

American Journal of Economics and Business Management

Vol. 9 Issue 10 | **pp.** 1118-1133 | **ISSN:** 2576-5973
Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Diversified Agritourism Services as a Driver of Job Creation and Employment Formalisation: Panel Evidence from the Regions of Uzbekistan

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Abstract: The study provides an econometric basis for the employment effects of diversified agritourism services in Uzbekistan and tests whether a target of 40,000 jobs – 24,000 newly created and 16,000 brought out of the shadow economy – is attainable through the development of agritourism destinations. A three-block model is estimated on official regional data for 14 territories: (1) a cross-regional log-log employment equation linking jobs in accommodation and food services to the number of persons accommodated (2024–2025, n = 28); (2) a two-way fixed-effects dynamic panel of the employment intensity of sectoral output (2018–2025, n = 112); and (3) a pooled regression of the shadow-economy share in services on the density of formal accommodation capacity (2023–2025, n = 42). The tourism-demand elasticity of sectoral employment equals 0.539 ($p < 0.001$; 95% CI 0.379–0.699), the short- and long-run output elasticities of employment equal 0.069 and 0.220, and a one-log-unit increase in formal capacity density lowers the shadow share in services by 3.78 percentage points ($p = 0.029$). All models pass tests for heteroscedasticity, functional form, normality, multicollinearity and influential observations, or are estimated with robust (cluster, Driscoll–Kraay) standard errors where tests so require. Simulations show that a 7.5% increase in persons accommodated generated by diversified agritourism destinations by 2030 yields about 23,800 new jobs, and a 1.85-fold rise in formal capacity density brings about 16,000 jobs out of the shadow economy, jointly reaching the 40,000-job benchmark.

Keywords: Agritourism, service diversification, employment elasticity, informal employment, shadow economy, panel data, fixed effects, simulation, Uzbekistan.

Citation: Abdug'ani o'g'li A. O. Diversified Agritourism Services as a Driver of Job Creation and Employment Formalisation: Panel Evidence from the Regions of Uzbekistan. American Journal of Economics and Business Management 2026, 9(10), 1118-1133.

Received: 10th Jul 2026
Revised: 11th Aug 2026
Accepted: 11th Sep 2026
Published: 27th Oct 2026

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1. Introduction

Employment generation has become the central yardstick by which tourism policy in Uzbekistan is assessed. The Decree No. PF-217 of 18 November 2025 sets out a programme of measures for a management system in the ecology and tourism sectors [1], while the Resolution No. PQ-161 of 30 April 2026 approved the targeted list of 30 promising land plots with a total area of 1,263 hectares on which tourism projects are to be implemented in 2026–2030 [2]. Among the expected outcomes of these documents is the creation of 24,000 new jobs in tourism and related industries and the removal of 16,000 jobs from the shadow economy – 40,000 jobs in total. The question this article addresses is whether such a target is economically justified, and through which channels diversified agritourism services can contribute to it.

The relevance of the question is reinforced by two structural features of the sector. First, employment in accommodation and food services (hereafter AFS) is growing much more slowly than its output: between 2019 and 2025 the number of persons employed in AFS in the 14 territories of the country increased from 315.3 to 389.5 thousand (+23.5%), while the number of collective accommodation facilities increased 2.3 times and the nominal output of AFS 4.5 times (Figure 1). Second, the sector is characterised by a high degree of informality: according to a 2026 UNDP study, the unobserved economy accounts for 87% of value added in AFS and about 23% of its employees work informally [3]. Any job target in this sector therefore has two dimensions – the quantity of new jobs and the quality (formality) of existing ones.

In previous work, we used a multilayer perceptron (MLP) on a survey of 103 respondents to identify the agritourism services that raise both the propensity to visit farm destinations and the willingness to pay: dairy and vegetable production on site, internet access, a swimming pool, fishing and barbecue facilities, trained service staff, and mountain, lake or riverside location [4]. International experience of successful agritourism destinations [5] and the dynamics of foreign tourists' spending [6] were analysed separately. What has been missing is a quantitative bridge between the diversified service package and labour-market outcomes. This article provides such a bridge and serves as the analytical basis for the proposal implemented by the Tourism Committee of the Republic of Uzbekistan, which included the "Agrotourism destinations services" model in the action plan under Resolution No. PQ-161 [7].

The **aim of the study** is to estimate, on official regional statistics, the employment response of the tourism economy to the expansion of visitor flows and formal accommodation capacity, and to determine the parameters of agritourism destination development under which the 24,000 + 16,000 job target is attainable by 2030. The study tests three hypotheses: H1 – regional employment in AFS is positively and inelastically related to the number of persons accommodated; H2 – the growth of sectoral output translates into employment gradually, with a long-run elasticity exceeding the short-run one; H3 – a higher density of formal accommodation capacity is associated with a lower share of the shadow economy in services.

Agritourism is commonly defined as tourism that takes place on a working farm and involves visitors in agricultural activities to varying degrees. S. Phillip, C. Hunter and K. Blackstock proposed a typology distinguishing direct, indirect and passive contact with agriculture [8], and C. Gil Arroyo, C. Barbieri and S. Rich showed that stakeholders differ in how broadly they define the activity [9]. The common denominator of these definitions is diversification: the farm adds hospitality, education, recreation and direct sales to its traditional production function.

A large body of evidence links agritourism to farm income and sustainability. C. Barbieri compared agritourism with other farm entrepreneurial ventures and found it superior on several sustainability criteria, including job creation for family members [10]. C. Tew and C. Barbieri showed that providers value agritourism primarily for additional revenue and direct marketing [11]. Using national farm survey data, H. Joo, A. Khanal and A. Mishra found that participation in agritourism increases farm income [12], while A. Khanal and A. Mishra demonstrated that for small farms agritourism complements off-farm work as a survival strategy [13]. B. Schilling, K. Sullivan and S. Komar quantified agritourism revenue in New Jersey [14], C. Lupi and co-authors documented its contribution to rural development in Italy [15], and A. Fleischer and A. Tchetchik showed that rural tourism earns a premium when it is embedded in active agriculture [16].

At the macro level, the employment and growth effects of tourism have been studied with increasingly rigorous designs. B. Faber and C. Gaubert used coastal geography in Mexico as a source of exogenous variation and found large positive effects of tourism on local employment and income, including spillovers to manufacturing [17]. R. Paci and E.

