,280	22,432	183%
Turnover of companies/	euro	10,947	21,868	200%

*Source data: calculated data from Romanian Yearbook 2007*

The concerns related to the analysis of tourism stability are very important on the context of increasing the economic integration of Romanian tourism services on the European economy, as effect of the reform process. This is why there are used various methods for dissemination and light-up the tourism indicators evolution.

Based on the statistics (see figure 1), in the period 2000-2008\*, the Romania's offer of tourists capacity had different evolutions: hotels and motels decrease from 170 places per unit to 132 places; camping, touristic bungalows and school camps decrease from 72 places to 58 places and touristic inns and chalets (decrease that average with 1 place). Urban and rural touristic boarding houses (11 places to 15 places), and hotels for youth and hostels had a little increase (5 places).

**Figure 1**  
**TOURISTIC ACCOMODATION CAPACITY**  
(average existing places per unit)

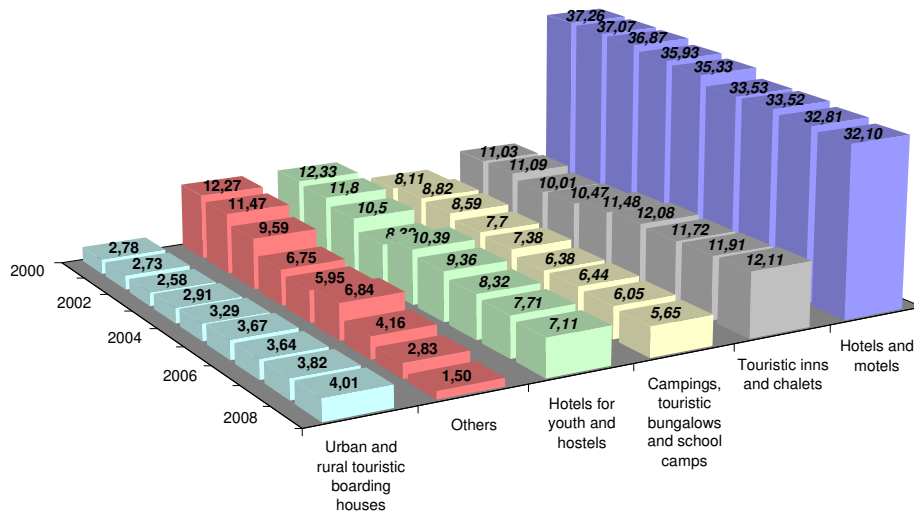


In according with these offer, is interesting to analyses the indicator *touristic accommodation capacity in function* calculated like an average per unit (tourism company) – see figure 2.

\* for 2007 and 2008 data are estimated from author

Figure 2 show that only touristic inns and chalets (from 11.3 to 12.11 thousand places) and urban and rural touristic boarding houses (from 2.78 to 4,01 thousand places) had increase. In rest the other decreased – hotels and motels (with 5.18 thousand places), hotels for youth and hostels (with as about 5.22 thousand places), camping, touristic bungalows and school camps (with as about 2.46 thousand places).

**Figure 2**  
**TOURISTIC ACCOMODATION CAPACITY IN FUNCTION**  
 (average per unit in '000 places)

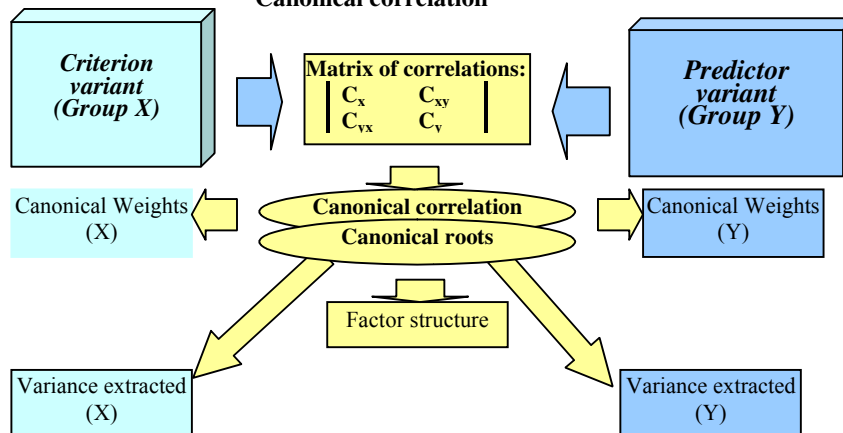


These dynamics had an influence to indices of net using the touristic accommodation capacity in function. Based on this, we propose **HYPOTESYS 1: it is a relation between the group of indices of net using the touristic accommodation capacity in function and the group of general indices of tourism sector?** Relations between groups have analyzed with the statistical methods of multiple factor analysis.

