A Comparative Analysis of Green Finance Initiatives in Central and Eastern Europe and Central Asia: Stakeholders and Policy Implications

Abstract: Green finance forms an increasingly important instrument to combat environmental degradation. However, countries differ widely in their green finance policies, but these differences receive little attention and are little understood. This paper conducts a comparative analysis of green finance initiatives in Poland and Uzbekistan, focusing on their policy adaptation and efficiency within the broader contexts of Central and Eastern Europe and Central Asia. By analyzing policy documents, articles, and reports through qualitative coding and thematic analysis, the study highlights the key similarities and differences in green finance implementation. We use the theory of policy diffusion and entrepreneurship ecosystems as our basic conceptual frameworks. The analysis reveals that both nations, despite their different stages of economic development, are actively transitioning from fossil fuels to renewable energies, utilizing varied financial instruments and strategies tailored to their specific environmental and economic challenges. The stakeholders involved in green finance implementation are also partly different between the two countries. The study suggests that expanding the use of specialized financial tools like blue bonds could significantly enhance both countries' capacity to manage critical water resources effectively. The study underscores the significance of understanding policy diffusion processes and the restructuring of entrepreneurial ecosystems in enhancing the effectiveness of green finance initiatives.

Keywords: green finance, green policies, green finance initiatives, policy diffusion, entrepreneurship ecosystems, Central and Eastern Europe, Central Asia.

1. Introduction

Climate change is a major challenge to the sustainable development of the world economy and the well-being of the world's population (Kompas et al., 2018). To transition to a sustainable global economy, a large amount of capital, roughly $3.5 trillion a year (Broom, 2022), will need to be directed into green investments. Spurred by the Paris Agreement (UNCC, 2021), numerous countries have implemented green policies aimed at influencing financial institutions to redirect their investments (Liu et al., 2019; Ren & Pei, 2023). Green financial policies play a pivotal role in advancing carbon emission efficiency (Du et al., 2022; Lei & Wang, 2023) and are also expected to have a big impact on entrepreneurship and SMEs as it will change the conditions under which firms can access external finance (Sadiq et al., 2022). In particular, firms will increasingly need to meet environmental sustainability conditions.

While green policies are recognized as crucial on a global scale, the level of commitment and implementation varies significantly across nations (Steffen, 2021). Comparing the policy initiatives of different nations proves to be a daunting task, yet this represents a fundamental necessity for the progress and fortification of policies in this crucial domain. Comparing policies is important because it enables benchmarking and learning. Despite their importance, green policies are little understood and little studied (Steffen, 2021).

This research undertakes a comparative analysis of the implementation of green finance initiatives in Poland and Uzbekistan, delving into the unique economic and environmental challenges these countries face. These countries are chosen as representative for the wider regions of Central and Eastern Europe and Central Asia, respectively, as they are the largest countries —in terms of population — within the two respective regions. Poland is one of the largest economies in Central and Eastern Europe and has been a leader in regional economic transformation (Parnell & Parnell, 2019). Uzbekistan, on the other hand, is the most populous

country in Central Asia and has significant economic potential and strategic location (Tleuken et al., 2022).

Poland, as an EU member, exemplifies how a nation with a well-developed economy integrates green finance initiatives within the regulatory framework of the European Union. Conversely, Uzbekistan's position as a Central Asian country introduces a unique perspective on green finance adoption. Additionally, during the mid-20th century, Poland and Uzbekistan found themselves navigating the challenges and transformations brought about by socialist ideologies. Poland, under the influence of Soviet socialism, and Uzbekistan, as part of the Soviet Union, shared common experiences that characterized the socialist era. This shared historical backdrop serves as a point of convergence in their respective narratives. The lessons learned in Poland and Uzbekistan could be applicable to other countries undergoing similar economic transformations. Further background on the historical and economic transition toward sustainability in the two countries can be found in Appendix 1.

