REPUBLIC OF AZERBAIJAN

On the rights of the manuscript

ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

IMPROVEMENT OF FINANCING MECHANISMS IN SMALL AND MEDIUM ENTERPRISES IN AZERBAIJAN

Speciality: 5301.01 - Internal fiscal policy and public finance

Field of science: Economic sciences

Applicant: **Ali Nazim Hasanov**

Baku - 2026

The work was performed at the Azerbaijan State University Economics Department of Finance and Audit

Scientific supervisor: Doctor of Economic Sciences, Professor
Avaz Akbar Alakbarov

Official opponents: Doctor of Economic Sciences
Saleh Mammadali Mammadov

Doctor of Philosophy in Economics, Associate Professor
Azim Heydar Abasov

Doctor of Philosophy in Economics
Jala Mammadali Afandiyeva

Dissertation Council FD 2.10 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Azerbaijan State University of Economics

Chairman of the Dissertation council:

Doctor of Economic Sciences, Professor
Yashar Atakishi Kalbiyev

Scientific secretary of the Dissertation council:

PhD in Economics, Associate Professor
Sugra Ingilab Humbatova

Chairman of the scientific seminar:

Doctor of Economic Sciences, Professor
Nizami Najafgulu Khudiyev

GENERAL CHARACTERISTICS OF THE DISSERTATION

Relevance and Level of Development of the Topic: Small and medium-sized enterprises (SMEs), including startups based on innovative solutions, are of significant importance to the country's economy. Currently, steps are being taken towards the development of SMEs in Azerbaijan. In the *"Strategic Roadmap for the National Economy and Main Sectors of the Economy"* approved by the President on July 22, 2022, the necessity of support mechanisms for startups and other SMEs and the increase in their number have been emphasized. Both the experience of leading countries in the world and the existing development potential in this field make scientific research on state support for entrepreneurship and new financing opportunities relevant and important. Additionally, there is a lack of scientific research deeply analyzing the current situation in Azerbaijan. Therefore, there is a need for new research. The dissertation addresses issues such as the organization of new financing sources for micro, small, and medium-sized entrepreneurship entities in Azerbaijan, the provision of successful state support to these businesses, and the development of the country's economy through them.

Various studies have been conducted by local and foreign scholars on the development of small and medium-sized entrepreneurship entities and new financing mechanisms. Recently, the development of SMEs and alternative financing mechanisms have been researched by scholars such as A.A.Alakbarov, K.S.Aliyev, R.R.Israfilov, A.Y.Abbasov, T. Alizada, V.A.Gasimli, and others. However, these studies have mainly focused on the development of SMEs, their impact on economic development, and various aspects of financing mechanisms. Meanwhile, there has not been a systematic study on modern financing mechanisms related to business entities, especially innovative businesses, and additional scientific research is needed.

Research on the financing issues of startups and SMEs by foreign scholars such as J.E. Stiglitz, A.N. Berger, G.F. Udell, D. Senor, S. Singer, and Y. Zhang is of particular importance. Recently,

research on the impacts of economic institutions by D. Acemoglu and J.A. Robinson, the state-army model in the development of SMEs by C.D. Freilich, the impact of blockchain technology on business financing by R. Wang, state financial support for the financing of SMEs and startups by S.Y. Lee and C.M. Lee, the relationship between state investment in scientific research and business benefits by K. Chang, C. Xue, H. Zhang, and Y. Zeng, and the impact of the interaction of SMEs and startups on the ecosystem by A. Cavallo, A. Ghezzi, and C. Rossi-Lamastra, have been conducted. The systematic application possibilities of the results of these studies and the innovations available in international practice in Azerbaijan have been studied in this dissertation. Additionally, the previously unexplored possible directions of the SME financing model suitable for Azerbaijan's socio-economic capabilities have been researched.

Research Object: The research object is micro, small, and medium-sized businesses in Azerbaijan, including startups and their financing mechanisms.

Research Subject: The subject of the research is the analysis of new financing paths and directions for SMEs and the investigation of their impact on the country's business environment, economic development, including the reaction of business entities.

Research Goals and Objectives: The main goal of the research is to study the financing of small and medium-sized businesses and the successful support policies for startups through new financing mechanisms that are new for Azerbaijan. During the research, the existing situation in Azerbaijan is analyzed, and the development potential, risks, and directions of businesses, as well as the possibilities of applying the experiences of foreign states, are determined. Based on the results of the research, new directions and reform proposals for state policy are considered.

Research Methods: During the research, articles, reports, books, and other scientific publications of Azerbaijani and world scholars were analyzed. Additionally, decrees and orders of the President of the Republic of Azerbaijan, statistical data released by state agencies of the Republic of Azerbaijan, reviews, laws, reports, decisions, as well as reviews, statistical data, and reports of

international organizations were used for research purposes. These sources were analyzed using methods such as logical generalization, comparison, analysis, and mathematical calculations.

Main Provisions for Defense: The following provisions are presented for defense:

- Analysis of existing financing mechanisms worldwide and determination of their risks.
- Possible impact directions of the development of SMEs with new mechanisms on the country's economy.
- Analysis of the application possibilities of alternative financing and other support mechanisms in Azerbaijan.
- Adaptation of the country's financial system for the application of alternative financing mechanisms and directions of state reforms.
- Study of the role of new financing mechanisms in the development of the liberated territories.

Scientific Innovation of the Research: As a result of the research, the following scientific innovations have been achieved:

- A financing and entrepreneurship support model suitable for Azerbaijan has been proposed by reviewing the international experience in the financing of small and medium-sized entrepreneurship entities.
- The risk of applying cryptocurrency-based financing to SMEs has been evaluated based on time series models.
- The scientific foundations of potential reforms by the state to develop the financing mechanisms of entrepreneurial entities have been disclosed.
- The possible impacts of the development of SMEs based on new financing mechanisms on the development of the liberated territories have been determined.

