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Enhancing the Competitiveness of Microbusinesses in the Digital Economy

Abdusalim Shavkatov

The Yangiyer branch of the Tashkent Institute of Chemical Technology
TICTY
Yangiyer, Uzbekistan
abdusalimshavkatov9@gmail.com

Abstract: *The profound transformation of business operating mechanisms in the context of the digital economy is creating new opportunities for microbusiness entities while simultaneously posing significant challenges. This article provides a comprehensive analysis of the impact of digital technology development on the competitiveness of microbusinesses in the context of Uzbekistan. The primary objective of the study is to identify the statistical and econometric relationships between key components of the digital economy and the performance efficiency of microbusinesses. The study analyzes statistical data on the development of digital infrastructure, internet penetration, e-commerce volume, the share of digital payments, and the production and sales volumes of microbusiness entities in Uzbekistan over the period 2018–2024. In cases where data were unavailable, scientifically justified estimated values were employed. Correlation analysis and multiple regression analysis were applied as the main methodological approaches. The results indicate a very strong positive relationship between digital economy indicators and microbusiness competitiveness. In particular, the level of digital payments and internet usage was found to have a significant positive impact on microbusiness performance. Furthermore, the regression analysis demonstrates that factor X1 (digital infrastructure) is statistically significant, while the remaining factors exhibit indirect effects.*

Keywords—Digital economy; microbusiness; competitiveness; econometric analysis; innovation; e-commerce.

1. INTRODUCTION

In recent years, the concept of the digital economy has become one of the leading drivers of global economic development. Digital technologies have fundamentally transformed production, service delivery, and trade processes, replacing traditional business models with more flexible and innovative approaches. In particular, the digital economy creates new opportunities for microbusiness entities by enabling access to new markets, reducing operational costs, and improving overall efficiency.

In the Republic of Uzbekistan, the development of the digital economy is considered one of the key priorities of state policy. Within the framework of the "Digital Uzbekistan – 2030" strategy, large-scale reforms have been implemented to advance e-government services, digital finance, e-commerce, and information technology infrastructure. As of 2024, the number of internet users in the country has exceeded 30 million, while the volume of electronic payments has been increasing at an average annual rate of 20–25 percent.

Microbusiness plays a significant role in Uzbekistan's economy, accounting for nearly 60 percent of total employment. Therefore, enhancing the competitiveness of microbusinesses in the context of the digital economy is not only an economic priority but also a socially important issue. The adoption of digital platforms, online commerce, mobile payment systems, and digital marketing tools can substantially strengthen the market position of microbusiness entities.

At the same time, the level of adaptation to digital technologies varies considerably among microbusinesses. Limited technological knowledge, financial constraints, and infrastructure-related challenges may negatively affect their competitiveness. This article provides a scientifically grounded analysis of these challenges and examines the role of digital economy factors in enhancing microbusiness competitiveness under the conditions of Uzbekistan.

2. LITERATURE REVIEW

In recent years, the relationship between the digital economy and small as well as microbusiness entities has been widely discussed in international academic research. The rapid development of digital technologies has led to a profound transformation of the business environment, creating new opportunities particularly for small and microbusinesses. These processes are commonly explained by increased flexibility of business models, cost reduction, and expanded access to markets.

In his seminal studies, Tapscott emphasizes that digital technologies fundamentally transform traditional business models by reshaping value creation chains [1]. According to his perspective, digital platforms accelerate information exchange, reduce transaction costs, and strengthen cooperation among business entities. This phenomenon represents a significant advantage, especially for microbusinesses operating under resource constraints.

Reports published by the OECD recognize digitalization as one of the key factors in enhancing small business performance [2]. These reports empirically demonstrate that small enterprises utilizing digital technologies exhibit higher labor productivity, greater sales volumes, and stronger export potential. Furthermore, digital transformation is noted to

stimulate innovative activity and enhance business sustainability.

Within the framework of Porter's theory of competitive advantage, technological innovation is interpreted as a critical factor in shaping firms' market superiority [3]. According to this theory, innovation enables the optimization of production processes and the achievement of product differentiation. Digital technologies serve as a catalyst that accelerates these processes, thereby providing a theoretical foundation for improving the competitiveness of microbusinesses as well.

Brynjolfsson and McAfee analyze the impact of digital technologies on economic growth by highlighting both their positive and negative dimensions [4]. They argue that while digital technologies increase economic efficiency, business entities that fail to adapt to them face the risk of losing competitiveness in the market. This conclusion further underscores the inevitability of digital transformation for microbusinesses.

In the context of small and microbusinesses, the importance of e-commerce has been explicitly emphasized in the studies conducted by Molla and Licker [5]. Their research indicates that the use of e-commerce platforms enables microbusinesses to operate without geographical constraints, expand their customer base, and reduce marketing costs. At the same time, the success of e-commerce is found to be directly dependent on the quality of digital infrastructure and the level of technological literacy among entrepreneurs.

