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МНОЖЕСТВЕННОЕ РЕГРЕССИОННОЕ МОДЕЛИРОВАНИЕ: СОВРЕМЕННОЕ ПРОСТРАНСТВЕННОЕ ПЛАНИРОВАНИЕ И ЭКОНОМИЧЕСКОЕ МОДЕЛИРОВАНИЕ ИНДУСТРИИ ТУРИЗМА (НА ПРИМЕРЕ ШЕКИНСКОГО РАЙОНА)

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Проведены тщательный анализ территориального планирования туристической отрасли и множественный регрессионный анализ доходов от туризма в Шекинском районе за 2010–2021 гг. Основной задачей исследования стало выявление факторов, влияющих на формирование доходов в туристической отрасли в контексте регионализации и современного направления развития туризма. Для достижения поставленной цели были изучены существующие теоретические подходы к территориальному планированию туризма, рассмотрены достоинства и недостатки туристической отрасли, проанализирована последовательность планирования. При исследовании факторов, влияющих на туризм, применялись методы сравнительного, регрессионного и корреляционного анализа, а окончательный вариант математической статистической модели был получен на основе использования последовательных моделей путем выдвижения гипотез. В ходе исследования установлено, что количество гостиничных номеров и иностранных туристов является основным фактором формирования доходов. Предложенная модель имела следующие характеристики: $p < 0{,}005$ и $R^2 = 0{,}488\,6$, что сделало ее окончательным вариантом. В работе подчеркивается важность глубокого изучения текущих и будущих ситуаций любого исследовательского направления, а также рассмотрения таких вопросов планирования туризма, как эффективное использование ресурсов и прогнозирование доходов. Вышесказанное свидетельствует о том, что сокращение доходов от туризма связано прежде всего со снижением интереса иностранцев, вызванного ростом цен на проживание в гостиницах и питание. Кроме того, в настоящее время лидируют регионы Габала и Гах, при этом туристические потоки направлены в сторону от Шекинского района. В целом результаты проведенного исследования дают ценную информацию о факторах, влияющих на доходы от туризма в Шекинском районе, что может способствовать принятию решений в индустрии туризма. Сделанные выводы помогут заинтересованным сторонам определить ключевые точки роста индустрии и принять соответствующие меры для привлечения большего количества туристов, а также увеличения доходов.

Ключевые слова: пространственное планирование; индустрия туризма; регрессионная модель; Шекинский район; прогнозирование; планирование туризма.

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MULTIPLE REGRESSION MODELLING: CONTEMPORARY SPATIAL PLANNING AND ECONOMIC MODELLING OF TOURISM INDUSTRY (CASE STUDY OF SHAKI DISTRICT)

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The study conducted a thorough analysis of the territorial planning of the tourism industry and a multiple regression analysis of tourism revenues in the Shaki district from 2010 to 2021. The main objective of the research was to identify the factors influencing the formation of income in the tourism industry in the context of regionalisation and the current direction of tourism development. Studying the negative and positive aspects of the tourism industry and the planning sequence, as well as the existing theoretical approaches to tourism planning, was necessary to achieve this goal. Comparative analysis, regression analysis, and correlation analysis methods were used to analyse the factors affecting tourism, and the final version of the mathematical statistical model was obtained based on successive models by establishing hypotheses. The study found that the number of hotel rooms and foreign tourists is the main influential factor in the formation of income. The proposed model had following parameters: $p < 0.005$ and $R^2 = 0.488\,6$, making it the final option. The research highlights the importance of deep learning about current and future situations of any research destination and tourism planning issues, such as the effective use of resources and the prediction of incomes. It demonstrates that the reduction in tourism income is primarily due to the decrease in foreign tourists' interest caused by rising hotel and food costs. The research also reveals that the focus has shifted to other neighbouring districts, such as Gabala and Gakh, with tourist flows directed away from the Shaki district. Overall, this study provides valuable insights into the factors affecting tourism revenue in the Shaki district, which can inform future policy and decision-making in the tourism industry. As a result of these findings, stakeholders will be able to identify the key drivers of tourism growth and take the necessary measures to attract more tourists and increase revenue from tourism.

Keywords: spatial planning; tourism industry; regression model; Shaki district; prediction; tourism planning.

