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Assessing the Socio-Economic Efficiency of Service Sector Development: A Methodological Framework and Evidence from the Regions of Uzbekistan

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Abstract: The service sector has become the main driver of structural change in Uzbekistan, yet the socio-economic efficiency of its development is still judged mostly by output volumes. This paper proposes a methodological framework that classifies efficiency assessment methods into direct, indirect and mixed groups and organises the corresponding indicators at the macro, meso and micro levels. Two components of the framework are applied empirically. First, an integral regional index is built from official 2025 data on market services in the 13 regions of Uzbekistan, excluding the capital, using per capita service volume, volume growth and per capita growth. The regions fall into three groups: Samarkand, Tashkent region, Namangan and Khorezm form the high group, while Karakalpakstan, Syrdarya, Surkhandarya and Kashkadarya form the low group. Tashkent city, with per capita services 4.6 times the national average, is treated as a structural outlier. Second, the link between innovation activity and service sector development is examined with national data for 2010–2020. Strong correlations in levels ($r = 0.97$ for innovative output) disappear when growth rates are used, indicating that the apparent relationship largely reflects common trends. The findings suggest that regional service policy should target lagging regions through per capita indicators rather than aggregate volumes, and that the impact of innovation on services needs firm-level evidence rather than national time series. The framework can support the monitoring targets introduced for the service sector in 2025..

Keywords: service sector, socio-economic efficiency, assessment methods, regional development, integral index, innovation, Uzbekistan.

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1. Introduction

Services now account for the largest and fastest-growing part of most economies, and Uzbekistan is no exception. According to the National Statistics Committee, market services in Uzbekistan reached UZS 1,050.3 trillion in 2025, an increase of 14.7% on 2024 [1]. In 2025 the government also introduced target indicators for the service sector and a system for monitoring them. This raises a practical question: how should the efficiency of service sector development be measured, and how should regions be compared?

Output volumes alone are a poor guide. A region can increase its service volume because of population growth, price effects or the expansion of a single large market while its residents still lack access to basic services. Conversely, the social value of services such as education, health care or district heating is not fully captured by their market price. The literature offers many separate tools for assessing efficiency, including input-output

analysis, expert assessments, quality scales and composite indices, but they are rarely brought together into a single framework that tells an analyst which tool to use for which purpose and at which level [2].

Efficiency has been understood in different ways: as the classical ratio of results to costs as Pareto's state in which no participant can be made better off without making another worse off as a function of the quality of management and the balance among production factors and, in marketing, as an external indicator of meeting customer needs, distinct from productivity as an internal ratio of output to input. For services, these views converge on a broad understanding of efficiency that includes both the economic result and the degree to which the service meets the needs of its users. Baumol argued that labour-intensive services tend to show slower productivity growth than manufacturing, which raises their relative costs over time, but later research showed that innovation can offset this tendency: innovating service firms outperform non-innovators in productivity and growth in Italy and innovation activities raise labour productivity across ten Portuguese service industries. Because service innovation is often organisational or process-based and involves customers directly it is difficult to capture with conventional indicators such as R&D spending, which is reflected in the broad definition of innovation in the current Oslo Manual [3].

In the post-Soviet literature, the socio-economic efficiency of services is frequently expressed through additive formulas that combine the ratio of results to goals with costs and operating conditions or add service quality, affordability and the orientation of services towards users' well-being. Such formulas are conceptually useful but add quantities with different units, a problem that composite indices with normalised indicators and explicit weights avoid. At the consumer level, the SERVQUAL model measures service quality as the gap between customers' expectations and perceptions and Quality Function Deployment, or the "house of quality", links customer requirements to the technical characteristics of a service [4]. Partial indicators can be aggregated into one criterion with Harrington's desirability function expert assessment remains the main tool for weighting indicators when objective weights are unavailable and input-output analysis allows the inter-industry linkages of services to be valued in monetary terms. At the regional level, the contribution of services is assessed through their effect on gross regional product, budget revenues, employment, small business development and residents' quality of life while studies of utilities show that consumer perceptions depend on the regulatory model as well as on service quality.

The literature therefore provides a rich set of individual methods but little guidance on how to combine them into a coherent system for a national service sector, especially in transition economies where data are limited. Regional studies of Uzbekistan typically describe growth in service volumes but rarely construct comparable integral indices, and many report correlation coefficients between innovation indicators and service output without testing whether these reflect common trends, a well-known source of spurious regression results [5].

