Analysis and Modeling of Factor Determinants for Ukraine Hotels and Tourist Sphere

Nazariy Popadynets[1]([✉]), Iryna Hryhoruk[2], Mariana Popyk[3],
Olha Bilanyuk[4], Oleksandr Halachenko[5], Inna Irtyshcheva[6],
Natalia Batkovets[7], Nataliia Lysiak[7], Yevheniya Boiko[6],
Nataliya Hryshyna[6], Mariana Bil[1], and Tetiana Nezveshchuk-Kohut[8]

[1] State Institution "Institute of Regional Research named after M. I. Dolishniy of the NAS of Ukraine", Kozelnytska, str. 4, Lviv 79026, Ukraine
popadynets.n@gmail.com, bmml983@gmail.com
[2] Vasyl Stefanyk Precarpathian National University, Shevchenko, str. 57, Ivano-Frankivsk 76018, Ukraine
ira.hryhoruk@gmail.com
[3] State University «Uzhhorod National University», Pidhirna, str. 46, Uzhhorod 88000, Ukraine
mariana.popyk@uzhnu.edu.ua
[4] Ivan Franko National University of Lviv, Universytetska, str. 1, Lviv 79000, Ukraine
bilanyuk.olha@gmail.com
[5] Interregional Academy of Personnel Management, Khmelnytske shosse, str. 145, Vinnytsia 21100, Ukraine
o.galachenko@gmail.com
[6] Admiral Makarov National University of Shipbuilding, Heroyiv Ukrayiny Ave. 9, Mykolayiv 54025, Ukraine
innauamd@gmail.com
[7] Institute of Enterprise and Advanced Technologies, Lviv Polytechnic National University, Gorbachevskyy, str. 18, Lviv 79044, Ukraine
natabatkovets72@gmail.com, natali.bila@gmail.com
[8] Chernivtsi Institute of Trade and Economics of Kyiv National University of Trade and Economics, Tsentralna, sq. 7, Chernivtsi 58002, Ukraine
t.semenivna@gmail.com

Abstract. The authorities together with businesses need to create conditions for boosting the competitiveness of hotel and restaurant industry in Ukraine. This article aims at determining the influence of selected factors on the development of the hotel and tourism sector and building a model of this influence in terms of individual factor determinants. Such factors include the number of consumers of tourism services, competitive hotel and tourism enterprises, indicators of costs and profitability, socio-cultural preferences, political and legal relations, and demographic factors. By constructing a correlation matrix, an attempt was made to identify the strength of the relationship between the factors and their nature. The assessment of standardized regression coefficients made it possible to determine the contribution of each factor to the state of the hotel and tourism sector. The existence of a close relationship between socio-economic factors and the hotel and tourism sector of Ukraine is demonstrated.

AQ1

1 Introduction

Economic, social, and administrative reforms caused by the decentralization of power and Ukraine's integration into the EU have led to the need for a systematic study of general and specific features of the hotel and tourism sector in the country, its organization, patterns of development and management, its inter-sectoral and infrastructural links. The changes covered a wide range of problems, affected many industrial bases of service activities, and brought new elements to the economic relations of the service system on a competitive basis, including the ability to serve foreign tourists. Therefore, the theoretical coverage of those trends is relevant and it determines the further development and transformation of this area. Since the hotel and tourism sector directly creates jobs and is a profitable sector all over the world, in Ukraine it can also bring a significant part of revenues to both state and local budgets. Therefore, the authorities, together with business, need to create such conditions that will boost the competitiveness of the hotel and restaurant industry in the country. A number of scientists deal with the development of the hotel and tourism sector and consider it from different points of view: environmental development [1–4], attracting innovation and investment [5,6], regional development [7,8], food support [9–12], etc. The purpose of the article is to determine the impact of selected factors on the development of the hotel and tourism sector of Ukraine and build a model of this impact in terms of individual factor determinants.

AQ2

2 Methodology

Today, the development of the hotel and tourism industry as the demand for tourism services requires the creation of new competitive advantages. Therefore, such development to some extent depends on objective and subjective factors, the analysis of which will offer proposals for the formation of a competitive environment in the tourism market. Such factors include the number of consumers of tourism services, competitive hotel and tourism enterprises, indicators of costs and profitability, socio-cultural preferences, political and legal relations, and demographic factors.

The study of factors influencing the development of the hotel and tourism industry is a necessary condition for building a mathematical model of the tourism market. Therefore, when building such a model, an algorithm was proposed, according to which the resulting variable is correlated as the number of tourists to the income from services provided in the hotel and tourism sector. This interpretation of the resulting variable makes it possible to more accurately analyze the prospects for this field.

