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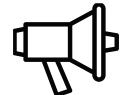
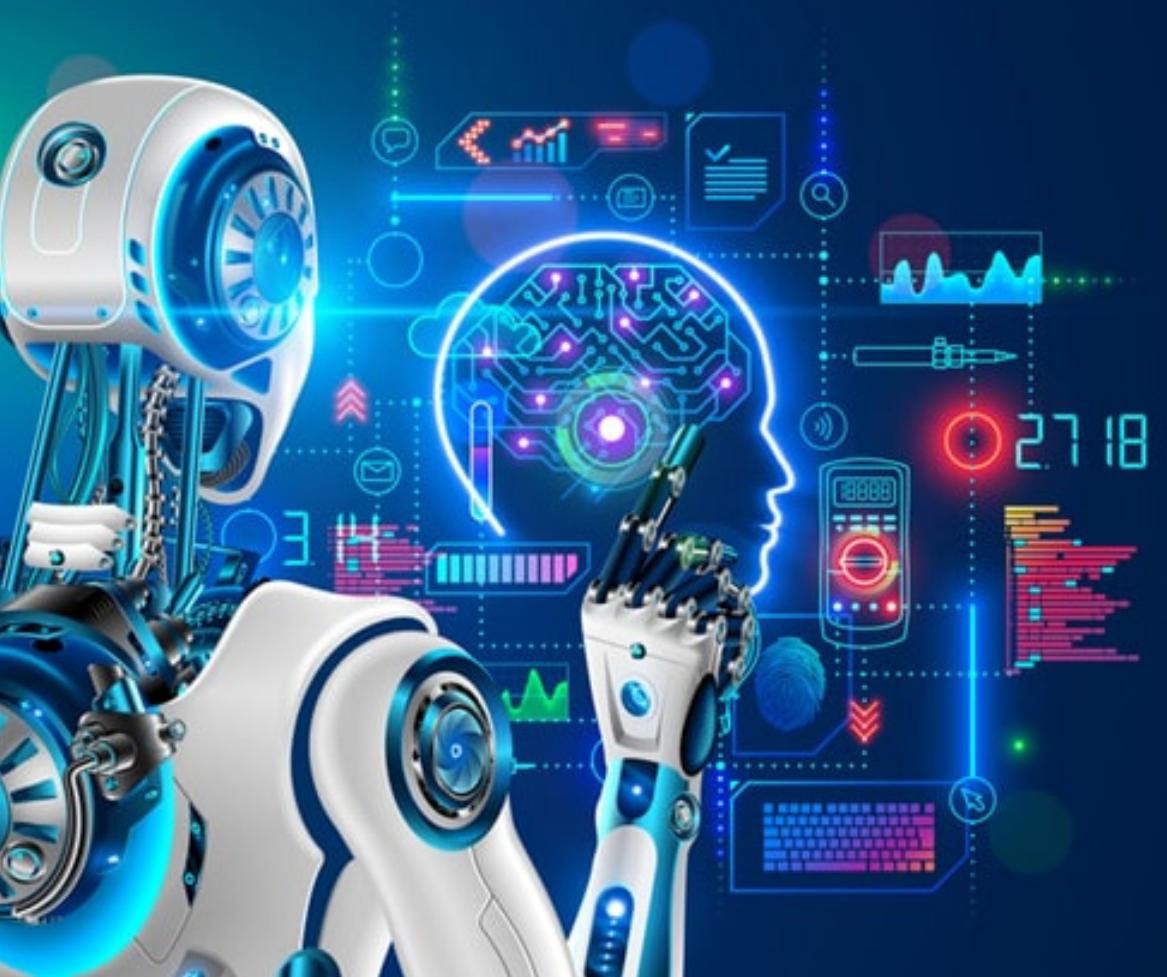


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THE EXPERIENCE OF GERMANY IN DEVELOPING SMALL AND MEDIUM ENTERPRISES

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Abstract: This article provides a systematic analysis of the institutional, financial, and organizational mechanisms supporting small and medium-sized enterprises (SMEs) in Germany. The primary objective of the study is to identify effective government policy instruments aimed at fostering SME development by examining Germany's experience and to assess their economic outcomes.

