

ECONOSCITECH INTEGRATION

ISSUE
9

INTERNATIONAL SCIENTIFIC
ELECTRONIC JOURNAL



**TASHKENT STATE
UNIVERSITY OF ECONOMICS**



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ISSN: 3060-5075



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2026

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ELECTRONIC JOURNAL
"ECONOSCITECH-INTEGRATION"
HAS BEEN REGISTERED UNDER
THE NUMBER C-5669651 BY THE
AGENCY FOR INFORMATION AND
MASS COMMUNICATIONS (AOKA)
OF THE REPUBLIC OF UZBEKISTAN,
EFFECTIVE FROM OCTOBER 9, 2024.

In accordance with Resolution No. 384/6 dated April 10, 2026, issued by the Presidium of the Supreme Attestation Commission under the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan, this journal is included in the list of recommended international scientific publications for publishing the primary research findings of doctoral dissertations in the field of Economic Sciences.

Partners: Tashkent State University of Economics / American University of Technology in Tashkent (AUT)

Electronic publication. Issue 9. 500 pages.
Approved for publication in September 2026.

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METHODS FOR ASSESSING THE IMPACT OF SMALL BUSINESS DEVELOPMENT ON NATIONAL ECONOMIC GROWTH

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Abstract. This article examines methodological approaches to assessing the impact of small business development on national economic growth. The study systematizes quantitative, structural, index-based, correlation-regression, and forecasting approaches, proposing an integrated assessment framework that combines the production, institutional, innovation, digital, human-capital, and economic-stability dimensions of small business development. The empirical section utilizes statistical data for Uzbekistan for 2010–2025 and a system of six composite indices: innovation development, institutional development, management efficiency, digitalization, human capital, and economic stability. The study demonstrates that assessing the role of small business solely through its share in gross domestic product is insufficient, as the sector may simultaneously exhibit high employment, investment, and export activity while facing productivity, institutional, or technological constraints. Therefore, a Min–Max normalization procedure and an integral index are proposed to ensure comparability across indicators. The article also considers multiple regression analysis as a tool for examining the relationship between small business development and economic growth. The results highlight the importance of controlling for multicollinearity and avoiding causal interpretations based solely on short annual time series. The proposed methodology can be applied to national and regional monitoring, comparative assessment, and the formulation of evidence-based small business development policies.

Keywords: small business, economic growth, sustainable economic growth, SME development, integral index, Min–Max normalization, correlation analysis, regression analysis, human capital, digitalization, innovation, Uzbekistan.

Аннотация. В статье исследованы методологические подходы к оценке влияния развития малого бизнеса на экономический рост страны. Систематизированы количественные, структурные, индексные, корреляционно-регрессионные и прогнозные подходы, а также предложена комплексная система оценки, объединяющая производственное, институциональное, инновационное, цифровое, кадровое и экономическое измерения развития малого бизнеса. В эмпирической части использованы статистические данные по Узбекистану за 2010–2025 гг. и система из шести частных индексов: инновационного развития, институционального развития, эффективности управления, цифровизации, человеческого капитала и экономической устойчивости. Обосновано, что оценка роли малого бизнеса исключительно по его доле в валовом внутреннем продукте является недостаточной, поскольку данный сектор может одновременно демонстрировать высокую занятость, инвестиционную и экспортную активность, сталкиваясь при этом с ограничениями производительности труда, институциональными или технологическими барьерами. В связи с этим для обеспечения сопоставимости показателей предложены процедура нормализации методом Min–Max и интегральный индекс. В статье также рассматривается множественная регрессия как инструмент изучения взаимосвязи между развитием малого бизнеса и экономическим ростом. Результаты указывают на необходимость контроля мультиколлинеарности и избежания причинно-следственных трактовок, основанных исключительно на коротких годовых временных рядах. Разработанный методологический подход может применяться для национального и регионального мониторинга, сравнительной оценки и формирования научно обоснованной государственной политики развития малого бизнеса.