It's crucial to recognize the environmental challenges in Poland and Uzbekistan, which underline the need for green initiatives. Poland's industrial reliance on coal leads to significant air pollution, compounded by a slow shift to renewable energy, highlighting the need for investments in green technology (Dmuchowski et al., 2021). Additionally, its agricultural practices, impacting climate and ecosystems, require a shift towards sustainability as per the European Green Deal (Prandecki, Wrzaszcz, & Zieliński, 2021). Uzbekistan faces challenges from its dry climate and the Aral Sea's desiccation, causing severe ecological and health issues, water scarcity, and impacting agricultural productivity (Tursunov et al., 2021). Both nations urgently need innovative solutions to address these environmental concerns.

The study is the first to conduct an in-depth comparative analysis of green finance practices in these regions, examining how unique geopolitical and economic factors influence the adoption and effectiveness of green finance initiatives, thereby contributing to the emerging

yet important research field of climate policies and entrepreneurship. To fill this gap, here we aim to answer the following research question: *What are the differences and similarities in the approaches to green finance taken by Poland and Uzbekistan, and how can these experiences inform policy recommendations for other nations?*

This study uses comparative analysis, qualitative coding, and thematic analysis to examine green finance initiatives in Poland and Uzbekistan. The analysis begins with qualitative coding of policy documents and articles on green finance, using open coding to identify patterns, axial coding to form broader themes, and selective coding to pinpoint key categories for comparison (Williams & Moser, 2019). Thematic analysis refines these categories, generating and defining significant themes (Kiger & Varpio, 2020) that represent the core aspects of green finance in both countries. This methodology allows us to highlight the similarities and differences in how each country implements and addresses challenges in their green finance policies, providing insights into their successes and areas for improvement.

The paper is organised as follows: Section 1 introduces the research area. Section 2 reviews relevant literature, covering green finance mechanisms, their role in supporting small and medium enterprises (SMEs), and the influence of policy on entrepreneurial ecosystems. Section 3 assesses the environmental challenges faced by Poland and Uzbekistan. Section 4 analyzes green finance policies and stakeholder engagement in both countries. Section 5 provides a comparative analysis, highlighting key similarities and differences. The paper concludes in Section 6, summarizing the findings and proposing recommendations for strengthening green finance's role within the studied regions.

2. Literature Review

Within the Literature Review, we analyze the critical components of green finance and its broader implications. Section 2.1, defines green finance within the wider sustainable

financial system and probes the influence of policy on green financial practices. Section 2.2, examines how green financing acts as a catalyst for small and medium enterprises, which are pivotal to innovation and sustainable growth. Section 2.3, delves into the mechanisms of policy diffusion, examining how innovative financial policies for sustainability are adopted and adapted across different contexts.

2.1 Green Finance Overview and Policy Impact

Green finance, as defined by the World Bank Group (2021), is part of a broader spectrum within sustainable finance, positioned between the overarching concept of "Sustainable Development" and the narrower focus of "Low-Carbon" finance. It supports a variety of environmental projects aimed at generating positive impacts, which may include climate-related or low-carbon initiatives (World Bank Group, 2021). See Figure 1.

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Green finance mechanisms include various financial instruments and policies that promote investments with environmental benefits. These mechanisms reduce risks associated with green technology innovation and enable governments, entrepreneurs, and businesses—including SMEs—to invest in green innovations (Hu et al., 2021). The effectiveness of green finance is significantly influenced by explicit and stable government policies. These policies are crucial for promoting renewable energy and other sustainable projects. Guild (2020) and Bhandary et al. (2022) discuss the importance of such policies in shaping the landscape for green finance. The development of unified green finance evaluation systems and the implementation of green standards are highlighted as fundamental for establishing a robust foundation for green financial practices (Lee, 2020; Wang et al., 2021; Feng et al., 2023).