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Introduction

An increase in the population's income leads to a rise in its cultural and living standards, which results in the expansion of interest in other countries and people, enhancement in the number of tourist activities, and the formation of the tourism industry [1]. There are several views and approaches to tourism. J. Holloway describes tourism as problematic in establishing clear lines between shoppers and tourists [2]. There is no commonly accepted definition of the tourism industry. R. Mill and A. Morrison point out that it is difficult to describe tourism as an industry because there are many complementary and competing activities among tourism businesses [3]. They integrate the definitions of tourism into a common context, emphasising the relationship between travel, tourism, leisure, and recreation. In their approach, they continue to define this relationship as «fuzzy» and distinguish that all tourism involves travel but not all travel is tourism. Nevertheless, the tourism industry is often portrayed as just an activity. In the above approaches, the formation of tourism as a separate industry and the emerging ideas in this field are clearly defined.

Tourism is a very fast-growing sector of the economy and it is becoming increasingly widespread among nations.Taking into account its economic, socio-cultural, and environmental impact potential, it is clear that these impacts can be positive or negative depending on whether tourism is planned or not, and how well it is planned and implemente [4].

In other words, tourism planning is the process of tourism development [5], and the main goal is to ensure sustainable development in tourism. There are usually issues that need to be followed in the planning schedule and sequence to minimise the negative potential of tourism and maximise its benefits.

Since the tourism industry covers various industries, it should be dealt comprehensively and planning should be done according to individual components. The complexity of the industry calls for coordinated, integrated, and careful planning between all tourism stakeholders, including tourism-related and involved sectors. The following conditionsmust be fulfilled for the development of tourism in the country as well:

- implementation of planning policy that can be at the national, regional, and local scale;
- existence of rules and laws which assume formation of the legal framework and legislation;
- control of the plan that must include the body responsible for monitoring its implementation and dynamics [6].

According to S. Roday, A. Biwal, and V. Joshi «unplanned and unregulated tourism has long-term adverse effects on society, culture, ecology, and economy» and at the same time «proper planning should ensure systematic operation to achieve desired results and success» [7, p. 436–437]. J. Ezani defines planning as «the act or process of making plans and designs for a particular project or enterprise» [8, p. 1]. Tourism planning should involve many stakeholders and have a common vision, direction, and commitment [9]. In tourism planning, each country should have a national tourism policy that will address tourism-related issues and advocate the need for tourism planning. In addition to the necessity of the above-mentioned conditions during tourism planning, the following are mentioned.

Integrated tourism development. The fact that the tourism industry covers many different sectors allows to coordinate activities of the sectors towards a common goal within the framework of the adopted plan.

Economic benefits. One of the reasons for the need for tourism planning is economic efficiency, that is, the ability to generate income. The development of tourism requires a large capital investment, where the main goal is to finance one or more areas and forecast revenues. Planning helps to achieve financial gain from tourism.

Protection. Planning helps to ensure conservation by optimising tourism benefits and preventing problems. During the tourism, historical places, archaeological monuments, cultural centres, scenic and touristic places, and mental components must be protected. Planning assists to implement policies, regulations and laws that will ensure their continued maintenance and availability. Proper planning of tourism can lead to the protection and maintenance of cultural, natural, and ecological resources in development.

Development of sustainable tourism. Among the modern industries, there is a great need to protect natural and culturally important places and the environment in the development of tourism (monuments, beach resorts, and wildlife reserves).

Development of human resources. In addition to the services of professionals, tourism requires skilled and unskilled labour. Planning helps to determine the number of human resources needed, the skills required, and how they can be acquired.

Security. The tourism plan addresses internal security issues, crimes committed by tourists, and crimes against tourists by host community members.

Tourism planning requires a painstaking and logical course followed in order of priority and it is important to follow the process. The following phases are mentioned as different stages of tourism planning: assessment of tourist demand and supply, determination of objectives, spatial planning, basic infrastructure, financial planning, human resource planning, administrative management structure, marketing and promotion, monitoring of results, time factor.

However, some changes have occurred in the general structure of planning and new approaches have been proposed in recent times. The main goal is to ensure the optimality of the process and to achieve the result in the medium and near future. This will help to prevent wasted time and financial loss. Some authors [7, p. 440–441] present more similar and more simple sequence of tourism planning: definition of the system, goals, and objectives, collection of relevant information; data analysis and interpretation, preliminary planning and analysis; approval and finalisation of the plan, implementation and monitoring of the final plan.