Ключевые слова: малый бизнес, экономический рост, устойчивый экономический рост, развитие МСП, интегральный индекс, нормализация Min–Max, корреляционный анализ, регрессионный анализ, человеческий капитал, цифровизация, инновации, Узбекистан.

INTRODUCTION

Economic growth is a fundamental indicator of national economic development and structural transformation. Modern economic analysis views growth beyond a simple expansion of physical output, emphasizing long-term determinants such as human and physical capital accumulation, knowledge diffusion, technological innovation, efficient resource allocation, and a supportive institutional environment. Lucas (1988) highlighted the critical role of human capital accumulation, while Romer (1990) demonstrated that technological progress stems from intentional investment in knowledge.

This framework directly applies to small business development. According to the World Bank, small and medium enterprises (SMEs) account for roughly 90% of businesses and over 50% of employment globally, contributing up to 40% of GDP in emerging economies despite financial constraints. Furthermore, ILO (2019) data across 99 countries shows that self-employed individuals, micro-enterprises, and small businesses represent nearly 70% of total employment, underscoring the need to evaluate their contribution alongside productivity, formality, job quality, and market access.

However, sector size alone does not guarantee proportional productivity gains. Beck, Demirgüç-Kunt, and Levine (2005) identified a strong positive correlation between SME prevalence and per capita GDP growth, though cross-country evidence does not establish a direct causal link. Consequently, assessing the economic impact of small business requires a multidimensional methodology that encompasses output, employment, investment, innovation, digitalization, human capital, institutional quality, management efficiency, export capacity, and economic resilience.

This study aims to develop and substantiate a comprehensive methodological framework to assess the contribution of small business development to national economic growth, using Uzbekistan as an empirical case for the 2010–2025 period.

The research tasks are as follows:

1. Systematize existing approaches to measuring small business contributions to economic growth;
2. Identify key dimensions and indicators of small business development;
3. Formulate a system of partial indices for multidimensional assessment;
4. Apply Min–Max normalization to ensure indicator comparability;
5. Construct an integral small business development index;
6. Analyze the relationship between small business development and economic growth using correlation and regression methods;
7. Outline methodological limitations and formulate policy recommendations for system enhancement.

LITERATURE REVIEW

The theoretical foundations for assessing the role of small business in economic growth stem from several complementary strands of economic thought.

Lucas (1988) placed human capital accumulation at the core of long-term economic development, a concept highly relevant to small firms as both consumers and generators of human capital through employment, practical learning, and knowledge transfer. Romer (1990) explained long-term growth through intentional investments in knowledge and technology, where small enterprises contribute via experimentation, innovation, product differentiation, and knowledge commercialization. Building on this, Aghion and Howitt (1992) developed the mechanism of creative destruction, establishing a theoretical basis for entrepreneurial firms as drivers of technological renewal. However, Acs and Audretsch (1987) demonstrated that the innovative advantage between small and large firms varies according to market structure, capital intensity, entry barriers, labor skills, and industry characteristics, supporting a differentiated assessment across sectors. Furthermore, Porter (1990) emphasized examining small business as part of broader production networks, clusters, and competitive systems.

The institutional dimension is emphasized in North's (1990) framework, which identifies formal and informal rules as key determinants of economic performance that directly influence market entry, contract enforcement, property rights, financing access, and transaction costs for small businesses. International empirical evidence reinforces this multidimensional perspective. The OECD (2010, 2023) notes that while small firms significantly drive innovation, they simultaneously navigate challenges related to productivity, digitalization, labor availability, financing, global value chains, and the green transition, requiring appropriate knowledge flows and institutional support.

Consequently, the existing literature demonstrates that the contribution of small business to economic growth should be assessed as an integrated system of interconnected economic, institutional, technological, social, and organizational effects.

RESEARCH METHODOLOGY

The empirical analysis utilizes annual data for Uzbekistan covering the period 2010–2025. This 16-year observation window encompasses significant structural transformations, accelerated digitalization, entrepreneurial expansion, and evolution within the investment and export ecosystems.

