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Article

Statistical Assessment of Qualitative Determinants of Small Business Efficiency: Evidence from a Survey of Enterprises in Bukhara Region

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Abstract: The article assesses how the qualitative characteristics of small business entities – organizational form, type of activity, financing source, financial, economic and institutional problems and territorial location – are associated with their business efficiency. The empirical base is a survey of 1,001 small business entities of Bukhara region conducted in January–February 2026 and processed in Stata 17.0. A three-level procedure for categorical variables is applied: frequency analysis, cross-tabulation and Pearson's χ^2 test supplemented with Cramér's V and adjusted standardized residuals. All tested pairs of qualitative indicators are significantly dependent (χ^2 = 57.56, 131.04 and 107.86; $p < 0.001$) with weak-to-moderate strength (V = 0.14–0.21). Adjusted residuals show that the strongest single association is the concentration of liquidity problems among entities whose main economic problem is competitiveness (z = 10.15). A multiple OLS regression with dummy variables reveals a territorial efficiency gap of 25.3 points between districts, a positive effect of managerial experience and a negative effect of unstable regulatory decisions (–3.9 points). Proposals are formulated for a differentiated, region-specific policy of small business support.

Keywords: Small business, business efficiency, qualitative indicators, cross-tabulation, Pearson χ^2 test, Cramér's V, adjusted residuals, dummy variables, OLS regression, Bukhara region.

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1. Introduction

Small and medium-sized enterprises (SMEs) are one of the main pillars of the modern economy. According to the OECD, SMEs account for about 99% of all firms, generate 50–70% of total employment and 50–60% of value added in member countries [1]. Their role is equally important in Uzbekistan: in 2025 small and medium-sized business produced 52.2% of GDP and small business employed 76.0% of all employed persons [2]. In Bukhara region the share of small business in gross regional product is considerably higher than the national average and reached 71.0% in 2025.

Over the past years Uzbekistan has adopted a number of policy documents aimed at improving the business environment. Decree of the President No. PF-50 of 19 March 2025 approved the Strategy for the Development of Small and Medium-Sized Business for 2025–2030 [3], while Decree No. PF-132 [4] of 30 August 2024 and Resolution No. PQ-306 [5] of 14 September 2023 expanded access to microloans and created a continuous support programme for SMEs. The effective implementation of these measures requires reliable statistical evidence on which factors actually drive the efficiency of small business entities at the regional level and in which territories support is most needed.

Most previous studies of small business performance in Uzbekistan relied on quantitative indicators such as output, profit, employment and exports. However, as competition develops, the efficiency of enterprises increasingly depends on qualitative factors: the legal and organizational form, the type of activity, access to finance and the quality of the institutional environment. These factors are measured on nominal scales, so their analysis requires specific statistical tools for categorical data rather than conventional correlation of averages. Treating the numerical codes of such categories as if they were continuous variables – a frequent practice in applied work – leads to meaningless averages and biased conclusions.

The aim of this article is to assess the association between qualitative characteristics of small business entities and their business efficiency in Bukhara region using a three-level analysis of categorical variables and a multiple regression model with dummy variables. The following hypotheses are tested:

- **H1:** the main financial, economic and institutional problems of small business entities are not independent but form statistically significant combinations;
- **H2:** business efficiency differs significantly between the districts of the region after controlling for enterprise and manager characteristics;
- **H3:** financial problems and institutional instability have a measurable effect on business efficiency;
- **H4:** characteristics of the manager (age, experience, gender) influence efficiency independently of the organizational form.

The determinants of small business performance have long been studied in economic theory. J. Schumpeter linked entrepreneurship with innovation and economic development. E. Penrose [6] showed that the growth of a firm is limited by its internal managerial resources, so that expansion into new markets becomes increasingly difficult as the firm grows. D. North [7] emphasized that institutions – formal rules and informal constraints – shape transaction costs and therefore the efficiency of economic agents. P. Krugman [8] demonstrated that firms located far from economic centres face higher barriers to market access, which explains persistent regional differences in business performance. M. Porter and C. van der Linde [9] argued that environmental efficiency can become a source of competitive advantage.

