Vol. 76 | No. 8/1 | Aug 2020
DOI: 10.21506/j.ponte.2020.8.3

PONTE
Florence, Italy
International Journal of Sciences and Research

THE ECONOMETRIC STUDY OF DEPENDENCIES IN THE TOURISM SECTOR OF AZERBAIJAN

Leyla HUSEYNOVA*

PhD in Economics, Lecturer

Department of Economics, Russian School of Economics

Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan*

Email: narxoz-1970@mail.ru, Tel: (+99451) 810-09-70

https://orcid.org/0000-0003-3562-1491

Corresponding address: Istiglaliyyat 6, AZ1001, Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan

ABSTRACT: This study aims to identify the econometric analysis of dependencies in the tourism sector of Azerbaijan. The main priorities for the development of the tourism sector defined in the Strategic Roadmap for the development of the specialized tourism industry of the country were investigated in the chosen study. Based on a systematic analysis of indicators of the tourism sector, it was revealed that there is a dynamic development of the main indicators of this sector, particularly, in the income of travel agencies in recent years. However, such a positive trend is not observed for some indicators of the tourism sector. The research paper considers the tourism sector as a complex economic-cybernetic system and mainly examines the quantitative relationship between the core indicators of the tourism sector based on the correlation-regression model analysis of econometric modeling. The degree of stationary and the integration of the tourism sector into time indicators are assessed based on the "Dickey-Fuller" test. The article builds a linear model of the dependence of the income of travel agencies based on exogenous parameters including the cost of trips, the number of agencies, the number of tourists sent, the number of national parks, the volume of investment, and the US dollar exchange rate. The analysis of the statistics of this model revealed that the model has poor quality characteristics, especially more prone to multidimensionality. Therefore, the systematic refinement of the model was carried out by removing some exogenous parameters from the study. Because of this algorithm, a new reaction of the multiple regression model is obtained, which meets all the conditions of the Gauss-Markov theorem and is consequently adequate to the real economic situation in the country's tourism sector and suitable for forecasting this sector.

Keywords: Tourism industry, Economic - cybernetic system, Multiple regression, Multicollenarity, VIF matrix, Autocorrelation function.

JEL Classification: B23, C01.

1. Introduction

After having completed many stages in its historical development, Azerbaijan has targeted the development of the non-oil sector, especially its agricultural and tourism sectors as the main directions of its economic diversification and development for the post-oil period. In this regard, the country has recently taken several successful measures to boost up the tourism sector, and the behavior and development of this priority sector have been given a systemic character. This systematic approach was reflected in the "Strategic Roadmap for the Development of the Specialized Tourism Industry in the Republic of Azerbaijan" approved by the Presidential Decree dated December 6, 2016. (Strategic Roadmap, 2016) The choice of specialized tourism as the core center of this document encompasses several purposes including ensuring the sustainability of work related to the development of tourism, providing the international recognition of the country as an attractive tourist destination, and improving the quality of tourism services. Therefore, the systematic analysis of the interaction in the field of tourism of Azerbaijan and the quantitative assessment of the impact of influencing factors upon key indicators characterizing the activities of the tourism sector based on the econometric approach could play an important role in effective management decisions in the country's tourism sector.

2. Systematic analysis of the current situation and strategic goals of the tourism sector

The tourism sector serves as a mirror of each nation-state commitment to democratic values, the rule of law, and its socio-economic situation within its territory. Thus, Azerbaijan possesses a very ancient and well-off tradition. Cultural tourism *(including historical tourism, health tourism, beach tourism, ecological tourism, hunting tourism, etc.)* as the subject of tourism in the country constitutes a pivotal element of a complex socio-economic system such as modern lifestyle, culture, organization, and implementation of international relations. (A. U, Aleksandrova, 2002) Azerbaijan's unique natural climate conditions, the passage of North-South and East-West transport corridors through its territory have opened favorable opportunities for the country to become one of the leaders in the field of foreign tourism. So that the country is more thrilled to give great importance to the establishment and development of mutual tourism relations with both regional and foreign countries.

Currently, Azerbaijan has tourism ties with many countries around the world. The main sources of these relations are the countries of the Persian Gulf region, the vast majority of CIS countries, mass tourism countries such as Canada, the USA, Japan, EU countries, China, etc. According to the State Agency for Tourism of Azerbaijan, about 3 million tourists visited Azerbaijan in 2019, which constitutes more than 11% (or more than 265,000) compared to 2018. The largest influx of tourists to the country came from Russia (about 800,000 people), Georgia (more than 600,000), and the Middle East bloc (more than 515,000). The next places are occupied by Turkey (more than 260,000), Iran (about 220,000), and Western European countries (about 103,000). It should be noted that the share of Russia, Georgia, and the Middle East bloc in the total number of tourists visiting the country is about 57.2%.