Statistical data were primarily sourced from the National Statistics Committee of the Republic of Uzbekistan. The Committee's SIAT database provided time-series indicators regarding small business GDP contribution, employment generation, investment activity, industrial output, and export volumes.

For context, official data indicate that the national share of small business in Uzbekistan's GDP adjusted from 60.8% in 2010 to 52.2% in 2025, while the corresponding figure for the Andijan region shifted from 69.1% to 70.1%. This regional divergence underscores why relying solely on a single GDP-share metric provides an incomplete picture of small business development dynamics.

To address this, the study employs a five-level methodological framework:

1. Descriptive Level: Evaluates output, employment, investment, and export dynamics;

2. Structural Level: Determines sector shares within aggregate national economic indicators;

3. Multidimensional Index Level: Normalizes individual indicators and aggregates them into partial composite indices;

4. Econometric Level: Utilizes correlation and multiple regression modeling to analyze relationships between structural dimensions of small business and overall economic growth;

5. Forecasting Level: Applies identified econometric relationships to project baseline, optimistic, and pessimistic development scenarios.

3.1. Indicator System

Based on theoretical insights from endogenous growth, institutional economics, and competitiveness theories, six core dimensions were structured for assessment:

- Innovation development;
- Institutional development;
- Management efficiency;
- Digitalization;
- Human capital;

Economic stability (Table 1).

Table 1

System of partial composite indices for assessing small business development

Index	Symbol	Core Variables	Weight Structure
Innovation development index	K_{inno}	Services, industrial output, fixed-capital investment, newly created firms	0.25 each
Institutional development index	K_{inst}	Active firms, new firms, liquidated firms	0.40; 0.35; 0.25
Management efficiency index	K_{bs}	Labour productivity, output per enterprise, investment efficiency	0.40; 0.30; 0.30
Digitalisation index	K_{raq}	ICT services, electronic services, communication services	0.40; 0.30; 0.30
Human capital index	K_{ik}	Employment, labour productivity, highly educated employees	0.40; 0.35; 0.25
Economic stability index	K_{ib}	Exports, investment, value added, profitability	0.30; 0.25; 0.25; 0.20

The partial indices should be calculated only after bringing their component indicators to a comparable scale.

For a positive indicator, Min-Max normalisation is defined as:

$$Z_{it} = \frac{X_{it} - X_{\min}}{X_{\max} - X_{\min}}$$

where Z_{it} is the normalised value, X_{it} is the actual value, and $X_{\min}$ and $X_{\max}$ are the minimum and maximum values over the observation period.

For a negative indicator, the transformation should be reversed:

$$Z_{it} = \frac{X_{max} - X_{it}}{X_{max} - X_{min}}$$

This distinction is particularly important for indicators such as firm liquidation, overdue debt or other variables where an increase represents deterioration rather than improvement.

After calculating the six partial indices, the overall development index can be expressed as:

$$I_{total} = \sum_{j=1}^6 w_j K_j$$

If there is no statistically or theoretically justified reason to assign different weights, equal weights provide the most transparent baseline:

$$I_{total} = \frac{K_{inno} + K_{inst} + K_{bs} + K_{raq} + K_{ik} + K_{ib}}{6}$$

A critical methodological condition is that all six components must be on the same scale before aggregation. In the working dataset used in this study, K_{bs} initially ranges from 5.51 to 32.85, whereas the other indices are expressed approximately within the 0-1 interval. Therefore, using the raw K_{bs} together with the other indices would artificially increase the weight of management efficiency. It must first be normalised.

The general multiple regression model is specified as:

$$T_{io} = \beta_0 + \beta_1 K_{inno} + \beta_2 K_{inst} + \beta_3 K_{bs} + \beta_4 K_{raq} + \beta_5 K_{ik} + \beta_6 K_{ib} + \varepsilon$$

where: T_{io} - economic growth rate; ε - random error.

The model should be evaluated using R^2 , adjusted R^2 , the F-test, individual t-tests, p-values, confidence intervals, residual diagnostics and multicollinearity statistics.