Marrocu found that tourism flows contribute to regional growth in Europe [18], and J. Brida, I. Cortes-Jimenez and M. Pulina concluded in their review that the tourism-led growth hypothesis is supported in most empirical studies [19]. At the same time, R. Lacher and C.-O. Oh warned that tourism is often a low-wage industry [20], and A. Ladkin emphasised the informality, seasonality and low qualification of tourism labour [21]. These findings make it necessary to distinguish between the quantity and the quality of tourism jobs.

Methodologically, the link between output and employment is captured by the employment elasticity of growth, which S. Kapsos estimated for a wide range of countries and sectors and found to be typically well below unity in services [22]. The informality dimension draws on the literature on the shadow economy: F. Schneider and D. Enste showed that the shadow economy expands where the costs of formality are high [23], while R. La Porta and A. Shleifer argued that informal firms are small, unproductive and become formal mainly as the formal sector expands around them [24]. R. Mahadevan, H. Amir and A. Nugroho showed for Indonesia that the distributional effects of tourism-led growth depend on regional economic structure [25].

Two gaps emerge from this review. First, agritourism studies are mostly micro-level and rarely translate service diversification into regional employment estimates usable for policy targets. Second, the formalisation channel – the conversion of informal hospitality into registered accommodation – has received little econometric attention, particularly in transition economies of Central Asia. The present study addresses both gaps.

2. Data and Methodology

Data

All variables are drawn from official sources of the National Statistics Committee of the Republic of Uzbekistan: the SIAT open data portal [26] and the annual press releases on the development of tourism and recreation [27]. The unit of observation is a territory (the Republic of Karakalpakstan, 12 regions and Tashkent city). Variables, definitions and sources are listed in Table 1, and descriptive statistics in Table 2.

Table 1. Variables, definitions and sources

Symbol	Definition	Unit	Period	Source (dataset)
L	Employment in accommodation and food services	thousand persons	2010–2025	SIAT 2789–2803
A	Persons accommodated in all collective accommodation facilities	thousand persons	2024–2025	Tourism press releases
Y	Output (volume) of accommodation and food services, current prices	billion UZS	2017–2025	SIAT 1223
GRP	Gross regional product, current prices	billion UZS	2010–2025	SIAT 1299
FAC	Number of collective accommodation facilities (all types)	units	2023–2025	Tourism press releases
D	Formal capacity density: FAC per 1,000 AFS workers	units	2023–2025	calculated
SH	Share of the shadow economy in services (annual mean of quarters)	% of GRP	2018–2025	SIAT 4665
L_{TRADE}, L_{TRANS}	Employment in trade and in transportation and storage	thousand persons	2010–2025	SIAT 2789–2803
L_{TSA}	Employees of legal entities in tourism industries (tourism satellite account)	persons	2019–2024	SIAT 3333

Table 2. Descriptive statistics of the estimation samples

Variable	Sample	n	Mean	Std. dev.	Min	Max
L, thousand	Model 1	28	26.89	17.79	7.00	77.10
A, thousand	Model 1	28	293.50	370.17	35.10	1,524.60
GRP, trillion UZS	Model 1	28	104.70	75.92	28.66	367.22
L, thousand	Model 2	112	24.38	15.08	4.30	77.10
Y, billion UZS	Model 2	112	7,828.3	6,704.6	616.3	38,743.7
SH, %	Model 3	42	19.65	4.28	10.60	27.70
D, units per 1,000 workers	Model 3	42	8.33	4.71	1.90	20.22

Table 3 presents the 2025 cross-section that underlies the analysis. The labour intensity of hospitality differs markedly across territories: per 1,000 persons accommodated, AFS employs 50.6 workers in Tashkent city and 47.1 in Bukhara, but 278.7 in Namangan and 326.5 in Andijan. Regions with dense, formal accommodation networks (Bukhara, Tashkent city, Tashkent region, Khorezm) show a lower shadow-economy share in services than regions where hospitality is dominated by small catering outlets (Namangan, Karakalpakstan, Kashkadarya). This pattern motivates H3.

Table 3. Regional indicators of the hospitality sector, 2025

Territory	L, thousand	A, thousand	L per 1,000 A	Y, billion UZS	SH, %	FAC, units	D
Karakalpakstan	14.8	58.4	253.4	12,385.5	24.3	90	6.08
Andijan	33.5	102.6	326.5	15,147.3	20.3	113	3.37
Bukhara	18.3	388.4	47.1	11,576.6	18.0	370	20.22
Jizzakh	12.8	114.9	111.4	6,949.1	17.9	124	9.69
Kashkadarya	19.6	108.8	180.1	19,981.2	23.8	141	7.19
Navoi	8.7	97.9	88.9	6,885.9	14.4	105	12.07
Namangan	34.7	124.5	278.7	23,631.5	26.5	87	2.51
Samarkand	56.2	746.1	75.3	25,977.9	20.0	501	8.91
Surkhandarya	17.5	125.7	139.2	9,760.8	17.6	103	5.89
Syrdarya	7.5	43.2	173.6	4,365.2	18.6	31	4.13
Tashkent region	32.3	463.8	69.6	16,110.2	15.0	442	13.68
Fergana	36.5	194.5	187.7	22,806.9	22.1	167	4.58
Khorezm	20.0	262.7	76.1	12,632.9	23.4	251	12.55
Tashkent city	77.1	1,524.6	50.6	38,743.7	11.1	1,119	14.51
Uzbekistan	**389.5**	**4,356.1**	**89.4**	**226,954.7**	**13.0**	**3,644**	**9.36**

Source: author's calculations based on SIAT data and the 2025 tourism press release. Note: the national SH value is the mean of the four quarters of 2025 for the Republic.