### 3. MULTIPLE FACTOR ANALYSIS

Multiple factor analysis is a category of complex statistical analysis, which implies many variables. Component of this category canonical analysis [WK07] try to investigate the relationship between two sets of variable named Criterion Variable (X) and Predictor Variable (Y). In according with scheme from figure 3, canonical analysis utilizes a group of methods which involve solving the characteristic equation for its latent roots and

**Figure 3**  
**Canonical correlation**



vectors. It describes formal structures in hyperspace invariant with respect to the rotation of their coordinates. The process is designed to obtain maximum (canonical) correlations between the predictor and criterion

canonical variants. In the process, similar with the factor analysis for each canonical correlation (root) is calculated an characteristic set of communalities, eigenvalues and eigenvectors.

The process solved with program "STATISTICA "99 Edition".

They are known applications of canonical analysis in the field of Sociology [RM07 and VSZ06], Psychology [GV07], Competitive Performance and International Diversification [BLT07] or Management [CL07]. The present paper is an application of canonical analysis in the field of tourism.

#### 4. ROMANIAN TOURISM CASE

The **HYPOTHESIS 2** concerning Romanian tourism is **how to determine the relations between indices of accommodation capacity in function per Romanian historical region and the indicators of Romanian regional economy** [AIM06 and BC06]. The groups of indicators utilized are in table 2.

**Table 2 GROUPS OF INDICATORS FOR CANONICAL ANALYSIS\***

<b>Criterion (independent) variable – Regional Indicators</b>	
X1	Average Number of employees on the tourism company
X2	Regional Gross Domestic Product calculated per company average (€)
X3	TURNOVER (average) of tourism per companies (€)
X4	GROSS INVESTMENTS average per company (€)
<b>Predictor (dependent) variable – Indices of net using accommodation capacity in function (%)</b>	
Y1	Hotels and motels
Y2	Touristic inns and chalets
Y3	Camping's, touristic bungalows and school camps
Y4	Urban and rural touristic boarding houses
Y5	Hotels for youth and hostels
Y6	Others

*\*)Data utilized are calculated for years 2003-2008 and for eight Romanian economic regions in according with Romanian National Institute of Statistics data.*

Based on these data are calculated (see figure 3) matrix of correlations between variable (see table 3), that is a symmetric matrix with diagonal values equal with 1.

**Table 3 MATRIX OF CORRELATIONS**

	<i>Criterion Variable (Cx)</i>				<i>Predictor Variable (Cy)</i>					
	X1	X2	X3	X4	Y1	Y2	Y3	Y4	Y5	Y6
X1	1,00	0,82	0,96	0,70	0,43	-0,94	-0,24	-0,23	0,29	-0,10
X2	0,82	1,00	0,88	0,75	0,43	-0,79	-0,30	-0,24	0,23	-0,25
X3	0,96	0,88	1,00	0,78	0,41	-0,93	-0,30	-0,28	0,23	-0,06
X4	0,70	0,75	0,78	1,00	0,34	-0,68	-0,20	-0,17	0,19	-0,14
Y1	0,43	0,43	0,41	0,34	1,00	-0,13	0,14	0,47	0,91	0,19
Y2	-0,94	-0,79	-0,93	-0,68	-0,13	1,00	0,39	0,48	0,04	0,13
Y3	-0,24	-0,30	-0,30	-0,20	0,14	0,39	1,00	0,92	0,47	0,24
Y4	-0,23	-0,24	-0,28	-0,17	0,47	0,48	0,92	1,00	0,72	0,29
Y5	0,29	0,23	0,23	0,19	0,91	0,04	0,47	0,72	1,00	0,25
Y6	-0,10	-0,25	-0,06	-0,14	0,19	0,13	0,24	0,29	0,25	1,00

*Note : trends are structured on years 2003-2008 and for eight economic regions in according with Romanian National Institute of Statistics data*

Table 3 show that all criterion variables ( $C_x$ ) have the same trend of development, the relation intensity is positive one, between 0.70 and 1. From predictor variables ( $C_y$ ), except with Y1/Y2 (correlation indices of net using capacity in function between *Hotels and Motels* and *Touristic Inns and Chalets*), all correlations are positive. Matrix  $C_{xy}$  show a heterogeneity between the trends of all indicators, with values between -0.94 and +0.43.