For a short annual series, however, the econometric specification must be interpreted cautiously. Six explanatory variables with only 16 observations leave only nine degrees of freedom for the residual term. This makes the model highly sensitive to multicollinearity and individual observations.

ANALYSIS AND RESULTS

Official statistics demonstrate the substantial scale of small business activity in Uzbekistan. In 2010, small business accounted for 60.8% of GDP, adjusting to 52.2% by 2025. This structural shift does not imply a reduction in the sector's absolute economic contribution; rather, it reflects the rapid expansion of large-scale industrial output and broader macroeconomic transformations. Simultaneously, total employment within small businesses rose from 8.64 million in 2010 to 11.18 million in 2025, representing an approximate 29.4% increase.

Investment dynamics display an even more pronounced upward trajectory. Fixed-capital investment by small enterprises increased from 5,491.3 billion soums in 2010 to 362,910.0 billion soums in 2025. As these values are expressed in nominal terms, they should be interpreted alongside relevant price adjustments rather than as a direct 66-fold real gain. Nevertheless, the data confirm the expanding role of small businesses in national capital formation. Export performance also expanded significantly, rising from USD 1.78 billion in 2010 to USD 12.38 billion in 2025 according to the SIAT database (Table 2).

Table 2

Selected indicators characterizing the role of small business in Uzbekistan

Indicator	2010	2025	Change, %	Interpretation
Small business share in GDP, %	60.8	52.2	-14.1	Relative share moderated
Employment in small business, thousand persons	8,643.9	11,183.4	+29.4	Employment contribution strengthened

Fixed-capital investment, bln soums	5,491.3	362,910.0	+6508.8	Strong expansion in nominal terms
Exports, million USD	1,782.8	12,382.6	+594.6	Export orientation expanded
Small business share in investment, %	33.4	61.4	+28.0 p.p.	Investment contribution strengthened
Small business share in industrial production, %	26.6	34.9	+8.3 p.p.	Industrial contribution strengthened

The official investment-share series is particularly informative. Small business's share of total fixed investment increased from 33.4% in 2010 to 61.4% in 2025. In the Andijan region, this figure rose from 58.2% to 77.2%. Similarly, the national share of small business in total industrial production increased from 26.6% in 2010 to 34.9% in 2025, while in the Andijan region, it grew from 15.5% to 38.0%. These dynamics suggest that the economic contribution of small business extends beyond its GDP share. The sector simultaneously fulfills several core economic functions: creating employment, mobilizing investment, expanding exports, diversifying production, and stimulating regional economic activity.

The empirical dataset constructed in this study contains six partial composite indices covering the 2010–2025 period (Table 3).

Table 3

Dynamics of partial composite indices of small business development, 2010–2025

Year	K_{inno}	K_{inst}	K_{bs}	K_{raq}	K_{ik}	K_{ib}
2010	0.04	0.00	5.51	0.01	0.00	0.19
2011	0.04	0.03	6.28	0.01	0.05	0.23
2012	0.01	0.07	6.57	0.01	0.10	0.02
2013	0.04	0.07	7.40	0.01	0.16	0.07
2014	0.05	0.10	8.09	0.01	0.21	0.07
2015	0.06	0.12	9.30	0.00	0.26	0.07
2016	0.09	0.15	10.52	0.02	0.31	0.07
2017	0.13	0.16	12.52	0.05	0.36	0.06
2018	0.20	0.21	14.81	0.08	0.37	0.11
2019	0.37	0.30	15.62	0.09	0.43	0.17
2020	0.40	0.49	17.81	0.14	0.43	0.12
2021	0.46	0.70	20.92	0.25	0.53	0.14
2022	0.47	0.84	24.03	0.44	0.60	0.21
2023	0.59	1.00	27.72	0.68	0.70	0.27
2024	0.74	0.71	32.43	1.00	0.79	0.39
2025	0.95	0.55	32.85	1.00	0.91	0.55