Theoretical and Practical Significance of the Research: The study of the existing topic can create a theoretical basis in accordance with the state strategy. The research topic covers many directions identified in the *"Strategic Roadmap for the National Economy and Main Sectors of the Economy"* approved by the President on July 22, 2022, and mentioned in the *"First State Program on the Great Return*

to the Liberated Territories of the Republic of Azerbaijan". Research conducted in this direction can contribute to the improvement of the country's development model by determining the necessary reforms to achieve socio-economic development in Azerbaijan. Considering that the development of entrepreneurship directly affects people's welfare and increases tax revenues, the research has special practical importance. At the same time, the mutual connection of the business environment and scientific development suggests that the results of the research can also play a role in increasing the scientific potential of the country.

Approbation and Application of Research Results: The results of the dissertation have been published in 6 scientific journals and 4 conference books between 2022-2024. Two of the scientific articles are periodical scientific journals published in foreign countries. These are the *"International Journal of Professional Business Review"* published in Brazil and the *"Futurity Economics and Law"* journal published in Poland. One of the scientific conferences where the results of the scientific work were presented was the *"International Conference on Modern Research in Management, Economics, and Accounting"* held in Berlin, Germany.

Organization Where the Dissertation Was Carried Out: The dissertation work was carried out at the Azerbaijan State University of Economics.

Structure and Volume of the Dissertation: The dissertation consists of an introduction (7211 characters), three chapters (Chapter I 80710 characters, Chapter II 79553 characters, Chapter III 60521 characters), a conclusion (4612 characters), and a list of 144 references, as well as 23 tables, graphs, and figures, making up a total of 232607 characters excluding spaces, figures, tables, graphs, appendices, and the list of references.

CONTENTS OF THE DISSERTATION

Introduction

Chapter I. Theoretical and Methodological Foundations of Financing Mechanisms for Economic Structures
1.1. Theoretical Aspects of the Formation of Small and Medium-Sized Business Entities
1.2. The Role of Small and Medium-Sized Business Entities in the Formation of GDP
1.3. Traditional and Modern Financing Mechanisms for Small and Medium-Sized Business Entities

Chapter II. Current Situation of Financing Mechanisms Applied in the Development of Small and Medium-Sized Businesses in Azerbaijan
2.1. Problems of Traditional and Modern Financing Mechanisms Applied in Small and Medium-Sized Businesses
2.2. Analysis of the Risks of Various Financing Mechanisms Applied in Small and Medium-Sized Businesses
2.3. Evaluation of Financing Mechanisms for Small and Medium-Sized Entrepreneurship Based on International Practices

Chapter III. Prospects for the Development of Financing Mechanisms for Small and Medium-Sized Business Entities in the Republic of Azerbaijan
3.1. Opportunities for the Application of New Financing Mechanisms for Small and Medium-Sized Entrepreneurship and Main Trends in Creating a Favorable Business Environment
3.2. Directions for Strengthening Government Support in the Implementation of New Financing Mechanisms for Small and Medium-Sized Businesses
3.3. Improving the Role of New Financing Mechanisms in the Restoration of Regions Liberated from Occupation
Conclusion
List of References Used
Appendices

MAIN CONTENT OF THE RESEARCH

1. Theoretical and Methodological Foundations of the Formation of Small and Medium Business Entities

At the heart of classical economic theory lies the concept of self-interest and competitive markets. Adam Smith's *"invisible hand"* illustrates how individual entrepreneurial efforts contribute to overall social wealth by efficiently distributing resources and meeting diverse consumer needs. Small and Medium Enterprises (SMEs) play a crucial role in this process, capturing niche markets and strengthening competition.

Keynesian principles contextualize SME formation within a broader economic ecosystem. Effective demand as the driving force of economic activity, highlights the importance of consumer spending and household incomes in sustaining SME operations.

Free-market advocates, including Milton Friedman, emphasize the need for limited government intervention to ensure SME flexibility and independence. Another key perspective, as highlighted by Friedrich Hayek, is decentralized knowledge and decision-making. SMEs context-specific knowledge to adapt to shifting consumer needs and market trends - advantages often unavailable to large business entities[1].

The integration of sustainability into economic strategies has reshaped SME expectations and contributions. Encouraged to adopt environmentally conscious approaches, these businesses play a significant role in building a greener and fairer economy. By addressing social and ecological priorities alongside economic goals, SMEs align themselves with broader global initiatives promoting sustainable development.

Thus, the theoretical-methodological foundations of SME formation reflect a rich synthesis of classical and modern economic doctrines. This approach not only underscores the complex

[1] Michaelides, P.G. History of Economic Ideas: From Adam Smith to Paul Krugman / P.G. Michaelides, T.E. Papadakis – Palgrave Macmillan – 2023. –186 p. – URL: https://doi.org/10.1007/978-3-031-19697-3

mechanisms behind SME development but also highlights their critical role in fostering innovation, strengthening resilience, and enhancing socio-economic sustainability across diverse contexts.

The application of new mechanisms, apart from traditional financing methods, has become necessary for the financing of small and medium-sized enterprises (SMEs) since the last century. To understand the financing of SMEs in the modern era more deeply, it is important to comprehend their organizational-legal forms and types and note the specific characteristics of their possible development stages. According to the World Bank, SMEs are the main driving force of a country's economy, especially in developing countries. SMEs account for 90% of business entities and 50% of jobs globally. Small and medium-sized enterprises constitute 40% of the economy in developing countries[2]. If we include newly established startups, we can see even larger numbers because the fourth industrial revolution has brought businesses based on new technologies to the forefront, and startups are entrepreneurial entities built on innovative ideas. Therefore, startups are treated as small and medium business entities in this dissertation.