Empirical studies increasingly apply econometric models to SME data. M. Hunter [10] compared the contributions of entrepreneurs to the success and failure of small businesses, while Manoj Kumar [11] built an econometric model of SME growth in India and identified finance and managerial capacity as key drivers. The World Bank [12] identified limited access to finance as one of the main constraints on SME development in emerging economies. In the CIS countries, A. Vilensky, I. Domnina and L. Maevskaya [13] analysed the state of small business in Russian regions before and after the pandemic and showed the strong regional heterogeneity of its development.

In Uzbekistan, U. G'afurov [14] and N. Murodova [15] studied the economic mechanisms of state regulation and support of small business, R. Jumanov [16] assessed the efficiency of SMEs in the context of sustainable regional development, and L. Xudoyorov [17] developed optimal models of SME development in a region. In our earlier works the key indicators of small business efficiency in Uzbekistan were systematized [18], a multifactor econometric analysis of SME efficiency was carried out [19], inter-sectoral efficiency of SMEs in Bukhara region was estimated [20], and institutional challenges were evaluated statistically [21]; a general methodology for the econometric analysis of SME efficiency was also proposed [22]. These studies, however, evaluated small business efficiency mainly through quantitative indicators or through regression coefficients without a systematic analysis of the structure of qualitative characteristics.

On the methodological side, A. Agresti [23] recommends cross-tabulation, the χ^2 test and the analysis of adjusted residuals for associations between categorical variables, while D. Gujarati and D. Porter [24] and J. Wooldridge [25] describe the use of dummy variables to capture the effects of qualitative factors in regression models. The present study combines these approaches into a single procedure in order to fill the gap between qualitative characteristics of small business entities and their measured efficiency.

2. Research methodology

The population of the study comprises small business entities operating in Bukhara region. The sample was formed by the snowball method and includes 1,001 entities from 14 territorial units of the region. The questionnaire was designed in Google Forms; data were collected in January–February 2026 and processed in Stata 17.0. The internal consistency of the questionnaire scales is acceptable: Cronbach's $\alpha = 0.758$.

The dataset contains 14 variables: 6 quantitative (business efficiency on a 0–100 scale, years of operation, age of the manager, years of education, number of employees, environmental safety score) and 8 qualitative (district, organizational form, type of activity, gender of the manager, financing source, main financial, economic and institutional problems). Qualitative variables were analysed in three levels:

1. Frequency analysis – the distribution of entities across categories.
2. Cross-tabulation – the joint distribution of two categorical variables.
3. Pearson's χ^2 test of independence, supplemented with Cramér's V to measure the strength of association:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij} - E_{ij})^2}{E_{ij}}, \qquad V = \sqrt{\frac{\chi^2}{n\,(\min(r,c) - 1)}}$$

where O and E are observed and expected frequencies, r and c the number of rows and columns, and n the sample size. To identify which specific cells drive the association, adjusted standardized residuals were calculated:

$$z_{ij} = \frac{O_{ij} - E_{ij}}{\sqrt{E_{ij}\left(1 - \frac{n_{i\cdot}}{n}\right)\left(1 - \frac{n_{\cdot j}}{n}\right)}}$$

Values $|z| > 1.96$ indicate that a combination of categories occurs significantly more ($z > 0$) or less ($z < 0$) often than under independence at the 5% level.

To estimate the effect of each category on efficiency, a multiple OLS regression with dummy (indicator) variables was built, with Buxoro city, joint-stock company, innovative activity, state funds, female manager, investment stability and low trust in state bodies as base categories:

$$Y_i = \beta_0 + \sum_k \beta_k X_{ki} + \sum_m \gamma_m D_{mi} + \varepsilon_i$$

where Y is business efficiency, X are quantitative variables and D are dummy variables of qualitative factors. Homoskedasticity was checked with the Breusch–Pagan test, and differences in efficiency between institutional problem groups were compared using Tukey's HSD test.

3. Analysis and discussion of results

Descriptive statistics. The average business efficiency of surveyed entities is 71.2 points with a standard deviation of 19.9 (coefficient of variation 27.9%), which indicates considerable heterogeneity (Table 1). The typical manager is 37 years old with 13.3 years of education; an average entity has operated for about 6 years and employs 8.9 workers. The very large maximum of employees (200) against a mean of 8.9 shows a strongly right-skewed size distribution typical of small business.