This paper addresses that gap. Its objectives are threefold: (1) to classify methods for assessing the socio-economic efficiency of service sector development and to link them to indicators at the macro, meso and micro levels; (2) to apply an integral index to compare the regions of Uzbekistan using the latest official data; and (3) to examine critically whether innovation activity can be shown to drive service sector growth with the available national statistics.

The paper contributes in three ways. It offers a structured classification of assessment methods adapted to the service sector of a transition economy. It provides an up-to-date regional grouping of Uzbekistan based on 2025 data. It also shows that strong correlations between innovation indicators and service output, often reported in the regional literature, do not survive a simple test for common trends [6].

2. Materials and Methods

The framework was developed through theoretical generalisation, systematisation and classification of existing approaches. It combines two dimensions: the level of assessment (macro, meso, micro) and the type of method (direct, indirect, mixed). Direct methods value the results of service provision in monetary terms. The proposed basis for them is the input–output model, in which services are divided into n industries and the output of each industry equals the sum of intermediate and final demand:

$$x = Ax + f \Rightarrow x = (I - A)^{-1} f \quad (1)$$

where x is the vector of service output by industry, A is the matrix of technical coefficients $a_{ij} = z_{ij} / x_j$, f is final demand from households, government, investment and exports, and $(I - A)^{-1}$ is the Leontief matrix of total requirements. Indirect methods rely on expert assessment of relative indicators. Mixed methods combine quantitative indicators with expert or consumer judgements in rating and composite indices.

To compare regions, an integral index was calculated from the official data published by the National Statistics Committee for January–December 2025. Three indicators were selected to capture both level and dynamics while neutralising differences in region size: per capita market services (UZS million), growth of total service volume (%), and growth of per capita service volume (%). Each indicator was normalised to the 0–1 range using min–max scaling. Per capita volume was log-transformed before scaling to reduce the influence of extreme values. The index is the unweighted mean of the three normalised indicators:

$$I_r = (1/3) \sum_k (x_{rk} - \min_k) / (\max_k - \min_k) \quad (2)$$

Tashkent city was excluded from the index calculation and analysed separately because its per capita service volume (UZS 126.3 million) is 4.6 times the national average and would compress the scale for all other regions. Regions were grouped into three levels using the interval length

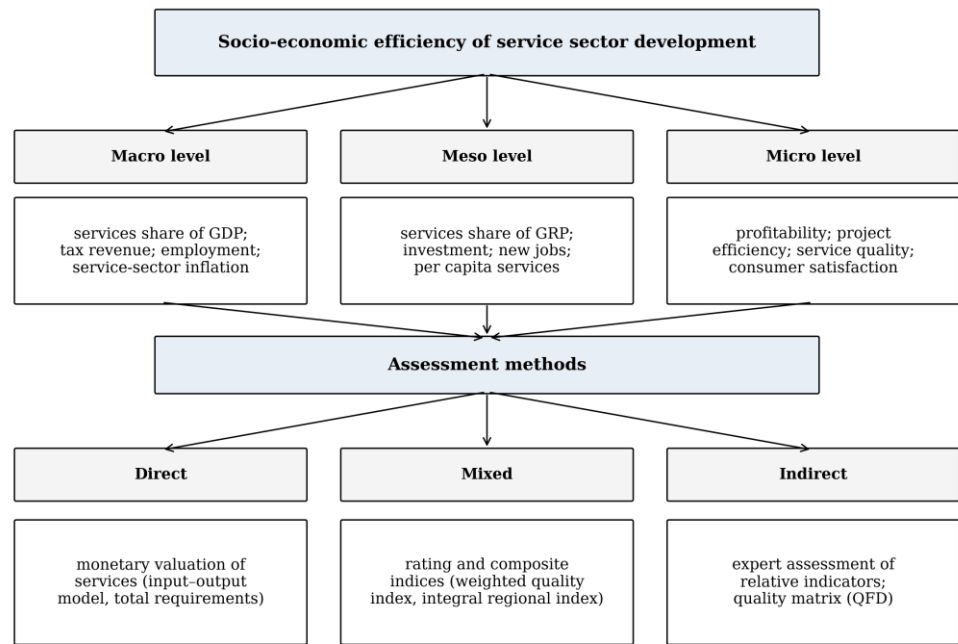
$$h = (I_{\max} - I_{\min}) / n \quad (3)$$

where $n = 3$ is the number of groups.

