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Article

Challenges to Agritourism Development in Uzbekistan

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Abstract: This research examines the evolution of agritourism in Uzbekistan by evaluating the preferences, expectations, and satisfaction levels of tourists based on data gathered from 103 respondents. The study used a multilayer perceptron neural network and a polynomial logistic regression model to identify the primary factors affecting visitors' propensity to visit agritourism sites and their satisfaction with price and services. The findings indicate that specific attributes—such as the presence of dairy and vegetable production, picturesque mountainous or riverside settings, internet connectivity, recreational facilities, and skilled service personnel—substantially increase both the likelihood of tourist participation and their readiness to pay elevated service fees. The research highlights agritourism's capacity to promote socio-economic advancement in rural regions and provides specific policy suggestions for the sector's sustainable development. The study establishes a basis for strategic agritourism planning in Uzbekistan by combining scientific methodologies with empirical tourism data.

Keywords:: agritourism, farms, rural tourism, service, culinary, specialization of farms, production of dairy products, vegetable growing, fruit growing, beekeeping or honey industry, fishing, neural network, KQP model.

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1. Introduction

In a number of scientific works, the concept of agritourism is defined as the component of rural tourism, including S. Phillip, K. Hunter and K. Blackstock in their scientific article "A typology for defining agritourism" who gave the following definition: "Agritourism is a component of rural tourism [1]." The concept that "Agritourism is a means of creating new economic opportunities through agricultural tourism and is one of the strategies proposed in recent decades for diversifying the rural economy and achieving sustainable rural development " was also cited by Romanian scientists in their works. Barbieri and Meschenga, in their scientific article "The role of firm and owner characteristics on the performance of agritourism farms", state that the concept of agritourism "often links the concepts of "farm tourism", "working farm tourism" and "rural tourism" [2], [3]. It should also be emphasized that the concept of agritourism is also considered as a part of ecotourism due to its connection with the environment, as S. Zoto, E. Kirisi, E. Polena, in their scientific article "Agrotourism – a sustainable development for rural areas of Korea", literally state as follows: "Agritourism is often considered as a part of ecotourism, since both are related and occur in places where nature is of interest" [4].

Thus, the concept of "agritourism" refers to a type of tourism in which tourists visit farms or rural areas to learn more about rural life, agriculture, and traditional farming methods. This type of tourism provides urban residents with the opportunity to experience the nature, culture, and lifestyle of rural areas [5], [6].

The definition of the concept of agritourism may vary depending on the region and country, depending on the agricultural activity and the needs of its consumers. The introduction of the concept of agritourism into science and its evolution have been presented by a number of scholars and researchers, for example, M. Sznaider, L. Przezborska and F. Schrimgeur in their work "Agritourism", who state that the concept of agritourism has appeared in international literature since 1984 [7]. In English, the terms "Agritourism" and "Agrotourism" refer to the same phenomenon and both words can be found in literature and publications. However, among English speakers, "Agritourism" is the most common variant, and both terms refer to a form of tourism in which tourists visit farms, wineries, ranches and other agricultural enterprises for the purpose of education, entertainment or purchasing products directly from the producer. He noted that it is a type of tourism that can include participation in agricultural activities, farm stays, horse riding, wine tasting and many other activities that allow visitors to immerse themselves in rural life and culture [8], [9].

By integrating insights from science and literature, policymakers, researchers, and practitioners can develop holistic strategies to promote sustainable agritourism initiatives that benefit both tourists and local communities. As Uzbekistan continues to prioritize rural development and tourism promotion, leveraging the synergies between science and literature can contribute to the advancement of agritourism as a catalyst for socio-economic transformation [10].

Agritourism In Europe both in the 1970s and 1980s, especially In Italy active be used started there agritourism village economy encouragement and village farm legacy save stay national of strategy one to the part became In Italy it is called "Agroturismo". as it is called , many village house to their farms stay place , food and open in the air tourism services present verb through own their businesses to expand possibility gave agrotourism of tourism other many types like various historical in times social, economic and cultural to changes adapted in case developed agrotourism initial development: at the beginning of the 20th century city population of points growth and industrialization open to relax in the air need gave birth Like France and Italy some in countries village teams city its population to oneself attraction to do started and to them of the village beauty and peace of mind appreciation the opportunity offer did [11], [12].