The tourism industry mainly includes inns, hotels, tourism companies, service areas, small workshops, and enterprises engaged in the production of souvenirs and gifts. Social services, production enterprises, museums, catering facilities, transport companies, advertising, tour operators, travel agencies, and other infrastructures are involved as the main enterprises that form the tourism product. It is necessary to group the enterprises involved in the formation of the tourism services market, taking into account infrastructure areas directly related to tourism, supply and production services, complex services (provided by tour operators, travel agencies, and other tourist organisers).

The spatial planning concept is increasingly prominent in discussions and strategies focusing on regional planning and tourism development. Spatial planning and the tourism industry are two various concepts, in fact, they are greatly interrelated. Spatial planning can be used as an instrument for coordinating socio-economic development by preventing environmental problems and simultaneously protecting the natural and cultural environment [10]. At the same time significant implications for how a given destination should be planned, developed and operated must be taken into account during both spatial and economic planning [11]. Let's summarise given concepts. Spatial planning in tourism is an integral part of socio-economic planning [12] and the continuous activity of society which aimed to organise, arrange and equip certain spatial entities in the function of their marketing possibilities, availability of tourism, and socio-economic goals, with the effort to maximise the positive and minimise the negative social, economic and spatial effects of tourism [13].

Summing up the above-mentioned ideas, it is clear that the primary goal here is to ensure the planning process, economic sustainability, sustainable development, and maximum results. A number of programmes and acts have been adopted in order to ensure the sustainable development of tourism in the research region. Important work has been done in the field of tourism in the country, the President of the Republic of Azerbaijan

signed the Decree of 1 September 2016 «On additional measures related to the development of tourism in the Republic of Azerbaijan» and the strategic road map for the development of the specialised tourism industry was adopted on 6 December 2016 in the country.

For this purpose, according to the Decree of the President of the Republic of Azerbaijan of 20 April 2018 «On some measures related to the improvement of state management in the field of culture and tourism», the State Tourism Agency was established, and within this framework, the tourism brand was formed and promoted on a local and international levels and work in the direction of increasing competitiveness was started. Azerbaijan Tourism Bureau was established under the agency and its information base was expanded. State historical-architectural reserve «Yukhari Bash» of Shaki district (including hotel complex «Carvansaray» in Shaki City), historical-architectural reserve «Kish» operates as part of the tourist office.

The main purpose of the research is to analyse the issues of territorial planning of tourism, to determine the main factors that affect development, and to find out the direction of the tourism development in the region for the period of 2010–2021. Here, the main goals are to assess the current situation in the field of tourism and determine the direction of it's development. A number of hypotheses have been put forward for these purposes.

First of them is to reveal factors that affect the income of hotels and hotel-type enterprises in the Shaki district. The second hypothesis is to determine the relationship between the employment of the population in tourism and hotel income. The third hypothesis suggests studying of correlation between fields in the tourism district. And according to the fourth hypothesis it is necessary to forecast revenues in the tourism region and to build the most appropriate model.

Materials and methods

Studied area. The total area of Shaki district is 2488 km^2 and it is the second largest district of Azerbaijan after Guba district, located in the northwest of the republic (fig. 1). The administrative district is surrounded by the Dagestan Republic of the Russian Federation from the north, Oguz from the east, Yevlakh from the south, and Gakh from the west.

