CURRENT STATE AND DEVELOPMENT PROSPECTS OF GREEN INNOVATION ADOPTION AMONG SMALL BUSINESSES IN UZBEKISTAN

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Abstract

This paper examines the current state and development prospects of green innovation adoption among small and medium-sized enterprises (SMEs) in Uzbekistan. Drawing on official statistics, government policy documents, and recent peer-reviewed literature, the study situates SME behavior within the country's Strategy for the Transition to a Green Economy for 2019–2030 and identifies the structural, financial, and informational barriers that constrain eco-innovation uptake. The analysis shows that while Uzbek SMEs generate over half of national GDP and the majority of employment, their engagement with green technologies, green finance, and circular business models remains limited and uneven across sectors and regions. The paper concludes with policy recommendations aimed at accelerating green innovation diffusion consistent with international best practice and Uzbekistan's revised 2030 renewable-energy targets.

Keywords: green innovation, eco-innovation, small business, SME, green economy, Uzbekistan, sustainable development

Introduction

Small and medium-sized enterprises are widely regarded as the backbone of the Uzbek economy. As of October 2025, the National Statistics Committee recorded 1.21 million active small business entities operating across the country, and small businesses contributed 51.5 percent of GDP and roughly three-quarters of total employment in the first nine months of the year.[1]Given this scale, the environmental performance of the SME sector is inseparable from the success of Uzbekistan's broader green-economy agenda.

Since 2018, the government has made green growth an explicit policy priority, formalized through Presidential Resolution No. PP-4477 of October 2019, which approved the Strategy for the Transition to a Green Economy for 2019–2030.[2] Yet the extent to which this national framework has translated into actual changes in SME behavior, investment in cleaner technology, resource efficiency, green finance uptake, and circular business practices, remains only partially documented. This paper addresses three questions: (1) what is the current level of green innovation adoption among Uzbek SMEs; (2) which factors drive or obstruct that adoption; and (3) what policy directions could accelerate diffusion over the remainder of the 2019–2030 strategy period. The study relies on a desk-based review of official statistical releases, government strategy documents, and recent academic literature on green

[1] State Committee of the Republic of Uzbekistan on Statistics / UzDaily. (2025). Small business in Uzbekistan accounts for over half of GDP in 2025. https://www.uzdaily.uz/en/small-business-in-uzbekistan-accounts-for-over-half-of-gdp-in-2025/

[2] President of the Republic of Uzbekistan. (2019). Resolution No. PP-4477: Strategy for the Transition to a Green Economy for the 2019–2030 Period. https://www.iea.org/policies/11979-strategy-for-the-transition-to-a-green-economy-for-the-2019-2030-period-resolution-of-the-president-of-the-republic-of-uzbekistan-no-pp-4477

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entrepreneurship, green marketing, and eco-innovation in Uzbekistan, supplemented by the broader international literature on eco-innovation determinants in SMEs from emerging markets.

Environmental Regulation and Innovation: The Porter Hypothesis

The theoretical starting point for most green-innovation research is the Porter Hypothesis, which proposes that well-designed environmental regulation can stimulate innovation offsets that improve rather than erode firm competitiveness.[3] Ambec, Cohen, Elgie, and Lanoie reviewed two decades of empirical evidence and found consistent support for the "weak" version of the hypothesis, regulation does stimulate innovation, while evidence for the "strong" version, that this innovation always raises profitability, remains mixed.[4] A recent meta-analysis by Yang and colleagues similarly found that the relationship between environmental regulation and green innovation is moderated by institutional context, including whether a country is developing or developed.[5] This moderation is directly relevant to Uzbekistan, where regulatory enforcement capacity and green-finance infrastructure are still developing.

Determinants of Eco-Innovation in SMEs

A growing body of systematic reviews has catalogued the determinants of eco-innovation adoption specifically in SMEs. Passaro, synthesizing prior reviews in Business Strategy and the Environment, grouped determinants into organizational, technological, and institutional categories.[6] A 2025 systematic review of 47 studies published between 2020 and 2025 similarly identified five recurring determinant categories: organizational capabilities, external institutional pressure, technological readiness, stakeholder influence, and resource availability. Qualitative work on developing-country SMEs consistently finds that limited finance, weak owner/manager awareness, and insufficient regulatory enforcement are the dominant constraints, while customer demand and government policy are the strongest positive drivers.[7] These findings provide the analytical lens applied to the Uzbek case below.