The classification of business entities by size varies according to the economic policies and other regulations of different countries. However, many countries have developed special programs and support mechanisms for micro, small, and medium-sized businesses, considering that they make up over 90% of entrepreneurial entities in their economies. In Azerbaijan, these support mechanisms are also being developed. According to the decision of the Cabinet of Ministers of the Republic of Azerbaijan dated December 21, 2018, No. 556 *"On the approval of the criteria for the classification of micro, small,*

[2] Small and Medium Enterprises (SMEs) Finance: [Electronic resource] / The World Bank. – Washington, 2023. – URL: https://www.worldbank.org/en/topic/smefinance#:~:text=SMEs%20account%20for%20the%20majority,(GDP)%20in%20emerging%20economies

medium, and large entrepreneurial entities", the classification of SMEs and large entrepreneurial entities is as follows[3]:

- Micro business - Entrepreneurial entities with up to 10 employees and an annual income not exceeding 200,000 manats
- Small business - Entrepreneurial entities with 11 to 50 employees and an annual income between 200,000 and 3 million manats
- Medium business - Entrepreneurial entities with 51 to 250 employees and an annual income between 3 million and 30 million manats
- Large business - Entrepreneurial entities with more than 251 employees and an annual income exceeding 30 million manats

For comparison, it is necessary to note that Azerbaijan's classification of entrepreneurial entities is very similar to that of the European Commission. However, while there are similarities in the number of employees, the criteria related to the revenues of businesses differ due to the profitability indicators in the country. As a result, the profitability criteria in the classification are lower in Azerbaijan.

Along with the size classification of SMEs and the definition of startups, the legal structure of business entities is also an important factor. Generally, the main business structures worldwide operate as sole proprietorships, partnerships, cooperatives, and corporations. Corporate structures are further subdivided. These business entities mainly operate as limited liability companies (LLC), joint-stock companies (JSC), and closed joint-stock companies (CJSC). Additionally, these organizational-legal structures are divided into natural persons and legal entities.

2. The Role of Small and Medium Business Entities in the Formation of GDP

We can divide the impact of SMEs on the economy into two parts: SMEs that support GDP growth in an effective economic environment and SMEs that are not significantly important in an ineffective

[3] "Mikro, kiçik, orta və iri sahibkarlıq subyektlərinin bölgüsü meyarları"nın təsdiq edilməsi haqqında Azərbaycan Respublikası Nazirlər Kabinetinin Qərarı: [Elektron resurs] / 21 dekabr 2018-ci ildə qəbul edilmişdir (4 mart 2022-ci il tarixdə olan dəyişiklik və əlavələr). – Bakı, 2022, - URL: https://e-qanun.az/framework/41048

economic environment. For example, if SMEs in developed countries with a well-established educational system, stable financial system, and effective business support mechanisms contribute on average 55% to the GDP, this figure is 35-40% in developing countries. Overall, in both developed and developing countries, micro, small, and medium-sized enterprises make up over 90% of all business entities[4]. In Azerbaijan, the share of SMEs in GDP was 13.9% in 2022, and their share in non-oil exports was 35.2%. However, in 2022, SMEs accounted for 41.8% of employment in Azerbaijan. Despite their 13.9% share in GDP, the exceptional role of SMEs in providing jobs highlights their importance in reducing unemployment[5]. It should also be noted that more than 60% of jobs in the European Union are provided by SMEs. Previous research also shows a positive correlation between the number of SMEs and GDP[6].

In developed countries, it is not uncommon for SMEs to grow rapidly and transform into *"unicorns"* and global companies. Most of these SMEs are technology companies that require high investment in the initial stage. There are many examples of this in the world. For example, global tech giants like Amazon, Meta (formerly Facebook), and Google were small startups in a strong business environment in their early stages. Today, the market capitalization of these companies is approximately 1.3 trillion, 834 billion, and 1.7 trillion US dollars, respectively[7] [8] [9]. Considering that the GDP of the US was 25.5 trillion dollars in 2022, the market value of these three former startups

[4] World Trade Report 2016: Levelling the Trading Field for SMEs: [Electronic resource] / Bakı, 2016, – URL: https://doi.org/10.30875/4348b814-en

[5] Kiçik və Orta Biznesin İnkişafı Agentliyi 2023 Hesabatı: [Elektron resurs] / Bakı, 2023, – URL: https://smb.gov.az/storage/HESABAT2023.pdf.

[6] Woźniak, M. Relations of GDP Growth and Development of SMEs in Poland. / M. Woźniak, J. Duda, A. Gąsior [et al.] // Procedia Computer Science, – Manchester: – 2019, 159, pp. 2470–2480. URL: https://doi.org/10.1016/j.procs.2019.09.422.

[7] Yahoo Finance: Amazon.com, Inc. (AMZN) Stock Price, News, Quote & History: [Electronic resource] / Baku, 2023, – URL: https://finance.yahoo.com/quote/AMZN/

[8] Yahoo Finance: Alphabet Inc. (GOOG) Stock Price, News, Quote & History: [Electronic resource] / Baku, 2023, – URL: https://finance.yahoo.com/quote/GOOG

[9] Yahoo Finance: Meta Platforms, Inc. (META) Stock Price, News, Quote & History: [Electronic resource] / Baku, 2023, – URL: https://finance.yahoo.com/quote/META/

constitutes 15% of the US GDP[10]. One of the main reasons for this realization is the opportunities provided by venture capital and investment markets in the US. However, if there is no capital market or it is non-functional, investors face problems in selling shares. As a result, issues arise in financing innovative SMEs that are startups. For financing startups and traditional SMEs, the sustainability and stability of the financial system, including banks, are also important. The Central Bank's ability to ensure macroeconomic and monetary stability contributes to the development of SMEs, and the development of SMEs, in turn, contributes to economic stability. High inflation, exchange rate instability, and rising interest rates negatively affect the financing of SMEs and hinder their positive impact on GDP growth and reducing unemployment. Therefore, in countries where more sustainable macroeconomic stability is ensured, the positive impact of SMEs and innovative startups is more pronounced.