Literature review. Agritourism is becoming increasingly popular as a form of leisure tourism around the world. According to the United States Department of Agriculture (USDA), the development of agritourism has significantly contributed to the growth of income in agriculture [13]. According to this organization, from 2012 to 2022, the agritourism sector grew by almost one billion US dollars. In India, the agritourism sector also recorded an annual growth rate of 20%. Agritourism is also developing rapidly in China, where approximately 200 million Chinese tourists currently prefer to engage in agritourism. In Israel, agritourism revenues have also shown an annual growth rate of 15%.

There is some controversy among scholars regarding the term agritourism. For example, Fleischer and Shetchik define agritourism as farm tourism or rural tourism, and it can be understood that tourists engage in or observe activities related to agriculture. Although there is no doubt that the agritourism sector really brings great benefits to the economy, the number of studies in this area is still very small. Therefore, studying agritourism issues in Uzbekistan is of great importance.

In general, it can be said that the scientific study of agritourism began in the 1980s. According to Flanigan and etc., the agritourism sector is not systematized, requires deep theoretical and practical research [14].

Sonino defines agritourism as a process in which agricultural entrepreneurs, along with farming, conduct a certain hospitality activity. Many researchers argue that agritourism is considered only as an additional source of income for farmers. Indeed, many farmers consider agritourism to be a convenient means of diversifying their family income. That is, when the crop season ends, it is possible to supplement farm income through agritourism [15]. According to Gomez and others, agritourism is often a phenomenon characteristic of small and medium-sized farms. The development of

agritourism encourages farms to introduce modern technologies that are less harmful to nature, and thereby reduces the damage caused to nature. At the same time, the development of agritourism helps to protect nature and familiarize young people with the process of growing agricultural products [16].

In countries such as the USA, Great Britain and France, agritourism is very well developed. In the West, farmers manage to promote their products through agritourism. For example, in Great Britain, it is known that every third farm is engaged in agritourism. This indicator is much better than in France and Italy.

The agritourism sector has not yet been thoroughly studied as a cross-marketing tool, a way of providing education. While many studies believe that agritourism activities are beneficial to the economy, some also consider it harmful. That is, there is an idea that agritourism, in a certain sense, leads to the disruption of some important ecological processes due to the large number of tourists. In addition, in some cases, the development of agritourism can lead to a decrease in the demand for labor on farms and an increase in seasonality in income [17].

The agritourism market is driven by the desire for unique experiences, local food and active outdoor recreation, which is associated with sustainable agricultural practices. State initiatives and policies aimed at the development of agritourism are aimed at promoting the development of rural areas and the diversification of farms. In recent years, the agritourism market has seen a significant increase in the number of domestic trips and the demand for unique, educational and entertainment activities. The COVID-19 pandemic has accelerated this trend as people seek out safe outdoor recreation closer to home. In addition, technological advances and social media have made it easier for farmers to market their agritourism offerings and connect directly with consumers [18].

In October 2023, Airbnb signed a partnership with Farm Stay USA, a new step in expanding its agritourism offerings and providing travelers with unique farm experiences. The partnership aims to grow rural tourism and support small farmers by offering a diverse and impactful rural experience [19].

In February 2023, John Deere, a leading agricultural equipment manufacturer, signed a partnership with the American Farm Bureau Federation to develop agritourism through technological integration. The partnership will involve the use of advanced agricultural equipment, improving guest service, and conducting educational tours on farms.

The travel agency sector of the agritourism business is seeing substantial expansion as travellers increasingly want distinctive and exhilarating experiences in rural locales. This market area has grown due to the increasing interest in sustainable tourism, organic agriculture, and local culture. Travel agencies are essential in crafting tailored experiences that align with the distinct interests of agritourists, including services such as farm accommodations, agricultural excursions, and interactive farming activities. The expansion of agritourism provides travel agencies with the chance to expand their services and access a burgeoning but distinctive market potential. Travel agencies may use this niche to appeal to ecologically aware travellers and those seeking distinctive, uncharted experiences. It is essential for agents to acquire specialised knowledge about rural locations, agricultural techniques, and sustainable development concepts to provide distinctive and significant experiences.