The determinants of the development of hotel and tourist services are numerous, various factors that affect changes in its size and structure. The determinants can be divided into several groups: economic, demographic, geographical, legal and political, the influence of the media and psychological factors.

Thus, independent indicators were selected on the basis of statistical data, i.e. those indicators of the hotel and tourism sector between which there is no multi-collinearity with the resulting variable (Table 1). Multi-collinearity is the reason for the inconsistency of estimates of the model parameters, and this does not allow to make sound conclusions about the relationship between the dependent and independent changes.

Confirmation of the connection between economic factors and the development of the hotel and tourism sector is the correlation analysis between the resulting variable (number of tourists and income from services provided in the hotel and tourism sector) and certain indicators of analysis of factor determinants of tourism services market.

Table 1. Key indicators of factor analysis of the determinants of hotel and tourism industry

X_1	Number of subjects of hotel and tourist activity, units
X_2	Number of foreign tourists served by hotel and tourism entities, persons
X_3	Number of domestic tourists served by hotel and tourism entities, persons
X_4	Number of persons accommodated in subjects of hotel and tourist activity, persons
X_5	Consumer price indices for goods and services, %
X_6	Operating costs incurred by the subjects of hotel and tourism activities, USD USA
X_7	The total cost of stay of all persons accommodated in hotels during the year, USD USA
X_8	The cost of sold tourist vouchers, USD USA
X_9	Number of sold tourist vouchers, units
X_{10}	Incomes of the population, USD USA
Y	Number of tourists/Revenues from services provided in the hotel and tourism sector

The reliability of the analysis was checked using the standard deviation of Constant Y and the standard deviation of Constant X, the Student's t-test, and the bone density with a coefficient of determination close to one. By constructing a correlation matrix, an attempt was made to identify the strength of the relationship between the factors (r_n) that affect the phenomenon under study and their nature.

3   Results and Discussion

Consider some of the main factors that, in our opinion, and are confirmed in the calculations, have the greatest impact on the tourism market.

Thus, the data to establish the strength of the relationship between the tourism market (number of tourists and income from services provided in the tourism sector) (Y) and the number of tourism entities (X_1), the number of foreign tourists served by tourism entities (X_2), the number of domestic tourists served by tourism entities (X_3), the total cost of stay of all persons accommodated in hotels during the year (X_7), the number of income per capita (X_{10}), for 2014–2019 as economic factors of influence are given in Table 2.

As we can see, such the number of hotel and tourism entities in the region (X_1) has a significant impact on the development of the tourism market, which is confirmed by a direct relationship, the correlation coefficient r is 0.923. Since our country is attractive

to a large number of tourists, both foreigners and domestic, the number of companies in the market directly affects the encouragement and attraction of tourists.

The model of tourism market development (Y) with the number of tourism entities (X_2) can be depicted as follows:

$$Y = 0.136585 + 0.9234 * X_1 \tag{1}$$

That is, if the number of hotel and tourism entities in the market increases by 1%, the level of development of the tourism market will increase by 9.2%.

Another studied factor that in our opinion has a significant impact on the level of development of the hotel and tourism industry is the number of foreign tourists served by hotel and tourism entities (X_2). There is a direct relationship between the number of foreign tourists served by hotel and tourism entities and the tourism market ($r = 0.845$). Since there are cities in Ukraine that are leaders in tourist visits, such as Lviv, Odessa, Kharkiv, Chernivtsi, this factor is of great importance for the development of the tourist market of these regions, because high-quality travel services will increase the number of tourists.

Table 2. Economic and mathematical model of development of the hotel and tourist sphere (2014–2019)

Year	Normalized data					
	Y	X_1	X_2	X_3	X_7	X_{10}
2014	−0.6543275	−0.2558310	−0.5620485	−0.5984436	0.7019895	−0.2428922
2015	−0.4196794	0.3751137	−0.4981128	−0.8820391	0.9792110	−0.2335698
2016	−0.6186752	0.4997699	−0.8736764	−0.9589825	1.0161391	−0.1805895
2017	0.2752654	1.3110258	0.3211528	0.3986895	−1.3073912	−0.5517436
2018	0.7964616	−0.0769497	0.7247582	1.7956698	−1.1040562	−0.7701102
2019	1.7502618	0.1317375	1.7912245	0.5230110	−0.7543674	2.2330825
Correlation coefficient	0.92344736	0.84544563	0.863844532	0.902583424	0.91041110
Coefficient of determination	0.83062212	0.69521345	0.745794356	0.898474563	0.83877187
Adjusted coefficient of determination	0.6473748	0.60806189	0.71453469	0.5674536	0.7180699
Standardized error	0.34251	0.62601	0.34566	0.27654	0.73604
Fisher's F-test	9.311 > F_{table}	10.343 > F_{table}	34.783 > F_{table}	12.165 > F_{table}	11.309 > F_{table}
Degrees of freedom	1.5 at p = 0.02343	1.5 at p = 0.02171	1.5 at p = 0.03524	1.5 at p = 0.04345	1.5 at p = 0.03371
t – Student's criterion, (5)	1.14250	5.38454	2.44092	−2.48470	4.99853