3. Traditional and Modern Financing Mechanisms for Small and Medium-Sized Business Entities

Small and medium businesses can secure financing through various modern and traditional methods. Therefore, it is important to thoroughly examine the following types of financing mechanisms:

- Personal and family funds
- Bank loans (business loans)
- Non-bank loans
- Capital financing (venture funds, business angels, etc.)
- Crowdfunding
- Government support (subsidies, grants, etc.) and public-private partnerships
- Factoring and forfaiting
- Islamic financing mechanisms
- Financing based on blockchain technologies

From the above, capital financing, crowdfunding, and financing based on blockchain technology can be considered modern financing

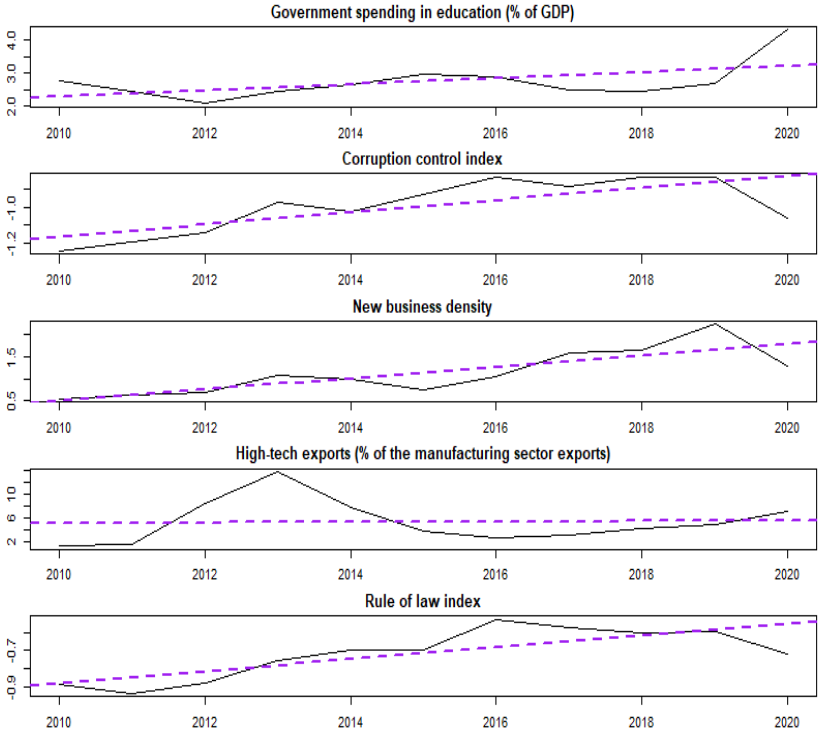
[10] World Bank Open Data: GDP (current US$) - United States: [Electronic resource] / Baku, 2022, – URL: https://data.worldbank.org

mechanisms. The other mechanisms are traditional methods. However, there are also scientific studies exploring the modern transformation of traditional financing through bank loans based on blockchain technology[11].

4. Problems of Traditional and Modern Financing Mechanisms Applied in Small and Medium-Sized Businesses

In general, the roots of financing problems in businesses are related to various socio-economic factors. Specifically, there are different socio-economic factors affecting the financing of SMEs. The absence or underdevelopment of these factors in the economic environment causes numerous problems, such as limited access to financing for business entities and an unfavorable business environment in the country. Socio-economic factors affecting SMEs include government support for business entities, regulatory regulations, investment in education and technology, and the effectiveness of the fight against corruption.

[11] Wang, R. Blockchain, bank credit and SME financing. / R. Wang, Z. Lin, H. Luo // Quality & Quantity, – Amsterdam: – 2019. 53(3), – pp. 1127-1140. URL: https://doi.org/10.1007/s11135-018-0806-6



Graph 2.1.1. Graphical representation of socio-economic factors in Azerbaijan over 11 years.

Note: Compiled by the author based on the data of the World Bank[12].

To better visualize the trends related to Azerbaijan within the panel data, Graph 2.1.1 displays 11 years of data across the five variables mentioned above on a single coordinate plane. The graph reveals that from 2010 to 2020, Azerbaijan experienced an upward trend in transparency, rule of law, and public expenditure on education. There was also a positive trend in the density of newly registered business entities. Therefore, we can initially hypothesize that transparency, rule of law, and education spending have a positive impact on the number of new businesses in Azerbaijan.

[12] World Development Indicators: DataBank: [Electronic resource] / Baku, 2023, – URL: https://databank.worldbank.org/source/world-development-indicators

The results of the econometric analysis based on the random effects model across 55 countries with diverse economic conditions—covering the five selected variables from 2010 to 2020—also show that strong control over corruption and adherence to the rule of law positively affect the business environment, innovative approaches, and technological development.

5. Analysis of the Risks of Various Financing Mechanisms Applied in Small and Medium-Sized Businesses

There are various risks associated with financing mechanisms for small and medium enterprises (SMEs). The use of business loans creates risks such as distrust between the bank and the entrepreneur (information asymmetry), lack of collateral, and high interest rates. These problems hinder SMEs' access to business credit. Similar risks exist in financing through microfinance institutions and non-bank credit organizations (NBCOs). Although financing through crowdfunding is more accessible, the difficulty of providing large funds can create additional liquidity risks for businesses. There are also certain risks in capital financing. Here, there is a possibility that the author of the business idea may lose control. In newly established and unestablished businesses with a high risk of default, venture funds, individual investors, and business angels require a larger share and management participation in exchange for investment. This causes the idea author to lose independence in major business decisions. The joint activity of state and private investment funds here can help reduce the risk of losing shares by business entities. In Islamic finance, the risks fall more on the banks and other investors. Here, because interest is prohibited, investments in businesses are mainly based on the logic of partnership. This leads to all the risks of SMEs being shared with the investor. Islamic finance is considered less risky and more acceptable for SMEs, but less attractive for investors.