Agritourism is developing variably throughout several global locations. The agritourism sector in North America is seeing consistent expansion, driven by consumer demand for sustainable agriculture, farm-to-table experiences, and rural tourism. The U.S. Department of Agriculture (USDA) reports that agritourism has substantially enhanced the agricultural economy, with farms in the region generating considerable revenue through diversified income streams, including farm stays, commercial operations, and educational tours. In February 2023, the U.S. Department of Agriculture (USDA) announced a collaboration with Airbnb to enhance agritourism opportunities on rural farms nationwide. The collaboration seeks to provide travellers distinctive farm accommodations and engaging agricultural experiences, bolster the rural economy, and promote agricultural education. The agritourism market is competitive and has several global and international players. Key players are adopting various growth strategies to

expand their market presence, such as partnerships, agreements, new product launches, geographic expansion, and mergers and acquisitions. Some of the key players operating in the market include Star Destinations; Greenmount Travel; Blackberry Farm, LLC; Kansas Tourism; Liberty Hill Farm; Trump Tours Inc.; Field Farm Tours; Agrilis; and Stita Farm.

In September 2023, Agritourism World announced that several agricultural organizations have joined forces to launch the Farm Fresh Trails initiative in the United States — a joint effort to promote agritourism trails and farm-to-table experiences in agricultural areas [20].

In a few words, agritourism may be described as the crossroad of tourism and agriculture. Agritourism, to put it another way, is a type of commercial enterprise that combines agricultural production and processing with tourism to attract visitors to an agritourism facility (farm, garden, etc.)

In July 2022, Agriturism India, an organization promoting rural tourism, entered into an alliance with leading online travel company MakeMyTrip. The partnership aims to create and promote agritourism tour packages that offer authentic rural experiences that benefit local farmers and boost the rural economy.

2. Materials and Methods

In addressing socio-economic challenges, ensuring food security and substituting agricultural products and food imports are prioritised in the regional and sectoral development of Uzbekistan's economy. This includes agriculture and related sectors of the agro-industrial complex, encompassing small agribusiness enterprises, peasant and farm enterprises, as well as large associations and holdings. In the context of contemporary creative advancement, small-scale farming in rural regions may generate not only agricultural commodities but also revenue from non-agricultural ventures, such as the promotion of agrotourism. Agrotourism originated in the 1970s in Western European nations as a distinct kind of tourism and a means of organising family leisure for those seeking isolation, tranquilly, pristine environment, and rural vistas. Moreover, agrotourism is distinguished by the little expense associated with organising leisure activities in rural regions, using natural, biological, and cultural-historical resources. Global evidence indicates that the advancement of agrotourism is a significant socio-economic avenue for the enhancement of the rural economy. Agrotourism include direct production activities, including the cultivation of diverse folk and creative crafts, the preservation and advancement of traditional crafts, and the manufacture of eco-friendly food items. Evidence indicates that agrotourism fosters the development of certain rural regions, enhancing the income and job opportunities for their inhabitants, mitigating migration from rural locales to urban centres, and establishing a novel sector within the rural economy.

During our research, we conducted a survey of 103 respondents in order to analyze the behavior of agrotourists. We analyzed the following variables in the survey:

Y-1-Whether the respondent has visited agrotourism farms or not, Yes-1, No-0.

Y-2-Respondent's satisfaction level with the price of agrotourism, 190,000-375,000 UZS -0, 376,000-564,000 UZS -1, more than 565,000-2

Q-1-Respondent's gender, Male-1, Female -0;

Q-2-Respondent's educational level, Secondary education-0, Bachelor's degree-1, Master's degree and above-2

Q-3-Respondent's permanent residence type, Village-0, town-1, city-2, large city-3, very large city-4.

Q-4- Respondent's attitude to the location of agrotourism services in the field or plain, 0-completely disagree, 1- disagree, 2-neutral, 3- agree, 4- completely agree.

Q-5- Respondent's attitude to the location of agrotourism services in the mountains, 0-completely disagree, 1- disagree, 2-neutral, 3- agree, 4- completely agree.

Q-6- Respondent's attitude to the location of agrotourism services by the lake, 0-completely disagree, 1- disagree, 2-neutral, 3- agree, 4- completely agree.

Q-7- Respondent's attitude to the location of agrotourism services in the forest, 0-completely disagree, 1- disagree, 2-neutral, 3- agree, 4- completely agree.

Q-8- Respondent's attitude towards the location of agrotourism services on the seashore, 0-completely disagree, 1- disagree, 2-neutral, 3- agree, 4-completely agree.