Source: Calculated based on statistics[13]

The model of development of the tourist market (Y) with the number of foreign tourists served by tourism entities (X_2) can be represented as follows:

$$Y = 0.128716 + 0.8454 * X_2 \qquad (2)$$

If the number of foreign tourists served by tourism entities increases by 1%, the level of development of the tourism market will increase by 8.5%.

Taking into account such a factor as the number of domestic tourists served by hotel and tourism entities also showed a high correlation coefficient ($r = 0.863$). This level of correlation can be explained by the fact that both external and domestic tourists have a great advantage in tourist trips to explore many historical and cultural sites, as well as in mountainous areas or at sea.

Therefore, the model of development of the tourist market (Y) with the number of domestic tourists served by the subjects of hotel and tourist activity (X_3) can be represented as follows:

$$Y = 0.094637 + 0.8638 * X_3 \qquad (3)$$

If the number of domestic tourists served by hotel and tourism activities increases by 1%, the level of development of the tourism market will increase by 8.6%.

Comparing these two factors, namely the number of external and internal tourists, we see that the second has a slight advantage over the first.

Another factor that deserves attention and has one of the greatest influences on the development of the hotel and tourism industry is the total cost of all stays in hotels during the year. The correlation level is 0.902, which indicates a direct relationship. The high cost of the room, as well as the high quality of services provided, requires hotel personnel to improve staff skills, acquire new forms of promotion and, accordingly, increase the competitive advantages of the studied facilities in the region.

The model of development of the tourist market (Y) with the total cost of stay of all accommodated persons in hotels during the year (X_7) can be represented as follows:

$$Y = 0.07637 + 0.9025 * X_7 \qquad (4)$$

Thus, if the total cost of all stays in hotels during the year by 1% increases, the level of development of the tourism market will increase by 9%.

Between the income (X_{10}) and the tourism market as a resultant variable (Y), there is a direct relationship, because the correlation coefficient r is 0.910. With the increase in the level of profitability of the population, the number of tourists and income from services provided in the hotel and tourism sector can increase in a significant proportion. Thus, with an increase in the population's income in the region by 1%, the level of development of the tourism market will increase by 9.1%.

The model of the market of tourist services (Y) with changes in the income of the population in the region (X_1) can be depicted as follows:

$$Y = 0.0032 - 0.91041 * X_{10} \qquad (5)$$

It is worth noting that the trend of development of the hotel and tourism sector may be less threatening, provided that the government will pursue an active policy of financial assistance to strategically important objects of the hotel and tourism business.

4   Conclusions

The presented analysis of the development of the hotel and tourism sector of Ukraine contains a broad overview of the phenomena occurring in it. This allowed us to trace them both chronologically and spatially, and also identify specific factors that had the greatest impact on the development of the tourism market.

Research shows that understanding the mechanisms of development of the hotel and tourism industry requires a differentiated approach. It is highly diversified both on the demand side, which can be distinguished by segments characterized by different market behavior, and on the supply side, which is a combination of different business structures related to the hotel and tourism industry.