Along with all the positive moments observed in the tourism sector of Azerbaijan, it should be noted that, unfortunately, this area continues to have the status of "elite business" and has not received the status of "public business" in the true sense of the word. Thus, if in neighboring Georgia, almost 2/3 of the population can work in the field of tourism and give the status of public business, in our country this figure is not more than 20,000 people.

The $2 billion spent by the 2.2 million foreign tourists visiting Azerbaijan in 2018 is significantly less than the $3 billion that Georgia received in the same year. Studies clearly show that Azerbaijan can receive this amount of income from tourism only if at least 10 million foreign tourists come to the country every year. In this case, the share of "net" foreign tourists in the number of foreign tourists visiting the country should be higher than the number of tourists from Russia and Georgia. This case is due to the vast majority of tourists coming to our country from Russia and Georgia, which make up more than 50% of the total tourist flow, are Azerbaijani compatriots living and working in these countries. This means that they belong to the group of tourists spending relatively less money in Azerbaijan as they have families or relatives there.

According to the report of the State Statistics Committee of Azerbaijan, (SSCA) compared to 2018, (especially in winter and spring periods) there is a certain decrease in the flow of tourists to the country in 2019. Thus, if in the first four months of 2018, the country received a bit more than 628.9 thousand tourists from 157 foreign countries, however, this figure decreased by 2.9% and amounted to 610.8 thousand people in 2019. The most significant decrease was observed in the number of tourists coming to the country from Qatar (around 45%), Iran (about 44%), and Israel (roughly 42%). (SSCA, 2019)

The analysis of statistical data for 2017-2019 indicates that during this period there was a certain decrease in the dynamics of the number of foreign tourists visiting Azerbaijan. Thus, compared to the previous year, in 2016 this figure decreased by 2% and made up 20%, and in 2018 decreased by 14% and constituted 6%. Although the first clear-cut steps taken to develop the tourism sector in the country have led to an increase in the number of tourists, the result is not enough to turn Azerbaijan into a global tourism industry and achieve the goal of becoming an important source of GDP.

One of the main reasons for this is the unsatisfactory resources available in the field of tourism and the urgent need to reform it. There is a crucial need for the state subsidies, tax exemptions, the creation of a relatively simple and inexpensive hostel network, the simplification of visa issuance and procedures (visa-free travel for some countries), and the provision of a high level of service in Azerbaijan's tourism sector. This strategic line will give a new impetus to the tourism sector of the country and turn it into a nationwide sector.

To achieve the goal set by the government to transform the tourism sector from an “elite business” to a “people's business”, the Strategic Roadmap has identified several strategic goals for the development of the tourism sector in the country. (Strategic Roadmap, 2016)

In Strategic Roadmap, these goals are systematized as follows:

- The full realization of the tourism potential of Baku by attracting more foreign tourists;
- Creating a favorable environment for the development of the tourism sector in the country;
- Development of regional types of tourism for local and regional tourists;
- Establishment of a national tourism quality system to increase tourist satisfaction.

Achieving these goals will create favorable conditions for the maximum mobilization of available resources for successful development in the field of tourism - such as the creation of free economic zones, exemption of the tourism sector from taxes, providing a favorable credit system, and most importantly, attracting foreign investment. The purpose of the study is to identify the interrelationships between the economic indicators characterizing the tourism sector and to quantify their impact on revenues in the country’s tourism sector. The following table 1 contains statistical data reflecting the changes in the main economic indicators of travel agencies in the tourism sector of Azerbaijan between 2006 and 2018. (SSCA, 2018)

Table 1. Dynamics of key economic indicators of travel agencies in the tourism sector

Year	The income of travel agents (thousand manats – AZN)	Cost of sold tourist vouchers (in thousands of manats)	Number of travel agencies	Number of tourists received and sent (in person)	Number of national parks (in number)	The volume of typical investment for tourism (thousand manats) * 1000	US exchange rate
2006	8480	20256	96	45605	9	425600	0,8927
2007	15966,6	26008	117	56290	9	478200	0,8281
2008	17120,5	27055	123	59607	9	501400	0,8216
2009	17839,6	28509	124	59700	9	527800	0,8038
2010	19065,3	34121	126	69923	9	949200	0,7989
2011	22634,8	42583	141	83620	8	1407800	0,7864
2012	27121,5	62866	170	101431	8	1478200	0,7848
2013	29600,9	65448	197	91961	8	1371000	0,7844
2014	31107,1	66233	218	92305	7	2204000	0,7844
2015	36482,2	44615	243	61965	7	1063900	1,2290
2016	36758,3	36978	273	53999	7	363000	1,7499
2017	41034,2	44066	339	63423	6	267300	1,7001
2018	56439,1	49992	374	83722	6	229700	1,7001