Policy Context: Uzbekistan's Green Economy Framework

Uzbekistan's Strategy for the Transition to a Green Economy for 2019–2030 set quantitative targets including a 10 percent reduction in greenhouse gas emissions per unit of GDP relative to 2010 and a doubling of energy efficiency by 2030. A follow-up Presidential Decree of December 2022 (PP-436) approved an implementation Program, a sectoral Concept for green economy and energy saving, and a detailed Action Plan through 2030, and created an Interdepartmental Green Economy Transition Council

[3] Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives, 9*(4), 97–118.

[4] Ambec, S., Cohen, M. A., Elgie, S., & Lanoie, P. (2013). The Porter Hypothesis at 20: Can environmental regulation enhance innovation and competitiveness? *Review of Environmental Economics and Policy, 7*(1), 2–22. https://academic.oup.com/reep/article-abstract/7/1/2/1578611

[5] Nature Humanities and Social Sciences Communications. (2024). Revisiting the Porter hypothesis: A multi-country meta-analysis of the relationship between environmental regulation and green innovation. https://www.nature.com/articles/s41599-024-02671-9

[6] Passaro, R., Rippa, P., & Scuotto, V. (2023). The drivers of eco-innovations in small and medium-sized enterprises: A systematic literature review and research directions. *Business Strategy and the Environment*. https://onlinelibrary.wiley.com/doi/full/10.1002/bse.3197

[7] PLOS One. (2024). Barriers to adaptation of environmental sustainability in SMEs: A qualitative study. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0298580

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to coordinate execution. In 2024 the government raised its renewable-energy target from 25 percent to 40 percent of installed electricity-generation capacity by 2030, reflecting accelerated ambition.[8]

International financial institutions have complemented this domestic framework. The European Bank for Reconstruction and Development's Green Economy Financing Facility (GEFF II Uzbekistan) channels concessional credit lines through local banks specifically to help micro, small, and medium enterprises finance energy-efficiency upgrades and climate-resilient modernization.[9] Such facilities are significant because access to affordable green finance is repeatedly identified in the literature as the single largest constraint facing SMEs seeking to adopt cleaner technology.

Current State of Green Innovation Adoption Among Uzbek SMEs

Despite the sector's economic weight, its integration of green practices remains uneven. Recent statistical analysis covering 2015-2025 shows a widening structural gap between the SME sector's employment share, which declined only marginally from 77.9 to 74.9 percent, and its GDP share, which fell more sharply from 64.6 to 52.2 percent , a 12.4 percentage-point drop that the authors attribute partly to persistently low productivity and limited technological upgrading among small firms.[10] This productivity gap is consistent with slow diffusion of resource-efficient and green technologies at the firm level.

Sector-specific studies reinforce this picture. Analysis of Uzbekistan's industrial enterprises found that although national strategic policy explicitly supports green transformation, firms continue to face outdated technological infrastructure, insufficient financial resources, and limited human capital, which together slow the adoption of green innovation.[11] Research on green marketing among small businesses similarly found that investment by smaller enterprises in green-market infrastructure remains modest and that this infrastructure is not yet well developed.[12] At the same time, several 2025–2026 studies point to emerging positive momentum: growth in green employment, renewable-energy integration, and afforestation between 2018 and 2024, with econometric analysis confirming that green-policy measures have had a positive effect on energy productivity at the national level. Digitalization is increasingly framed as a complementary lever: studies argue that digital tools such as IoT and data analytics can enhance resource efficiency and open circular-economy opportunities for Uzbek SMEs, though adoption of these tools is still at an early stage.[13]