The analysis demonstrates that SME support in Germany is implemented through a comprehensive and long-term policy framework characterized by strong public-private partnerships, a stable and transparent institutional environment, and diversified financing mechanisms. Key instruments include development banking through KfW, credit guarantee schemes, innovation and investment support programs, and market-based scale-up finance tools. These mechanisms play a crucial role in enhancing the competitiveness of SMEs, promoting innovation, expanding employment opportunities, and ensuring sustainable economic growth.

Furthermore, the article explores the potential for adapting Germany's SME development model to the context of developing economies, with particular emphasis on Uzbekistan. Based on the analysis, practical policy recommendations are proposed to improve access to finance, strengthen institutional capacity, and support innovation-driven growth among SMEs. The findings suggest that selective and context-sensitive adaptation of Germany's experience can significantly contribute to the sustainable development of the SME sector in emerging economies.

Key words: small business, government support, experience of developed countries, institutional mechanisms, financing, economic stability.

Annotatsiya: Ushbu maqola Germaniyada kichik va o'rta biznesni (KO'B) qo'llab-quvvatlovchi institutsional, moliyaviy va tashkiliy mexanizmlarning tizimli tahlilini taqdim etadi. Tadqiqotning asosiy maqsadi Germaniya tajribasini o'rganish va ularning iqtisodiy natijalarini baholash orqali KO'B rivojlanishini rag'batlantirishga qaratilgan samarali davlat siyosati vositalarini aniqlashdir.

Tahlil shuni ko'rsatadiki, Germaniyada KO'Bni qo'llab-quvvatlash kuchli davlat-xususiy sherklik, barqaror va shaffof institutsional muhit va diversifikatsiyalangan moliyalashtirish mexanizmlari bilan tavsiflangan keng qamrovli va uzoq muddatli siyosat doirasi orqali amalga oshiriladi. Asosiy vositalar qatoriga KfW orqali rivojlanish bankchiligi, kredit kafolati sxemalari, innovatsiya va investitsiyalarni qo'llab-quvvatlash dasturlari va bozorga asoslangan miqyosni kengaytirish moliyalashtirish vositalari kiradi. Ushbu mexanizmlar KO'Bning raqobatbardoshligini oshirish, innovatsiyalarni rag'batlantirish, bandlik imkoniyatlarini kengaytirish va barqaror iqtisodiy o'sishni ta'minlashda muhim rol o'ynaydi.

Bundan tashqari, maqlada Germaniyaning KO'Bni rivojlanirish modelini rivojlanayotgan iqtisodiyotlar kontekstiga, xususan, O'zbekistonga moslashtirish imkoniyatlari o'rganiladi. Tahlil asosida moliyalashtirish imkoniyatlarini yaxshilash, institutsional salohiyatni mustahkamlash va KO'B o'rtasida innovatsiyalarga asoslangan o'sishni qo'llab-quvvatlash bo'yicha amaliy siyosat tavsiyalari taklif etiladi. Tadqiqot natijalarini shuni ko'rsatadiki, Germaniya tajribasini tanlab va kontekstga sezgir moslashtirish rivojlanayotgan iqtisodiyotlarda KO'B sektorining barqaror rivojlanishiga sezilarli hissa qo'shishi mumkin.

Kalit so'zlar: kichik biznes, davlat tomonidan qo'llab-quvvatlash, rivojlangan mamlakatlar tajribasi, institutsional mexanizmlar, moliyalashtirish, iqtisodiy barqarorlik.