The link between innovation and services was examined with annual national data for 2010–2020 compiled from statistical yearbooks of the National Statistics Committee. The dependent variable is the volume of services provided (UZS trillion, current prices). The six explanatory indicators are: the volume of innovative goods, works and services (X1); expenditure on innovation (X2); R&D personnel (X3); R&D personnel with higher education (X4); the number of enterprises that implemented innovations (X5); and the number of innovations implemented (X6). Pearson correlation coefficients and simple linear regressions were first estimated in levels. Because all series share strong upward trends and are in current prices, correlations were then recalculated for annual log growth rates as a robustness check against spurious correlation. Correlation strength was interpreted with the Chaddock scale. Calculations were performed in Python (pandas, SciPy).

3. Results

Figure 1 summarises the proposed framework. At the macro level, efficiency is reflected in the share of services in GDP, tax revenues, employment and service-sector inflation. At the meso level, it is reflected in the share of services in gross regional product, investment, job creation and per capita service consumption [7]. At the micro level, it is reflected in profitability, project efficiency, service quality and consumer satisfaction. Each level is matched with the most suitable group of methods.



Innovation efficiency: index, scoring (Harrington desirability) and correlation-regression methods

Figure 1. Framework for assessing the socio-economic efficiency of service sector development

Source: developed by the author.

Table 1 sets out the classification criteria and their analytical purpose.

Table 1. Classification of approaches to assessing the socio-economic efficiency of the service sector

Classification criterion	Indicators	Analytical purpose
Integration of elements into a system	correlation of services across industries; effect of services on regional and national development	to assess efficiency from the combination of individual elements
Scope of assessment	integral regional indicator; indicators by service type and by economic activity	to compare individual providers, industries and regions
Components of system performance	structure of services; factors of service sector development; management of the external environment	to assess achievement of regional strategic goals
Balanced directions of assessment	resource and financial efficiency; institutional support; human capital	to assess the efficiency of resource use for public services
Type of integral indicator	rating; volume of immobilised resources; competitiveness; use of economic potential	to provide an overall evaluation of all indicators

Source: developed by the author.

Table 2 shows the structure of market services in 2025. Accommodation and food services form the largest category (21.6% of the total), followed by transport (17.9%), trade (17.8%) and financial services (16.3%) [8]. The fastest growth was recorded in financial

services (24.6%) and information and communication services (22.7%). Financial services alone contributed 4.0 percentage points to the overall growth of 14.7%.

Table 2. Market services by main type, Uzbekistan

Type of service	2024, UZS trillion	2025, UZS trillion	Growth, %	Share in 2025, %
Accommodation and food services	183.9	226.9	110.4	21.6
Transport	151.8	188.3	110.8	17.9
Trade	155.0	187.0	113.8	17.8
Financial services	135.8	171.9	124.6	16.3
Information and communication	56.9	79.5	122.7	7.6
Education	32.1	39.6	110.4	3.8
Real estate	20.9	25.9	113.1	2.5
Health care	16.0	19.9	114.2	1.9
Other services	87.7	111.3	–	10.6
Total	840.1	1,050.3	114.7	100.0

Source: National Statistics Committee of the Republic of Uzbekistan. "Other services" combines rental, repair, personal, architectural and engineering, and other services. Growth rates are as published by the National Statistics Committee.

Services remain highly concentrated geographically. Tashkent city accounted for 37.8% of all market services (UZS 397.4 trillion) and grew by 17.7%, faster than any other region [9]. Per capita services in the capital reached UZS 126.3 million, against a national average of UZS 27.7 million. Small businesses provided 56.7% of market services nationally, but only 40.9% in Tashkent city, compared with 71–76% in most regions. In the regions, therefore, service provision depends heavily on small businesses, which makes it more sensitive to changes in regulation and access to finance.

Table 3 and Figure 2 present the integral index for the 13 regions. The index ranges from 0.13 (Kashkadarya) to 0.87 (Samarkand). With an interval length of $h = 0.247$, four regions fall into the high group, five into the medium group and four into the low group [10].