Table 1. Descriptive statistics of quantitative variables (n = 1,001)

Variable	Mean	Std. dev.	Coef. of variation, %	Min	Max
Business efficiency, points	71.16	19.88	27.9	5	100
Years of operation	5.99	4.48	74.8	1	50
Age of manager, years	37.05	8.95	24.2	15	71
Years of education	13.29	2.38	17.9	10	30
Number of employees	8.86	10.85	122.5	0	200
Environmental safety score (1–5)	3.31	1.36	41.0	1	5

Source: author's calculations based on survey data (Stata 17.0).

First level: structure of qualitative characteristics. Individual entrepreneurs (27.5%) and limited liability companies (26.1%) dominate among organizational forms, while joint ventures (0.8%) and public–private partnerships (2.9%) are rare (Table 2). By type of activity, manufacturing (32.5%), trade (24.9%) and services (22.0%) prevail, agriculture accounts for 11.3%, while innovative (5.8%) and financial (3.6%) activities remain marginal. Own funds are the main financing source (60.8%); loans (4.3%), international financing (3.4%) and leasing (1.8%) together cover less than 10% of entities, which points to weak access to external finance. Men head 63.2% of entities. Competitiveness is named as the main economic problem by 44.3% of entities, market diversification by 26.0%, supply chain sustainability by 17.4% and technological modernization by 12.4%.

Table 2. Structure of the sample by qualitative characteristics, %

Characteristic	Category	Share, %
Organizational form	Individual entrepreneur	27.5
	Limited liability company	26.1
	Private enterprise	16.2
	Farm	10.3
	Family enterprise	9.6
	Joint-stock company	6.7
	Public–private partnership	2.9
	Joint venture	0.8
Type of activity	Manufacturing	32.5
	Trade	24.9
	Services	22.0
	Agriculture	11.3
	Innovative activity	5.8
	Financial activity	3.6
Financing source	Own funds	60.8
	Partnership	17.3
	State funds	12.4
	Loan	4.3
	International financing	3.4
	Leasing	1.8
Main financial problem	Liquidity and solvency	34.6
	Debt burden management	33.0
	Currency and inflation risks	20.3
	Investment stability	12.2
Main economic problem	Competitiveness	44.3
	Market diversification	26.0
	Supply chain sustainability	17.4
	Technological modernization	12.4
Main institutional problem	Low trust in state bodies	27.7
	Personal connections	25.1

Characteristic	Category	Share, %
	Bureaucracy (red tape)	21.3
	Changing decisions	14.0
	Corruption	12.0

Source: author's calculations based on survey data.

Efficiency also differs by financing source (Table 3). Entities with international financing show the highest mean efficiency (77.9 points), followed by partnership (72.3) and own funds (70.7), while leasing (67.4) and loans (68.5) are associated with the lowest values. Managers of loan-financed entities are on average the oldest (42.3 years), and entities with leasing and international financing are the largest (13.3 and 13.1 employees). This suggests that international financing reaches younger, larger and more efficient entities, while debt financing is used by older, smaller businesses with a higher financial burden.

Table 3. Business efficiency and characteristics of entities by financing source

Financing source	Efficiency, mean	Efficiency, std. dev.	Age of manager	Years of operation	Employees
International financing	77.94	21.00	35.4	4.8	13.1
Partnership	72.29	22.07	36.2	6.0	9.7
State funds	71.16	19.13	37.3	5.8	11.0
Own funds	70.75	19.37	37.0	6.1	7.9
Loan	68.51	18.53	42.3	5.7	7.7
Leasing	67.44	20.14	37.8	6.7	13.3

Source: author's calculations based on survey data.

Second and third levels: cross-tabulation and χ^2 test. The cross-tabulation of organizational form and financial problems (Table 4) shows that liquidity problems are concentrated in limited liability companies (114 cases) and among individual entrepreneurs (113), while debt burden is most frequent among individual entrepreneurs (81), limited liability companies (72) and private enterprises (67). Adjusted residuals specify these patterns: liquidity problems are over-represented in LLCs ($z = 3.60$) and among individual entrepreneurs ($z = 2.67$), but under-represented in private enterprises ($z = –3.25$) and joint-stock companies ($z = –2.44$); debt burden is over-represented in private enterprises ($z = 2.48$); joint-stock companies more often report investment stability ($z = 2.26$) and currency and inflation risks ($z = 2.02$).

