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THE INFLUENCE OF MAIN QUALITY FACTORS ON THE EVOLUTION OF TOURISTS NUMBER - A STUDY IN A ROMANIAN BUSSINESS HOTEL

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Abstract: *Quality requires a perfect adaptation to customer needs in terms of optimal costs. The first determinant factor of the buying process is quality, this having a fundamental impact. The services quality in a hotel is influenced by a number of factors in which falls material and personnel behavior.*
The aim of this paper is to identify the influence of main quality factors – quality costs based on material and quality costs for human resources – on the evolution of tourist's number accommodated in a Romanian 4 stars hotel, using the dispersion analysis method.
Key words: *hotel, quality, costs, material, human resources*

1. INTRODUCTION

Quality in hospitality industry is more difficult to achieve than in other sectors. Ensuring quality requires quality in three major chronological stages (before consumption, consumption, after consumption), each being required for obtaining customer satisfaction.

It is essential to know the degree of clients' satisfaction, their needs and expectations so that it can highlight the quality costs, considered an important tool of quality valorization.

Representing a potential source of maximizing the profit of organizations, the quality costs are used as a tool for optimization of processes and activities relevant to quality.

Due to changes taking place continuously, is necessary description and analysis of economic and social phenomena and processes and analyze the influence of factors which may change them. To highlight the degree of influence of different factors may apply multifactorial regression model, respectively dispersion analysis method Analysis of Variance – ANOVA.

ANOVA method implies defining a regression model, which involves: determining the regression equation, testing the validity of the regression model, establishment and testing correlation, and testing significance and estimation of linear regression model parameters on confidence intervals.

For a better understanding of issues relating to determination and analysis of dependency between the number of tourists, quality costs based on material and quality costs for human resources, it will be applied multiple regression method for the value registered in a Romanian 4 stars hotel – Alpha Hotel (to maintain confidentiality the hotel was renamed; the data provided and used for the research are real).

Here are the steps followed for dispersion analysis method ANOVA. To facilitate the calculations and problem solving it has been used Excel software.

2. DETERMINE THE REGRESSION EQUATION

Analyzing characteristics: number of tourists accommodated in Alpha Hotel, quality costs based on material and quality costs for human resources, we establish:

y_i – number of tourists accommodated in Alpha Hotel
x_{i1} – quality costs based on material (lei)
x_{i2} – quality costs for human resources (lei)

Regression equation which model the link between the variables mentioned is:

$$y_i = b_0 + b_1 \times x_{i1} + b_2 \times x_{i2}. \quad (1)$$

In Table 1, are presented intermediate values necessary for apply the least squares method:

Years	y_i	x_{i1}	x_{i2}	x_{i1}^2
2000	13.924	590.477	650.234	348663.0875
2001	14.025	669.778	677.955	448602.5693
2002	14.458	671.452	710.437	450847.7883
2003	16.890	674.742	805.700	455276.7666
2004	17.258	681.152	853.544	463968.0471
2005	17.582	702.472	885.622	493466.9108
2006	17.869	852.524	915.487	726797.1706
2007	18.256	975.662	987.556	951916.3382
2008	25.643	1386.322	1455.248	1921888.688
∑	155.905	7204.581	7941.783	6261427.366
Years	x_{i2}^2	$x_{i1} \times x_{i2}$	$y_i \times x_{i1}$	$y_i \times x_{i2}$
2000	422804.2548	383948.2216	8221.801748	9053.858216
2001	459622.982	454079.344	9393.63645	9508.318875
2002	504720.731	477024.3445	9707.853016	10271.49815
2003	649152.49	543639.6294	11396.39238	13608.273
2004	72853.3599	581393.2027	11755.32122	14730.46235
2005	784326.3269	622124.6576	12350.8627	15571.006
2006	838116.4472	780474.6392	15233.75136	16358.8372
2007	975266.8531	963520.8621	17811.68547	18028.82234
2008	2117746.742	2017442.318	35549.45505	37316.92446
∑	7480294.186	6823647.219	131420.7594	144448.0006