The risks of financing based on blockchain technology, especially the use of cryptocurrencies in SMEs, have been less studied in scientific sources. The main risk associated with blockchain technologies is the volatility of cryptocurrencies. This complicates their use in daily business processes and can lead to currency risks

when applied to SMEs. Therefore, in the dissertation, a quantitative analysis of the volatility of cryptocurrencies was conducted to assess currency risks.

To model the relationship between Bitcoin returns and the exogenous variable Nasdaq Composite Index, famous time series models, ARMAX and GARCH, were used. ARMAX models are used for forecasting and control, while GARCH models are used to model and evaluate conditional variances in financial time series[13]. For this purpose, Bitcoin and Nasdaq Composite Index prices covering 5 years were obtained. Bitcoin prices between 23.03.2018-22.03.2023 and Nasdaq Composite Index prices between 23.03.2018-21.03.2023 were used in the empirical analysis[14].

The selected most suitable ARMAX model, ARMA(7,1)X(2), is as follows:

$$rt_{Bit_t} = \alpha + \beta_1 * rt_{Bit_{t-1}} + \beta_2 * rt_{Bit_{t-2}} + \beta_3 * rt_{Bit_{t-3}} + \cdots + \beta_7 * rt_{Bit_{t-7}} + \delta_1 * rt_{Nas_{t-1}} + \delta_2 * rt_{Nas_{t-2}} + \gamma_1 * X_{Bit} + \gamma_2 * X_{Nas} + \epsilon_t + \theta_1 * \epsilon_{t-1}$$

Where:

rt_{Bit_t} – Bitcoin returns at time *"t"*,

α – Intercept parameter,

β_i – Coefficient of Bitcoin returns at time *"t-i"*,

δ – Coefficient of Nasdaq Composite Index returns,

$rt_{Nas_{t-1}}$ – Nasdaq Composite Index returns at time *"t-1"*,

ϵ_t – *"t"* Error term at time *"t"*, assumed to be normally distributed ($N \sim (0, \sigma^2)$),

θ – Coefficient of the error term,

[13] Sharma, S. Modelling Volatility of Size Indices Through Garch and Tgarch Models: Evidence from India // - Miami: International Journal of Professional Business Review, - 2023, 8(4), e01639. – pp. 1-13. URL: https://doi.org/10.26668/businessreview/2023.v8i4.1639

[14] Bitcoin USD (BTC-USD) Historical Data: [Electronic resource] / Yahoo Finance, - 2023. URL: https://finance.yahoo.com/quote/BTC-USD/history/

X_{Bit} – Vector of dummy variables expressing outliers for Bitcoin returns,

X_{Nas} – Vector of dummy variables expressing outliers for Nasdaq Composite Index returns,

γ_1 – Vector of coefficients for dummy variables expressing outliers for Bitcoin returns,

γ_2 – Vector of coefficients for dummy variables expressing outliers for Nasdaq Composite Index returns.

According to the Ljung-Box Q-test, there is no serial correlation in the residuals for the mentioned model. Thus, the model can be considered suitable. To model the volatility of cryptocurrencies, a GARCH(1,1) volatility model was established using the residuals of the selected ARMAX model. The GARCH model allows the error variance to be a function of not only past error squares but also past variances. The formula for the model is as follows:

$$y_t = \mu_t + \epsilon_t$$

$$\epsilon_t = \sigma_t * z_t$$

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2$$

Where:

y_t – Observed time series data at time *"t"*,

μ_t – Conditional mean of y_t at time *"t"*,

ϵ_t – Error at time *"t"* (deviation of y_t from the conditional mean),

σ_t – Conditional standard deviation of ϵ_t at time *"t"*,

z_t – Standard normal random variable with zero mean and unit variance,

ω – Constant representing the long-term mean of error variance,

α_i – Weight assigned to the error square at time *"t-i"*,

β_j – Weight assigned to the variance at time *"t-j"*.

For the selected data and the GARCH(1,1) model based on the ARMAX model, the formula is as follows:

$$\sigma_t^2 = 0.3191 + 0.0494\epsilon_{t-1}^2 + 0.9242\sigma_{t-1}^2$$

All parameters of the model are statistically significant at least at a 95% confidence level. As a result, the outcomes of the ARMAX and GARCH(1,1) models show that shocks in the economy represented by the Nasdaq Index can affect Bitcoin returns. It was found that negative outliers in Nasdaq returns reduced Bitcoin returns, while positive outliers had both negative and positive effects. This indicates that the relationship between Bitcoin and traditional financial markets is complex and can be influenced by various factors. Additionally, the estimated omega, alpha, and beta values for Bitcoin returns in the GARCH(1,1) model prove that the long-term mean level of error variance is relatively high, and past variance strongly affects current variance. This is characterized by the persistence of Bitcoin return volatility, which has important implications for risk management and investment decisions.

6. Evaluation of Financing Mechanisms for Small and Medium-Sized Entrepreneurship Based on International Practices

There are various experiences regarding the financing of small and medium enterprises (SMEs) and the directions of governments' financing strategies across different countries. Particularly, developed countries have interesting experiences in this regard. This part of the research mainly touches upon the experiences of Israel, South Korea, and Singapore related to SME financing.