The dynamics demonstrate a general strengthening of the innovation, institutional, digital and human-capital dimensions. The innovation index increased from 0.04 in 2010 to 0.95 in 2025, while the digitalisation index increased from 0.01 to 1.00. The human-capital index increased from 0.00 to 0.91. The institutional index reached its maximum in 2023 and subsequently declined to 0.55 in 2025. This is analytically important because it suggests that improvements in one dimension of small business development do not necessarily produce simultaneous improvements in all other dimensions. The economic-stability index increased from 0.19 to 0.55. Its slower progression compared with innovation and digitalisation indicates that technological transformation does not automatically translate into equivalent improvements in external competitiveness, profitability, value added and resilience. This finding is consistent with OECD evidence showing that digitalisation creates opportunities for SMEs but also requires appropriate skills, management capabilities and institutional conditions to translate technological adoption into productivity improvements.

For an illustrative integral assessment, the management-efficiency index was first normalised:

$$K_{bs}^* = \frac{K_{bs} - K_{bs,min}}{K_{bs,max} - K_{bs,min}}$$

Table 4

Normalised management-efficiency index and integral development index

Year	K_{bs}^*	I_{total}	Assessment
2010	0.000	0.040	Low
2011	0.028	0.065	Low
2012	0.039	0.041	Low
2013	0.069	0.070	Low
2014	0.094	0.089	Low
2015	0.139	0.108	Low
2016	0.183	0.137	Low
2017	0.256	0.169	Low
2018	0.340	0.218	Low
2019	0.370	0.288	Low
2020	0.450	0.338	Low
2021	0.564	0.441	Medium
2022	0.677	0.540	Medium
2023	0.812	0.675	Good
2024	0.985	0.769	Good
2025	1.000	0.827	High

For the purposes of methodological classification, the following proposed thresholds may be used:

- **low level:** $I_{total} < 0.34$
- **medium level:** $0.34 \leq I_{total} < 0.56$
- **good level:** $0.56 \leq I_{total} \leq 0.78$
- **high level:** $I_{total} > 0.78$

Under this classification, the integrated level of small business development remained low during 2010-2020, moved to a medium level in 2021-2022, reached a good level in 2023-2024 and entered the high category in 2025. This transition is methodologically significant. It indicates that the development of small business should be interpreted as a cumulative process. Individual improvements in employment or firm numbers may not immediately produce a high integral score; rather, the cumulative strengthening of innovation, institutional capacity, human capital, digitalisation, management and economic resilience is required.

Correlation analysis provides an initial assessment of the direction and strength of statistical association between the variables.

The six explanatory indices in the working dataset are strongly correlated with one another. For example, the correlation between management efficiency and human capital is approximately 0.982, while the correlation between innovation development and management efficiency is approximately 0.977 (Table 5).

Table 5

Correlation matrix

Variable	K_{inno}	K_{inst}	K_{bs}	K_{raq}	K_{ik}	K_{ib}	T_{io}
K_{inno}	1.000	0.826	0.977	0.934	0.957	0.850	-0.146
K_{inst}	0.826	1.000	0.887	0.765	0.851	0.539	-0.231
K_{bs}	0.977	0.887	1.000	0.942	0.982	0.784	-0.185
K_{raq}	0.934	0.765	0.942	1.000	0.898	0.888	-0.001
K_{ik}	0.957	0.851	0.982	0.898	1.000	0.724	-0.198
K_{ib}	0.850	0.539	0.784	0.888	0.724	1.000	0.132
T_{io}	-0.146	-0.231	-0.185	-0.001	-0.198	0.132	1.000

The high correlations among the explanatory variables have an important interpretation. They do not necessarily mean that the indices are conceptually redundant. Rather, they suggest that innovation, management, digitalisation and human capital tend to develop simultaneously. However, such strong interdependence creates a serious econometric problem when all six indices are introduced simultaneously into a regression equation. The correlation between the individual indices and the contemporaneous economic-growth variable in the supplied 2010-2025 dataset is weak. This does not necessarily mean that small business does not affect economic growth. Instead, it indicates that the annual growth rate is affected by many short-term macroeconomic factors and that the effect of structural business development may occur with a time lag.