Source: calculations made by the authors. To facilitate calculations, values were expressed in thousands of tourists, respectively lei

Tab. 1. Algorithm required for applying least squares method

Least square minimizes the residual sum of squares (Baltagi, 2008). Knowing that n = 9, $\sum x_{i1} = 7204.581$, $\sum x_{i2} = 7941.783$ and $\sum y_i = 155.905$, the system equations become:

$$\begin{cases} b_0 \times 9 + b_1 \times 7204.581 + b_2 \times 7941.783 = 155.905 \\ b_0 \times 7204.58 + b_1 \times 6261427.366 + b_2 \times 6823647.219 = 131420.7594 \\ b_0 \times 7941.783 + b_1 \times 6823647.219 + b_2 \times 7480294.186 = 144448.0006 \end{cases} \quad (2)$$

Where: $b_0 = 4131.3959$, $b_1 = -0.0049$ and $b_2 = 0.0194$.

Regression line is defined by the equation:

$$y_i = 4131.3959 - 0.0049 \times x_{i1} + 0.0194 \times x_{i2}. \quad (3)$$

3. TESTING THE VALIDITY OF THE REGRESSION MODEL

To confirm the model establishment and use the approach was to verify the validity of the method. This is achieved in the following stages of linear regression model analysis.

The established assumptions are:

- H_0: the model is not valid (null hypothesis)
- H_1: the model is valid (alternative hypothesis)

To use the F test, compared with the analyzed data was applied EXCEL software. The obtained values, necessary for analysis of the validity of regression model, are:

ANOVA			
	Regression	Residual	Total
Df	2	6	8
SS	100881273.9	406755.6246	101288029.6
MS	50440636.97	67792.60409	
F	744.0433605		
Significance F	6.47629E-08		

Tab. 2. ANOVA table with the necessary values for analysis the regression model

Knowing that the probability of occurrence of the results is 95% and the limit of significance $\alpha = 0.05$ it was obtained the limit region of rejection: $F_{\alpha;k;n-k-1} = F_{0.05;2;6} = 5.14$ (4)

For analyzed characteristics (number of tourists accommodated at Alpha Hotel, quality costs based on material and quality costs for human resources), $F_c = 744.0433605 > F_{\alpha;k;n-k-1} = 5.14$. In this case H_0 is rejected, the regression model being statistically valid.

Another element which reflects the validity of the model is Significance F. If the value obtained for this element is less than 0.05, H_0 is rejected. In Table 2 it is shown that Significance F = 6.47629E-08 < 0.05, and the regression model is statistically valid.

4. DETERMINING AND TESTING THE CORRELATION

For determining the correlation was used Excel software. The values obtained for the correlation (R), R Square (R^2), the adjusted R Square (R^2), and standard deviation of errors (s_e), are presented in table 3:

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.997990065
R Square	0.995984169
Adjusted R Square	0.994645558
Standard Error	260.370129
Observations	9

Tab. 3. The values of parameters R, R^2, $\bar{R}^2$ and s_e

The correlation value (Multiple R) is set to 0.997990065 and shows that between number of tourists, quality costs based on material and quality costs for human resources, registered in the period under review at Alpha Hotel, is a very strong connection, almost perfect.

R^2 is called the coefficient of determination (Kennedy, 2003). R Square is set to 0.995984169 and shows that the influence of the two factors (quality costs based on material and quality costs for human resources) on the number of tourists accommodated at Alpha Hotel is about 99.60%, the remaining 0.40% is due to other random factors.

Adjusted R Square value can increase or decrease along with the inclusion of new exogenous variables in the regression model (Andrei, 2003). The value of standard error shows that points are not placed near the regression right.