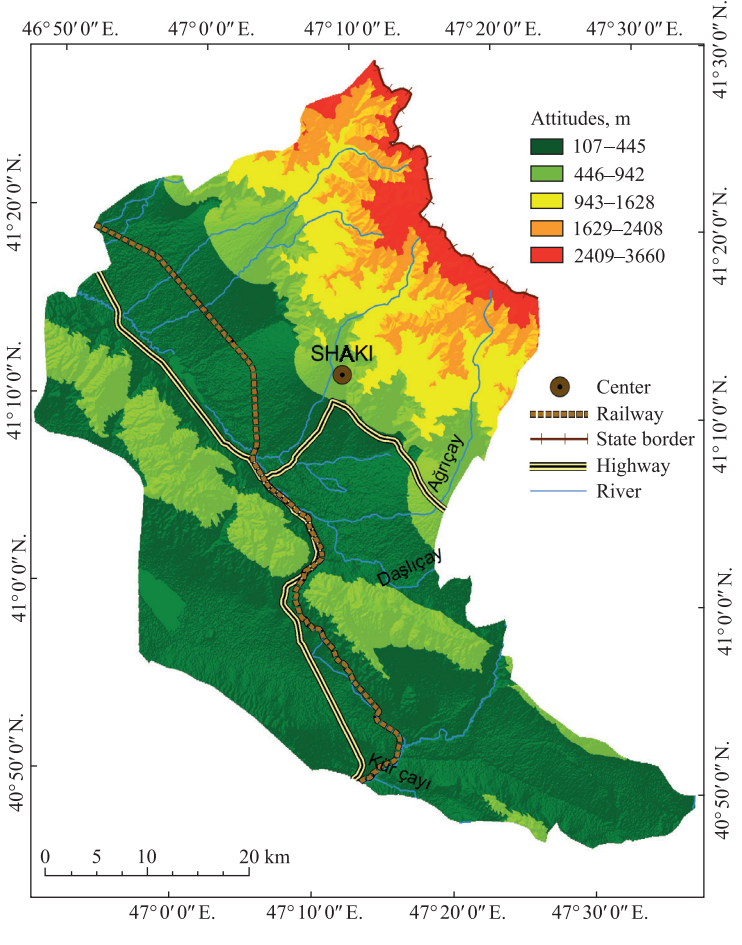


Fig. 1. Studied area (Shaki district) (prepared in *ArcGIS 10.3*)

Methods. Comperative, correlation and regression analysis were used and a model was built to predict the studied area for the period of 2010–2021. For this purpose, statistical data have been used and factors that could affect the income of hotels were calculated. The R programming language was used in the construction of the mathematical-statistical model. A number of parameters that formulate and have a significant influence on region's tourism income were taken into account in building the model: one-time capacity of hotels, number of hotel rooms, number of employees, number of foreign tourists, and number of citizens.

Several factors influence the formation of the income of hotels in the Shaki district. It is for this reason that the multiple regression method was used in the analysis by region. In cases where there is one dependent and more than one independent variable, the multiple linear regression model that examines the relationship between the variables is expressed as follows:

$$\gamma = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon,$$

where γ is the dependent variable (income); x is independent variables (capacity, number of rooms, number of employees, foreign tourists, citizens); β is intercept.

To use multiple linear regression analysis, the factors of the model must be provided. The terms of this regression model can be summarised as follows: condition of normality, linearity condition, constant change condition, absence of autocorrelation, absence of multicollinearity problem between independent variables, equality of the average of the error terms to zero and it's proximity to zero [14]. Some pre-requisities to carry linear regression model are the following:

- there is linear relationship between quantitative dependent and independent variables;
- there is no presence of autocorrelation of residuals;
- the mean of residuals is zero;
- there is equal variance of residuall or presence of homoscedasticity;
- the independent variables are uncorrelated with errors;
- there is absence of multicollinearity [15].

Regression analysis. A number of models have been developed as a way to attempt to measure and predict incomes about tourism [16]. The most recent models have utilised either a matrix, factor analysis, or cluster analysis and ect. P. J. Sheldon and T. Var discussed five general groups of forecasting techniques, some of the most frequently used varieties are called «econometric models», including regression and discriminant analysis [17]. These behavioural models attempt to determine cause and effect relationships between travel trends and imputed causal factors [18].

Regression analysis is an actively used mathematical statistical method. Its easy and understandable application, and fast results thanks to statistical package programmes lead to an increase in interest in regression analysis in scientific research, and use of multivariate statistical techniques has been growing in the social science literature, allowing researchers to answer complex research questions and test multivariate models [19]. The technique has provided tourism researchers with a comprehensive means for testing and modifying theoretical models and it is comparatively more sophisticated than other multivariate statistical techniques [20]. A. D. Tasci studied the relative impact of factors influencing destination image, by analysing the large scale and longitudinal dataset of the Michigan regional travel market survey by applying multiple regression analysis and found that only a few of those selected variables (i. e. age, race and visitation) play curicial role in destination image [21].

Regression analysis examines the relationship between a variable and one or more independent variables [22]. In regression analysis, there is a cause-and-effect relationship between these variables, and this relationship is explained by a mathematical model [23]. This model is called a regression equation or a regression model. A model consisting of a dependent variable and an independent variable is called a simple regression model [24], while a model consisting of a dependent variable and multiple independent variables is called a multiple regression model [25].

