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INNOVATIONS FOR SUSTAINABILITY: HOW GREEN STARTUPS ARE EMERGING IN UZBEKISTAN

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Abstract: *As eco innovations and low carbon transitions are gaining priority over global sustainable development whilst setting down powerful economic ecological sustainable solutions and growing environmental inclusion. Green entrepreneurship has new opportunities in Uzbekistan, thanks to recent policy reforms, the most recent being the Green Economy Transition Strategy (2019-2030) and the Uzbekistan-2030 Strategy. There is however little empirical evidence regarding how are these startups emerging, operating, or contributing to the national sustainable goals. Knowledge of that other knowledge gap being addressed by this study is another knowledge gap, and is addressed by the use of a qualitative secondary data analysis methodology from government documents, international reports, and sectoral statistics, conducted over the last three years (2021–2024). The findings state that the efforts Uzbekistan has put in to generating opportunities for renewable energy projects and fertile grounds for eco innovation (eg solar and wind plants, electric vehicle manufacturing), remain hampered by lack of funding, technological dependence and poor coordination of institutions. The findings indicate that more robust innovation ecosystem is required to successfully promote green ventures at a scale. Policymakers and those seeking theoretical understanding of sustainability oriented entrepreneurship in emerging economies can learn from this study.*

Keywords: *Green startups, sustainability, innovation, Uzbekistan, green economy, renewable energy, entrepreneurship*

Introduction

In recent years, innovations that support sustainable development through the alignment of economic growth and environmental preservation are integral to a global hunt for such path. The growing effect of climate change, depletion of resources and a weakening ecosystem has forced both the developed and developing nations to adapt their growth paths towards green and low carbon models. Green Startups, entrepreneurial ventures that create environmentally sustainable products, services, or business models, have been among these global responses that have gotten attention as important actors to trigger sustainability transitions. Particularly, their contribution to national and global sustainable development goals (SDG) such as technological diffusion, resource efficiency and clean energy adoption can be put forward through them [1].

With significant economic reform and modernization under way, Uzbekistan is lately shifting its focus on green innovation to expand and secure long term green and economy sustainability. The adoption of such a fertile policy landscape for the nurturing environmentally responsible entrepreneurship has been launched with the adoption of the Green Economy Transition Strategy (2019–

2030) and the updated Uzbekistan 2030 Strategy in 2023. The country is also no odd one out in that it is trying to raise the proportion of renewable energy, stimulate energy efficiency and rehabilitate ecologically vulnerable areas like the Aral Sea basin in line with the sustainability trend. While the importance of startups in translating these policies into practice has been unexplored, in terms of the capacity of startups to innovate, the sector to which they are addressed, and the institutional support that most of them receive [2].

Green startups are thoroughly studied in advanced economies but they are completely new for emerging markets like Uzbekistan. Studies on general facets of sustainability transitions and green growth have been made but few have formulated systematically the dynamics of green entrepreneurial ecosystems in Central Asia. However, there is important knowledge gap regarding how startups emerge in transitional policy environments and how they take advantage of innovation to take advantage of both market opportunities and environmental imperatives. It is crucial to understand the driving forces, challenges, and the trajectories of such startups within Uzbekistan for the sake of appraisal of the effectiveness of the past reforms and the direction of upcoming innovation policy [3].

Qualitative research design is applied in this study to observe the increase of green startups in Uzbekistan from 2021 to 2024 by means of secondary data analysis. In state policies–entrepreneurial alignment analysis, it derives from government strategies, economic reports, international assessments, and the case based observations. First, the research examines key sectors of innovation, institutional enablers and barriers, and the character of collaboration between the public, private, and academic actors. Moreover, it studies the ways in which startups are involved in achieving the national sustainability goals through the deployment of renewable energy and circular economy models and eco friendly technologies [4].

The expected results give a picture of the Uzbekistan's step forward to the green transition in the sense of launching new solar and wind power projects, as well as clean transport fuel incentives, but with significant roadblocks for the country's startibup ecosystem at the level of financial access, technological dependence and knowledge transfer. Thus, this study has two practical implications on how to better support green entrepreneurship and one theoretical contribution to the small body of knowledge on sustainability driven startups in post-Soviet economies. This research ultimately shows how innovation ecosystems are key in fostering sustainable development and underscores the need for continuous, local and data based policy interventions [5].