Аннотация: В данной статье представлен систематический анализ институциональных, финансовых и организационных механизмов поддержки малых и средних предприятий (МСП) в Германии. Основная цель исследования — выявление эффективных инструментов государственной политики, направленных на содействие развитию МСП, на основе опыта Германии и оценка их экономических результатов. Анализ показывает, что поддержка МСП в Германии осуществляется посредством комплексной и долгосрочной политической структуры, характеризующейся прочными государственно-частными партнерствами, стабильной и прозрачной институциональной средой и диверсифицированными механизмами финансирования. Ключевые инструменты включают в себя банковское дело развития через KfW, схемы кредитных гарантит, программы поддержки инноваций и инвестиций, а также рыночные инструменты финансирования масштабирования. Эти механизмы играют решающую роль в повышении конкурентоспособности МСП, содействии инновациям, расширении возможностей трудоустройства и обеспечении устойчивого экономического роста. Кроме того, в статье рассматривается потенциал адаптации немецкой модели развития МСП к контексту развивающихся экономик, с особым акцентом на Узбекистан. На основе анализа предлагаются практические рекомендации по улучшению доступа к финансированию, укреплению институционального потенциала и поддержке инновационного роста среди МСП. Результаты исследования показывают, что избирательная и учитывающая контекст адаптация опыта Германии может внести существенный вклад в устойчивое развитие сектора МСП в странах с развивающейся экономикой.

Ключевые слова: малый бизнес, государственная поддержка, опыт развитых стран, институциональные механизмы, финансирование, экономическая стабильность.

INTRODUCTION

In the context of globalization, technological innovation, and intensifying international competition, small and medium-sized enterprises (SMEs) are recognized as one of the key drivers of economic development. Experience from developed countries shows that SMEs play a crucial role in increasing gross domestic product, ensuring stable employment, accelerating innovative activities, and deepening structural diversification of the economy. Therefore, systematic and targeted support for SMEs is considered one of the priority directions of state economic policy.

In recent years, the development of small and medium-sized businesses has been placed at the center of state policy in the Republic of Uzbekistan. In particular, the Decree of the President of the Republic of Uzbekistan No. PF-50 dated March 19, 2025, "On Measures to Increase the Role of Small and Medium-Sized Businesses in the Economy" has launched a new stage in this area. The decree sets out clear objectives, including creating favorable conditions for the rapid development of SMEs, fundamentally improving the business environment in regions, encouraging new business initiatives, and supporting access to external markets.

According to the decree, by 2025, the strategic targets include increasing the share of SMEs in gross domestic product to 55%, in industry and exports to 34%, and in employment to 75%. Furthermore, specific targets have been set, such as transforming at least 600 SMEs into "champion" enterprises through scaling up, increasing the number of enterprises employing over 100 people to 4,000, and doubling the share of SMEs in service provision and social sectors. This approach demonstrates that the aim is to develop SMEs not only quantitatively but also qualitatively.

Additionally, the decree outlines objectives such as implementing at least 200 startup projects with SME participation, establishing brand-product manufacturing in 100 enterprises, and cultivating high-yield crops on 30,000 hectares of agricultural land while forming modern agro-industrial structures. These measures aim to strengthen the role of SMEs in innovation, industry, and the agricultural sector.

These priority tasks are closely linked to the goals of the "Uzbekistan – 2030" strategy, which aims to build a sustainable, inclusive, and competitive economy. The strategy emphasizes long-term economic growth through the development of the private sector, expanding financial and institutional opportunities for entrepreneurial entities, and supporting innovative, export-oriented SMEs.

From this perspective, a detailed analysis of the experience of developed countries in supporting small businesses and adapting their effective mechanisms to the Uzbek context has significant scientific and practical importance. The experience of the United States, European Union countries, and Japan demonstrates that institutional, financial, and innovative mechanisms for supporting SMEs play a crucial role in ensuring economic stability and competitiveness.

The main objective of this study is to identify the key mechanisms for supporting SMEs in developed countries, assess their economic effectiveness, and scientifically analyze the possibilities of applying this experience in the Republic of Uzbekistan, particularly within the framework of Decree No. PF-50 and the "Uzbekistan – 2030" strategy.