Table 4. Organizational form and main financial problem (number of entities; adjusted residuals in brackets)

Organizational form	Investment stability	Liquidity and solvency	Debt burden	Currency and inflation	Total
Joint-stock company	14 (2.26)	14 (–2.44)	19 (–0.83)	20 (2.02)	67
Public–private partnership	5 (0.84)	5 (–1.99)	13 (1.38)	6 (0.06)	29
Farm	9 (–1.13)	38 (0.52)	39 (1.12)	17 (–1.01)	103
Limited liability company	22 (–2.16)	114 (3.60)	72 (–2.15)	53 (0.01)	261
Family enterprise	13 (0.43)	23 (–2.30)	38 (1.45)	22 (0.68)	96
Joint venture	3 (2.20)	1 (–1.32)	1 (–1.24)	3 (1.22)	8
Private enterprise	23 (0.85)	38 (–3.25)	67 (2.48)	34 (0.24)	162
Individual entrepreneur	33 (–0.11)	113 (2.67)	81 (–1.45)	48 (–1.37)	275
Total	**122**	**346**	**330**	**203**	**1,001**

Source: author's calculations; Pearson $\chi^2 = 57.56$, $df = 21$, $p < 0.001$.

The association between financial and economic problems is the strongest of all pairs (Table 5). Liquidity problems coincide with competitiveness problems in 229 of 346 cases, and the adjusted residual of this cell ($z = 10.15$) is the largest in the entire analysis. At the

same time, entities with liquidity problems rarely report supply chain (z = –6.86) or technological (z = –3.80) problems. Currency and inflation risks, on the contrary, are associated with supply chain sustainability (z = 4.09) and technological modernization (z = 3.07), which reflects the dependence of these activities on imported inputs and equipment.

Table 5. Main financial problem and main economic problem (number of entities; adjusted residuals in brackets)

Financial problem	Market diversification	Competitiveness	Technological modernization	Supply chain	Total
Investment stability	30 (–0.37)	39 (–2.92)	25 (2.90)	28 (1.73)	122
Liquidity and solvency	72 (–2.71)	229 (10.15)	24 (–3.80)	21 (–6.86)	346
Debt burden management	100 (2.19)	123 (–3.12)	37 (–0.79)	70 (2.24)	330
Currency and inflation risks	58 (0.95)	52 (–5.99)	38 (3.07)	55 (4.09)	203
Total	**260**	**443**	**124**	**174**	**1,001**

Source: author's calculations; Pearson $\chi^2 = 131.04$, $df = 9$, $p < 0.001$.

The cross-tabulation of economic and institutional problems (Table 6) shows that low trust in state bodies dominates among entities whose main problem is competitiveness (39.3%; z = 7.31), personal connections (31.9%; z = 2.96) and red tape (29.6%; z = 3.82) dominate among those facing market diversification problems, while changing decisions are typical of entities facing technological modernization (28.2%; z = 4.88). Thus, each economic problem has its own institutional "partner": entry into new markets is hindered by informal networks and bureaucracy, and modernization by the instability of rules.

Table 6. Main economic problem and main institutional problem (row %, adjusted residuals in brackets)

Economic problem	Low trust in state bodies	Corruption	Changing decisions	Red tape	Personal connections	n
Market diversification	14.2 (–5.63)	15.8 (2.18)	8.5 (–2.99)	29.6 (3.82)	31.9 (2.96)	260
Competitiveness	39.3 (7.31)	8.1 (–3.35)	13.5 (–0.36)	19.2 (–1.44)	19.9 (–3.39)	443
Technological modernization	27.4 (–0.07)	10.5 (–0.55)	28.2 (4.88)	10.5 (–3.14)	23.4 (–0.46)	124
Supply chain	18.4 (–3.01)	17.2 (2.35)	13.2 (–0.32)	21.8 (0.20)	29.3 (1.42)	174
Total	**27.7**	**12.0**	**14.0**	**21.3**	**25.1**	**1,001**

Source: author's calculations; Pearson $\chi^2 = 107.86$, $df = 12$, $p < 0.001$.