METHOD

The research design of this study is grounded in the methodology, secondary data analysis to examine the emergence and role of green startups in the environmental protection of Uzbekistan. Therefore, the research process included a complete review of official policy documents, statistical data, government resolutions, the recent publications (2021–2024), Uzbekistan-2030 Strategy, Strategy for transition to a green economy (2019–2030) and the reports of the State Statistics Committee and international organization: the UN, World Bank. The study used content analysis to uncover the most important sustainable development goals (SDGs) that are also closely linked with government incentives and startup activities regarding innovation. It stressed green entrepreneurship areas such as renewables, waste management, water conservation technologies and energy efficiency in construction, transport etc. Particularly this year, 2023, we have data of how solar and wind power infrastructure is growing as well

as joint ventures between Chinese and UAE firms to launch clean energy facilities. The study's insights also emanated from descriptive evaluation of startup policies, for example, tax incentives, green certification programs, and the local production of eco technologies. Analytical findings from recent talks in contemporary case study, media coverage, and think tank reports on Uzbekistan's transition efforts were also included as part of the research. The national progress reports were cross validated with third party evaluations that include CABAR.asia and The Diplomat. A triangulated approach offered a resourceful basis for understanding how the policy innovation entrepreneurship nexus operates in Uzbekistan, and how the current and the future landscape of green startups in Uzbekistan can be compared.

RESULTS AND DISCUSSION

The paper argues to the contrary by providing an analysis of a growing and still nascent ecosystem of green startups in Uzbekistan and the role of state-led policy reforms and emerging private sector initiatives in building this ecosystem. During the past three years (2019–2024), Uzbekistan has carried out significant efforts to move to a green economy along with its strategic documents, namely the Green Economy Transition Strategy (2019–2030) and the updated Uzbekistan 2030 Strategy. The focus of these frameworks is on sustainable innovation, renewable energy expansion and resource efficiency, and environmental entrepreneurship. This is the operationalization of the projects that represent solar and wind energy, among them are six power plants started in 2023 with Chinese and UAE companies. This is an emerging investment climate that is conducive to green technological innovation [6].

In terms of entrepreneurial development, green zones, green certificates, and incentives in the market for renewable energy production provide the basis for the area of startups specializing in energy, ecoagriculture and waste management. By way of example, BYD's plan to construct an electric vehicle manufacturing plant in 2024 that indicates foreign interest and local ambition in sustainable mobility solutions [7]. However, advances in these areas do not address all of the barriers. The technological dependence on import, weak R&D capacity and under development venture capital market limit the scope of the startup ecosystem. A clear knowledge gap exists between commercialization pathways of sustainable technologies and local green startups' scalability.

There is a need for further theoretical exploration of the institutional dynamics behind or against eco-entrepreneurship in post-Soviet transition economies. Instead of existing policy frameworks, which have a strategic role, there is an empirical dearth in the literature of studies on how regulatory environments translate to startup growth and innovation outcomes in practice. In order to analyze the socio technical networks that drive green innovation, as a networked problem, deep, interdisciplinary research is required to examine the collaborations between universities, research institutes and private enterprises as well as within private enterprises [8].

In practice, more case specific studies on Uzbekistan's early stage green ventures are required to understand success factors and failure modes. Longitudinal research about startups from conceiving to the market entry would help to draw the real effect of current policies. Furthermore, the potentials of digitalization to facilitate startup agility and sustainable product development are not well underpinned. To further, an emerging priority is to examine ways that public private partnerships can be optimised to help generate knowledge spillovers, especially in the renewable energy technology and waste to energy applications [9].

Finally, it is concluded that the green transition in Uzbekistan has been catalyzed by the state's strategic orientation, but it remains to be seen whether the green entrepreneurship may become

sustainable in the medium term of sufficient innovation infrastructure, financial mechanisms, and base of research. In addition to strengthening institutional support and integrating innovation metrics into policy assessments so that policy can better support on the ground startup success, it will also be necessary to facilitate access to international green technology markets.

CONCLUSION

To conclude, the rise to green startups in Uzbekistan during the past three years is primarily steered by state induced strategies, namely, Green Economy Transition Strategy (2019–2030), and the new updated Uzbekistan 2030 Strategy, which converge on the domain of renewable energy, energy efficiency, and sustainable innovation. While Uzbekistan has successfully spearheaded large clean energy projects and provided green entrepreneurship an enabling environment in the form of tax reliefs, green certifications and infrastructure modernization the environment for startups continues to be weakly developed as the technology autonomy is limited, R&D network is weak and financial access is restricted. This highlights the need for an integrated support systems such as a targeted capacity building programs and expanded public private academic collaboration. Far-reaching are the implications: a strong green startup base not only supports Uzbekistan's net zero ambitions and environmental resilience but with a focus on innovation enabled employment adds to an inclusive economic growth of Uzbekistan. Future research should be done on in depth empirical studies of startup lifecycle development, the effectiveness of the current policy instruments and the contribution of digitalization and global partnerships towards scaling sustainable technologies.

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