LITERATURE REVIEW

The development of small and medium-sized enterprises (SMEs) and private entrepreneurship in Uzbekistan has been one of the priority areas of economic policy since the country gained independence. Recent deep economic reforms have further increased attention to this sector, and the relevance of the topic has grown in scientific literature. This section analyzes the current state, challenges, and prospects of SME development based on the existing literature.

Firstly, decrees and resolutions of the President of the Republic of Uzbekistan serve as the main political and legal sources for the development of small businesses and private entrepreneurship. For example, the "Action Strategy" implemented since 2017 and later the "New Uzbekistan" development strategy for 2022–2026 specifically highlight support for small entrepreneurship, expansion of free-market relations, and creation of opportunities for unrestricted access to credit resources. Additionally, Presidential Decree No. PQ-366 dated August 8, 2022, and Decree No. PF-50 dated March 19, 2025, "On Measures to Increase the Role of Small and Medium-Sized Businesses in the Economy," set out specific measures to expand infrastructure networks specialized in supporting entrepreneurship.

Statistical data also confirm the stable growth of SMEs. According to the State Statistics Committee of the Republic of Uzbekistan, by the end of 2023, the number of active small business entities in the country exceeded 600,000, and their share in GDP reached 56.5%. This represents a significant increase compared to 2017 (46.3%) and reinforces the role of SMEs as a key driver of the economy.

The works of D. Ruzmetov and M. Saidov examine the socio-economic effectiveness of financial support provided through preferential lending mechanisms. Their research offers an important empirical basis for analyzing methods of strengthening the financial stability of SMEs under the conditions of Uzbekistan. [12]

Similarly, the article published by N. Irgasheva analyzes the experience of developed countries in supporting SMEs through bank lending mechanisms and explains how these instruments function in practice. The study highlights the relevance of adapting international best practices to enhance the effectiveness of SME financing through commercial banks in Uzbekistan. [13]

From an international perspective, according to the World Bank's 2024 Doing Business report, Uzbekistan improved its ranking to 69th in terms of the ease of doing business. This improvement is attributed to regulatory simplifications, a streamlined tax system, and optimized licensing procedures. However, UNDP (2024) and IFC (2024) reports indicate that collateral requirements and financial barriers for entrepreneurs remain pressing challenges.

Local sources also emphasize social aspects. In particular, youth and women entrepreneurship development has received special attention. Within the frameworks of the "Youth Register" and "Women Register," nearly 300,000 citizens in 2024 were provided with subsidies, preferential loans, and essential equipment for entrepreneurship. Nevertheless, the effectiveness of existing programs has not yet been fully monitored, and analytical mechanisms remain insufficient.

Overall, scientific literature and statistical analyses indicate that there is political will in Uzbekistan to develop SMEs and private entrepreneurship. However, to ensure real growth, it is necessary to implement evidence-based strategies, infrastructure shaped by international experience, and effective monitoring systems. Existing literature demonstrates a significant need for consistent study and improvement in this area.

RESEARCH METHODOLOGY

This study is aimed at identifying the institutional and economic mechanisms for supporting small and medium-sized enterprises (SMEs) developed in advanced countries and evaluating the possibilities of applying them in the context of the Republic of Uzbekistan. The research design employed a comprehensive methodology based on the integration of comparative-analytical and institutional approaches.

The study was conducted using a sequential explanatory design. Initially, the current political and economic mechanisms for supporting SMEs in developed countries were identified, followed by an assessment of the economic outcomes of these mechanisms using quantitative indicators. In the final stage, the results were interpreted in the context of the target indicators set forth in Decree No. PF-50 of the President of the Republic of Uzbekistan dated March 19, 2025, and the "Uzbekistan-2030" strategy.

The study relied on secondary data, with the database formed from the following sources:

- Official statistical data and reports published by the OECD, World Bank, IMF, and UNCTAD;
- Legal and regulatory documents and strategic programs of developed countries concerning SME support;
- Decree No. PF-50 of the President of the Republic of Uzbekistan and the "Uzbekistan-2030" strategy;
- International indices (Doing Business, Global Entrepreneurship Index, SME Policy Index) and empirical studies published in scientific journals.