Q-9- Respondent's attitude towards dairy products, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-10- Respondent's attitude towards vegetable growing, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-11- Respondent's attitude towards fruit growing, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-12- Respondent's attitude towards beekeeping, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-13- Respondent's attitude towards fishing, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-14- Respondent's attitude towards mixed production in an agrotourism complex, 0-not at all interested, 1- not interested, 2-neutral, 3- interested, 4- very interested.

Q-15-Respondent's attitude towards the presence of a kitchen in an agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-16-Respondent's attitude to the presence of the Internet in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-17-Respondent's attitude to the presence of a swimming pool in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-18-Respondent's attitude to the presence of sports and sports equipment in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4-very important.

Q-19-Respondent's attitude to the presence of a garden in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-20-Respondent's attitude to the presence of a grill (barbecue) for barbecue in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4-very important.

Q-21-Respondent's attitude to the presence of the possibility of making a bonfire in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-22-Respondent's attitude to the presence of the possibility of fishing and cooking in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Q-23-Respondent's attitude towards the presence of service providers (cook, assistant) and others in the agrotourism complex, 0-not at all important, 1- less important, 2-neutral, 3- important, 4- very important.

Since 2012, deep learning models have been used in quantitative forecasting processes. A deep learning model is a neural network-based model for classifying and predicting various types of data: text, numbers, videos, images, etc. In these models, x is the input factor and y is the output factor based on the calculated weights.

From a mathematical point of view, the function of the neural network algorithm has the form $y = fw(x)$. The computer program executes this algorithm in several simple steps: each step involves addition, multiplication, and finding the maximum. The main difference between a classical algorithm and a neural network is that the correct selection of parameters is very important in neural networks. Before using a neural network, these weights must be changed to a certain extent and adapted to find a solution to a given problem. That is, the data is trained by dividing it into training and test data. This process requires a lot of energy and computing power from computers.

Applying this algorithm requires deep knowledge of computers and mathematical thinking. In general, artificial neural networks actually originated from the concept of biological neural networks.

The architecture of the brain's visual layer is extensively understood, and in 1962, Gubel and Wiesel became the first recipients of the Nobel Prize in Physiology for their elucidation of the neuronal organisation in the brain's higher layers. Consequently, the brain, in a very simplified manner, comprises layers of neurones, with each neurone receiving input from the preceding layer, doing a basic computation, and relaying its output to the neurones in the subsequent layer. Nonetheless, it is important to note that a biological neurone is linked to an artificial neural network in a figurative manner. Biological networks have far more intricate connections, and the mathematical equations that describe them are considerably more sophisticated, having been formulated by Alan Hodgkin and Andrew Huxley in 1952, for which they were awarded the Nobel Prize. Consequently, it is challenging to correlate the sometimes unexpected outcomes of artificial neurones with cognitive functions in the brain.

This neurone type was introduced by McCulloch and Pitts in 1943. For simplicity, they include just two layers of neurones (the first layer between x and u, and the subsequent layer between u and y), but contemporary effective networks may encompass several dozen layers. In our research, the input factors x include the 24 variables gathered from all the surveys, while the respondents' effect on the likelihood of participating in agritourism serves as the y factor. Each factor comprises 103 observations.

The transition from one layer, such as the input layer x, to another layer, such as the second layer u, which serves as a "hidden" layer inside the network, is facilitated by a collection of artificial neurones.The neuron is shown in Figure 1.2. This is the first neuron, which calculates the first value u1 that makes up the layer. This neuron connects a certain number of elements of the first layer (here three: x1, x2, x3, but there can be more) to a single element of the second layer, here u1. The formula for calculating the output variable of a neural network is as follows:

$$u1 = \max(w1 \times x1 + w2 \times x2 + w3 \times x3 + w4; 0): \quad (1)$$

So, the neuron performs a weighted sum of the three input factors, adding three weights w1; w2; w3 and also w4 as a free term. The neuron then compares this sum with zero and calculates the largest one. We can compare this to biological neurons, which transmit or not transmit information depending on whether they are sufficiently excited or not. So, if the weighted sum $w_1x_1 + w_2x_2 + w_3x_3 + w_4$ is less than zero, then the neuron returns the value u1 = 0, otherwise the value of the weighted sum is returned.

Such neural networks were introduced in 1957 by Rosenblatt, who called them "perceptrons". The first perceptrons consisted of only one layer. Such single-layer architectures were not designed to perform complex tasks. By adding multiple layers, we can assign more complex tasks to artificial intelligence.