Governments are encouraged to provide incentives, subsidies, or regulatory support to foster green investments. Government support programs can only be effective if they support access to financing instruments that consider both the specific characteristics of SMEs and their demand for finance as well as the supply conditions in specific countries (Moritz et al., 2016). Zhang et al. (2021) and Shen et al. (2022) suggest that incentive schemes such as tax refunds or green credit guarantee schemes can mitigate the perceived high risks and enhance the returns associated with green energy projects. Mandatory disclosure requirements also play a significant role in enhancing transparency and enabling informed decision-making within green finance (Lee, 2020; Feng et al., 2023). Development banks, including Multilateral Development Banks, are pivotal in advancing green finance by providing financing, technology, and construction services for renewable energy projects, particularly in developing countries. They also support the formulation, execution, and enforcement of relevant policies (Lee, 2020; Mendez & Houghton, 2020; Bhandary et al., 2022). The literature also examines the role of green policies in restricting credit, altering corporate financing costs, and stimulating innovation (Liu et al., 2017; Yu et al., 2021; Hu et al., 2021; Zhang et al., 2022; Xiong et al., 2023; Huang et al., 2022; Cai et al., 2023). Notably, well-designed environmental regulations can create a win-win situation for the economy and the environment by fostering competitive innovations that also reduce environmental degradation (Porter & Linde, 1995).

2.2 The Role of Green Finance in SME Development

Sadiq et al. (2022) emphasize the significant role green finance plays in enabling SMEs to address the economic consequences of the COVID-19 pandemic while simultaneously contributing to the global sustainability agenda. The adaptability of SMEs to use green finance underlines the importance of financial mechanisms in promoting sustainable business practices and environmental stewardship. Ebrahimi and Mirbargkar (2017) present green innovation as a

cornerstone for the development and competitiveness of SMEs, especially in turbulent markets. Lotfi, Yousefi, and Jafari (2018) argue for the crucial role of market demand in driving companies towards green innovations. This demand-driven approach signifies a shift in consumer behavior and preferences towards more sustainable and environmentally friendly products, thereby incentivizing SMEs to pursue green innovations. Zeng, Wang, and Wu (2022) underscore the indirect benefits of green finance in enhancing environmental quality through technological innovation, thereby creating a conducive environment for sustainable business practices. Talić, Ivanović-Đukić, and Rađenović (2020) highlight the ecosystem's significance in the development and marketing of green products. Bhatnagar, Taneja, and Özen (2022) recognize government policies as instrumental in fostering an ecosystem conducive to sustainability-focused startups. Jin, Gao, and Wang (2021) emphasize the critical need for policy interventions to bolster green finance mechanisms, thereby facilitating the green transition of SMEs. This viewpoint is complemented by Koirala (2019) claims SMEs as pivotal actors in achieving green and inclusive growth. Chien et al. (2021) underscore complexities faced by SMEs in developed countries, particularly the UAE, as they attempt to integrate green finance into their operations. The paper highlights the dual role of SMEs in economic and environmental spheres, underscoring the challenges, including financial and growth constraints, that prevent the adoption of green practices. The analysis presents a nuanced understanding of the barriers to green finance, advocating for an enhanced access to green finance as a catalyst for economic and environmental sustainability.

The literature underscores the integral role of green finance in facilitating the transition of SMEs towards sustainability and resilience. While challenges exist, the potential of green finance to drive innovation, competitiveness, and environmental stewardship within SMEs is evident. Policy support can propel SMEs towards a sustainable future, thereby contributing to broader environmental and economic objectives.

2.3 Policy Diffusion and Entrepreneurship Ecosystems

Berry and Berry (2018) define policy diffusion as the process through which policy innovations spread across jurisdictions. Authors emphasize that policy diffusion is not merely about the adoption of new policies but also involves the mechanisms through which these policies are communicated, understood, and implemented across different political and administrative contexts. Shipan and Volden (2008) provide foundational insights into the mechanisms of policy diffusion, identifying learning, economic competition, imitation, and coercion as key drivers. This framework is instrumental in understanding how entrepreneurial policies spread across regions, suggesting that jurisdictions adopt new policies based on their effectiveness, competitive pressures, desire to imitate successful models, and compliance with higher-level mandates. The temporal and conditional effects highlighted in their study underscore the dynamic nature of policy diffusion and its dependency on various factors, such as city size and economic conditions. Mintrom (1997) explores how policy entrepreneurs—political actors who promote policy ideas—play a significant role in the diffusion of policy innovations. This perspective is crucial for entrepreneurship ecosystems, as policy entrepreneurs can act as catalysts for the introduction and propagation of policies that foster entrepreneurial activity and innovation within regions.