The following scientific methods were systematically applied:

- Comparative institutional analysis – to identify and compare the normative, financial, and organizational mechanisms for supporting SMEs in developed countries;
- Benchmarking – to determine normative and regulatory directions by comparing the best practices of developed countries with the target indicators outlined in Decree No. PF-50;
- Inductive and deductive logical analysis – to derive general conclusions from the experience of individual countries and substantiate their adaptation to the Uzbek context.

The study primarily relies on open statistical and normative-legal sources, which may result in methodological differences in data across certain countries. Moreover, the full application of support mechanisms used in developed countries to the Uzbek context requires consideration of the specific characteristics of the institutional environment and economic structure.

ANALYSIS AND RESULTS

Over the past decade, small and medium-sized enterprises (SMEs) have been recognized as one of the key drivers of economic growth, employment, and innovative development. Experience from developed countries shows that the institutional support of the SME sector is crucial for building a stable and competitive economy. From this perspective, the experience of the Federal Republic of Germany is of particular scientific and practical interest. In Germany, SMEs are represented by the concept of "Mittelstand," which is not only a collection of business entities but also a unique economic and cultural model.

Mittelstand enterprises form the backbone of the German economy, playing a significant role in industry, services, exports, and innovation. They are distinguished by long-term strategic planning, family business traditions, the preparation of highly skilled personnel, and a focus on technological advancement. Therefore, Germany's experience is an example of a systematic, comprehensive, and balanced approach to SME development.

In Germany, SMEs account for nearly 99% of all enterprises by number. They generate almost half of the country's gross value added and provide employment for the majority of the workforce. Mittelstand enterprises not only meet domestic market needs but also serve as key actors ensuring Germany's high export potential.

Table 1. Almost half of the German economy's value added is produced by SMEs

2024	Enterprises		Persons employed		Value added	
	Number	Share	Number	Share	EUR billion	Share
SMEs	2 520 981	99.6%	17 856 188	58.2%	924	47.4%
Large enterprises	11 303	0.4%	12 744 228	41.8%	1024	52.6%

One important characteristic of SMEs is their role in regional economic development. In Germany, industry and services are developed not only in large cities but also in small towns and rural areas, which helps reduce interregional economic disparities and strengthen social stability.

The policy for SME development in Germany is implemented through a multi-level institutional system. While the federal government defines overall strategic directions, the Länder and local authorities implement these policies based on regional characteristics. This approach ensures a combination of centralized strategy and decentralized execution.

The Federal Ministry for Economic Affairs and Climate Action plays a crucial role in SME support by shaping policy, improving the legal framework, and coordinating financial support programs. At the same time, the KfW Development Bank serves as the main institutional pillar for SME financing.

A key feature of Germany's experience is the diversification of SME financing mechanisms. Alongside traditional bank loans, government guarantees, subsidies, grants, mezzanine finance, and venture capital instruments are widely used. Preferential loans provided through KfW are long-term, low-interest, and offered under favorable conditions, stimulating SME investment activity. These loans primarily target innovation, digitalization, energy efficiency, and production modernization. Importantly, the state channels financial resources not directly but through commercial banks, ensuring the stable functioning of the financial market.

Innovation occupies a central place in Germany's SME policy. State programs aim to expand SME participation in research and development (R&D) and experimental design activities. The Central Innovation Program (ZIM) provides financial support for SMEs to develop new products, technologies, and services.

Additionally, special venture funds support high-tech startups, offering not only financial resources but also consulting, mentorship, and networking services. This ensures that innovative ideas enter the market quickly and effectively.

In recent years, Germany's SME development policy has become closely linked to digitalization and green economy principles. The adoption of digital technologies enhances production efficiency, reduces costs, and expands access to global markets.