In general, deep neural networks use a large number of layers. In recent years, these architectures have allowed us to obtain very high results for image and video recognition, as well as automatic text translation. It was the research on deep networks that allowed the French researcher Yann Le Cun, as well as Jeffrey Hinton and Joshua Bengio to receive the Turing Award in 2019.

During the study, we used a multilayer perceptron, that is, an artificial neural network, to evaluate the influence of 24 factors on the probability of random variables-respondents engaging in agritourism and on their level of satisfaction with agritourism services.

The multilayer perceptron model was calculated using the IBM SPSS program. In total, 73 out of 103 observations were divided into a training set and 32 for testing. (Table 1)

Table 1. General information about the multilayer perceptron model

Teaching kit	Error		83,128
	Average percentage of incorrect predictions		22,5%
		Have you ever visited agritourism farms?	11,3%

	Percentage of incorrect predictions for categorical variables	What price would be satisfactory for you for the services of an agrotourism farm? (Accommodation and service price per person, per day)	33,8%
	Stop counting rule		Sequence of steps without reducing error
	Teaching time		0:00:00,78
Test kit	Error		44,456
	Average percentage of incorrect predictions		28,1%
	Percentage of incorrect predictions for categorical variables	Have you ever visited agritourism farms?	15,6%
		What price would be preferable for you? (Including Accommodation and service price per person, per day)	40,6%

Table 1 presents the statistics of the solution of the multilayer perceptron model in the case of these factors. The percentage of incorrect predictions for both factors did not exceed 30%. The training time for the data was also very fast, less than a second. **Figure 1** depicts the structure of the perceptron consisting of these 24 input factors, 10 hidden layers, and 2 output layers.

The mathematical representation of this multilayer perceptron can be written as follows:

$$Y_1 = \max\left(c + \sum_{j=1}^{j=23} \sum_{i=0}^{i=k} w_{ji} Q_j(i);\ 0\right)$$
$$Y_2 = \max\left(c + \sum_{j=1}^{j=23} \sum_{i=0}^{i=k} w_{ji} Q_j(i);\ 0\right) \quad (2)$$

Here, $Y_1 -$ is the probability of respondents engaging in agritourism, $Y_2 -$ is the level of satisfaction of respondents with the prices of agritourism services, $c -$ is the free limit, $k -$ is the number of corresponding values for each categorical factor, $Q_j(i) - Q_j$is the value of the function at i, $w_{ji} - j$ is the corresponding weight in the i th column and the ith row (Appendix 1). That is, if the value of the weighted sum in this function is greater than 0, the $Y_{1,2}$ functions take exactly these values, otherwise the zero value is taken.

This model estimates the two variables with an average accuracy of more than 70% (Table 2).

Table 2. Percentage of correct answers in the QQP model

Collection	Percentage of correct answers
Trained set	77,5%
Test	71,9%

The first and second figures also present the results of forecasting respondents' visits to agritourism farms and their satisfaction with the prices of services at agritourism farms using a multilayer perceptron. That is, given the parameters in Appendix 1, it can be seen that the KQP model calculates visits to agritourism farms with an accuracy of 20%, but non-visits with an accuracy of 80%. This can be explained by the large number of respondents who did not visit agritourism farms in the data set.