Source: Table 1 was compiled by the author based on the official data of the State Statistics Committee of Azerbaijan. (SSCA)

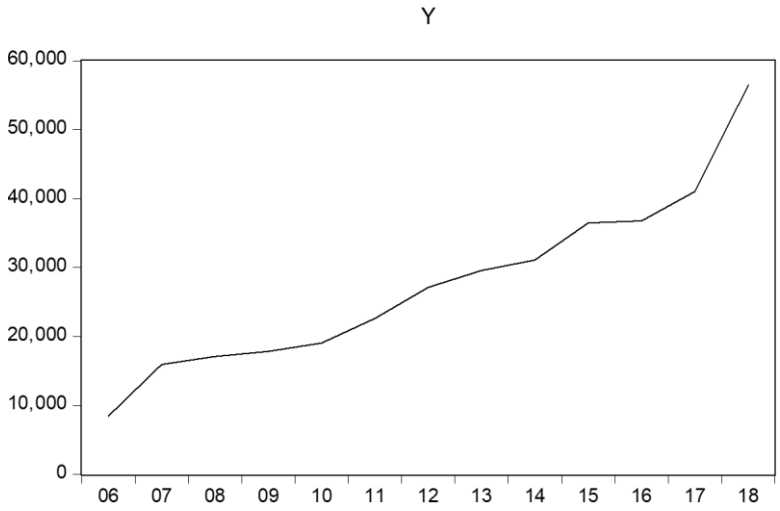
An analysis of the data in Table 1 depicts that during 2006 and 2018, there was a dynamic increase in the revenues of travel agencies in the country that can be identified by the dynamic sequence of revenues of travel agencies in respect of the 2006 year. (2006 - 1.00)

{2016 year - 1,00; 1,88; 2,02; 2,10; 2,25; 2,67; 3,19; 3,49; 3,67; 4,30; 4,34; 4,86; 6,66 - 2018 year}

The study of the dynamic sequence indicates that in recent years the growth rate of this economic indicator of the tourism sector has been faster and amounted to 4.8 times in 2017 and 6.7 times in 2018. It should be noted that to more clearly determine the impact of the economic indicator, it is crucially necessary to use dynamic series reflecting the rate of change than the previous year. The following is a dynamic range that reflects the changes in tourism revenues of travel agencies compared to the previous year.

- This is the order of the dynamics of revenues of travel agencies compared to the previous year. (Every previous year since 2006 - 1.00) {1.00; 1.88; 1.07; 1.04; 1.19; 1.20; 1.09; 1.03; 1.17; 1.01; 1.17; 1.38} Figure 1 hereinbelow shows a trend graph showing the internal structure of this dynamic series.

Figure 1. Trend chart of revenues of travel agencies between 2006 and 2018.



As can be seen from Table 1, the largest increase in this indicator of the tourism sector was observed in 2007 (88%) and 2018 (38%). The lowest growth rates were observed in 2009 and 2016. In our opinion, the main reason for the deterioration in 2016 was the sharp rise in the exchange rate of the US dollar against the Azerbaijani currency manat (AZN) in the country. The given table 1 also reveals that there is no continuous positive trend in the value of sold tourist vouchers that can be seen in the following dynamic series below:

- The dynamic range of changes in the cost of sold tourist vouchers compared to the previous year (1.00 each year since 2006)

{1.00; 1.38; 1.04; 1.05; 1.20; 1.25; 1.48; 1.04; 1.01; 0.67; 0.83; 1.19; 1.13}

Thus, although there is a steady growth trend in this economic indicator of the tourism sector until 2016, due to the sharp rise in the US dollar, this rate became sharply negative in 2016 with a decrease of estimated 33%. In 2017, this downward trend was maintained at a 17 % decrease. In the following years, a certain stabilization and growth were observed in the dynamics of the indicator. Other indicators of the tourism sector, shown in Table 1, do not show a stable trend, except for the number of travel agencies. Consequently, the systematic research illustrates that the country's tourism sector can be considered a complex economic-cybernetic system with many direct and indirect links, and can be studied in terms of making optimal decisions based on econometric modeling. (Guseinova, 2018)

3. Stationary testing on time series indicators of the tourism sector

As mentioned above, the tourism sector in Azerbaijan has the characteristics of a complex and dynamic economic-cybernetic system. On the other hand, the behavior of this system is influenced by many external factors, and their impact on the system is mainly stochastic. It is this stochasticity that mainly necessitates the use of econometric modeling, which is a method of quantifying the validity of economic laws in the study of interactions in the field of tourism and is based on statistical concepts and approaches. (Melnikov, 2014)