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[8] OECD. (2025). Promoting green investment in Uzbekistan: Roadmap for sustainable investment policy reforms in Uzbekistan. https://www.oecd.org/en/publications/roadmap-for-sustainable-investment-policy-reforms-in-uzbekistan_20865f29-en/full-report/promoting-green-investment-in-uzbekistan_021bd5e8.html

[9] EBRD. (2025). EBRD supports green lending in Uzbekistan. European Bank for Reconstruction and Development. https://www.ebrd.com/home/news-and-events/news/2025/ebrd-supports-green-lending-in-uzbekistan.html

[10] Journal of Agrobusiness, Science and Technology. (2025). Disparity between employment and GDP shares of small business in Uzbekistan: National and regional statistical analysis. https://agrobiznesjournal.uz/index.php/ast/article/view/178

[11] PST Journal. (2026). Current state and specific features of green innovation development in Uzbekistan's industrial enterprises. https://www.pstjournal.uz/index.php/pst/article/view/77

[12] Central Asian Journal of Innovations on Tourism Management and Finance. (2026). Problems and solutions of green marketing use in small business activities in Uzbekistan. https://cajitmf.casjournal.org/index.php/CAJITMF/article/view/1167

[13] Zenodo. (2026). Green business models in Uzbekistan: How SMEs can drive sustainable growth in the digital age. https://zenodo.org/records/20727404

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Barriers and Drivers

Consistent with the international eco-innovation literature, the Uzbek-specific studies reviewed here converge on four recurring constraints: (1) limited access to affordable green finance, despite facilities such as GEFF II; (2) outdated technological infrastructure and low absorptive capacity among small firms; (3) shortages of technically trained personnel able to design or operate cleaner processes; and (4) low consumer awareness of green products, which weakens the market-demand channel that elsewhere drives adoption.[14] Regulatory complexity and administrative burden are cited as secondary but persistent obstacles, echoing findings from other developing economies.

On the driver side, three forces stand out: explicit government strategy and target-setting, which has raised the policy salience of green transformation since 2019; growing access to concessional green credit lines channeled through partner banks; and rising international cooperation and donor co-financing, including support from Canada, Germany, and other HIPCA partners routed through the EBRD. Regional entrepreneurship studies also note that small businesses are well positioned, given their flexibility, to act as agents of decentralized environmental solutions and green-job creation once financing and awareness constraints are eased.

Development Prospects and Policy Recommendations

Three directions appear most promising for accelerating green innovation diffusion among Uzbek SMEs through the remainder of the 2019-2030 strategy period. First, expanding blended and concessional green-finance instruments beyond current pilot facilities, with simplified application procedures tailored to microenterprises, would directly target the most-cited barrier. Second, targeted capacity-building, energy audits, technical training, and demonstration projects, could raise absorptive capacity, consistent with the emphasis on capacity building already written into the national Strategy. Third, demand-side measures such as green public procurement and consumer-awareness campaigns could strengthen the market-pull mechanism that the literature identifies as a leading driver of adoption elsewhere.

Given the Porter Hypothesis framework, the design of future regulation matters as much as its stringency: regulation that is predictable, phased, and paired with technical assistance is more likely to generate genuine innovation offsets for resource-constrained small firms than abrupt compliance mandates. Continued monitoring through the Interdepartmental Green Economy Transition Council, combined with disaggregated SME-level data collection, would allow policymakers to track adoption more precisely than the current aggregate indicators permit.

Conclusion

Uzbekistan has built a comprehensive policy architecture for green economic transformation since 2019, and small businesses, given their overwhelming share of employment and output, are central to its success. Yet the evidence reviewed here indicates that green innovation adoption among SMEs remains constrained primarily by finance, technology, skills, and awareness gaps rather than by an absence of policy ambition. Closing these gaps through targeted finance, capacity-building, and demand-side

[14] Wisdomvector. (2024). Embracing green entrepreneurship: A case of Uzbekistan — A pathway towards a more sustainable future (Part 1). https://www.wisdomvector.org/post/embracing-green-entrepreneurship-a-case-of-uzbekistan-a-pathway-towards-more-sustainable-future-p

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instruments represents the most direct path to converting Uzbekistan's green-economy strategy into measurable change at the level of individual small enterprises.

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