In the context of green transformation, special attention is given to energy-efficient technologies, renewable energy sources, and environmentally friendly production methods. The state has introduced preferential financing mechanisms for ecological projects, supporting the sustainable development of SMEs.

German SMEs are highly active in international trade. Mittelstand companies often specialize in narrow niches but produce high-quality products and are global leaders in their fields. State policies to promote exports focus mainly on consulting, information, and insurance mechanisms. Notably, direct state intervention in SME export activities is relatively limited, reflecting the high competitiveness and independent growth potential of SMEs.

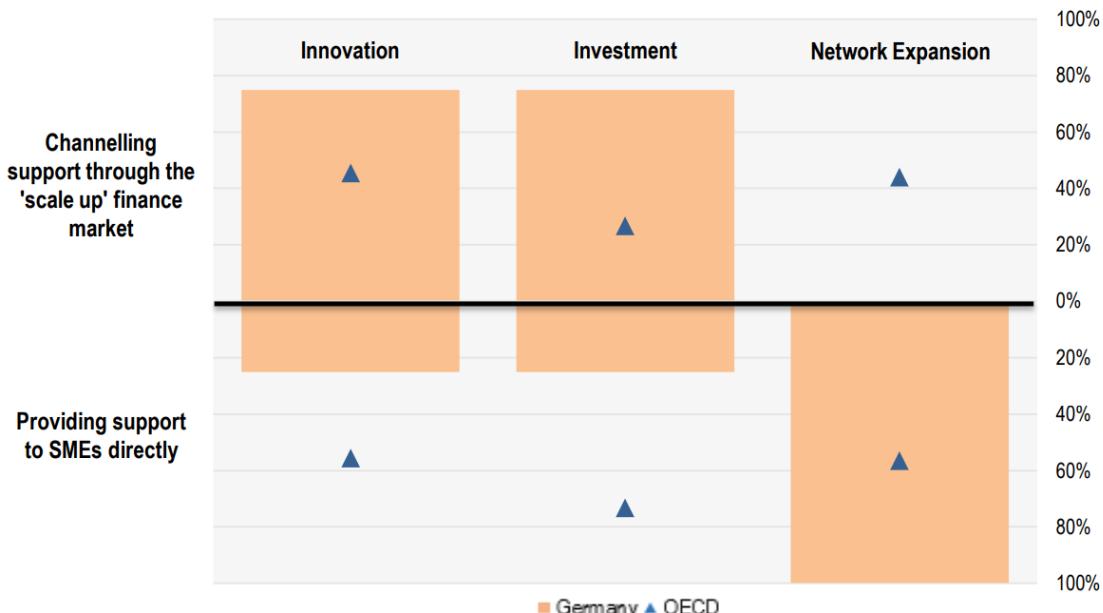


Figure 1. Germany relies heavily on the 'scale up' finance market to support SME growth through innovation and investment

Figure 1 illustrates the distribution of SME scale-up finance policies in Germany across three key scaling-up drivers – innovation, investment, and network expansion—and distinguishes between two main support channels: support channelled through the scale-up finance market and direct support provided to SMEs. The figure highlights a distinctive structural feature of the German SME support model, namely its strong reliance on market-based financial intermediation, particularly for innovation- and investment-led growth.

The results show that, in the areas of innovation and investment, Germany predominantly channels public support through the scale-up finance market rather than providing direct financial assistance to SMEs. This indicates a policy preference for leveraging financial intermediaries, such as commercial banks, public development banks, venture capital funds, and guarantee schemes, to mobilise private capital and allocate resources efficiently. Compared to the OECD average, Germany's reliance on market-based mechanisms in these two domains is noticeably stronger, reflecting the country's well-developed financial system and its long-standing tradition of close cooperation between the public sector and financial institutions.