Table 7 summarizes the χ^2 tests for the three pairs of qualitative indicators. In all three cases the null hypothesis of independence is rejected at $p < 0.001$, which confirms hypothesis H1. Cramér's V shows that the strongest association exists between financial and economic problems (V = 0.21), followed by economic and institutional problems (V = 0.19), while the association between organizational form and financial problems is weak (V = 0.14).

Table 7. Results of χ^2 tests of independence for qualitative indicators

Pair of variables	χ^2	df	p-value	Cramér's V	Strength	Largest adjusted residual
Organizational form × financial problem	57.56	21	< 0.001	0.14	weak	LLC × liquidity (3.60)
Financial problem × economic problem	131.04	9	< 0.001	0.21	moderate	liquidity × competitiveness (10.15)

Pair of variables	χ^2	df	p-value	Cramér's V	Strength	Largest adjusted residual
Economic problem × institutional problem	107.86	12	< 0.001	0.19	weak-to-moderate	competitiveness × low trust (7.31)

Source: author's calculations; n = 1,001.

Correlation analysis. Pearson correlations (Table 8) show that business efficiency is positively and significantly correlated with the age of the manager (r = 0.149), years of operation (r = 0.124), gender of the manager (r = 0.133) and years of education (r = 0.104), and negatively with the district code (r = –0.139). The number of employees is not correlated with efficiency (r = 0.013; p = 0.671). All correlations are weak ($|r| < 0.15$) and the strongest correlation between explanatory variables (age and years of operation, r = 0.400) is moderate, so multicollinearity is not a concern for the regression model.

Table 8. Pearson correlations of business efficiency with selected variables

Variable	r with efficiency	p-value	Interpretation
Age of manager	0.149	0.000	positive, significant
Gender of manager (male = 1)	0.133	0.000	positive, significant
Years of operation	0.124	0.000	positive, significant
Years of education	0.104	0.001	positive, significant
Main financial problem	0.083	0.009	positive, significant
Organizational form	–0.076	0.016	negative, significant
District	–0.139	0.000	negative, significant
Number of employees	0.013	0.671	not significant
Institutional problem	–0.003	0.912	not significant

Source: author's calculations (Stata 17.0).

Regression with dummy variables. Since correlations cannot separate the effect of each category, a multiple OLS model with dummy variables was estimated (Table 9). The model is significant as a whole (F = 7.556; p < 0.001; n = 1,000; AIC = 8,623.9; BIC = 8,825.1), and the Breusch–Pagan test ($\chi^2(1) = 0.04$; p = 0.834) shows no heteroskedasticity, so the standard errors are reliable.

Table 9. OLS model of business efficiency with dummy variables

Factor (base category)	Coefficient	Std. error	t	p-value
Years of operation	0.296	0.153	1.94	0.053
Age of manager	0.191	0.076	2.51	0.012
Years of education	0.415	0.255	1.63	0.104
Number of employees	–0.068	0.056	–1.21	0.228
District (Buxoro city):				
Buxoro district	8.978	3.111	2.89	0.004
Jondor	8.561	2.748	3.12	0.002
Qorovulbozor	8.050	4.307	1.87	0.062
Vobkent	7.229	3.991	1.81	0.070
G'ijduvon	5.518	2.136	2.58	0.010
Shofirkon	–0.845	2.924	–0.29	0.773
Qorako'l	–1.616	2.517	–0.64	0.521
Peshku	–3.184	2.553	–1.25	0.213
Romitan	–10.835	2.350	–4.61	0.000
Olot	–13.541	3.214	–4.21	0.000
Kogon	–16.336	2.475	–6.60	0.000
Organizational form (joint-stock company):				
Joint venture	6.394	6.784	0.94	0.346
Farm	–6.790	3.440	–1.97	0.049