Israel's approaches to financing SMEs can be summarized as follows:

- Requirements of the army and intelligence services,
- Immigration policy,
- Investment in human capital,
- Public-private partnership programs for financing (venture capital funds),
- The social-cultural characteristics of the nation.

Analyses of the experiences in these advanced countries show that state support is of particular importance for creating a better business environment, innovative companies, and well-functioning

financial mechanisms. In the current situation, Israel develops SME financing through the sources of the army and intelligence, immigration policy, investment in human capital, and public-private partnership programs, based on social and cultural characteristics. Additionally, external financial and managerial support can yield better results.

Singapore, on the other hand, relies on the following measures for the development of SMEs: reducing bureaucratic burdens and strengthening the protection of property rights; developing infrastructure; regulating fiscal policy through low tax rates; investing in human capital; and financing research and development. However, Singapore faces certain challenges in implementing these measures. At the root of the problem lies an obstacle to business expansion, which is also characteristic of Israeli SMEs. Despite this, Singapore is considered an attractive country for foreign investments.

South Korea's experience with SME financing differs from those of the other two countries. In Korea, the state financing of SMEs has gained popularity and effectiveness, which can be applied as a good practice in other countries. When analyzing the experiences of SME financing in the three mentioned countries, it is important to note that a comprehensive approach is needed to create a well-functioning financing and development program. If the management of state financing programs does not work effectively and transparently, it can create significant reputational risks and result in failure in financing policy.

7. Opportunities for Implementing New Financing Mechanisms for Small and Medium Entrepreneurship in Azerbaijan and Directions for Strengthening Government Support

According to the State Statistics Committee of Azerbaijan as of January 1, 2023, there were 1,388,293 business entities in Azerbaijan, and only 164,618 of them, or 11.9%, were classified as micro, small, and medium enterprises (SMEs). Among these business entities, 1,222,859 or 88.1% were individual entrepreneurs, and 816 or approximately 0.06% were large business entities. However, if we look

at the share of SMEs in the country's economy based on the value of goods, services, and work performed by them, we can see that SMEs executed, provided, and produced approximately 29 billion manats worth of work, services, and goods in 2022. Approximately 19.3 billion manats or 66.6% of this turnover was contributed by SMEs operating in Baku. The share of SMEs in other regions varies between 2-4% for each economic region. This indicates a greater need for the development of SMEs in the regions. Moreover, there is a need to increase the accessibility of financing services and awareness activities in the regions. Developing SMEs and reducing tax burdens can increase their numbers in the long term and increase tax revenues to the state budget in the future. SMEs paid approximately 1.8 billion manats in taxes to the state budget in 2022, which accounted for 5.8% of budget revenues for that period[15]. Despite the measures taken to reduce the shadow economy, which have led to increased tax revenues, revenues from the oil sector still form the basis of state budget revenues. However, the development of SMEs and startups can help form a significant part of the budget through tax revenues from the non-oil sector in the future. For this purpose, it is necessary to direct part of the transfers from the oil fund towards financing measures for SMEs, as well as steps to improve the business environment. Because both tax revenues and GDP formation are still not significantly driven by SMEs in Azerbaijan. This indicates that the economic development potential is still not being effectively utilized.

In the post-acceleration stages, startups and other SMEs need venture investment companies and business angels to attract larger funds. Recently, there has been a certain increase in the number of individual investors in Azerbaijan. However, venture funds generally invest in relatively established startups, so they do not have a large portfolio in Azerbaijan, negatively affecting risk diversification. Therefore, venture funds established in Azerbaijan are still unable to make large-scale investments.

[15] Azərbaycanda sahibkarlıq: [Elektron resurs] / Azərbaycan Respublikası Statistika Komitəsi. – Bakı, 2023. URL: https://www.stat.gov.az/source/entrepreneurship/

Traditional SME financing relies heavily on bank and non-bank credits, as they are the most accessible financing method after personal funds. However, there is a certain level of concentration in Azerbaijan's banking sector. The lack of serious competition does not compel banks and credit organizations to invest in risky businesses. Consequently, banks apply a conservative approach to risk management.

Another issue with financing through bank loans and other credit organizations is that interest rates are higher than profit indicators. According to the World Bank, the average interest rate in Azerbaijan was 14% in 2023[16]. Considering that the average net profit margin of business entities operating in developing countries was 7.31%, the pre-tax operating margin was 8.23%, and the post-tax operating margin was 7.16% at the end of 2023, it should be noted that SMEs that attract financial resources through an annual 14% business loan may find it difficult to make a profit[17]. This limits SMEs' access to business credit. To address this, it is necessary for the state to implement reforms to increase competition in the banking sector and provide concessional loans.

The survey conducted by the Small and Medium Business Development Agency (KOBİA) on *"Determining the level of use of alternative financial sources by SMB entities"* once again highlights the significance of the support mechanisms and recommendations mentioned above. The survey, conducted between May 15, 2024 – June 15, 2024, included 605 entrepreneurial entities from various economic regions of Azerbaijan[18]. Based on the survey results, the following conclusions can be drawn:

---

[16] Lending interest rate: [Electronic resource] / World Bank Data. – 2024. URL: https://data.worldbank.org/indicator/FR.INR.LEND

[17] Operating and Net Margins by Industry Sector: [Electronic resource] / Damodaran Online. – New York, 2024. URL: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html

[18] "KOB Subyektlərinin Alternativ Maliyyə Mənbələrindən İstifadə Səviyyəsinin Müəyyən Edilməsi" sorğusu: [Elektron resurs] / KOBİA. – Bakı, 2024. URL: https://smb.gov.az/az/nav/sorgular

- Intensive use of state support channels for educating SMBs on alternative financing could enhance their financial capabilities.
- Reducing credit interest rates and eliminating bureaucratic obstacles requires a set of comprehensive measures.
- Continuing state support for SMBs while gradually reducing their dependence through innovative financing mechanisms could improve their financial independence and lead to savings in state funds in the future.
- Encouraging innovative entrepreneurship in the regions by increasing the number of startups can bring SMBs closer to modern financial solutions.
- Improving the efficiency and management of state-organized SMB support mechanisms can make existing financial mechanisms more accessible to SMBs.