Stam & Van de Ven (2021) define entrepreneurial ecosystems as encompassing all interdependent actors and factors that enable and constrain entrepreneurship within a specific territory. The authors reveal a strong correlation between the prevalence of high-growth firms in a region and the quality of its entrepreneurial ecosystem. This underscores the importance of a well-functioning ecosystem in fostering successful entrepreneurship. Stam (2015) introduces the entrepreneurial ecosystem approach as a critique of traditional entrepreneurship policy, advocating for a shift towards policies that support an entrepreneurial economy. This framework emphasizes the systemic conditions and contextual factors conducive to productive

entrepreneurship, highlighting the importance of policy in shaping these environments. Stam's critique and proposed frameworks provide a nuanced understanding of how entrepreneurial activities are supported or inhibited, emphasizing the role of policy in nurturing vibrant entrepreneurial landscapes. Meshram and Rawani (2019) and Cavallo, Ghezzi, and Balocco (2019) highlight several critical factors intrinsic to the successful functioning of entrepreneurial ecosystems. These include access to finance, supportive government policies, a vibrant entrepreneurial culture, market demand, and the availability of support services and infrastructure.

Integrating policy diffusion and entrepreneurship ecosystem frameworks offers a comprehensive approach to understanding the impact of green finance on entrepreneurship and SMEs. While policy diffusion provides insight into how green finance policies spread and are adopted across different domains, the entrepreneurship ecosystem framework examines the operational context in which these policies are implemented and their direct impact on entrepreneurs and SMEs. Together, these frameworks can help identify best practices in policy formulation and ecosystem development to support green finance initiatives effectively. Employing these theoretical frameworks will help researchers and policymakers to gain a deeper understanding of the dynamics at play in advancing green finance and its implications for fostering sustainable entrepreneurship and the growth of SMEs.

3. Environmental Challenges in Poland and Uzbekistan

3.1 Poland

Poland's environmental landscape is characterized by a number of problems caused by its industrial legacy, dependence on coal in the energy sector and the pressure of modern economic growth. Understanding these issues is crucial for developing effective sustainable development strategies.

According to a survey conducted by Poland's Ministry of Climate and Environment (2022), the country faces significant environmental challenges, primarily in air pollution, waste management, and climate change. Air pollution remains a major concern, driven by emissions from industrial activities and domestic heating systems, particularly old coal stoves. Despite a noted decrease in these emissions, air quality issues persist. Efforts to combat this include transitioning to greener energy sources and promoting the use of low-emission heating options. In waste management, the survey found a robust culture of recycling, with 96% of respondents regularly segregating their waste. Challenges here include limited space for waste segregation at home and doubts about the effectiveness of recycling processes. As for climate change, it is recognized as a crucial issue by 91% of those surveyed, with many urging for immediate action from both individuals and the government to reduce greenhouse gas emissions and mitigate its adverse effects on health and the environment.

In the article from Notes from Poland (2022)[1] titled "Poland ranks last in EU green index," it's reported that according to EU-funded study, Poland was ranked as the worst performing EU country in a green index with a score of 34 out of 100. The index measured the environmental performance of countries based on their policies and achievements in areas such as air quality, climate change, and biodiversity. The next three lowest countries were Estonia (36.1), Luxembourg (37.4) and Finland (38.1). Key factors contributing to Poland's low ranking include its continued heavy reliance on coal for energy, which significantly impacts air quality and carbon emissions. Additionally, the article highlights that despite some progress in renewable energy, Poland's transition away from fossil fuels has been slow compared to other EU countries.