Factor (base category)	Coefficient	Std. error	t	p-value
Other forms (5 categories)	from –3.607 to 0.433	–	–	> 0.29
Type of activity (2 categories)	from 0.786 to 3.940	–	–	> 0.30
Male manager (female)	2.943	1.277	2.30	0.021
Financial problem (investment stability):				
Liquidity and solvency	4.585	2.005	2.29	0.022
Debt burden management	4.743	1.938	2.45	0.015
Currency and inflation risks	5.388	2.064	2.61	0.009
Institutional problem (low trust in state bodies):				
Changing decisions	–3.915	1.988	–1.97	0.049
Personal connections	–1.368	1.677	–0.82	0.415
Corruption	–0.934	2.069	–0.45	0.652
Red tape	0.212	1.803	0.12	0.907
Financing source (5 categories)	from –2.421 to 3.757	–	–	> 0.29
Constant	55.159	6.130	9.00	0.000

Source: author's calculations (Stata 17.0); $F = 7.556$, $p < 0.001$; Breusch–Pagan $\chi^2(1) = 0.04$, $p = 0.834$.

Each additional year of the manager's age raises efficiency by 0.19 points, and each year of operation by 0.30 points (p = 0.053), which confirms hypothesis H4 on the role of accumulated experience. Entities headed by men show 2.9 points higher efficiency; this difference should be interpreted with caution, since female-headed entities in the sample are on average younger (the correlation between male gender and years of operation is r = 0.194). Farms are 6.8 points less efficient than joint-stock companies, while the other organizational forms and all financing sources do not differ significantly after controlling for other factors – the differences observed in Table 3 are therefore largely explained by the composition of entities rather than by the financing source itself.

The regional coefficients are the most important result. Holding all other factors constant, efficiency is 9.0 points higher in Buxoro district, 8.6 in Jondor and 5.5 in G'ijduvon than in Buxoro city, but 16.3 points lower in Kogon, 13.5 in Olot and 10.8 in Romitan. The gap between the most and least efficient districts reaches 25.3 points, which is larger than the effect of any other factor and confirms hypothesis H2. Table 10 groups the districts by the sign and significance of their effects.

Table 10. Typology of districts by efficiency relative to Buxoro city

Group	Districts	Effect, points	Policy implication
High efficiency (p < 0.05)	Buxoro district, Jondor, G'ijduvon	+5.5 … +9.0	dissemination of good practice, export orientation
Moderately high (p < 0.10)	Qorovulbozor, Vobkent	+7.2 … +8.1	support of growth, monitoring
Not different from the regional centre	Shofirkon, Qorako'l, Peshku	–3.2 … –0.8	standard support instruments
Low efficiency (p < 0.01)	Romitan, Olot, Kogon	–16.3 … –10.8	priority territories for targeted support

Source: compiled by the author on the basis of Table 9.

All three types of financial problems are associated with higher efficiency than the base category "investment stability" (+4.6 to +5.4 points). This seemingly paradoxical result means that entities whose main concern is current liquidity, debt or currency risks are operating, active businesses, whereas the lack of investment stability is typical of entities that cannot plan their development at all. Among institutional problems, only frequently changing decisions reduce efficiency significantly (–3.9 points), confirming hypothesis H3. Tukey's HSD test (Table 11) adds that red tape is associated with significantly different

efficiency levels compared to corruption, changing decisions and personal connections (differences of 6.3–6.9 points), while all other pairs differ insignificantly.

Table 11. Pairwise differences in efficiency by institutional problem (Tukey's HSD)

Comparison	Difference, points	Std. error	t	p-value	95% CI
Red tape vs corruption	6.890	2.255	3.06	0.020	[0.73; 13.05]
Red tape vs changing decisions	6.372	2.149	2.96	0.026	[0.50; 12.25]
Personal connections vs red tape	–6.278	1.840	–3.41	0.006	[–11.31; –1.25]
Red tape vs low trust	3.681	1.800	2.04	0.245	[–1.24; 8.60]
Corruption vs low trust	–3.208	2.159	–1.49	0.572	[–9.11; 2.69]
Changing decisions vs low trust	–2.691	2.048	–1.31	0.683	[–8.29; 2.91]

Source: author's calculations.