The goal is to create an estimation equation that can be used to estimate the dependent variable with the help of the independent variable or variables [26]. To make reliable predictions using a regression model, you need to know the state of the relationship between the variables in the model [27]. The regression model to be used varies depending on the state of the relationship between the variables (linear, logarithmic, exponential, etc.) [28]. Regression analysis is particularly affected by distributional characteristics [29].

Building the model. The construction of the model is carried out in stages. First, the stable variable with the highest correlation with the dependent variable is added and the p-value is looked at in the F-statistic. Consecutively, other influencing factors are included in the model and the increasing and decreasing tendency of the p-value is measured. As a result, the most suitable model is proposed. The question of what factors affect hotel revenues in the Shaki district, proposed in first hypothesis, was tested one by one with the following models. After entering all the components (with the enter method), it is set as model 1. Looking at the F-statistic of model 1, we see that $p > 0.18$, some variables are removed from the model (table 1 (model 1)). Regression analysis is continued by keeping some of the variables constant in building the model.

Table 1

Model 1 and model 2 after adding factors

Parameters	Model 1 (once capacity, number of rooms, employees, and number of foreign and domestic tourists)	Model 2 (number of rooms, foreign and domestic tourists, when one-time capacity)
Residual standard error	458.3 on 10 degrees of freedom	444.9 on 12 degrees of freedom
Multiple R^2	0.484 5	0.417 2
Adjusted R^2	0.226 8	0.271 5
F-statistic	1.88 on 5 and 10 degrees of freedom	2.864 on 3 and 12 degrees of freedom
p-Value	0.185 1	0.081 07

Model 2 differs from the previous model: there some variables were removed, a new variable was added. After the regression analysis is established, when we look at the value of the *F*-statistic, we see that $p > 0.08$, which means that the most ideal result has not been achieved in this model. However, it is possible to maintain variables by taking a wide margin of error.

Results and discussion

Table 2 shows the construction of the model as well. Here, unlike the previous ones, a number of influencing factors have been removed, only the number of hotel rooms, the arrival of foreigners in the region, and the impact on hotel revenues based on this have been studied. Also, $p < 0.04$ was obtained in the *F*-statistic, which is considered the most appropriate model. This model fully explains fourth hypothesis and it is possible to make its predictions.

Table 2

Model 3 (regression model): statistical values and metrics

The function used to build the model				
lm(formula = incomes ~ hotel_rooms + foreign, data = *df*)				
Distribution statistics of surpluses				
Minimal	First quartile	Median	Third quartile	Maximal
–403.0	–172.74	–34.78	28.11	1396.07
Statistics of influencing factors (standard errors, p-values)				
Parameters	Estimate	Standard error	*t*-Value	Pr (>|*t*|)
Intercept	–425.543 3	618.449 5	–0.688	0.503 5
Hotel rooms	3.677 3	2.339 4	1.572	0.140 0
Foreign	0.118 9	0.056 5	2.104	0.055 4
Metrics that measure how well the model fits				
Residual standard error is 437.8 on 13 degrees of freedom	Multiple R^2 is 0.488 6	Adjusted R^2 is 0.294 6 on 1 and 13 degrees of freedom	*F*-statistic is 4.132	*p*-Value is 0.040 83

Note. Significant codes are `0‘***’0.001‘**’0.01‘*’0.05‘.’0.1‘’1`.

Data analysis. Shaki district is one of the main tourism centres of Azerbaijan. The tourism infrastructure of the region is covered by the construction of inns and hotels, the construction of the transport system, and the creation and operation of service areas. To analyse the current state of tourism in the research region, it is

enough to look at the information of the State Statistical Committee on Tourism. Looking at the statistics of tourist tickets sold in the Shaki district, we see that this figure is equal to 582. In 2019, 218 tour packages were sold, which is 2 times less[1] than the number of 2021. Taking into account their economic values, it is clear that the income from these sales in 2019 was 190.9 thsd manats, and in 2021 it was 69.2 thsd manats, which means a 64 % decrease. However, the registration of general indicators is almost non-existent in the administrative regions of the Shaki – Zagatala region. Thus, there are only 2 years of data.

There is an increasing and decreasing trend in the capacity of hotels and inns operating in the region between 2010 and 2021 due to seasonly demand. Thus, in 2010, the capacity of hotels in the Shaki district was 576 places, in 2015 it has increased by 109 places, and in 2021 it decreased again by 103 places and returned to its previous state. During the mentioned period, the highest indicator was recorded in 2016 (808 places). When analysed by economic region, it ranked 3rd after Gabala and Gakh districts.