\* STATISTICA "99 Edition, ©1994-1999 by StatSoft, Inc

Based on this matrix was calculated the three significant Canonical Correlation Coefficients\* : 0.998, 0.70 and 0.545. First commentary is that selections of correlations extracted are independent one.

The first canonical correlation coefficient was 0.998, significant for a probability near 0. Among them, the canonical weights of criterion variable can explain 81% of variance of independent variable in hierarchy **X1, X3, X2, X4**. First commentary is that the variance of X4 (Gross investments) may be an effect of economic crisis from the second part of the year 2008. The redundancy coefficient in independent variables stands for that the 80.6% of the total variance of regional indicators can be explained by indices of net using accommodation capacity in function through predictor variable consider that canonical group. The predictor variable can explain 22% of variance of dependent variable in hierarchy **Y4, Y5, Y6, Y2,Y1,Y3**. The redundancy coefficient in dependent variables stands for that the 21.5% of the total variance of indices of net using accommodation capacity in function can be explained by regional indicators through predictor variable consider canonical group.

Table 4

**FIRST CANONICAL CORRELATION ANALYSIS FOR ROMANIAN TOURISM**

First canonical correlation coefficient <b>R=0.999</b> ; The Square of Canonical Correlation Coefficient <b>R<sup>2</sup>=0.998</b> ; <b>P value=0.000</b>					
Criterion variable		Canonical weights	Predictor variable	Canonical weights	
Regional Indicators	X1-Average Number of employees on the tourism company	0.67*	Indices of net using accommodation capacity in function	Y1-Hotels and motels	-2.690
	X2-Regional Gross Domestic Product - average per company	0.06*		Y2-Touristic inns and chalets	-2.336
	X3-TURNOVER of tourism companies- average per company	0.29*		Y3-Camping's, touristic bungalows and school camps	-5.001
	X4-GROSS INVESTMENTS average per company	-0.01		Y4-Urban and rural touristic boarding houses	6.278*
		Y5-Hotels for youth and hostels		0.619*	
		Y6-Others		-0.049	
Variance extracted		80.9%	Variance extracted		21.6%
Redundancy coefficient		80.6%	Redundancy coefficient		21.5%
<b>Hierarchy of criterion variables</b>			<b>Hierarchy of predictor variables</b>		
X1-Average Number of employees on the tourism company			Y4-Urban and rural touristic boarding houses		
X3-TURNOVER of tourism companies- average per company			Y5-Hotels for youth and hostels		
X2-Regional Gross Domestic Product - average per company			Y6-Others		
X4-GROSS INVESTMENTS average per company			Y2-Touristic inns and chalets		
			Y1-Hotels and motels		
			Y3-Camping's, touristic bungalows and school camps		

\* meaning positive canonical weight

Table 4 (continue)

**CANONICAL CORRELATION ANALYSIS FOR ROMANIAN TOURISM**

Second canonical correlation coefficient <b>R=0.700</b> ; The Square of Canonical Correlation Coefficient <b>R<sup>2</sup>=0.489</b> ; <b>P value=0.00008</b>					
Criterion variable		Canonical weights	Predictor variable	Canonical weights	
Regional Indicators	X1-Average Number of employees on the tourism company	-3.098	Indices of net using accommodation capacity in function	Y1-Hotels and motels	-51.937
	X2-Regional Gross Domestic Product - average per company	-0.812		Y2-Touristic inns and chalets	-26.721
	X3-TURNOVER of tourism companies- average per company	3.64*		Y3-Camping's, touristic bungalows and school camps	-94.756
	X4-GROSS INVESTMENTS average per company	0.29*		Y4-Urban and rural touristic boarding houses	119.496*
		Y5-Hotels for youth and hostels		5.618*	
		Y6-Others		0.515*	
Variance extracted		4.1%	Variance extracted		6.0%
Redundancy coefficient		2.0%	Redundancy coefficient		2.9%
<b>Hierarchy of criterion variables</b>			<b>Hierarchy of predictor variables</b>		
X3-TURNOVER of tourism companies- average per company			Y4-Urban and rural touristic boarding houses		
X4-GROSS INVESTMENTS average per company			Y5-Hotels for youth and hostels		
X1-Average Number of employees on the tourism company			Y6-Others		
X2-Regional Gross Domestic Product - average per company			Y3-Camping's, touristic bungalows and school camps		
			Y1-Hotels and motels		
			Y2-Touristic inns and chalets		