The given research systematically examines the quantitative relationships between the main indicators of the tourism sector in Azerbaijan, which have many direct and indirect links with the environment and are perceived as an open socio-economic system in this regard. One of the main requirements of econometric modeling is to classify the indicators that characterize the cybernetic system under study as explained *(Y)* and explanatory *(Xi)* parameters. From this point of view, the indicators of the tourism sector reflected in Table 1 are related to the explained and explanatory variables as follows. (Hajizalov, Karimova et.al. 2013)

Explained factors

- Revenues of travel agencies in the tourism sector - Y

Explanatory factors

- Value of tourist tickets sold - X_1
- Number of travel agencies - X_2
- Number of tourists received and sent - X_3
- Number of national parks - X_4
- The volume of typical investments for tourism - X_5
- Exchange rate of the US dollar against a national currency - X_6

The study aims to build a linear multi-regression model of the dependence of revenues of travel agencies in the field of tourism on the explanatory (exogenous) parameters and based on this econometric model to evaluate the degree of elasticity of the reaction of the dependent variable Y to the change of free variables $X_i(i = \overline{1,6})$. (Vasenkova, Abakumova et.al. 2015)

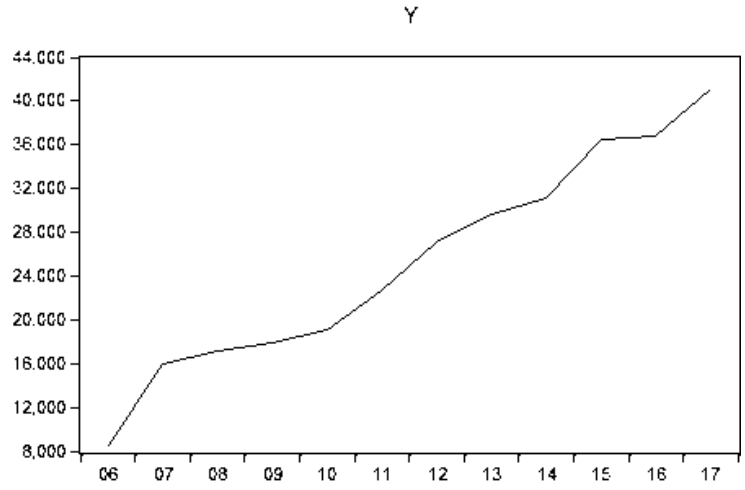
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon \quad (1)$$

The reliability of econometric analysis and the validity of its results depends on the stationary nature of the time series indicators used during the research process. Thus, if the stationary of the series is violated, then it is necessary to use different mechanisms to determine their statistical characteristics in comparison with the stationary series. (Tekin Mustafa and Caglayan Ebru, 2003) Setting trend models, it is possible to determine the level of stationary time series of some of the indicators of the tourism sector reflected in Table 1. Based on the results of the building of the trend model for 2006-2018, the indicator of income of travel agencies in the tourism sector using the method of econometric modeling *("Y"- endogenous parameter time series)*, the dual regression-type trend model taken as:

$$Y = 11{,}74 + 20{,}44t \quad (2)$$

(2) According to the economic interpretation of the trend model, the revenues of travel agencies increase by an average of AZN 20.44 thousand per year in "*t"* compared to year "*(t-1)"*. Now, based on visual analysis, it is possible to provide a graphical representation of the endogenous parameter *"Y"* with the help of the E-views software package to assess the stationary time sequence. (Borodich, 2006)

Figure 2. Income earned by travel agencies.

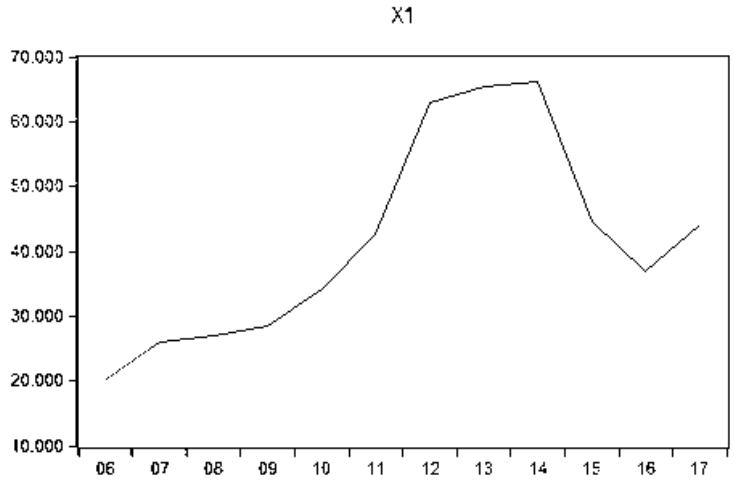


As can be seen from the figure, the increase in the row can be considered linear. Hence, the time sequence of the *"Y"* endogenous parameter is non-stationary. In econometric modeling, a single "Dickey-Fuller" root test is used to assess whether time series are stationary and how they are integrated. (Doronina A. I., 2016) Here, the autoregression model plays the role of an evaluation mechanism for this test, and the presence of seasonal changes and the