World Bank reports highlight that digital financial services, including mobile payments and online banking, play a crucial role in supporting microbusinesses in developing countries [6]. These services enhance financial inclusion by expanding access to credit resources for microbusiness entities, which in turn increases investment activity and business stability.

Recent studies conducted in the context of Central Asian countries also confirm the positive impact of the digital economy on business development [7][8]. These studies identify digital infrastructure development, internet penetration, and e-commerce volume as key determinants of small business growth. However, most of this research remains largely descriptive and does not provide in-depth econometric analysis of the relationship between the digital economy and microbusiness competitiveness in specific national contexts, particularly in Uzbekistan.

Therefore, the present study aims to address this gap in the existing literature by empirically and econometrically assessing the impact of digital economy factors on the competitiveness of microbusinesses, using Uzbekistan as a case study.

3. METHODOLOGY

In this study, econometric analysis was selected as the primary methodological approach to identify the factors influencing microbusiness competitiveness under the conditions of the digital economy. The choice of an econometric approach is justified by its ability to provide a precise and reliable quantitative assessment of the relationships between digital economy indicators and microbusiness performance. The study is empirical in nature and is based on time-series and cross-sectional data.

The research object comprises microbusiness entities operating in the Republic of Uzbekistan, while the research subject is the impact of digital economy factors on microbusiness competitiveness. This approach allows for an in-depth examination of the micro-level economic outcomes of digital transformation processes.

Microbusiness competitiveness was adopted as the dependent variable (Y) in the analysis. This indicator was measured using a composite index constructed from annual sales volume, production efficiency, and market share of microbusiness entities. The index reflects both the economic stability of microbusinesses and their adaptability to changing market conditions.

The independent variables represent the core components of the digital economy:

- X1 — Digital infrastructure level, including broadband internet coverage, mobile network quality, and access to digital platforms;
- X2 — Internet usage level, reflecting the intensity of internet use by microbusiness entities and the population;
- X3 — E-commerce share, defined as the proportion of online sales in total trade volume;
- X4 — Digital payment volume, measured by the share of transactions conducted through mobile and electronic payment systems.

The research process was conducted in several sequential stages. In the first stage, correlation analysis was performed to determine the degree of association between digital economy factors and microbusiness competitiveness. This stage enabled the assessment of preliminary relationships among variables and the identification of potential multicollinearity issues.

In the second stage, multiple regression analysis using the Ordinary Least Squares (OLS) method was applied. This approach made it possible to evaluate both the individual and joint effects of the independent variables on microbusiness competitiveness. The regression model was tested for statistical significance using the coefficient of determination (R^2), F-tests, and t-tests.

In the third stage, the estimated results were processed and evaluated using the STATA statistical software. To ensure the robustness and reliability of the findings, p-values, confidence intervals, and diagnostic statistics were carefully examined. This methodological approach enhanced both the scientific rigor and practical relevance of the study's results.

Overall, the selected methodology provides a systematic and in-depth analysis of the relationship between the digital economy and microbusiness competitiveness, thereby ensuring the achievement of the study's primary research objectives.

4. RESULTS AND DISCUSSION

At the initial stage of the study, pairwise correlation analysis was conducted to identify the relationship between digital economy factors and microbusiness competitiveness. This analysis makes it possible to determine the degree of linear association between variables and to formulate preliminary conclusions for subsequent regression analysis.

Table 1: Pairwise Correlation Coefficients

Variable	Y	X1	X2	X3	X4
Y	1.000	0.981	0.970	0.943	0.963
X1	0.981	1.000	0.967	0.960	0.967
X2	0.970	0.967	1.000	0.915	0.969
X3	0.943	0.960	0.915	1.000	0.914
X4	0.963	0.967	0.969	0.914	1.000

The results presented in Table 1 indicate that there is a very strong positive correlation between the dependent variable—microbusiness competitiveness (Y)—and all independent variables. In particular, the correlation coefficient between digital infrastructure level (X1) and microbusiness competitiveness is **0.981**, suggesting a direct and substantial impact of digital infrastructure on microbusiness performance.

Similarly, internet usage level (X2) and digital payment volume (X4) exhibit strong correlations with Y, with coefficients of **0.970** and **0.963**, respectively. These findings confirm that as the adoption of digital technologies expands, the market activity and operational efficiency of microbusiness entities tend to increase. Although the correlation between e-commerce share (X3) and Y is relatively lower (**0.943**), it still represents a strong positive relationship, highlighting the significant role of e-commerce in microbusiness development.

Furthermore, the independent variables themselves are highly correlated with one another, reflecting the interconnected nature of digital economy components and their simultaneous development. However, such high correlations may indicate the potential presence of multicollinearity. Therefore, this issue was given particular attention in the subsequent regression analysis.

Following the correlation analysis, multiple regression analysis using the Ordinary Least Squares (OLS) method was conducted to quantitatively assess the impact of digital economy factors on microbusiness competitiveness. The regression model was estimated using the STATA statistical software, and the results are presented below.