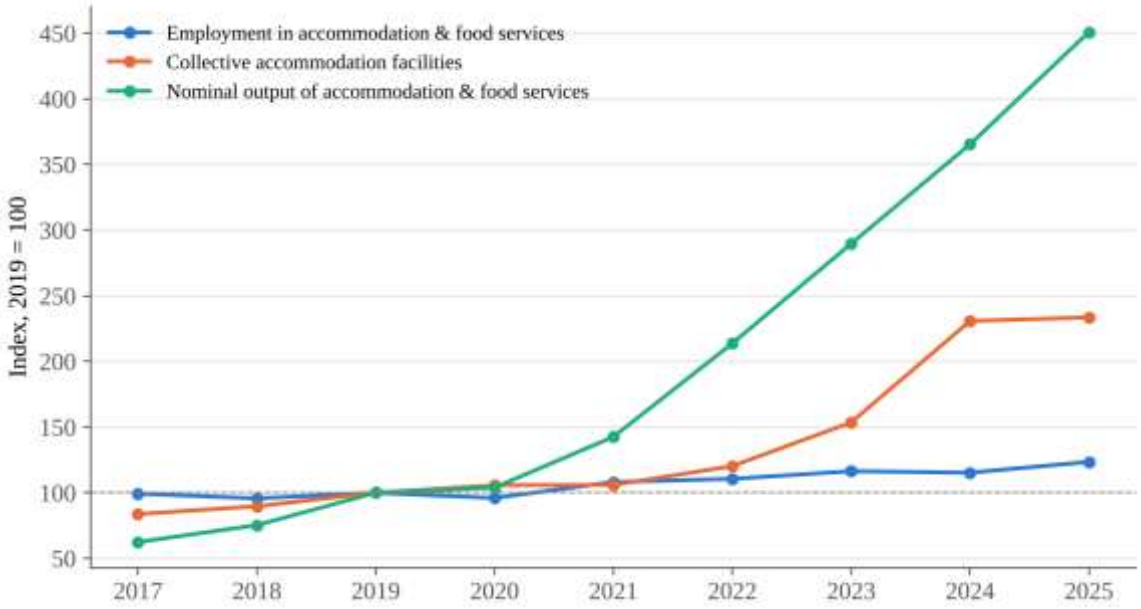


Figure 1. Employment, accommodation capacity and output of the hospitality sector, index 2019 = 100

Source: author's calculations based on SIAT data.

Analytical framework and model specification

The analytical framework is shown in Figure 2. A diversified agritourism service package, identified in the earlier MLP analysis [4], raises visitor flows to agritourism destinations and requires formal accommodation capacity on farms and in rural guest houses. Visitor flows create jobs in AFS (Model 1) and in adjacent tourism industries (tourism satellite account ratio and Model 4), sectoral output translates into employment over time (Model 2), and the growth of formal capacity reduces the shadow economy (Model 3).

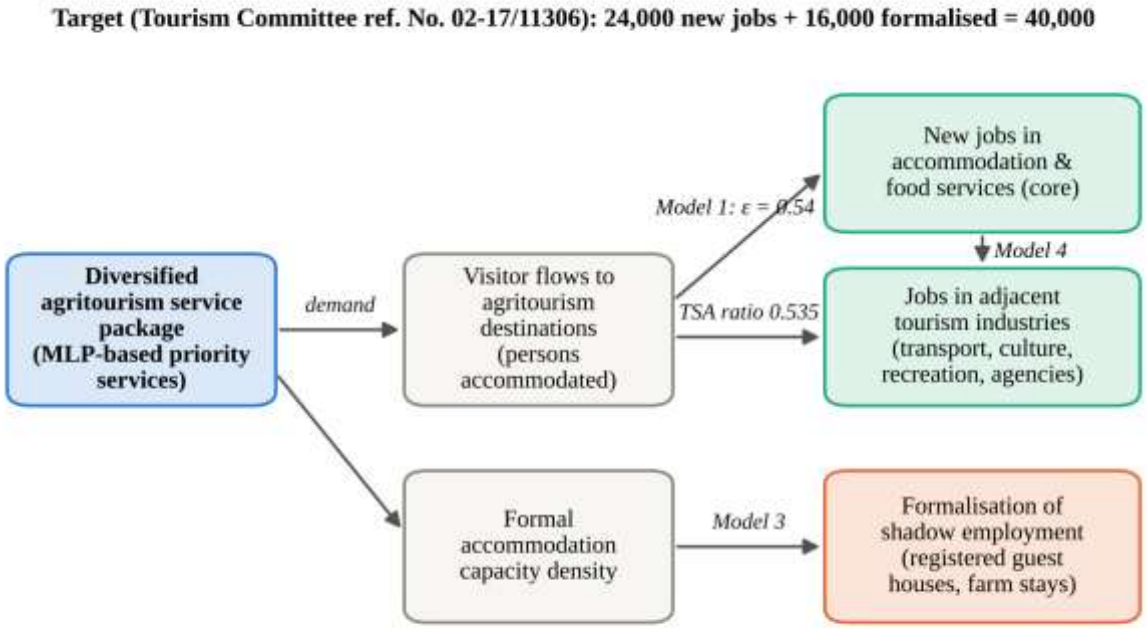


Figure 2. Analytical framework linking diversified agritourism services to job creation and formalisation

Model 1 (tourism-demand elasticity of employment) is a pooled cross-regional log-log equation:

$$ln\ L_{it} = \beta_0 + \beta_1\ ln\ A_{it} + \beta_2\ ln\ GRP_{it} + \delta \cdot D2025_t + \varepsilon_{it}\ ,\quad i = 1\ldots14,\ t = 2024,\ 2025, \qquad (1)$$

where β_1 is the elasticity of sectoral employment with respect to the number of persons accommodated. Because regional differences in tourism intensity accumulate over decades, the cross-regional (between) dimension identifies the long-run relationship; the year dummy absorbs common shocks. Specification 1a omits GRP, specification 1b includes it as a control for the overall size of the regional economy.

Model 2 (employment intensity of output) is a dynamic two-way fixed-effects panel:

$$ln\ L_{it} = \alpha_i + \lambda_t + \beta\ ln\ Y_{it} + \rho\ ln\ L_{i,t-1} + u_{it}\ ,\quad \varepsilon_{LR} = \beta\ /\ (1 - \rho)\ , \qquad (2)$$

where α_i and λ_t are territory and year effects. Year effects absorb the common AFS price deflator, so nominal output can be used without bias in β. The sample starts in 2018 (with 2017 as the lag) because SIAT output data are methodologically comparable only from 2017, when surveys of the informal and shadow economy were incorporated. The standard error of the long-run elasticity ε_{LR} is obtained by the delta method.