non-correlation of the random scattering of observations are used during the testing of the built-in model. However, there are some limitations to the use of the "Dickey-Fuller" test in assessing the stationary of time series. Thus, if, in addition to structural and seasonal changes over time, heteroskedasticity of random remains is observed, it is not possible to compile this test. (Dougherty, 2011).

The results of checking the stationary of the series $\Delta Y_t = Y_t - Y_{t-1}$ based on the "Dickey-Fuller" test indicate that the value of the test statistics for this series is equal to 5.17. This figure is not only 5% below, but even a 1% significance level is also below the critical level. Hence, the time sequence ΔY_t is in a stationary sequence. Based on a similar approach, let's assess the time constant of the value index of sold tourist vouchers in the tourism sector (exogenous parameter X_1). The graph below shows a graphical representation of this influencing factor with the help of the E-views software package to perform visual analysis.

Figure 3. Value of sold tourist vouchers



As can be seen from the figure, the time sequence of this indicator of the tourism sector is also non-stationary, and as a result, the range increases mainly linearly. Therefore, for this series, it is necessary to use the "Dickey-Fuller" test to calculate the residuals $\Delta X_t = X_t - X_{t-1}$ and to check the stationary of the obtained series. Test data depict that the value of the "Dickey-Fuller" test statistics for this series is 2.16 and is below the critical level of 5%. So that the time sequence ΔX_t is in a stationary sequence. Now, based on the first-order differences, the econometric model of the relationship of the time series of the dependent variable Y and the independent variable X_1 is constructed in this way.

$$(Y) = b_0 + b_1 d(X_1) + e \qquad (3)$$

The results of the model construction are shown in the table below.

Table 2. Analysis based on first-order differences

Dependent Variable: DY

Method: Least Squares

Date: 03/22/19 Time: 19:57

Sample (adjusted): 2007 2017

Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2914.433	735.5449	3.962278	0.0033
DX1	0.020808	0.072444	0.287227	0.7804

Thus, the following interaction model was obtained as follows:

$$d(Y) = 2914{,}43 + 0{,}02d(X_1) \quad R^2 = 0{,}009 \qquad (4)$$

$$P \quad (0{,}00) \quad (0{,}78)$$

It is ostensible to see that the quality of the model (4) is not considered high. Therefore, due to the small number of observations on the studied economic-cybernetic system, the construction of a model based on the function of checking the stationary and growth does not give the expected result.

4. Econometric modeling and forecasting in the tourism sector

Now it is possible to move on to a quantitative analysis of the interrelationships of economic indicators observed in the tourism sector. For this purpose, the multi-regression analysis will be used, which is considered to be a quantitative analysis of the effect of multiple exogenous parameters on the endogenous parameter of the double regression analysis. It is not enough to satisfy the conditions determined by the Gauss-Markov theorem for the reliability of the values of the coefficients of the regression equation in the analysis of regression. (Вербук, 2018) The requirement to correctly specify the model in terms of the composition of endogenous parameters comes to the fore. Therefore, special attention will be paid to the correct

specification of the model of multi-regression obtained in the process of econometric analysis of the interaction of economic indicators in the studied tourism sector. The following multi-regression model was obtained as a result of econometric modeling of the dependence of revenues "Y" (incomes) of travel agencies in the tourism sector on these X_1, X_2, X_3, X_4, X_5 və X_6 explanatory factors with the E-views program based on the time series of economic indicators shown in Table 1:

$$Y = -6073{,}32 + 0{,}03X_1 + 189{,}97X_2 - 0{,}02X_3 + 752{,}83X_4 -$$
$$-0{,}01X_5 - 7973{,}46X_6 \quad (5)$$
$$P\ (0{,}91)\ \ (0{,}86)\ (0{,}02)\ (0{,}05)\ (0{,}87)\ \ (0{,}92)\ \ (0{,}33)$$

Under the initial economic interpretation of the model (5), the cost of tourism tickets sold, the number of travel agencies, and the number of national parks affect the amount of revenue earned by travel agencies in the tourism sector, while other explanatory factors affect the decrease. However, we cannot evaluate this econometric model as a quality model. Thus, according to the probability values of P, the value of only one explanatory variable of the model is significant, and the others are considered unnecessary. (Eliseeva and Kurisheva, et.al. 2007)