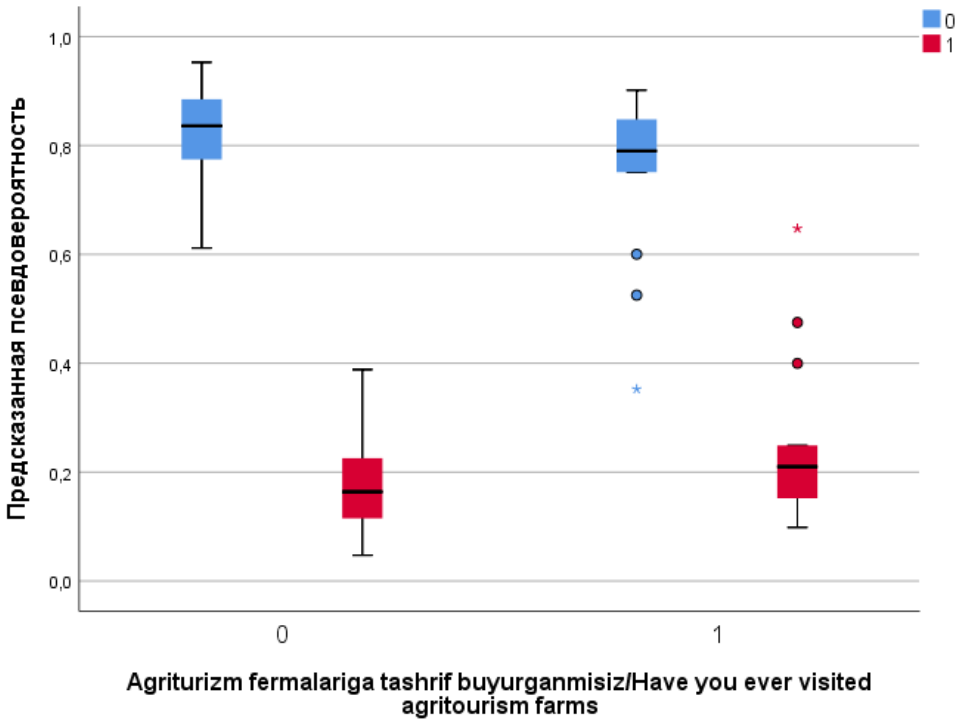
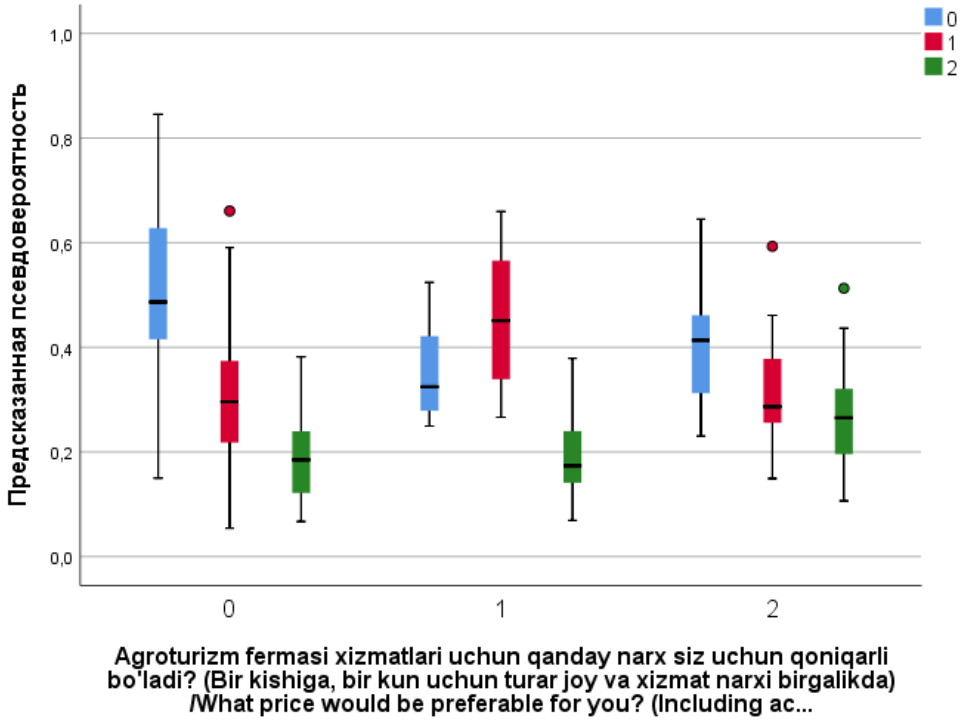


Figure 1. Forecast statistics of the KQP model for determining visits to agritourism farms



The KQP model's predictions for respondents' satisfaction with agrotourism service prices are illustrated in Figure 2, which shows the forecast accuracy across different price ranges. When service prices range from 190,000 to 375,000 UZS, the model achieves approximately 45% accuracy. For mid-range prices (375,000 to 576,000 UZS), the accuracy is about 40%, while for higher prices, it remains steady at around 40%. These findings indicate a moderate predictive capability of the model in assessing satisfaction based on price sensitivity.

Figure 2. Forecast statistics of the satisfaction level with the prices of agritourism farm services of the KQP model

Forecast indicators of the level of satisfaction with the prices of agrotourism farm services, given the parameters in Appendix 1, when the prices are in the range of 190-375

thousand soums, the KQP model achieves an average accuracy of 45%, when the prices are 375-576 thousand soums, the forecast accuracy is 40% on average, and when the price is more than 576 thousand soums, an average forecast accuracy of 40% is achieved.