In the case of innovation-driven scale-up, this approach is consistent with Germany's emphasis on financing research and development (R&D), disruptive innovation, and digital transformation through instruments such as venture capital co-investment, innovation loans, mezzanine finance, and guarantee facilities. Rather than directly subsidising firms, policy makers seek to reduce market failures by improving access to risk finance and strengthening the functioning of innovation finance markets. This strategy is particularly relevant for high-growth and technology-oriented SMEs, which typically face higher financing constraints due to information asymmetries and elevated risk profiles.

A similar pattern is observed for investment-related scale-up, where Germany again relies mainly on financial market channels. Investment financing policies are designed to support both tangible and intangible assets, including machinery, digital infrastructure, and intellectual property. The strong role of the scale-up

finance market in this area suggests that public policy in Germany aims to crowd in private investment rather than substitute for it. By contrast, direct support to SMEs plays a relatively minor role, which may limit access for firms that are less integrated into formal financial markets.

In contrast, the distribution of support for network expansion exhibits a markedly different pattern. Here, Germany relies more heavily on direct support to SMEs, while the use of scale-up finance market instruments is comparatively limited. This reflects the nature of network expansion policies, which often involve non-financial or semi-financial measures such as export promotion services, internationalisation support, partnership facilitation, and advisory programmes. Given the strong export performance and global integration of the German Mittelstand, the relatively lower intensity of market-based financial intervention in this area may also indicate that many SMEs are already capable of financing network expansion through retained earnings or existing commercial relationships.

Overall, Figure 1 underscores that Germany's SME scale-up finance policy is highly differentiated by growth driver. The policy mix prioritises market-based financial instruments for innovation and investment, while relying more on direct support mechanisms for network expansion. This structure highlights both the strengths and potential limitations of the German model: while it effectively mobilises private finance and supports high-potential firms, it may also risk excluding SMEs with growth potential that lack sufficient access to sophisticated financial markets. From a comparative perspective, the German experience provides valuable insights into how advanced financial systems can be leveraged to support SME growth in a sustainable and innovation-oriented manner.

The main advantage of the German model is its systematic and balanced approach. Financial support, innovation, workforce training, and the institutional environment are well coordinated. However, some limitations exist, such as a high degree of regulation and complex bureaucratic procedures, which may pose challenges for certain SMEs.

CONCLUSION AND SUGGESTIONS

In conclusion, Germany has developed an advanced and effective model for SME development. Built on the Mittelstand concept, this model ensures economic stability, innovative growth, and social balance. This experience warrants thorough scientific study and adaptation to national conditions for practical implementation.

This article has examined the German experience in supporting small and medium-sized enterprise (SME) growth, with a particular focus on the role of scale-up finance policies and the balance between market-based financial instruments and direct public support. The analysis demonstrates that Germany has developed a highly structured and differentiated SME support model, in which innovation- and investment-driven growth is predominantly financed through the scale-up finance market, while direct support mechanisms play a more prominent role in facilitating network expansion.

The German approach highlights the strategic importance of leveraging financial markets as intermediaries rather than relying excessively on direct subsidies. By channelling public resources through banks, venture capital funds, guarantee schemes, and development finance institutions, Germany succeeds in crowding in private capital, mitigating market failures, and allocating financial resources more efficiently. This model is particularly effective in fostering innovation, supporting high-growth firms, and sustaining long-term competitiveness within a knowledge-based economy.

At the same time, the analysis reveals that such a market-oriented approach requires a mature financial system, strong institutions, and high levels of financial literacy among SMEs. Without these prerequisites, scale-up finance mechanisms may primarily benefit a narrow group of firms, potentially leaving behind SMEs with latent growth potential. Therefore, the German experience underscores the need for a balanced policy mix that aligns financial market development with targeted public intervention.

For Uzbekistan, where the SME sector plays a crucial role in employment generation, regional development, and economic diversification, the German case provides valuable lessons. However, direct replication is neither feasible nor desirable. Instead, selective adaptation of key principles—adjusted to national institutional, financial, and developmental conditions—offers a more effective pathway for strengthening SME growth and resilience.