According to the theoretical foundations of econometric modeling based on the Gauss-Markov theorem, in the process of multi-regression analysis, the value of the correlation coefficients of free variables is used to increase the accuracy of the selected values of the coefficients of the multi-regression equation. (Magnus, et.al. 2004) In other words, it is necessary to test whether the multi-regression model is "infected" with "multicollinearity", or rather, whether there is a weak linear relationship between the exogenous parameters Xj included in the model. In econometric modeling, the method of "Variance-Inflation Factor" (VIF) is mainly used to detect multicollinearity. In this case, to eliminate the paradox that all the coefficients of the regression model are statistically insignificant and the model as a whole is significant, an indicator called the coefficient of variation of the inflation factor is calculated for each exogenous parameter Xj included in the model:

$$VIF_j = \frac{1}{1 - R_j^2},$$

Here $R_j^2 - x_j$ is the key determinant of the auxiliary regression to all other parameters of the exogenous parameter.

Note that the practice of accepting the value VIF = 10 as a limit value for this ratio is more widespread. The following table shows the statistics for calculating the VIF (variance inflation factor) to test the "multicollinearity" of the linear multi-regression model compiled for the tourism sector of Azerbaijan (5).

Table 3. Estimation of inflation factor of explanatory variances

Variance Inflation Factors (VIF)

Date: 01/09/20 Time: 22:47

Sample: 2006 2018

Included observations: 13

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.70E+09	6488.896	NA
X_1	0.024171	116.4030	12.82694
X_2	4297.008	471.2518	76.40454
X_3	3.40E-05	2.941328	1.860916
X_4	22185182	3349.270	64.40903
X_5	2.54E-05	66.50176	20.55193
X_6	57453694	172.8386	20.17343

As can be seen from the testing statistics shown in the table, the value of the VIF coefficient for the exogenous parameter X3 alone is less than the limit value VIF = 10, and for the remaining parameters, it is significantly higher, meaning that there is multicollinearity in the linear multi-regression model developed for the tourism sector (5). In the econometric model, the most "desirable" way to eliminate the consequences of multicollinearity is to exclude variables from the study that are closely correlated with other exogenous parameters. However, in this case, as a result of incorrect specification of the composition of the explanatory variables, prices may undergo a shift in the model. Therefore, the researcher will use a step-by-step regression analysis algorithm to exclude variables from the study.

First of all, the exogenous parameter X_2 is removed from the model, which has the largest correlation index for the VIF matrix. (VIF = 76,40). Then, a model of multi-regression regarding the new composition of the influential parameters of the studied economic system is constructed. According to econometric modeling statistics, this model will be as follows:

$$Y = 113854{,}9 + 0{,}38X_1 - 0{,}02X_3 - 10704{,}47X_4$$
$$-0{,}01X_5 - 5440{,}48X_6 \quad (6)$$
$$P\ (0{,}04)\ \ (0{,}03)\ (0{,}04)\ (0{,}02)\ \ (0{,}04)\ \ (0{,}63)$$

Based on the values of the probabilities "P" of the coefficients of the linear multi-regression model, It can be revealed that in this model only one variable X_6 is insignificant, and the remaining variables are statistically considered important. Therefore, in the second step, the explanatory parameter X_6 should be removed from the model. Based on this approach, the econometric studies have resulted in the following linear multi-regression model:

$$Y = 92369{,}14 + 0{,}39X_1 - 0{,}02X_3 - 8997{,}27X_4 - 0{,}01X_5 \quad (7)$$
$$P\ (0{,}00)\ \ (0{,}01)\ \ \ (0{,}03)\ (0{,}00)\ \ \ (0{,}01)$$

For all coefficients of the linear regression model (7), the P <0.1 conditions (P <0.05 in the more severe approach) are satisfied. Thus, all coefficients of this model are significant at a reliability level of 95%. This shows that the explanatory variables related to these ratios are also statistically significant. In conjunction with the statistics of the model (7), the value of the Fisher's coefficient is Fsta = 47.47, and the value of the Pech (Fsta) of the Fisher statistic is equal to 0.00. Since this characteristic is less than α = 0.05, the coefficient of determination with value R2 = 0.96 is important, and in this regard, model (7) can be considered a model that is quite adequate in terms of multicollinearity to the dependencies in the tourism sector. Thus, 96% of the variation in the income of travel agencies in the tourism sector of Azerbaijan is due to the influence of the explanatory regressors that have been considered. However, based solely on the absence of multicollinearity, it is not possible to decide whether the linear multi-regression model (7) is fully adequate for the expression of dependencies in the tourism sector. Hence, it is important to evaluate the model in terms of the presence of autocorrelation, or rather, to check whether the εt remains of the model are not correlated and to test the stability of the variances. For this purpose, Darbin-Watson statistics or autocorrelation functions can be used.