One of the development directions for financing mechanisms in Azerbaijan could be the adapted application of experiences from Islamic finance. One less popular but beneficial product of Islamic finance for the development of business entities is the interest-free and termless loan known as Qarzi al-Hasan. Although this loan type is based on social responsibility, it can be applied by the state to support business entities during economic crises. Additionally, to increase the private sector's interest in this loan type, Qarzi al-Hasan loans can be provided with stock option privileges for SMEs. Here, in exchange for the interest-free and termless loan provided to SMEs, an option is given to the investor to purchase a certain number of shares of the business entity at a preferential price determined in advance by the contract. If the loan is not repaid within the period specified in the contract, the investor exercises the option and becomes a partner in the business entity. This allows the entrepreneur access to cheap financial resources. Furthermore, in case the loan is not repaid, the investor manages their risk with stock options of the business entity. However, providing interest-free loans does not make it very attractive to the private sector. Therefore, it is possible to create interest in this type of financing mechanism among investors by setting the exercise price in the option below the current market price. Granting the right to sell the

option loan to other investors in the capital market can positively impact the development of the stock exchange in Azerbaijan and the introduction of derivative financial instruments to the market, thus diversifying the financial instruments in the capital markets. Consequently, new opportunities for portfolio diversification will open for other business entities.

State support for SME development in Azerbaijan can be summarized as follows:

- Applying certain state grants, tax benefits, and subsidies to increase the number of foreign and local individual investors, including venture funds;
- Providing support for the transition of highly qualified personnel discharged from the army to the business environment, parallel to increasing the number of venture funds;
- Establishing public-private joint venture funds;
- Extending interest subsidies for business loans to longer-term loans;
- Setting a ceiling on interest rates for business loans in accordance with the economic situation;
- Increasing accessibility to electronic government services in the regions;
- Organizing state projects for the transfer of scientific research and highly qualified personnel to innovative businesses.
- Strengthening measures aimed at improving the financial literacy of business owners.

8. Improving the Role of New Financing Mechanisms for SMEs in the Restoration of Liberated Regions

In addition to the role of small and medium enterprises (SMEs) in the country's economic development, they also have exceptional potential in the restoration of liberated areas. The return of the population to territories that have been under occupation for nearly 30 years can be ensured not only by the restoration of residential areas but also by the creation of new jobs. To ensure the sustainability of the

return of citizens whose homes are being restored by the state, it is necessary to address their employment issues. Although the establishment of regional state administrations and branches of large businesses has been implemented in the Karabakh and East Zangezur economic regions in this direction, supporting the creation of SMEs can show positive results in turning the zone into an economic development factor and ensuring the employment of all population segments.

If a proper capital flow and technological development policy is pursued in the Karabakh and East Zangezur economic regions of Azerbaijan, we can say that these zones will become leading regions in the country's economy, even playing a significant catalytic role in economic development based on the Solow Model. For the development of technological innovations in the country, the development of the startup environment is essential. Therefore, the development of startups should also be considered during SME financing in the liberated regions.

The increase in the region's scientific-innovative potential, the creation of technoparks, and the diversification of individual investment opportunities can lead to an increase in the effective labor variable mentioned in the Solow Model[19]. Here, the increase in the financing opportunities of startups and SMEs results in an increase in the number of workers, while scientific-technological reforms result in an increase in the technology factor. This, in turn, increases effective labor, which is equal to the product of the number of workers and technology. Additionally, a rapid increase in capital will naturally be observed during the initial stages of the infrastructure restoration process in the liberated regions, leading to a sharp increase in GDP based on the Model. Since the increase in capital is directly proportional to investments, an increase in foreign investments results in an increase in capital. However, for the sustainable continuation of capital growth in the future, it is essential to support local businesses and increase their competitiveness as mentioned above. Because

[19] Dykas, P. The Solow model of economic growth / P. Dykas, T. Tokarski, R. Wisła, – New York: Taylor & Francis Group, – 2023. – 248 p.

foreign investments can continue for a certain period, their share may decrease later, and the growth of amortization in subsequent years may be observed. This can result in a reduction in accumulated capital under foreign investment dependence and a slowdown in GDP growth. To prevent this and accelerate the restoration processes in the liberated regions, it is crucial to expand the financing opportunities for local startups. In such cases, local investments gradually replace foreign investments in the future, ensuring the sustainability of GDP growth.

MAIN RESULTS

As a result of the research conducted on the financing of small and medium-sized enterprises (SMEs), including startups, in Azerbaijan, the problem of improving new financing sources for SMEs in Azerbaijan can be summarized based on individual investment, state support, Islamic finance, and blockchain technology. First of all, it should be noted that it is necessary to make certain amendments related to the organizational-legal forms of SMEs in the Civil Code of the Republic of Azerbaijan. These amendments will have a positive role in solving their tax issues. Next, focusing on increasing the share of small and medium-sized businesses in GDP and taking steps towards reducing state monopoly can lead to the diversification of the Azerbaijani economy. In this regard, it is important to eliminate concentration in the financial sector and strengthen anti-monopoly measures.