Based on the German experience and the analysis of scale-up finance policies, the following policy recommendations are proposed for Uzbekistan:

First, Uzbekistan should gradually shift from a predominantly direct-support-oriented SME policy toward a hybrid model that increasingly leverages market-based financial mechanisms. While grants and concessional loans remain important at early stages of SME development, greater emphasis should be placed on credit guarantees, co-financing schemes, and risk-sharing instruments that encourage commercial banks and private investors to participate in SME scale-up financing.

Second, strengthening the role of national development finance institutions is essential. Institutions similar to Germany's KfW could be further empowered to act as financial intermediaries rather than direct lenders, operating through commercial banks and capital market instruments. This would improve resource allocation efficiency, reduce fiscal pressure, and enhance the sustainability of SME financing programmes.

Third, innovation-driven SME growth should be prioritised through the development of dedicated scale-up finance instruments. These may include innovation loans, mezzanine finance, venture capital co-investment funds, and public–private partnership schemes targeting R&D, digitalisation, and technology adoption. Particular attention should be given to reducing information asymmetries and collateral constraints faced by innovative SMEs.

Fourth, while market-based instruments should be expanded for innovation and investment, direct support mechanisms should remain central for network expansion and internationalisation. Export promotion programmes, advisory services, matchmaking platforms, and support for participation in global value chains are especially relevant for Uzbek SMEs, which often lack experience and networks in foreign markets.

Fifth, improving financial literacy and managerial capacity among SMEs is a critical complementary reform. Without adequate understanding of financial products and growth-oriented strategies, SMEs may be unable to fully benefit from advanced financing instruments. Targeted training programmes, advisory services, and digital platforms can play a key role in this regard.

Finally, SME scale-up finance policy in Uzbekistan should be explicitly aligned with broader national objectives, including industrial diversification, digital transformation, green growth, and regional development. Integrating SME policy across innovation, investment, and sustainability agendas will help ensure coherence and maximise long-term economic impact.

References:

1. *Strategy on five priority areas of development of the Republic of Uzbekistan for 2017–2021*. Tashkent: Government of the Republic of Uzbekistan.
2. *Development strategy of New Uzbekistan for 2022–2026*. Tashkent: Government of the Republic of Uzbekistan.
3. *Presidential Decree No. PQ–366 (August 8, 2022), on measures to further support small entrepreneurship and expand access to credit resources*. Tashkent.
4. *Presidential Decree No. PF–50 (March 19, 2025), on enhancing free-market relations and improving financial support mechanisms for entrepreneurship*. Tashkent.
5. United Nations Development Programme (UNDP). (2021). *Supporting small and medium-sized enterprises for inclusive growth in Uzbekistan*. Tashkent: UNDP Uzbekistan.
6. United Nations Development Programme (UNDP). (2023). *Private sector development and access to finance in Uzbekistan*. Tashkent: UNDP Uzbekistan.
7. Acs, Z. J., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2012). Growth and entrepreneurship. *Small Business Economics*, 39(2), 289–300. <https://doi.org/10.1007/s11187-010-9307-2>
8. Ibrahim, N. A., Mahmood, R., & Bakar, M. S. (2024). Impact of government support policies on entrepreneurial orientation and performance of SMEs. *Small Business Economics*, 45(3), 1–17. <https://doi.org/10.1007/s11187-015-9647-8>
9. Organisation for Economic Co-operation and Development (OECD). (2022). *Scale-up finance for SMEs: Policy mapping and comparative analysis*. Paris: OECD Publishing.
10. Organisation for Economic Co-operation and Development (OECD). (2024). *SME scale-up finance ecosystems and policy instruments*. Paris: OECD Publishing.
11. Ruzmetov, D., & Saidov, M. (2021). Socio-economic effectiveness of preferential lending to small business entities. *Scientific Bulletin of Tashkent State University of Economics*, 4, 78–86.
12. Irgasheva, N. (2023). Improving mechanisms for financing small and medium-sized enterprises through commercial banks. *Green Economy and Development*, 2, 112–121.

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