Model 3 (formalisation channel) relates the shadow share in services to formal capacity density:

$$SH_{it} = \gamma_0 + \gamma_1\ ln\ D_{it} + \gamma_2\ ln\ GRP_{it} + \Sigma\ \tau_t\ Year_t + v_{it}\ ,\quad t = 2023,\ 2024,\ 2025\ . \qquad (3)$$

Model 4 (adjacent industries) estimates two-way fixed-effects elasticities of employment in trade and in transport with respect to AFS employment (2010–2025, n = 224) and is used as evidence that hospitality employment co-moves with employment in related industries. For the job calculations we use the more conservative tourism satellite account (TSA) ratio of employment in adjacent tourism industries to employment in AFS.

All models are subjected to a full set of tests [28]: Breusch–Pagan [29] and White tests for heteroscedasticity, Ramsey's RESET for functional form [30], Jarque–Bera and Shapiro–Wilk tests for normality, variance inflation factors (VIF) and Cook's distance. For the panel model we apply the F-test for fixed effects, the Breusch–Pagan LM test for random effects, the Hausman test [31], the Wooldridge test for serial correlation, the modified Wald test for groupwise heteroscedasticity and Pesaran's CD test for cross-sectional dependence [32]; inference is based on standard errors clustered by territory and on Driscoll–Kraay standard errors [33]. Because the time dimension of Model 2 is short (T = 8), the dynamic fixed-effects estimator carries a Nickell bias of order 1/T [34]; we therefore treat the long-run elasticity as a conservative estimate and cross-check it against Model 1. Estimation was performed in Python 3 (statsmodels 0.15, linearmodels 7.1); equivalent Stata commands are given in the Appendix.

3. Results

Tourism demand and employment in accommodation and food services (Model 1)

The pairwise correlation between ln L and ln A equals 0.786, between ln L and ln GRP 0.650, and between ln A and ln GRP 0.756. Estimation results are reported in Table 4 and visualised in Figure 3.

Table 4. Model 1: tourism-demand elasticity of employment in accommodation and food services (dependent variable: ln L)

Variable	1a: OLS	1b: OLS	1c: 2024 only	1d: 2025 only
ln A	0.539*** (0.082)	0.472* (0.261)	0.557*** (0.100)	0.523*** (0.097)
ln GRP	–	0.146 (0.427)	–	–
D2025	0.020 (0.033)	−0.001 (0.071)	–	–
Constant	0.287 (0.470)	−1.017 (3.483)	0.195 (0.551)	0.393 (0.559)
Observations	28	28	14	14

Variable	1a: OLS	1b: OLS	1c: 2024 only	1d: 2025 only
R^2	0.618	0.625	0.627	0.608
Adjusted R^2	0.587	0.578	0.596	0.575
F-statistic (p-value)	20.18 (<0.001)	13.31 (<0.001)	–	–
AIC / BIC	34.11 / 38.10	35.58 / 40.91	–	–
ln A: p-value, HC3 SE	<0.001	0.031	<0.001	<0.001

*Source: author's estimations. Standard errors clustered by territory in parentheses (heteroscedasticity-consistent HC3 for 1c–1d); * **p < 0.01,** p < 0.05, * p < 0.1.*

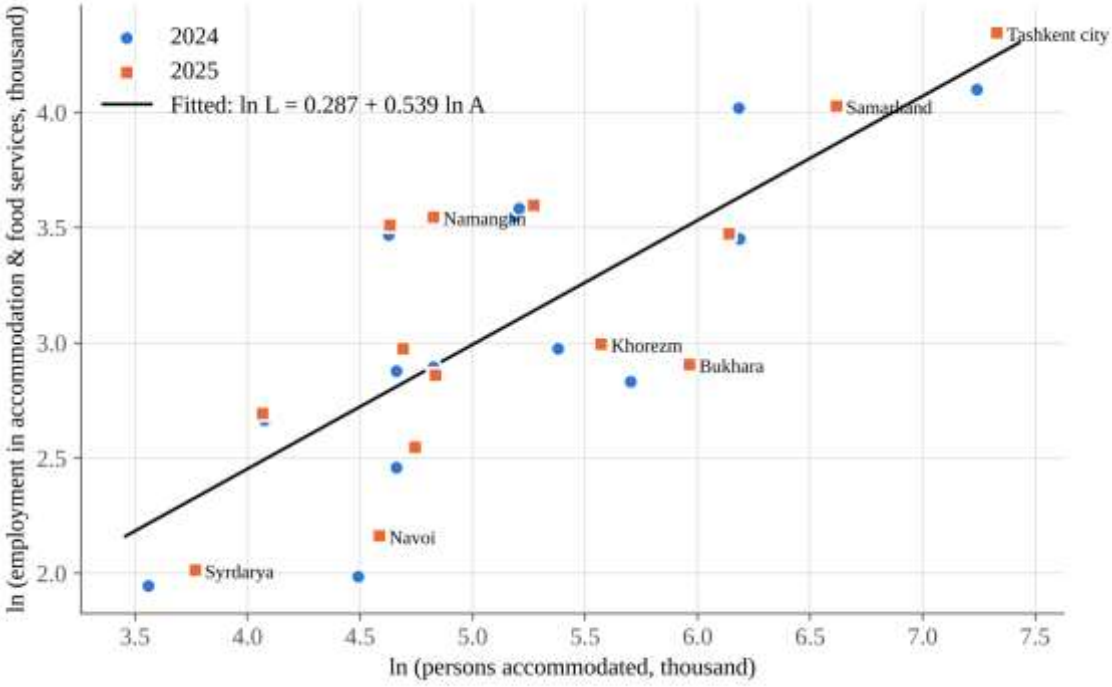


Figure 3. Employment in accommodation and food services versus persons accommodated, 14 territories, 2024–2025 (log scale)

The preferred specification 1a yields an elasticity of 0.539 with a cluster-robust standard error of 0.082 (t = 6.59, p < 0.001; 95% confidence interval 0.379–0.699). A 10% larger flow of persons accommodated is thus associated with about 5.4% higher employment in AFS. The coefficient is remarkably stable across years (0.557 in 2024 and 0.523 in 2025) and remains significant when GRP is added (specification 1b: 0.472, p = 0.031 with HC3 standard errors), while GRP itself is insignificant. This indicates that the relationship reflects tourism demand rather than the overall size of regional economies. H1 is confirmed: the relationship is positive and inelastic, which is consistent with economies of scale in hospitality and with the international evidence on employment elasticities in services [22].