4. Discussion

The results confirm that small business efficiency in Bukhara region is shaped not only by quantitative resources but also by qualitative factors. The weak-to-moderate values of Cramér's V mean that each qualitative characteristic explains only part of the variation, so they should be analysed jointly in a multivariate model, as was done here. The analysis of adjusted residuals adds a new dimension to the conventional χ^2 test: it shows not only that problems are related, but exactly which combinations of problems occur together – for example, liquidity shortages combined with weak competitiveness, or currency risks combined with supply chain and modernization problems. Such combinations can serve as "problem profiles" for targeting support measures.

The strong territorial differentiation agrees with Krugman's (1991) argument on market access barriers in peripheral areas: the remote Olot district, as well as Kogon and Romitan, show the lowest efficiency of small business even after controlling for enterprise characteristics, which points to territorial rather than firm-level causes. The negative effect of changing decisions supports North's (1990) view that unstable rules raise transaction costs. The marginal role of external financing (loans, leasing and international funds together cover less than 10% of entities), combined with the higher efficiency of internationally financed entities, indicates that the potential of the financial instruments of the 2025–2030 Strategy is not yet fully realized in the region. These findings are consistent with our earlier results on the institutional challenges of SME development (Nazarov, 2026c) and extend them to the level of individual districts.

5. Conclusion and suggestions

The study shows that qualitative characteristics of small business entities in Bukhara region are statistically associated with each other and with business efficiency. The main conclusions are as follows:

1. All three tested pairs of categorical indicators are significantly dependent ($p < 0.001$; $V = 0.14–0.21$); the strongest association is between financial and economic problems, driven by the combination of liquidity shortages and weak competitiveness ($z = 10.15$).
2. Small business in the region relies heavily on own funds (60.8%), while external financing covers less than 10% of entities; at the same time, internationally financed entities have the highest mean efficiency (77.9 points).
3. After controlling for enterprise and manager characteristics, efficiency differs between districts by up to 25.3 points; Kogon, Olot and Romitan form the group of lowest efficiency.

4. Manager experience (age and years of operation) has a positive effect, and frequently changing regulatory decisions a negative effect (–3.9 points) on efficiency.

Based on the results, the following scientific and practical proposals are made:

1. **A three-level procedure for analysing qualitative indicators of small business.**

– **Innovation:** frequency analysis, cross-tabulation and the Pearson χ^2 test supplemented with Cramér's V and adjusted standardized residuals are combined into a single sequential procedure for categorical data.

– **Impact:** statistical bodies can test not only the presence but also the strength and structure of associations between organizational, financial, economic and institutional characteristics, and identify typical "problem profiles" of entities for targeted support.

2. **Differential assessment of efficiency by territory using dummy variables.**

– **Innovation:** the OLS model with district dummies measures the efficiency gap of each district relative to Buxoro city, from –16.3 points in Kogon to +9.0 points in Buxoro district, and groups districts into four types.

– **Impact:** Kogon, Olot and Romitan districts can be identified as priority territories for targeted support programmes – concessional loans, business infrastructure and advisory services – instead of uniform measures for the whole region.

3. **Expanding access to external finance for small business.**

– **Innovation:** the results show that external financing reaches less than 10% of entities, while internationally financed entities are the most efficient.

– **Impact:** expanding leasing, collateral-free microloans and co-financing with international financial institutions, especially for entities with currency and supply chain risks, would increase efficiency in line with the 2025–2030 SME Development Strategy.

4. **Strengthening institutional stability.**

– **Innovation:** the negative effect of frequently changing decisions (–3.9 points) and the specific link between changing decisions and modernization problems ($z = 4.88$) are quantified.

– **Impact:** a moratorium on frequent changes of regulatory requirements, a mandatory transition period for new rules and a one-stop-shop principle for permits would reduce transaction costs and stimulate investment in modernization.

5. **Including qualitative indicators in regular statistical monitoring.**

– **Innovation:** the main financial, economic and institutional problems of entities are proposed as standard categorical indicators of small business surveys.

– **Impact:** regular collection of these indicators by regional statistics departments would allow tracking the effect of support measures by district and type of problem.

Further research may extend the analysis to panel data and to a composite institutional index, which would allow tracking the dynamics of qualitative factors over time.

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