In the next phase, there is a need to develop infrastructure for the financing of business entities. This includes the resolution of internet infrastructure, transportation-logistics problems, and the accessibility of digital services within the country. Additionally, minimizing bureaucracy in the registration process, especially simplifying the procedure for obtaining startup certificates, can enable business entities to access tax incentives and lead to an increase in the number of entrepreneurs. Measures in this direction also include the development of the business ecosystem. Allocating funds from the state budget to apply scientific research and study results to business projects, as well as to promote new scientific inventions, can lead to

the rapid development of the ecosystem. Strengthening the fight against corruption and protecting property rights are also included in the development of the ecosystem.

According to the research results, it should be noted that in addition to the above-mentioned reforms, there is a need for extensive use of alternative financing methods for SMEs in Azerbaijan. The main role here involves the establishment of venture funds based on private-state joint activities and primarily investing in innovative startups, and increasing the number of individual investors. Easing the entry of foreign venture investors into the country and establishing a financing system based on the Israeli model of military-business interaction can also be considered suitable solutions for Azerbaijan. Along with alternative financing opportunities, the application of certain elements of Islamic finance, including Islamic insurance opportunities, can be considered in conjunction with financial instruments. However, since the development of alternative financing sources is not possible without the development of capital markets, it is important to take measures to revitalize the stock exchange. Privatization processes are needed in this regard.

The research also determined that blockchain-based settlements contain high risks and that SMEs in Azerbaijan are not ready for it. However, in the future, the application of initial coin offerings and digital crowdfunding opportunities to accelerate processes and expand financial opportunities can positively impact Azerbaijan's SME environment.

State support is of exceptional importance in increasing the financing opportunities of SMEs in Azerbaijan. Considering that the private sector in the country's economy is not fully prepared for large and high-risk investments and that the business infrastructure in the regions has developed recently, it is crucial to continue the policy of supporting credit subsidies, agriculture, and light industry, as well as green economy projects with state funds. Even this support can be implemented by increasing the budget deficit or using the funds of the Oil Fund. This is because the development of SMEs in the future can lead to a sharp increase in tax revenues and a predominance of non-oil sector revenues. Especially improving the financing opportunities of

SMEs in the Karabakh and East Zangezur economic regions parallel to the reconstruction processes can lead to these regions playing a leading role in the Azerbaijani economy. This, in turn, can lead to greater savings of oil fund resources and further increase economic sustainability in the future.

The main content of the dissertation is reflected in the following scientific works:

1. **A.Hasanov.** Importance of government support for startups. International Conference on Economics "Regional Development – Digital Economy", 12 December 2022, UNEC, Baku, pp. 182-185.
2. **Ə.Həsənov.** Startap maliyyələşməsinin əsasları. "Geostrategiya" beynəlxalq ictimai-siyasi, elmi-nəzəri jurnalı, 05(77), 2023, Bakı, s. 140-144.
3. **A. Hasanov.** Analysis of The Relationship Between Returns of Nasdaq Composite and Bitcoin. International Journal of Professional Business Review, vol. 8, n. 11, 2023, Miami, pp. 1-13
4. **Ə.Həsənov.** Mikro, Kiçik və Orta Bizneslərin Dayanıqlı İqtisadi İnkişafda Rolu. Davamlı İnkişaf Strategiyası: Qlobal Trendlər, Milli Təcrübələr və Yeni Hədəflər II Beynəlxalq elmi konfransı, 27 dekabr 2023, Mingəçevir Dövlət Universiteti, Mingəçevir, s. 243-246.
5. **A. Hasanov.** Panel Analysis of the Relationship Between Main Socio-Economic Factors and New Business Density. International Conference on Modern Research in Management, Economics and Accounting, 14-16 March 2024, Berlin, pp. 14-26.
6. **Ə.Həsənov.** Kiçik və Orta Sahibkarlıq Subyektlərinin Maliyyələşmə Problemləri. Azərbaycan Dövlət İqtisad Universitetinin Elmi Xəbərləri, cild 12, il 12, 2024, Bakı, s. 101-113.
7. **Ə.Həsənov.** Azərbaycanda Kiçik və Orta Bizneslərin Maliyyələşməsində İnnovasiyaların Tətbiqi. "Geostrategiya"

beynəlxalq ictimai-siyasi, elmi-nəzəri jurnalı, 04(82), 2024, Bakı, s. 209-212.
8. **A.Alakbarov, A. Hasanov.** Leading Practices in MSME Financing: A Systematic Review. Futurity Economics and Law, vol. 4, n. 3, 2024, Lodz, pp. 194-213.
9. **Ə. Həsənov.** Azərbaycanda Kiçik və Orta Sahibkarlıq Subyektlərinin Maliyyələşmə Vəziyyəti. Elmi Araşdırmalar XX Beynəlxalq Elmi Konfransı, Azərbaycan Elm Mərkəzi, 7 sentyabr 2024, Bakı, s. 46-49.
10. **Ə.Həsənov.** Kiçik və orta bizneslərin maliyyələşmə mexanizmlərindəki problemlər və onların həlli yolları. "Dayanıqlı inkişaf" multidisiplinar elmi jurnalı, cild 4, n. 2, 2024, Mingəçevir, s. 32-36.



The defense will be held on 11 November 2026 at 14:00 at the meeting of the Dissertation Council FD 2.10 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at Azerbaijan State University of Economics.

Address: 6 Istiqlaliyyat Street, Baku, AZ 1001

Dissertation is accessible at the Azerbaijan State University of Economics Library.

Electronic version of the abstract is available on the official website of the Azerbaijan State University of Economics (www.unec.edu.az).

Abstract was sent to the required addresses on 09 October 2026.

Signed for print: 30.09.2026
Paper format: 60x84 1/16.
Volume: 40515 characters.
Number of hard copies: 20.

Printed at the "AA – Poligraf" production and commercial Association using ready-made diapositive films.

Contact: capevi@internet.ru / (+99455) 201-2809