Specification 1a passes the full diagnostic set (Table 5): residuals are homoscedastic, normally distributed and free of functional-form misspecification, there is no multicollinearity, and no observation exceeds the Cook's distance threshold of 4/n. The residual plots in Figure 4 confirm these results visually.

Table 5. Diagnostic tests for Models 1a and 3a

Test	H_0	Model 1a: statistic (p-value)	Model 3a: statistic (p-value)	Conclusion
Breusch–Pagan	homoscedasticity	$\chi^2 = 1.25$ (0.536)	$\chi^2 = 3.80$ (0.283)	H_0 not rejected
White	homoscedasticity	$\chi^2 = 3.88$ (0.422)	$\chi^2 = 4.02$ (0.675)	H_0 not rejected
Ramsey RESET	correct functional form	F = 0.23 (0.638)	F = 0.05 (0.831)	H_0 not rejected
Jarque–Bera	normal residuals	JB = 0.99 (0.608)	JB = 3.11 (0.211)	H_0 not rejected
Shapiro–Wilk	normal residuals	W = 0.967 (0.499)	W = 0.919 (0.005)	1a: not rejected; 3a: see note
VIF (max)	no multicollinearity (< 5)	1.00	1.41	passed
Cook's distance (max)	no influential points (< 4/n)	0.103 (< 0.143)	0.087 (< 0.095)	passed

Source: author's estimations. Note: for Model 3a the Shapiro–Wilk test signals mild non-normality, but the Jarque–Bera test does not; inference relies on cluster-robust standard errors, which do not require normality.

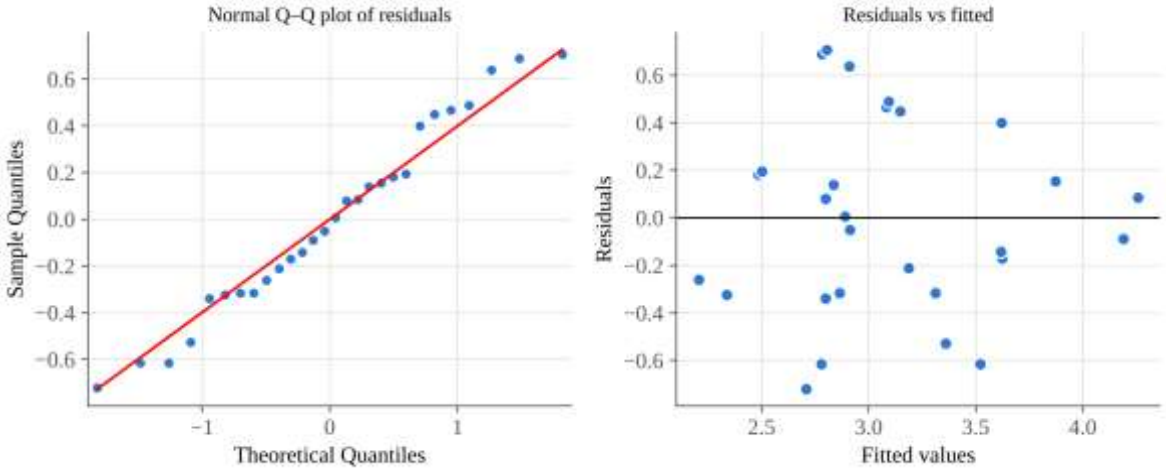


Figure 4. Residual diagnostics of Model 1a

Employment intensity of sectoral output (Model 2)

Model 2 estimates how the growth of AFS output translates into jobs over time. Results and specification tests are presented in Tables 6 and 7.

Table 6. Model 2: dynamic two-way fixed-effects model (dependent variable: ln L), 2018–2025

Variable	Coefficient	Cluster SE (p)	Driscoll–Kraay SE (p)	Robust SE (p)
ln Y (short-run elasticity)	0.069	0.035 (0.050)	0.020 (0.001)	0.034 (0.047)
ln L_{t-1} (ϱ)	0.686	0.101 (<0.001)	0.116 (<0.001)	0.088 (<0.001)
Long-run elasticity β/(1−ϱ)	0.220	0.126 (0.082)	–	–
Territory and year effects	yes			

Variable	Coefficient	Cluster SE (p)	Driscoll–Kraay SE (p)	Robust SE (p)
Observations / territories	112 / 14			
R^2 (within)	0.664			
F-statistic (p-value)	40.70 (<0.001)			

Source: author's estimations. The standard error of the long-run elasticity is computed by the delta method.

Table 7. Specification tests for the panel model

Test	H_0	Statistic	p-value	Decision
F-test for territory effects	all $\alpha_i = 0$	F = 5.97	<0.001	fixed effects required
Breusch–Pagan LM	no random effects	$\chi^2 = 0.04$	0.842	random effects not supported
Hausman	RE consistent	$\chi^2(2) = 15.83$	<0.001	fixed effects preferred
Wooldridge	no AR(1) in errors	F(1,13) = 4.11	0.064	no serial correlation at 5%
Pesaran CD	no cross-sectional dependence	CD = −1.63	0.103	no dependence at 5%
Modified Wald	groupwise homoscedasticity	$\chi^2(14)$ = 52.68	<0.001	robust SE used
Jarque–Bera	normal residuals	JB = 7.37	0.025	large-sample inference used

The specification tests unanimously support the fixed-effects estimator: territory effects are jointly significant, the Hausman test rejects random effects, and the LM test finds no random-effects variance component. The errors show no first-order serial correlation and no cross-sectional dependence at the 5% level (average absolute residual correlation 0.36), so the estimates are not driven by common shocks unaccounted for by year effects. Groupwise heteroscedasticity is present, which is why inference relies on cluster-robust and Driscoll–Kraay standard errors.