Using the 2010-2025 data presented in the analytical dataset, the direct OLS estimation gives the following working equation:

$$T_{io} = 1.47 - 0.12K_{inno} + 0.76K_{inst} - 0.14K_{bs} + 1.24K_{raq} + 2.11K_{ik} + 1.32K_{ib}$$

The estimated R^2 is approximately 0.429, while the adjusted R^2 is approximately 0.049. The overall F-test does not reach the conventional 5% significance level in this specification. This result should not be interpreted as evidence that small business development has no effect on economic growth. The more appropriate conclusion is methodological: the six-dimensional contemporaneous model is too demanding for a sample of only 16 annual observations, especially because the explanatory variables are highly correlated (Table 6).

Table 6
Main diagnostic characteristics of the multiple regression model

Indicator	Result	Interpretation
Number of observations	16	Small time-series sample
Explanatory variables	6	Relatively high for sample size
R^2	0.429	About 42.9% of variation explained in-sample
Adjusted R^2	0.049	Strong penalty for model complexity
F-statistic	1.129	Overall model is statistically weak
F-test p-value	0.418	Overall significance is not established
VIF ₁	≈10.56	High multicollinearity
VIF ₂	≈27.04	Very high multicollinearity
VIF ₃	≈51.08	Very high multicollinearity
VIF ₄	≈52.13	Very high multicollinearity
VIF ₅	≈192.50	Extremely high multicollinearity
VIF ₆	≈13.20	High multicollinearity

The VIF values demonstrate that the explanatory variables contain substantial overlapping information. This is logical from an economic perspective: firms that improve management efficiency often simultaneously invest in digital technologies, human capital and innovation. Therefore, coefficient signs in such a model should not be interpreted mechanically. A negative coefficient on one variable does not necessarily mean that the corresponding dimension harms economic growth. It may reflect the fact that several closely related variables are competing to explain the same component of variation.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that assessing the contribution of small business to national economic growth requires moving beyond reliance on a single indicator, such as its share in GDP. While the GDP-share metric reflects the sector's direct scale, it does not reveal whether growth stems from productivity improvements, technological upgrading, human capital accumulation, investment, exports, or institutional progress. Although the national share of small business in Uzbekistan's GDP adjusted from 60.8% in 2010 to 52.2% in 2025, sector employment expanded by approximately 29%, its share in total fixed investment rose from 33.4% to 61.4%, and export volumes increased significantly.

The integral assessment based on six core dimensions indicates a steady strengthening of small business development. Following the normalization of the management efficiency indicator, the calculated integral index increased from 0.040 in 2010 to 0.827 in 2025, marking a transition from a low to a high development level. Simultaneously, econometric modeling underscores the need for careful statistical interpretation, as the six explanatory indices exhibit strong mutual correlation within a 16-observation time series.

Based on these findings, the following methodological and policy recommendations are proposed:

Multidimensional Monitoring: National tracking systems should complement GDP, employment, and enterprise counts with metrics for investment, labor productivity, exports, innovation, digitalization, human capital, and institutional quality.

Indicator Normalization: All variables within aggregate indices must undergo statistical normalization prior to aggregation to ensure comparability across diverse measurement units.

Weight Calibration: Component weights in composite indices should be substantiated theoretically, statistically, or through transparent expert evaluations, using equal weighting as a baseline and testing alternative schemes for robustness.

Sample Expansion: To enhance econometric reliability given limited annual time series (15–20 observations), future modeling should incorporate regional panel data spanning Uzbekistan's subnational territories.

Overall, the contribution of small business to economic growth is best conceptualized not as a simple statistical share of GDP, but as a multidimensional transformation of productive resources into employment, investment, innovation, value added, exports, and productivity. This approach provides a robust analytical foundation for evaluating sustainable growth dynamics and designing evidence-based policy frameworks.

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Proofreader: Xondamir Ismoilov
Layout and Designer: Hasan Maqsudov

2026. № 9

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