If we look at the income from hotels in the region, a decreasing trend is observed in 2010–2021. The income of hotels was 2210.5 thsd manats in 2010, in 2015 it decreased by 52 % to 1068.9 thsd manats, and in 2021 it decreased by 26 % to 796 thsd manats. If we look at the general figures, we can see that the income has decreased up to 3 times in 11 years. Also, the share of Shaki in the Shaki – Zagatala economic region has dropped sharply in the mentioned period. Thus, the share of Shaki in the economic region decreased from 55.4 % in 2010 to 41.0 % in 2015 and to 4.0 % in 2021. This is a very low indicator. Analysing by region, it becomes clear that it lags behind only Gabala district. However, in 2021, for the first time it fell behind in the Gakh district and fell to the 3rd level.

One of the main conditions for the development of the tourism market and the sale of tourism products is meeting the tourist demand. Two factors play a key role in the formation of the tourism industry in Shaki district and in the increase of hotel revenues: visiting of foreigners and visiting of citizens of the country.

If we pay attention on the level of foreigners coming to the region and staying, it can be seen that between 2010 and 2021, increasing recorded initially, but in the last period, a sharp decrease was observed (fig. 2). According to statistics, in 2010, 2110 foreign citizens visited the region, and in 2015, it increased by 26 % compared to the previous year and reached 2852 people. In 2021, it has decreased 14 times at a sharp speed. The number of foreigners has changed between 200–300 people in the last two years. The decrease in the number of tourists is seen not only in Shaki district but also in other districts.

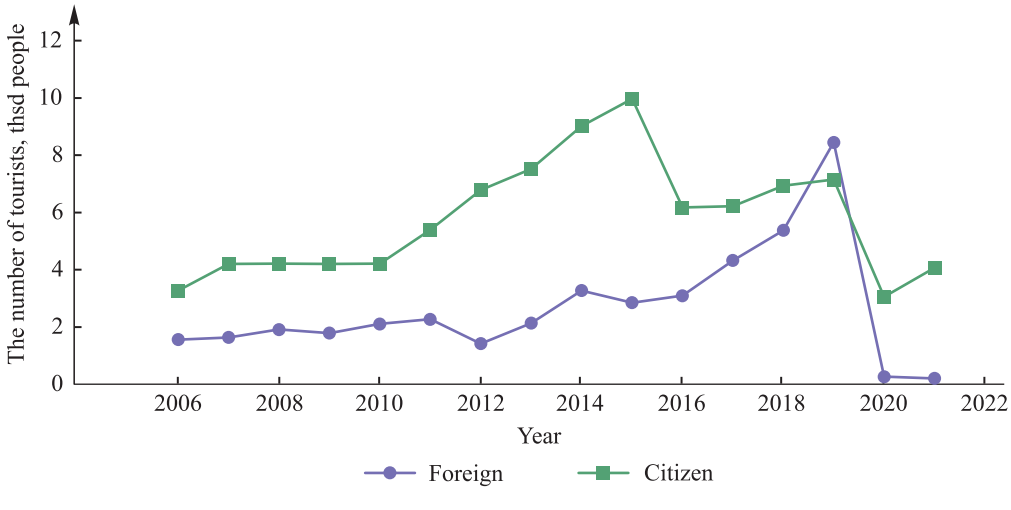


Fig. 2. Graphics of foreigners and citizens by years
(prepared on the data of statistical reports
of the State Statistical Committee of the Republic of Azerbaijan)

The highest indicator for the region was obtained in 2019 when there were 8447 people. The leadership in the economic region belongs to the Gabala district. The involvement of the country's citizens in domestic tourism has had a positive effect on the development of tourism in the Shaki district. So, if the number of citizens was 4209 in 2010, it reached 9974 people in 2015, which means an increase of more than 2 times compared to

[1]Socio-economic development of regions. Statistical collection [Electronic resource]. URL: https://www.stat.gov.az/menu/6/statistical_yearbooks/ (date of access: 20.12.2022) (in Azerbaijani).

the previous year. However, it decreased again by the same amount and returned to its previous state in 2021. When analysing the Shaki – Zagatala economic region, we observe that the share of Shaki among the regions visited by citizens has decreased in recent times.