The short-run output elasticity of employment equals 0.069 (p = 0.050 with clustered and p = 0.001 with Driscoll–Kraay errors), and the persistence parameter equals 0.686. The implied long-run elasticity is 0.220 (p = 0.082). H2 is therefore confirmed: output growth in hospitality creates jobs with a lag, and about three times as many jobs appear in the long run as in the year of the shock (Figure 5). A permanent 10% increase in sectoral output raises employment by 0.69% in the first year, 1.87% after five years and approaches 2.2% in the long run. The fact that the output-based long-run elasticity (0.22) is lower than the demand-based elasticity of Model 1 (0.54) is expected: output growth in nominal terms partly reflects price and productivity increases, while visitor numbers are a direct measure of the volume of services that must be delivered by staff.

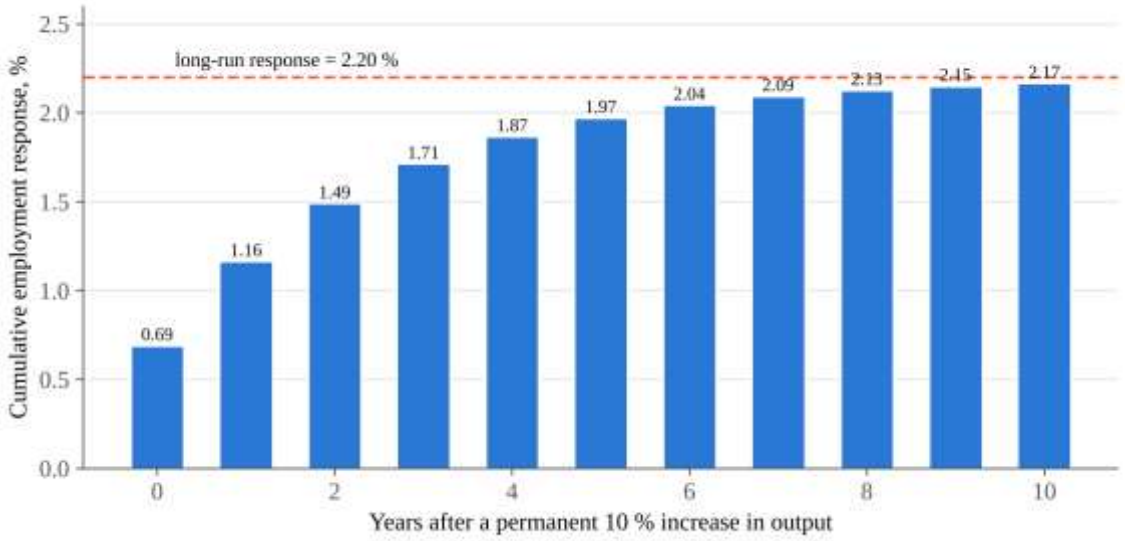


Figure 5. Cumulative response of employment in accommodation and food services to a permanent 10% increase in sectoral output

Formal accommodation capacity and the shadow economy (Model 3)

Table 8. Model 3: shadow-economy share in services and formal capacity density (dependent variable: SH, %)

Variable	3a: coefficient	Cluster SE (p)	3b: coefficient	Cluster SE (p)
ln D	−3.784	1.738 (0.029)	−2.607	1.581 (0.099)
ln GRP	–	–	−2.947	1.952 (0.131)
Year 2024	0.686	0.653 (0.293)	0.813	0.615 (0.186)
Year 2025	0.554	0.503 (0.271)	1.269	0.723 (0.079)
Constant	26.628	3.038 (<0.001)	57.311	21.549 (0.008)
Observations	42		42	
R^2 / adjusted R^2	0.274 / 0.216		0.398 / 0.333	
F-statistic (p-value)	4.77 (0.006)		6.11 (0.001)	

Source: author's estimations. In specification 3b the conventional (non-clustered) p-values of ln D and ln GRP equal 0.015 and 0.009.

In the preferred specification 3a, a one-log-unit increase in the number of formal accommodation facilities per 1,000 AFS workers is associated with a 3.78 percentage-point lower share of the shadow economy in services ($p = 0.029$ with clustered errors; $p < 0.001$ with conventional errors). The specification passes the heteroscedasticity, functional-form, normality (Jarque–Bera), multicollinearity and influence tests (Table 5). When GRP is added (3b), the coefficient remains negative and of similar magnitude (−2.61) but its precision falls because GRP and capacity density are correlated; since 3b fails the RESET test, it is reported only as a robustness check. H3 is thus supported: regions whose hospitality employment is anchored in a dense network of registered facilities have a smaller shadow sector (Figure 6). The result is consistent with the view that informality recedes as the formal sector expands around informal producers [24] and that lowering the cost of registration reduces the incentive to stay in the shadow [23].

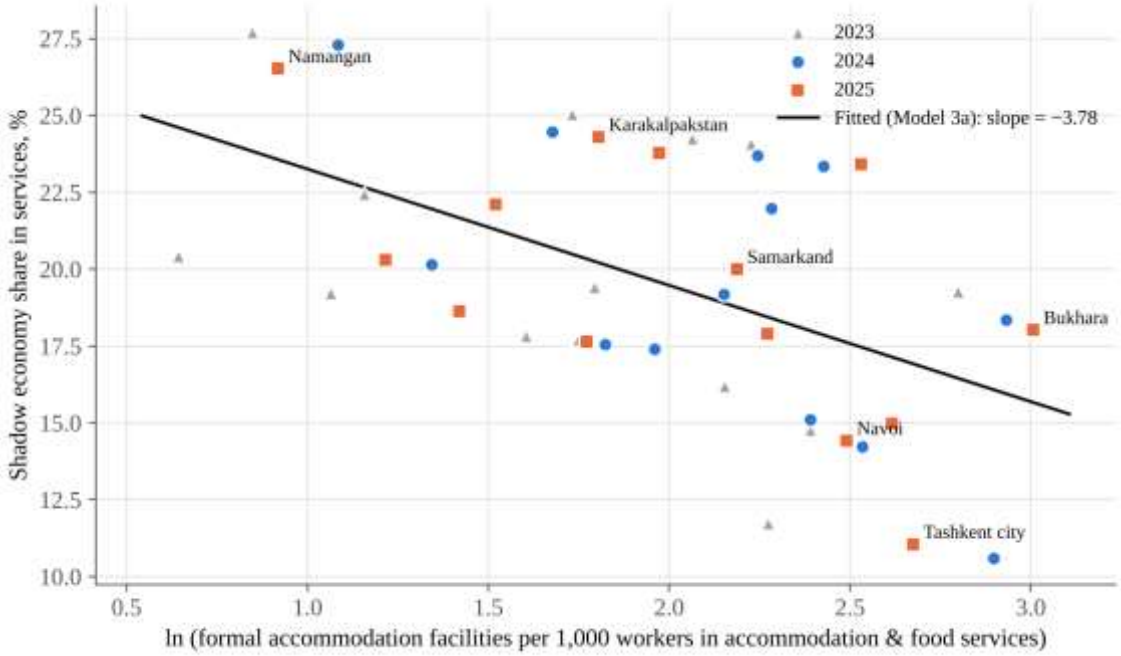


Figure 6. Shadow-economy share in services and formal accommodation capacity density, 2023–2025