3. Results

In conclusion, based on the analysis of data from 103 respondents, based on the latent layer weights of the KQP model, the presence of dairy products on a hypothetical agritourism farm, the location of the farm on a river or mountain, the presence of vegetable and fish farming, a kitchen, a swimming pool, sports equipment, a grill for barbecue, conditions for fishing and cooking, and the presence of special service personnel increase the likelihood of visiting an agritourism farm and being satisfied with higher prices for services.

At the same time, during the study, we added eight variables to the variable $Y_2 -$ - Respondent's level of satisfaction with the price of agritourism

At the same time, during the study, we added eight variables to the variable $Y_2 -$ - Respondent's level of satisfaction with the price of agritourism: The impact of $Q_2, Q_{16}, Q_{17}, Q_{18}, Q_{19}, Q_{20}, Q_{22}$ va Q_{23} factors was assessed.

The effect of these factors on Y_1 was calculated using a polynomial logistic regression model in IBM SPSS. The mathematical form of the polynomial logistic regression model is as follows:

$$\Pr(Y_i = k) = \frac{1}{1+\sum_{j=1}^{k-1} e^{\beta_j X_i}} \qquad (3)$$

Here $Y_i -$-relevant random variables, $k -$ the number of discrete values of each variable, $X_i -$ the relevant influencing factor, $\beta_j -$ the relevant coefficients.

Below are some characteristics of the polynomial logistic regression model calculated in IBM SPSS software in the tables 3.

Table 3. **Pseudo R squared**

Cox and Snell	0,574
Neidjelkerk	0,681
McFadden	0,461

According to the data in Table 3, the independent factors in the model explain 68% of the variation in the independent factor (the value of the Neidjelkkerk coefficient). In general, the significance of the impact of each of the 8 factors listed above on the independent variable is presented in Table 4.

Table 4. Variable impact criteria

	Model criteria	Reliability criteria		
Variable	-2 Log-reliability	Chi-square	Liberty degrees	Importance
Free term	97,820[a]	,000	0	.
Completed education	112,062	14,242	4	0,007
Access to the internet	114,346	16,526	8	0,035
Pool	116,433	18,613	8	0,017
Sports and Gym equipment	123,728	25,908	8	0,001
Garden	111,265	13,445	8	0,097
Barbeque grill	109,165	11,345	8	0,183
Fishing and cooking	116,384	18,564	8	0,017
Service providers (cooker, assistant). etc.	123,048	25,228	8	0,001

From the data in **Table 4**, it can be seen that the effect of the remaining 7 factors on the random variable, except for the factor of having a barbecue grill on an agrotourism farm, is statistically significant at a 90% confidence level.

4. Discussion

The data on the effect of each of the random factors on the random variable, assuming that other factors remain unchanged, is presented in Table 4. For example, changing the availability of the Internet on an agrotourism farm from 2 (important) to 3 (very important) increases the probability of respondents being satisfied with the service by 4.7 times when the price of services increases from the lower price of 190-375 thousand soums to 375-576 thousand soums. The presence of a swimming pool on an agrotourism farm increases the probability of respondents being satisfied with the service by 1.3 times when the price of services increases. At the same time, the presence of a garden also increases the probability of respondents being satisfied with the service by 14 times when prices increase [21], [22]. It was found that the presence of specialized service personnel on the farm increased the likelihood of respondents being satisfied with the service by 23 times, even when prices increased from 190-375 thousand to 375-576 thousand soums.

5. Conclusion

This study's results provide a detailed comprehension of the principal elements affecting agritourism growth in Uzbekistan. Utilising a multilayer perceptron (MLP) model and polynomial logistic regression, we established that particular services and amenities—including dairy production, vegetable and fish farming, picturesque natural settings (e.g., mountains, riversides), internet connectivity, kitchens, swimming pools, gardens, and specialised service staff—substantially enhance both the probability of tourist visitation to agrotourism farms and their satisfaction with service pricing. The significant impact of service workers and fishing possibilities on satisfaction levels is particularly noteworthy, especially when price ranges rise. These findings highlight the significance of value-added services in influencing customer expectations and behaviour within rural tourism. The neural network model (KQP) had an accuracy of 70% in anticipating tourist behaviour and satisfaction, underscoring its practical relevance in tourism management and demand prediction. The model indicated that urban respondents exhibited greater happiness when certain modern amenities, such as internet access and sports facilities—were available, implying a convergence between rural authenticity and contemporary expectations.

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