According to the statistical report of the linear multi-regression model (7), DW = 1.24 was obtained (in this case the limit values were di = 0.574 and du = 2.094). This indicator fell on the scale in the range di = 0.441 <DW = 1.24 <di = 1.737, which did not allow to decide whether there is autocorrelation in the model. Note that the presence of a zone of uncertainty, in this case, is due to the distribution of Darbin-Watson statistics which is affected not only by the number of observations and the number of explanatory variables but also by the values of explanatory variables. (Balash and Kharlamov, 2008)

Concerning autocorrelation functions (ACF general autocorrelation function, PACF individual autocorrelation function), the main difficulty of econometric research is related to determining the number of lags used in the tests. Thus, if the number of lags is small, the test may not detect autocorrelation in large ones. (Stock and Watson, 2010) Note that in this case, we look at the lag as a compilation of the autocorrelation coefficient, or rather as the number of cycles covered by the coefficient. For example, if the lag is equal to a unit, then the first-order autocorrelation coefficient will be calculated, and this coefficient period will be considered a characteristic of the relationship between the residuals. The following figure shows the correlogram of the residuals for the linear multi- regression model of the tourism sector (7). (Gujarati, and Porter, 2009)

Table 4. The correlogram of the residuals.

Sample 2006 2018
Included observations 13

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0 138	0 138	0 3090	0 578
		2	-0 149	-0 171	0 7010	0 704
		3	-0 155	-0 113	1 1715	0 760
		4	-0 412	-0 422	4 8438	0 304
		5	-0 094	-0 051	5 0612	0 408
		6	-0 083	-0 301	5 2532	0 512
		7	0 074	-0 037	5 4328	0 607
		8	0 160	-0 182	6 4368	0 598
		9	-0 050	-0 222	6 5597	0 683
		10	0 217	0 090	9 6326	0 473
		11	0 015	-0 144	9 6554	0 562
		12	-0 162	-0 153	14 772	0 254

As can be seen from this correlogram of residuals, since the value of each lag does not exceed the reliability limits, there is no autocorrelation of order 1 and higher in the model (7).

Now, by compiling White's statistics (7), the existence of homoskedasticity in the multi-regression model must be checked. The following Table 4 (7) illustrates that the statistics for testing the homoskedasticity of the regression model using the White test.

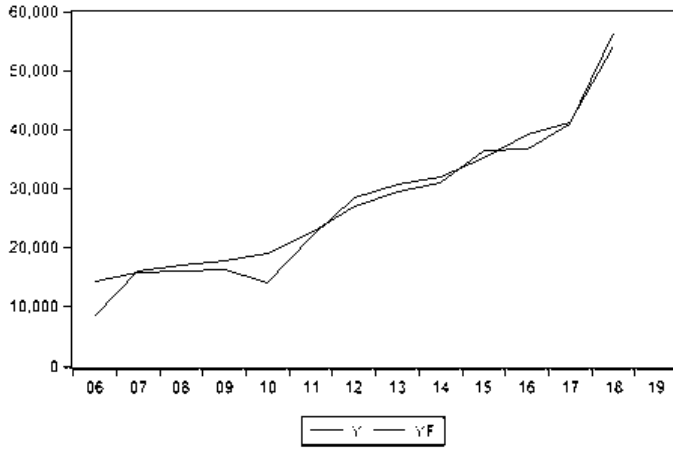
Table 5. Testing homoskedasticity based on the White test.

Heteroskedasticity Test: White

F-statistic	0.565468	Prob. F(4,8)	0.6950
Obs*R-squared	2.865397	Prob. Chi-Square(4)	0.5806
Scaled explained SS	1.440993	Prob. Chi-Square(4)	0.8370

According to the testing statistics, the value of the F-statistic Prob (F-statistic) = 0.6950 is greater than the value of α = 0.05. Therefore, the hypothesis of the existence of homoskedasticity for the model (7) is accepted. This result is confirmed by the Obs * R-squared value in the above statistics. Thus, the ratio of Prob (Obs * R-squared) = 0.5806> α = 0.05 is paid. (Pelix, 2009) Thus, systematic econometric studies show that all the characteristics of the linear multi-regression model (7), which approximates the dependence of the income of travel agencies in the tourism sector based on the influencing factors, are in the plane of the Gauss-Markov theorem, which can be considered a useful mechanism for forecasting the tourism sector as a fairly adequate, high-quality model for real conditions. (Emelyanov, 2002) As a result, forecast indicators were determined based on the model (7) of indicators obtained by travel agencies in the research process. The following figure compares these forecasts with the actual levels of income shown in the given Figure 4 below.