Adjacent tourism industries (Model 4 and the tourism satellite account)

Jobs created by agritourism are not limited to accommodation and catering. In the two-way fixed-effects panel for 2010–2025 (n = 224, Driscoll–Kraay errors), the elasticity of employment in trade with respect to AFS employment equals 0.625 (SE 0.017, $p < 0.001$) and that of employment in transport equals 0.640 (SE 0.077, $p < 0.001$), controlling for GRP. Because these elasticities measure co-movement in large sectors and may overstate the tourism-specific effect, the job calculations rely on the narrower TSA ratio. In 2024 legal entities in tourism industries employed 162,737 persons in accommodation and food-serving services and 87,027 persons in adjacent tourism industries (passenger transport, transport rental, travel agencies, cultural, sports and recreational services). Each job in AFS is thus accompanied by 0.535 jobs in adjacent tourism industries.

The TSA data also document the formalisation trend. The share of AFS employment accounted for by legal entities increased from 38.4% in 2019 (121,182 of 315.3 thousand) to 44.8% in 2024 (162,737 of 363.5 thousand), i.e. by 1.28 percentage points a year. Given AFS employment of 389.5 thousand in 2025, each percentage point of formalisation corresponds to about 3,900 jobs.

Simulation of the employment effects of diversified agritourism destinations, 2026–2030

The estimated parameters are used to simulate the employment effect of agritourism destinations that offer the diversified service package. New jobs in AFS are calculated as $\Delta L = L_0[(1 + g)^{\beta_1} - 1]$, where $L_0 = 389.5$ thousand (2025), $\beta_1 = 0.539$ (Model 1a) and g is the additional growth of persons accommodated generated by agritourism destinations by 2030. Jobs in adjacent industries equal $0.535 \cdot \Delta L$. Three scenarios are considered (Table 9).

Table 9. Simulated new jobs created by diversified agritourism destinations by 2030

Scenario	g, %	Additional persons accommodated, thousand	New AFS jobs	New jobs in adjacent industries	Total new jobs	95% interval
Conservative	4.0	174.2	8,323	4,451	12,773	8,946–16,625

Scenario	g, %	Additional persons accommodated, thousand	New AFS jobs	New jobs in adjacent industries	Total new jobs	95% interval
Baseline	7.5	326.7	15,485	8,281	23,766	16,599–31,015
Accelerated	12.0	522.7	24,537	13,122	37,659	26,216–49,312

In the baseline scenario, agritourism destinations add 7.5% to the number of persons accommodated (326.7 thousand persons a year by 2030), which generates 15,485 jobs in AFS and 8,281 in adjacent industries, i.e. 23,766 new jobs. Solving the model for exactly 24,000 jobs gives g = 7.58%, or about 330 thousand additional persons accommodated per year. Distributed across the 30 land plots of Resolution No. PQ-161, this corresponds to roughly 11,000 guests per destination per year, or about 30 guests a day – a realistic load for a farm destination of 40–45 hectares with guest houses, a tasting hall and recreation facilities. Even the lower bound of the confidence interval (16,600 jobs) represents a substantial contribution, while the accelerated scenario shows that the target can be exceeded if diversified services attract more than 12% additional demand.

The formalisation effect is simulated with Model 3a. With 23% of AFS employees working informally, as estimated in the UNDP study [3], the informal pool in 2025 equals about 89.6 thousand persons. Assuming that informal employment declines in proportion to the shadow share in services (13.03% in 2025), the number of jobs brought out of the shadow equals 89.6 thousand × $(-\gamma_1 \cdot \Delta \ln D)/13.03$. Table 10 shows the results.

Table 10. Simulated formalisation of shadow employment through formal capacity growth by 2030

Increase in capacity density D	Δ ln D	Change in shadow share, p.p.	Jobs brought out of the shadow	95% interval
×1.50	0.405	−1.53	10,553	1,053–20,053
×1.85 (baseline)	0.615	−2.33	16,011	1,597–30,425
×2.20	0.788	−2.98	20,521	2,047–38,995

A 1.85-fold increase in formal capacity density – from 9.36 to about 17.3 registered facilities per 1,000 AFS workers – formalises about 16,000 jobs. With AFS employment rising to roughly 413 thousand after the creation of new jobs, this requires about 7,150 registered facilities in 2030, i.e. some 3,500 more than in 2025 or about 700 per year. This pace is consistent with recent experience: the number of collective accommodation facilities increased by 1,991 units in 2021–2025 and by 1,204 units in 2024 alone. An independent cross-check gives a similar figure: continuing the 2019–2024 growth of the legal-entity share of AFS employment (1.28 percentage points a year) for slightly more than three years yields 16,000 formal jobs (4.1 percentage points of 389.5 thousand). Because the confidence interval of the formalisation effect is wide, the 16,000 figure should be regarded as attainable on condition that registration of family guest houses and farm stays inside agritourism destinations is actively encouraged.