If we look at the number of employees working in the service sector, we see that the highest indicator was recorded in the region in 2019. In the following years, there is a tendency of increasing and decreasing the total number. Thus, in 2010, the number of employees increased from 109 people to 177 people (38 %), and in 2021, it decreased again by the same amount to the level of 2010. There is no stability in the number of employees and it varies depending on the current situation.

Correlation analysis. Correlation analysis is applied between the given influencing factors and the relationship between two or more variables is studied. Correlation can be studied by two methods, diagrammatic method and mathematic method. Diagrammatically it is studied with the help of scatter diagram which cannot provide exact value of correlation in all case. Mathematically many methods and formulas are there however Pearson's method is widely used [30]. The Pearson correlation analysis is a common criterion to measure the correlation between variables, which is defined as following [31]:

$$R(i) = \frac{\sum_{k=1}^{m} \left(x_{k,i} - \overline{x_i}\right)\left(y_k - \overline{y}\right)}{\sqrt{\sum_{k=1}^{m} \left(x_{k,i} - \overline{x_i}\right)^2 \sum_{k=1}^{m} \left(y_k - \overline{y}\right)^2}},$$

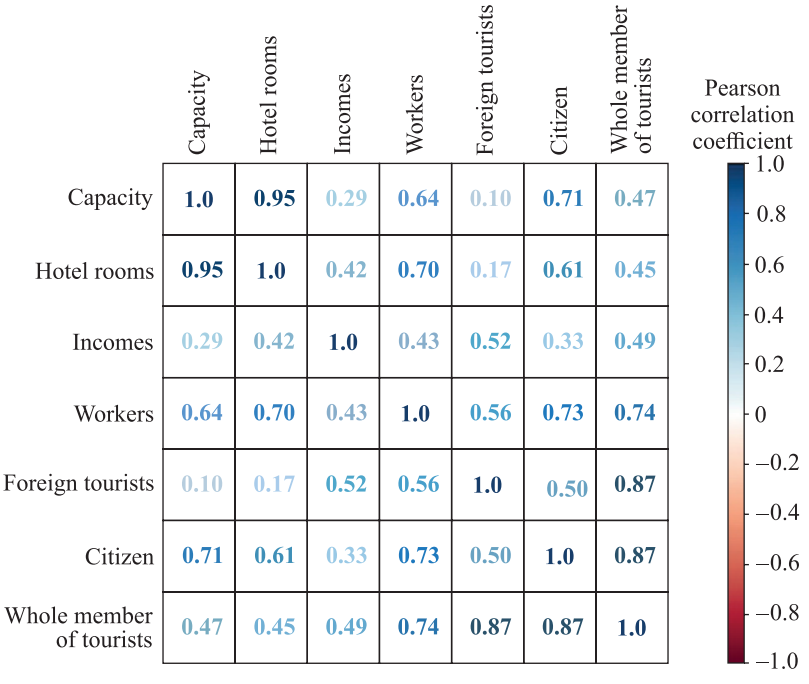
where m is the number of samples; $R(i)$ measures the correlation between the feature i and the class standard; $x_{k,i}$ is the feature value of the feature i of the sample k; x_i is the average value of the feature i; y_k represents the value of the sample k; y represents the class standard mean value of the sample k. According to the definition formula, the variation range of $R(i)$ is between –1 and 1 [32]. When $R(i) = 1$, the feature i is positively linear correlated with the class standard; when $R(i) = -1$, the feature i is negatively linear correlated with the class standard. As the degree of correlation between the feature i and the class standard varies, the value of $R(i)$ changed between 0 and 1. The larger the value of $R(i)$ is, the greater the contribution of the feature i to classification is. There was a weak correlation between features and class standard when $R(i) < 0.3$. There was a low correlation between features and class standard when $0.3 < R(i) < 0.5$. There was a significant correlation between features and class standard when $0.5 < R(i) < 0.8$. There was a high correlation between features and class standard when $0.8 < R(i) < 1$ [33]. To summurise all above mentioned indicators the Pearson correlation coefficient is displayed between –1 and 1 and is expressed as follows: if $R(i) = 1$, the correlation is said to be perfect positive; if $R(i) = -1$, the correlation is said to be perfect negative; if $R(i) = 0$, the variables x and y are said to be uncorrelated; if $0 < R(i) \geq 0.4$, it is low correlation; if $0.4 \leq R(i) < 0.7$, it is moderate correlation; if $0.7 \leq R(i) < 1$, it is high correlation [34].