References

1. Korkuna, O., Korkuna, I., Kulyk, O.: Green tourism as a factor of development of United Territorial Communities in Ukraine. Econ. Regional Stud. **13**(1), 126–136 (2020)
2. Yakymchuk, A., et al.: Public administration and economic aspects of Ukraine's nature conservation in comparison with Poland. In: Kantola, J., Nazir, S., Salminen, V. (eds.) Advances in Human Factors, Business Management and Leadership. AHFE 2020. Advances in Intelligent Systems and Computing, vol 1209, pp. 258–265 (2020)
3. Pavlova, O., et al.: Strategic priorities for socio-economic development of Ukraine in comparison with the republic of Poland. In: Karwowski, W., Ahram, T., Etinger, D., Tanković, N., Taiar, R. (eds.) Human Systems Engineering and Design III. IHSED 2020. Advances in Intelligent Systems and Computing, vol 1269, pp 308–314 (2021)
4. Kuzo, N.J., Kosar, N.S.: Marketing support of rural green tourism development in Ukraine. Market. Manag. Innov. **2**, 369–381 (2017)
5. Vasyltsiv, T., et al.: Economy's innovative technological competitiveness: decomposition, methodics of analysis and priorities of public policy. Manag. Sci. Lett. **10**(13), 3173–3182 (2020)
6. Irtyshcheva, I., et al.: Building favorable investment climate for economic development. Accounting **6**(5), 773–780 (2020)
7. Kramarenko, I., et al.: The model of economic system management for the Black Sea region of Ukraine in the sustainable development context. Accounting **6**(4), 387–394 (2020)
8. Melnyk, M., Korcelli-Olejniczak, E., Chorna, N., Popadynets, N.: Development of regional IT clusters in Ukraine: institutional and investment dimensions. Econ. Ann. XXI **173**(9–10), 19–25 (2018)
9. Panukhnyk, O., Popadynets, N., Fedotova Y. Analysis and modeling of factor determinants of food provision at consumer market of Ukraine. Global. J. Environ. Sci. Manage. **5**(SI), 215–226 (2019)
10. Shults, S., Popadynets, N., Barna, M.: Differences in consumer buying behavior in consumer markets of the EU member states and Ukraine. Econ. Ann. XXI **166**(1–2), 26–30 (2017)

Author Proof

11. Kolomiyets, I., Popadynets, N.: Trade at Ukrainian internal market: the development mechanism. Actual Probl. Econ. **1**(175), 69–75 (2016)
12. Pruntseva, G., et al.: The impact of governance on agricultural production as an exclusive factor of the country's food security. Accounting **7**(1), 75–80 (2021)   AQ3
13. The official site of State Statistics Service of Ukraine. https://www.ukrstat.gov.ua (2020)

Author Query Form

Book ID : **507043_1_En**

Chapter No : **76**

Please ensure you fill out your response to the queries raised below and return this form along with your corrections.

Dear Author,

During the process of typesetting your chapter, the following queries have arisen. Please check your typeset proof carefully against the queries listed below and mark the necessary changes either directly on the proof/online grid or in the 'Author's response' area provided below

Query Refs.	Details Required	Author's Response
AQ1	This is to inform you that corresponding author has been identified as per the information available in the Copyright form.	
AQ2	Please confirm if the section headings identified are correct.	
AQ3	The Reference '12' has been split into two different Reference. Please check and correct if necessary.	

MARKED PROOF

Please correct and return this set

Please use the proof correction marks shown below for all alterations and corrections. If you wish to return your proof by fax you should ensure that all amendments are written clearly in dark ink and are made well within the page margins.

Instruction to printer	Textual mark	Marginal mark
Leave unchanged	・・・ under matter to remain	Ⓙ
Insert in text the matter indicated in the margin	⅄	New matter followed by ⅄ or ⅄⊗
Delete	/ through single character, rule or underline or ├───┤ through all characters to be deleted	⌀ or ⌀⊗
Substitute character or substitute part of one or more word(s)	/ through letter or ├───┤ through characters	new character / or new characters /
Change to italics	─ under matter to be changed	⌣
Change to capitals	≡ under matter to be changed	≡
Change to small capitals	= under matter to be changed	=
Change to bold type	〜 under matter to be changed	〜
Change to bold italic	≈ under matter to be changed	≋
Change to lower case	Encircle matter to be changed	≢
Change italic to upright type	(As above)	⊣
Change bold to non-bold type	(As above)	⊥
Insert 'superior' character	/ through character or ⅄ where required	Ɣ or Ⅹ under character e.g. Ɣ or Ⅹ
Insert 'inferior' character	(As above)	⅄ over character e.g. ⅄
Insert full stop	(As above)	⊙
Insert comma	(As above)	,
Insert single quotation marks	(As above)	Ɣ or Ⅹ and/or Ɣ or Ⅹ
Insert double quotation marks	(As above)	Ɣ or Ⅹ and/or Ɣ or Ⅹ
Insert hyphen	(As above)	⊢⊣
Start new paragraph	⌐	⌐
No new paragraph	⌒	⌒
Transpose	⊔⊓	⊔⊓
Close up	linking ⌣ characters	⌒
Insert or substitute space between characters or words	/ through character or ⅄ where required	Ɏ
Reduce space between characters or words	❘ between characters or words affected	↑