\* meaning positive canonical weight

\* Note: means the canonical correlation coefficients exceeding 0.3 could be viewed as important variables

Table 4 (continue)

**CANONICAL CORRELATION ANALYSIS FOR ROMANIAN TOURISM**

Third canonical correlation coefficient <b>R=0.545</b> ; The Square of Canonical Correlation Coefficient <b>R<sup>2</sup>=0.297</b> ; <b>P value=0.031</b>					
Criterion variable		Canonical weights	Predictor variable	Canonical weights	
Regional Indicators	X1-Average Number of employees on the tourism company	0.202*	Y1-Hotels and motels	19.294*	
	X2-Regional Gross Domestic Product - average per company	-1.752	Y2-Touristic inns and chalets	10.213*	
	X3-TURNOVER of tourism companies- average per company	1.790*	Y3-Camping's, touristic bungalows and school camps	37.190*	
	X4-GROSS INVESTMENTS average per company	-0.605	Y4-Urban and rural touristic boarding houses	-47.261	
			Y5-Hotels for youth and hostels	-1.401	
			Y6-Others	0.825*	
Variance extracted		9.2%	Variance extracted		10.6%
Redundancy coefficient		2.7%	Redundancy coefficient		3.2%
<b>Hierarchy of criterion variables</b>			<b>Hierarchy of predictor variables</b>		
X3-TURNOVER of tourism companies- average per company			Y3-Camping's, touristic bungalows and school camps		
X1-Average Number of employees on the tourism company			Y1-Hotels and motels		
X4-GROSS INVESTMENTS average per company			Y2-Touristic inns and chalets		
X2-Regional Gross Domestic Product - average per company			Y6-Others		
			Y5-Hotels for youth and hostels		
			Y4-Urban and rural touristic boarding houses		

\* meaning positive canonical weight

The second canonical correlation coefficient was 0.700 significant for a probability equal with 0.00008. For this canonical root resulted after first extraction, the canonical weights of criterion variable can explain as about 4.1% of variance of independent variable in positive hierarchy X3, X4. The redundancy coefficient was 2.0% and explains at low level of the influence of indices of net using accommodation capacity in function. In this case, the predictor variable can explain 6.0% of variance of dependent variable in hierarchy Y4, Y5, Y6. The redundancy coefficient in dependent variables stands for that the 2.9% of the total variance of indices of net using accommodation capacity in function can be explained by regional indicators through predictor variable consider canonical group.

After two extractions, the program calculates the third residual root 0.545 for a significant probability 0.031. This extraction explain only 9.2% from variance of criterion variable in which, only X3 and X1 had a positive influence and only 10.6% from variance of predictor variable in which Y3, Y1, Y4 and Y5 had a positive influence.

**5. CONCLUSIONS**

The analysis result for this research can concluded as below:

- Variations Regional Indicators caused significantly influence on variations of Indices of net using accommodation capacity in function. Is necessary to complete analysis with a component that show the direct influence of regions specific aspects;
- The analysis of canonical criterion and predictors variate is necessary to develop of same indicators of regional analysis;
- Canonical analysis can to apply on efficiency of the tourism services considered as priorities in the efforts towards economic promotion;
- For the applying the multifactor analysis is necessary to develop specialized management information systems [GI06].

The impact statistical methods – has it been evaluated in terms of economic development and international trade and tourism relations.

There are many concerns related to a progress in terms of international tourism flow favorable to the general economic development, framework in which international economic cooperation gets a higher importance.

Another conclusion is that Romania has some specific natural resources and highly trained specialists that could facilitate, through policies structured mostly on efficiency criteria, the country's performances as a robust EU-type business partner.

The EU integration process is the first step towards global economy required alignments and aspiring countries, more or less in competition among themselves, have to design quite accurately their future role and actions on the world market(s).



The mark-up strategies used by companies are, for the time being, more related to national prospective than to the global environment.

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