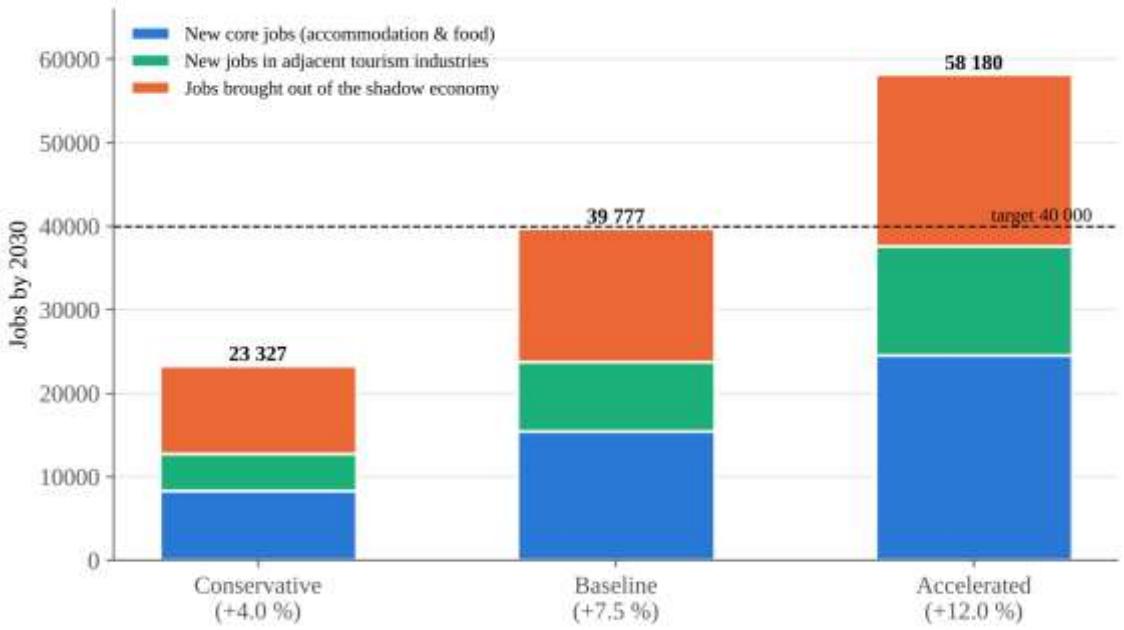


Figure 7. Simulated job effects of diversified agritourism destinations by 2030

Combining both channels, the baseline scenario yields 23,766 new jobs and 16,011 formalised jobs – 39,777 in total, which corresponds to the 40,000-job benchmark (Figure 7). The conservative scenario delivers about 23,300 jobs, the accelerated one about 58,200. The results are summarised in Table 11, which links the econometric evidence to the provisions implemented by the Tourism Committee.

Table 11. Correspondence between the empirical results and the implemented proposal

Element of the implemented proposal	Empirical basis in this study	Quantitative result
24,000 new jobs in tourism and related industries	Model 1a elasticity; TSA ratio of adjacent jobs	23,766 jobs at g = 7.5%; 24,000 at g = 7.58%
16,000 jobs brought out of the shadow economy	Model 3a; TSA formalisation trend; UNDP informality share	16,011 jobs at ×1.85 capacity density
Diversified services in agritourism destinations	MLP-based priority service package; Model 2 output elasticity	long-run output elasticity of jobs 0.22
Implementation sites (PQ-161)	30 land plots, 1,263 ha	≈11,000 guests per destination per year

4. Discussion

The estimated tourism-demand elasticity of 0.54 lies within the range typical for services [22] and implies that employment grows more slowly than visitor flows. This has two implications. First, hospitality in Uzbekistan enjoys scale economies: large urban hotels in Tashkent, Samarkand and Bukhara serve many guests per worker, while in regions with few guests employment is dominated by catering. Second, agritourism can raise the labour intensity of tourism, because farm stays, tastings, master classes and guided farm visits require more staff per guest than standardised urban accommodation. In this sense the baseline estimate based on the national average elasticity is conservative for agritourism.

The dynamic model shows that most of the employment response materialises with a lag. Policy evaluation of agritourism projects within the 2026–2030 horizon should

therefore expect only about one third of the long-run effect in the first year; the remainder follows as destinations build their reputation and occupancy. The findings for the formalisation channel complement the micro evidence that informality in catering is driven by compliance costs and cash payments [3]: where formal capacity is denser, the shadow share is lower. For agritourism this means that simplified registration of rural guest houses, farm stays and family catering inside designated destinations is not only a fiscal measure but an employment-quality measure.

For Samarkand region, which accounts for 17.1% of persons accommodated in the country, a proportional allocation of the baseline scenario implies about 56.0 thousand additional guests, 2,230 new AFS jobs and 1,190 jobs in adjacent industries, i.e. about 3,400 new jobs. Given the region's comparative advantages in viticulture and horticulture and its low current share of rural districts in tourism flows, the regional potential is likely to be higher.

The study has limitations. The cross-regional elasticity is estimated on two years of regional accommodation data, because consistent regional series of persons accommodated are not published for earlier years; its stability across 2024 and 2025 is nevertheless reassuring. The dynamic panel is short and subject to Nickell bias, and the output data are in current prices; the use of year effects mitigates the latter. The formalisation simulation assumes proportionality between the shadow share in services and informal employment in AFS. Future research could use administrative records of registered guest houses and farm-level survey data to estimate the employment effects of agritourism directly.

5. Conclusion

The study provides econometric evidence that diversified agritourism services can make a quantifiable contribution to employment in Uzbekistan. The main conclusions are as follows. Employment in accommodation and food services is positively and inelastically related to tourism demand: the elasticity with respect to persons accommodated equals 0.539 (95% CI 0.379–0.699); the model passes all diagnostic tests. Sectoral output translates into jobs gradually: the short-run elasticity equals 0.069 and the long-run elasticity 0.220; the fixed-effects specification is supported by the F, LM and Hausman tests, and the errors show no serial correlation or cross-sectional dependence. A higher density of formal accommodation capacity is associated with a smaller shadow economy in services: a one-log-unit increase in density lowers the shadow share by 3.78 percentage points. If diversified agritourism destinations increase the number of persons accommodated by 7.5% by 2030 and formal capacity density rises 1.85 times, about 23,800 new jobs will be created and about 16,000 jobs brought out of the shadow economy – close to 40,000 jobs in total. This provides the analytical basis for the corresponding provision included in the action plan under Resolution No. PQ-161. Practical recommendations follow from these results: to include the priority agritourism service package in the design of tourism projects on the 30 land plots of Resolution No. PQ-161; to introduce a simplified, low-cost registration regime for farm stays and rural guest houses within agritourism destinations; to monitor the indicators used in this study (persons accommodated, AFS employment, capacity density and the shadow share in services) annually by region; and to incorporate the estimated elasticities into the evaluation of tourism investment projects.

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