Figure 4. Comparative graph of forecast indicators with the actual level.



As can be seen from figure 4, the forecast prices of the model largely coincide with the actual prices of travel agencies' revenues. This fact proves once again that the linear multi-regression model developed for the tourism sector (7) is well-defined and can be used to establish optimal management and development strategies in this sector.

Conclusion

The study analyzes the current situation and development strategy of the tourism sphere of Azerbaijan in terms of a systematic approach and econometric modeling of existing dependencies. As a result of the econometric analysis, the stationary of time series indicators related to the tourism sector was assessed and a linear multi-regression model was developed that reflects the dependence of travel agency revenues on the selected explanatory variables. With the involvement of special tests, the multicollinearity of this regression model was eliminated and it was found to be an adequate and predictable mechanism that meets all the requirements of the Gauss-Markov theorem. Under the established linear multi-correlation model, the revenue forecast of travel agencies in the tourism sector was calculated and it was determined that these forecast prices are quite close to the actual costs, thus reaffirming that the model is sufficiently adequate and high quality in real conditions.

References

1. "Strategic Roadmap for the Development of the Specialized Tourism Industry, (2016), Azerbaijan Available at: https://ereforms.org/store//media/ekspert_yazilari/islahat%20icmali/mart/strateji%20yol%20x%C9%99rit%C9%99si%20-eng1.pdf
2. A. U. Aleksandrova, (2002). "International Tourism", Moscow. Available at: http://www.anl.az/el_ru/a/aa_mt.pdf
3. Melnikov R. M, (2014). "Econometrics", Moscow, Available at: https://search.rsl.ru/ru/record/01006762996
4. Vasenkova E.I., Abakumova Yu.G., et.al. (2015). "Workshop on econometrics: textbook.-method". Belarusian State University, Minsk. Available at: https://elib.bsu.by/handle/123456789/149417
5. State Statistics Committee of Azerbaijan, (2019). "Research and Statistics in the field of Tourism: Development of Tourism in Azerbaijan". Available at: https://tourism.gov.az/uploads/documents/statistic/_report_okt_2019_az.pdf
6. Tekin Mustafa and Çağlayan Ebru, (2003). "Basic Econometrics with Excel", Der Publications. pp.178.
7. Borodich S.A. (2000). "Introductory Econometrics Course", Belarusian State University, Minsk, Available at: https://www.twirpx.com/file/39006/
8. 10. Hajizalov Y.I., Karimova Y.R., Huseynova L.N., (2013). "Econometrics", University of Economics, pp.520.
9. Dougherty, C. (2011). "Introduction to Econometrics", 4 th ed.. Oxford University Press, pp.512.
10. Huseynova L.N. (2018). "Analysis and forecasting of the labor market based on econometric methods". Abstract of dissertation for the degree of Doctor of Philosophy in Economics, Baku.
11. Verbuk M. (2008). "Guide to modern econometrics". Moscow. Available at: https://may.alleng.org/d/econ/econ400.htm
12. Doronina A.I. (2016). Time Series Models: AR (P), MA (Q), ARIMA (P, D, Q). Financial University, Moscow, Russia Available at: http://economy.bsu.by/wp-content/uploads/2016/10/naft_ar_ma.pdf
13. I.I. Eliseeva, S.V. Kurysheva, T.V. Kosteeva et.al. (2007). "Finance and Statistics", pp.576. Available at: https://www.twirpx.com/file/31650/

14. Magnus I. R., Katyshev P.K., Peresetskiy A.A. (2004). "Econometrics. Initial course: Textbook. - 6th ed., Revised. pp. 576, Available at: http://math.isu.ru/en/chairs/me/files/books/magnus.pdf
15. Balash V.A., Kharlamov A.V., (2008). "Econometrics". Saratov, Available at: https://math.sgu.ru/nto/sites/default/files/3/__68431.pdf
16. Gujarati, D.N., Porter, D.C., (2009). "Essentials of Econometrics"., 4th ed.. McGraw-Hill Irwin, pp. 576.
17. Stock, J.H., Watson, M.W. (2010). "Introduction to Econometrics"., 3rd ed. Addison-Wesley, 840.
18. Pelikh A.S., Terekhov L.L., Terekhova L.A., (2005). "Economic - mathematical methods and models in management". Moscow, Available at: https://www.studmed.ru/pelih-as-terehov-ll-terehova-la-ekonomiko-matematicheskie-metody-i-modeli-v-upravlenii-proizvodstvom_a7453402d5c.html