5. TESTING THE SIGNIFICANCE AND ESTIMATION OF PARAMETERS FOR LINEAR REGRESSION MODEL ON CONFIDENCE INTERVALS

Estimators for regression parameters are determined by least squares method.

Testing their significance has in view the size of the selected collectivity, so if n <30, it is applied Student test (Gogonea & Zaharia, 2008). In Table 4, an ANOVA table, are presented the necessary elements for testing parameters and establish confidence intervals.

From the table below we establish the linear adjusting equation of the connection between analyzed indicators:

$$y_i = 4131.3959 - 0.0049 \times x_{i1} + 0.0194 \times x_{i2} \quad (5)$$

	Intercept	X Variable 1	X Variable 2
Coefficients	4131.3959	-0.0049	0.0194
Standard Error	359.4597	0.0014	0.0015
t Stat	11.4933	-3.4951	13.4449
P-value	2.60589E-05	0.012902631	1.04885E-05
Lower 95%	3251.8297	-0.0084	0.0159
Upper 95%	5010.9621	-0.0015	0.0230

Tab. 4. Elements necessary for testing parameters and establish confidence intervals

The value of b_0 is 4131.3959 and shows that if quality costs based on material are remaining constant, respectively quality costs for human resources, the number of tourists accommodated in Alpha Hotel, was set to a value of approximately 4131. Analyzing the value resulted for t test, $t_c = 11.4933$, and significance threshold P-value = 2.60589E-05 < 0.05, we see that free term is statistically significant. This is reflected also by the presence of the confidence interval, respectively $3251.8297 < b_0 < 5010.9621$.

The value of b_1 coefficient is -0.0049 and shows that by decreasing Variable 1 with one leu per year, the Intercept will decrease with 0.0049. This means that the decrease of quality costs based on material with 204.08 lei will decrease the number of tourists accommodated in Alpha Hotel by one. Threshold of significance P-value is 0.012902631 < 0.05, and the result $t_{cb1} = |-3.4951| > 2.365 = t_{0.025;7}$, shows us that this coefficient is considered statistically significant. The limits of the confidence interval of this parameter are: $-0.0084 < b_1 < -0.0015$.

The value of coefficient b_2 is approximately 0.0194 and it shows that by increasing Variable 2 with one leu per year, the Intercept will increase with the value of b_2. This means that the increase of quality costs for human resources with approximately 51.55 lei will increase the number of tourists accommodated in Alpha Hotel by one. For this coefficient the threshold of significance P-value is 1.04885E-05 < 0.05, respectively $t_{cb2} = 13.4449 > 2.365 = t_{0.025;7}$, the coefficient being statistically significant.

The lower limit of the confidence interval of this parameter is approximately 0.0159, and the upper limit reaches 0.0230.

6. CONCLUSION

After testing the validity of regression model was established that this model is statistically valid. Thus, it was observed that between the number of accommodated at Alpha Hotel and quality costs based on material costs, namely quality costs for human resources is a strong connection.

For the most part, service quality dimensions are determined by the activities of staff. Because the improvement of quality of service and productivity growth is found in an inverse relationship, requires the activity in a manner that ensures a balance between quality and quantity of services, that balance is a benchmark used to staff. Always investments in human resources and material basis will attract, through the quality of services, new tourists.

7. REFERENCES

Andrei, T. (2003). *Statistica si econometrie*, Publisher Economica, ISBN 973-590-764-X, Bucharest

Baltagi, B. H. (2008). *Econometrics 4th edition*, Publisher Springer, ISBN 978-3-540-76515-8, Berlin

Gogonea, R. M. & Zaharia, M. (2008). *Econometrie cu aplicatii in comert-turism-servicii*, Publisher Universitara, ISBN 978-973-749-496-2, Bucharest

Kennedy, P. (2003). *A guide to Econometrics – fifth edition*, Publisher MPG Books, Bodmin, Cornwall, ISBN 0-262-11280-9, United Kingdom

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