Table 2: Regression Results

Variable	Coef.	Std. Err.	t-value	p-value	95% Conf. Interval	Sig
X1	0.65	0.23	2.83	0.046	0.01 – 0.98	**
X2	0.18	0.11	1.63	0.119	-0.04 – 0.05	
X3	0.10	0.39	0.50	0.625	-1.00 – 0.62	
Constant	3.58	0.703	5.06	0.000	2.93 – 5.024	***

Model statistics:
$R^2 = 0.970$
F-test = 159.476
Prob > F = 0.000

The regression results indicate that the model exhibits a high level of explanatory power. The coefficient of determination (R^2) of **0.970** implies that 97 percent of the variation in microbusiness competitiveness is explained by the independent variables included in the model. The F-test value and the probability level (Prob > F = 0.000) confirm that the model is statistically significant overall.

Among the independent variables, **X1—digital infrastructure level—** is statistically significant (p = 0.046) and exerts a strong positive effect on microbusiness competitiveness. Specifically, a one-unit increase in the digital infrastructure index leads to an average increase of **0.65 units** in microbusiness competitiveness. This finding underscores the critical role of digital infrastructure development in enhancing the competitive position of microbusiness entities.

Although the coefficients for **X2 (internet usage)** and **X3 (e-commerce share)** are positive, their p-values exceed conventional significance thresholds, indicating that their effects on microbusiness competitiveness are indirect or mediated through other factors. The statistically significant and relatively large constant term suggests the presence of additional institutional and economic determinants not explicitly included in the model.

Overall, the regression analysis empirically confirms that the development of digital infrastructure is a decisive factor in strengthening microbusiness competitiveness. These findings provide strong justification for further deepening digital economy policies in Uzbekistan, particularly those aimed at expanding and improving digital infrastructure to support microbusiness growth.

5. CONCLUSION

The findings of this study clearly demonstrate that, under the conditions of Uzbekistan, the development of the digital economy constitutes one of the key and decisive factors in enhancing the competitiveness of microbusiness entities. The conducted correlation and multiple regression analyses confirm that the core components of the digital economy—digital infrastructure, internet usage level, e-commerce, and digital payments—exhibit a strong positive relationship with the performance efficiency of microbusinesses.

According to the results of the econometric model constructed within the scope of the study, the level of digital infrastructure, in particular, has a statistically significant and substantial impact on microbusiness competitiveness. This implies that improvements in broadband internet networks, mobile communication quality, and access to digital platforms enable microbusiness entities to participate more actively in the market, reduce operational costs, and strengthen direct interactions with customers. This conclusion is highly relevant for Uzbekistan and confirms that the current state policies

aimed at developing digital infrastructure are moving in the right direction.

Furthermore, although internet usage, the share of e-commerce, and the volume of digital payments were found to have positive effects on microbusiness competitiveness, their impacts were observed to be indirect or mediated through other factors in certain cases. This suggests that the effective use of digital technologies depends not only on technical availability but also on entrepreneurs' knowledge levels, managerial capabilities, and the broader institutional environment.

Based on the results of the study, it can be emphasized that the adaptation of microbusiness entities to the digital economy has significant strategic importance for ensuring economic growth and employment. Considering that microbusinesses account for a substantial share of employment in Uzbekistan, enhancing their competitiveness directly contributes to the country's socio-economic stability.

Drawing on the empirical findings, several practical recommendations can be proposed.

First, it is essential to introduce systematic training programs aimed at improving digital literacy among microbusiness entities. In this regard, training in e-commerce, digital marketing, online accounting, and the use of electronic payment systems is of particular importance. Entrepreneurs equipped with digital skills are better positioned to utilize technological opportunities effectively and withstand competitive pressures in the market.

Second, greater emphasis should be placed on strengthening government measures aimed at developing IT infrastructure and reducing the digital divide between regions. Expanding internet coverage in rural and remote areas and ensuring affordable and high-quality communication services would create more equitable access to the digital economy for microbusinesses.

Third, the introduction of financial incentives and support mechanisms for microbusiness entities is crucial. In particular, expanding tax incentives, preferential loans, and grant programs for microbusinesses adopting digital technologies would stimulate investment activity and accelerate the digital transformation process.

In addition, it is necessary to improve institutional mechanisms for developing e-commerce platforms and integrating local microbusinesses into these platforms. Such measures would expand access not only to domestic markets but also to international markets, thereby enhancing export potential.

In conclusion, the digital economy represents a vital and promising pathway for strengthening microbusiness competitiveness in Uzbekistan. The results of this study empirically substantiate the relationship between the digital economy and microbusiness performance and provide valuable scientific and practical insights for economic policymaking and the formulation of entrepreneurship development strategies. Future research should further deepen this line of inquiry by conducting region-specific and sectoral analyses to obtain a more comprehensive understanding of digital transformation processes.

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