The value of correlation coefficients nearer to 1 or –1 be interpreted as very high positive or negative correlation and nearing zero is considered as very low [35].

When looking at the correlation in the formation of the income of hotels and hotel-type enterprises in the tourism industry in the Shaki district, it can be seen that there is a moderate relationship between their income and hotel numbers, number of employees, foreign and domestic tourists, and it varies between 0.42 and 0.52 (fig. 3).

Looking at the correlation analysis of employees with other factors, it is observed that there is a medium relationship between the one-time capacity, the number of hotel rooms, and a high relationship with the total number of tourists. In other words, the number of employees in the region, the mentioned factors play an important role.

The highest correlation between the number of single capacity and the number of employees is due to qualified personnel, the relationship between them varies between 0.64 and 0.70 on average. The main factor is the increase and decrease in the number of tourists. According to C. A. Gunn [36] the limitation of the skewness coefficient between 1 and –1 can be interpreted as the distribution showing close to normal distribution.



	Capacity	Hotel rooms	Incomes	Workers	Foreign tourists	Citizen	Whole member of tourists
Capacity	1.0	0.95	0.29	0.64	0.10	0.71	0.47
Hotel rooms	0.95	1.0	0.42	0.70	0.17	0.61	0.45
Incomes	0.29	0.42	1.0	0.43	0.52	0.33	0.49
Workers	0.64	0.70	0.43	1.0	0.56	0.73	0.74
Foreign tourists	0.10	0.17	0.52	0.56	1.0	0.50	0.87
Citizen	0.71	0.61	0.33	0.73	0.50	1.0	0.87
Whole member of tourists	0.47	0.45	0.49	0.74	0.87	0.87	1.0

Fig. 3. Factors affecting hotel revenues in tourism correlation analysis between 2010–2021 (based on statistical data in R programming language)

Assesment of results. During the research, the forward selection method and stepwise selection method were investigated during the construction of the model. In each model, different values were obtained, and finally, the optimal model has been proposed. The estimation model is found to be $y = -425.5 + 3.7x_1 + 0.12x_2$. Here, the dependent variable income is denoted by y, x_1 is the number of hotel rooms, and x_2 is the number of foreign tourists. The prediction can be given by the mentioned formula. However, the value of –425.5 is not practical value because such a situation would not occur in reality. It is considered a necessary breakpoint parameter for prediction. Based on the formula, it is possible to forecast tourism revenues if other independent indicators except hotel rooms and foreign tourist parameters are kept stable. In this case, it is sufficent to add the corresponding numbers to the dependent variables. In the model, $R^2 = 0.488\,6$ is the average explanatory value. This suggests that there will be other variables involved in determining the number of returns.

Conclusions

The research examined the major factors that impact tourism income in the Shaki district from 2010 to 2021, and the degree of influence of these factors. It was found that the number of foreign tourists and hotel room occupancy were the primary drivers of tourism income. The majority of tourists preferred hotel rooms for one or two people, and a decrease in the number of beds led to a reduction in costs for cleaning and heating the rooms, which in turn resulted in an increase in hotel revenues.

The decline in tourism income in Shaki district has been observed recently. While the COVID-19 pandemic is believed to be a significant factor, it should be noted that the decline began before the pandemic, and a partial recovery was observed towards the end of it. Nonetheless, our analysis demonstrates that the reduction in tourism income is primarily due to the decrease in foreign tourists' interest caused by rising hotel and food costs. Foreign tourists are the primary source of income compared to domestic tourists and play a significant role in revenue generation.

One of the scientific innovations of the research is the creation of a regression analysis and model, as well as comparative and correlation analyses for the region, which are being implemented for the first time. During the correlation analysis, it was discovered that the relationship between employees and income in revenue generation is 0.43, implying that workers or skilled personnel influence 43 % of the income.

Tourism spatial planning and the organisation of package tours, as well as enhancing the appeal of destinations, are all essential factors in revenue growth, and they should be considered when planning. However, the research reveals that the focus has shifted to other neighbouring regions, such as Gabala and Gakh, with tourist flows directed away from Shaki district.

Despite a well-organised tourism industry in the Shaki district, the current state of tourism fails to reflect this. In addition to the previously mentioned factors, hotel revenue is also impacted by changes in the number of guest nights, service quality, customer satisfaction, and current prices. Since information about other parameters is unavailable, only these aspects were evaluated.

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