Table 3. Indicators and integral index of service sector development by region, 2025

Region	Per capita services, UZS million	Volume growth, %	Per capita growth, %	Integral index	Group
Samarkand	18.0	115.9	113.6	0.87	High
Tashkent region	22.9	115.2	113.2	0.84	High
Namangan	17.8	115.4	113.1	0.73	High
Khorezm	18.0	115.2	113.1	0.71	High
Andijan	15.5	114.7	112.6	0.50	Medium
Jizzakh	15.9	114.7	112.5	0.50	Medium
Bukhara	20.4	114.0	112.2	0.49	Medium
Navoi	23.3	113.7	111.8	0.46	Medium
Fergana	17.2	114.4	112.2	0.45	Medium
Karakalpakstan	17.2	113.7	112.3	0.38	Low
Syrdarya	15.6	113.4	111.4	0.16	Low
Surkhandarya	11.9	114.1	111.5	0.13	Low
Kashkadarya	14.7	113.6	111.2	0.13	Low

Region	Per capita services, UZS million	Volume growth, %	Per capita growth, %	Integral index	Group
Tashkent city (outlier)	126.3	117.7	115.1	–	–

Source: calculated by the author from National Statistics Committee of the Republic of Uzbekistan.

The grouping differs noticeably from a ranking by total service volume. Fergana, which ties with Tashkent region for the third-largest volume (UZS 71.8 trillion), is only in the medium group because its per capita level and growth are modest [11]. Navoi and Bukhara have relatively high per capita services but slower growth, which places them in the medium group. Syrdarya combines a below-average per capita level with the lowest volume growth in the country (113.4%) and falls into the low group. Surkhandarya has the lowest per capita services in the country (UZS 11.9 million).

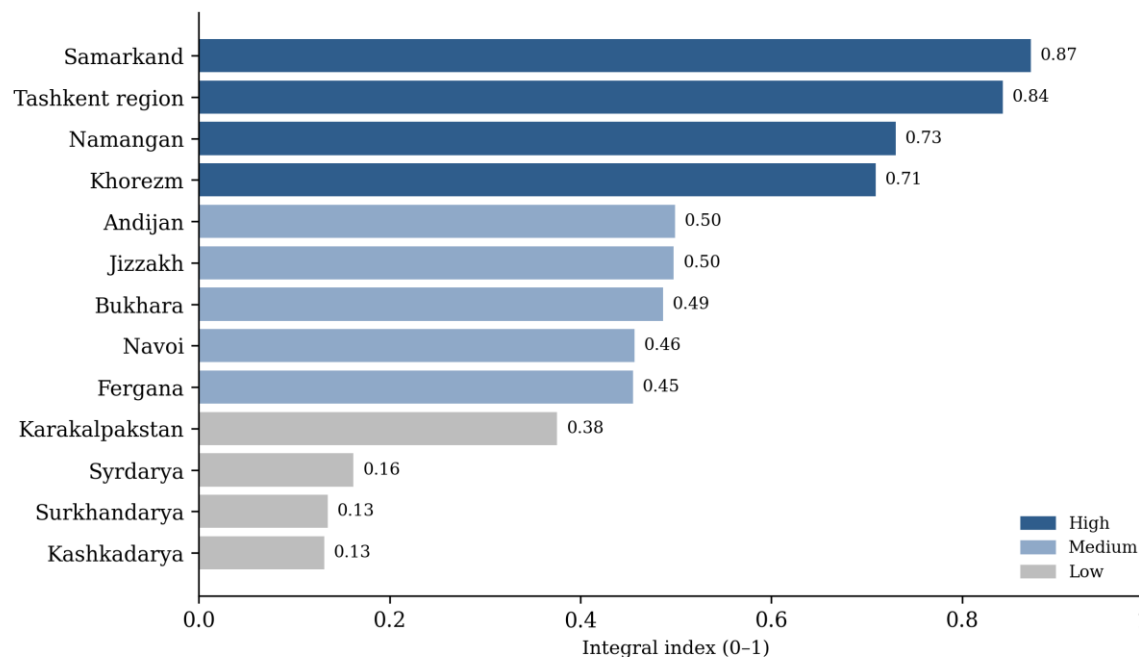


Figure 2. Integral index of service sector development by region, 2025 (Tashkent city excluded)

Source: calculated by the author.

Table 4 reports the correlation between service volume and innovation indicators. In levels, the volume of innovative output (X1) and the number of innovations implemented (X6) show very strong positive correlations with service volume ($r = 0.97$), while innovation expenditure (X2) and the number of innovating enterprises (X5) show strong correlations ($r = 0.81$ and 0.86) [12]. R&D personnel (X3, X4) are negatively correlated with service volume, reflecting a decline in R&D staff in 2019–2020 while services continued to grow. The simple regressions in levels yield high coefficients of determination, for example $R^2 = 0.94$ for X1 and X6.

Table 4. Correlation between service volume and innovation indicators, Uzbekistan, 2010–2020

Indicator	r (levels)	P	r (log growth rates)	p
X1 Innovative goods, works and services	0.97	<0.001	–0.06	0.88
X2 Expenditure on innovation	0.81	0.002	0.16	0.67
X3 R&D personnel	–0.65	0.030	–0.28	0.44
X4 R&D personnel with higher education	–0.49	0.130	–0.27	0.44

Indicator	r (levels)	P	r (log growth rates)	p
X5 Enterprises that implemented innovations	0.86	<0.001	0.41	0.25
X6 Innovations implemented	0.97	<0.001	0.51	0.13

Source: calculated by the author from statistical yearbooks of the National Statistics Committee (2010–2020). n = 11 years for levels and n = 10 for growth rates.

When annual growth rates are used, however, none of the correlations is statistically significant [13]. The coefficient for innovative output falls from 0.97 to –0.06. The largest coefficient in growth rates belongs to the number of innovations implemented (0.51, $p = 0.13$). The strong correlations in levels therefore mainly reflect common upward trends and nominal price growth rather than a demonstrated effect of innovation on services [14].

4. Discussion

The results support the view that efficiency in the service sector should be assessed with a combination of methods at different levels rather than with a single volume indicator. The regional index shows that a ranking by aggregate volume can be misleading. Large regions such as Fergana appear successful by volume but only average once population and dynamics are taken into account. This is consistent with the regional literature, which stresses per capita service availability and the contribution of services to residents' quality of life [15].

The concentration of services in Tashkent city and the high share of small businesses in the regions point to two different policy challenges. In the capital, growth is driven by financial and information services, which are less dependent on small firms. In the regions, services are provided mainly by small businesses and are therefore more exposed to changes in regulation, taxation and access to credit [16]. Measures to support service development in lagging regions such as Surkhandarya, Kashkadarya and Syrdarya should therefore focus on small business finance and on per capita access to basic services [17].

The innovation analysis illustrates a methodological pitfall. Correlations close to one between innovation indicators and service output are easy to obtain with short, trending national series [18]. Once growth rates are used, the relationship becomes weak and insignificant. This does not mean that innovation is unimportant for services. Firm-level studies from Italy and Portugal have found positive effects of innovation on productivity in services [19]. Rather, it means that national time series of innovation in Uzbekistan, which are dominated by manufacturing and are measured in current prices, are not suitable for identifying that effect. Service innovation is often organisational and customer-driven and is poorly captured by indicators such as R&D personnel [20].

The study has several limitations. The regional index uses three indicators with equal weights, and expert weighting could change the boundaries between groups. Data on enterprise profitability and gross regional product by sector, which are needed for the intensive efficiency coefficient, were not available for 2025. The innovation analysis relies on only 11 annual observations in current prices.

5. Conclusions

This paper proposed a framework that classifies methods for assessing the socio-economic efficiency of service sector development into direct, indirect and mixed groups and links them to indicators at the macro, meso and micro levels. Applying an integral index to 2025 data divided the 13 regions of Uzbekistan into three groups. Samarkand, Tashkent region, Namangan and Khorezm form the high group, while Karakalpakstan, Syrdarya, Surkhandarya and Kashkadarya form the low group. Tashkent city remains a structural outlier. A re-examination of national data showed that the strong correlations between innovation and service volume found in levels do not hold in growth rates.

Several policy implications follow. First, the monitoring of service sector targets introduced in 2025 should include per capita and growth indicators alongside total volumes, so that lagging regions can be identified and supported. Second, support for service development in the low group should prioritise small business finance and access to basic services. Third, official statistics should collect data on innovation specifically in service enterprises, including organisational and process innovation, in line with the Oslo Manual. Fourth, future evaluations of the link between innovation and services should use firm-level or regional panel data in constant prices.

Future research could extend the regional index with expert-derived weights and additional indicators such as sectoral profitability and employment, and could apply consumer-based quality indices to specific services such as district heating, education and health care.

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Use of artificial intelligence. AI-based tools were used in drafting, editing and translating the text, performing the statistical calculations and formatting the manuscript according to the journal's requirements. All results, sources and conclusions were verified by the author, who takes full responsibility for the content of the article.

Data availability. The regional data used in this study are publicly available from the National Statistics Committee of the Republic of Uzbekistan. The calculations are available from the author upon request.

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