Country's heavy reliance on coal for energy has led to significant environmental challenges, particularly in terms of air pollution and has positioned Poland among the countries

[1] https://notesfrompoland.com/2022/11/05/poland-ranks-last-in-eu-green-index/

with the highest air pollution levels in Europe (Dmuchowski et al., 2021). The transition to low-carbon technologies, especially in rural areas, is crucial for reducing emissions and improving environmental quality (Piwowar & Dzikuć, 2019). Modernization of energy blocks as well as greenhouse gas reducing installations would significantly reduce the negative impact of the electric energy production of one of the biggest power plants in Poland (Dzikuć & Tomaszewski, 2016). Despite the need for diversification, domestic coal is expected to remain a key energy source, although its share in the fuel mix is likely to decrease due to environmental regulations (Kamiński & KudeŁko, 2010; Brauers & Oei, 2020). The future demand for coal in the power sector will be significantly influenced by environmental regulations, with the potential for a substantial reduction in coal consumption (Kaszyński & Kamiński, 2020; Tomaszewski, 2020).

Poland's accession to the EU in 2004 was a pivotal moment in its post-independence era, symbolizing a reconnection with Europe and a significant step towards modernization and economic growth. This integration expanded market access, increased foreign investment, and provided financial aid, significantly benefiting smaller and medium-sized enterprises and boosting the entrepreneurial sector (Kolodziejczyk, 2016; Hunter & Ryan, 2006). While EU membership has propelled economic development and expanded export opportunities, it has also introduced challenges such as the financial costs of membership, competitive pressures in the single market, and migration trends (Pawlas, 2014). Nonetheless, the advantages, including a stronger role in European decision-making and economic advancement, have been substantial (Antoszewski, 2000).

3.2 Uzbekistan

Uzbekistan faces a range of pressing environmental challenges that impact its development and the health of its ecosystems and populations. Among these challenges, water

scarcity, air pollution, and the effects of the desiccation of the Aral Sea are particularly significant.

The Aral Sea crisis, one of the most pronounced ecological disasters of the 20th century, continues to significantly impact Uzbekistan's environment today. Initially one of the world's largest lakes, the Aral Sea began shrinking in the 1960s due to Soviet irrigation projects that diverted its tributary rivers for cotton cultivation. This drastic reduction in water inflow caused the sea to lose over half its volume and surface area by the late 20th century, resulting in severe ecological, economic, and social consequences (Micklin, 1988). The environmental impacts include severe desiccation and salinization of the lake, which have destroyed local ecosystems and led to the collapse of the region's once-thriving fishing industry. As the sea receded, it left behind a toxic dust laden with pesticides and industrial chemicals previously used in farming, which are now carried by wind across the region, causing serious health problems among the local population (Gupta, 2020). The human cost of the disaster has been immense, affecting millions of people living in the Aral Sea basin. Health issues such as respiratory illnesses, cancer, and other serious diseases have become more prevalent due to the contaminated air and a lack of clean water. Additionally, the economic decline following the destruction of the fisheries and the decreased viability of farming due to salt-ridden soils has led to widespread poverty and diminished living standards (Gupta & Gupta, 2016). Efforts to mitigate these impacts have been complicated, requiring significant international cooperation and investment. Despite various rehabilitation projects proposed or initiated, the situation calls for urgent and sustained efforts to restore ecological balance and provide relief to the affected communities. The legacy of the Aral Sea crisis exemplifies the profound interconnections between environmental management decisions and long-term regional sustainability (Micklin, 1988).

The economic growth experienced by Uzbekistan over the past few decades has been notable, primarily driven by resource extraction, mining activities, and the manufacturing

sector. However, this growth has come with significant environmental consequences, particularly in terms air pollution and water scarcity (Toderich et al., 2013; Tukhtaeva, 2020). Uzbekistan's heavy reliance on water resources makes it vulnerable to water deficiency and pollution due to mismanagement, outdated technologies, and unsustainable agricultural practices, necessitating the development of economic mechanisms for water distribution and use at national and regional levels (Kulmatov, 2014). Air pollution in Uzbekistan presents a significant environmental challenge that affects the health and quality of life of its population. The country's industrial activities, coupled with increasing vehicle emissions, are primary contributors to air quality degradation. Cities like Tashkent, which experience rapid industrial growth and high traffic volumes, frequently report elevated levels of air pollutants (Tursumbayeva et al., 2023).

Despite heavy reliance on fossil fuels in Central Asian countries, there's significant potential for renewable energy development. Uzbekistan, in 2020, set ambitious targets for wind and solar capacity, aiming for 8 GW by 2030 (REN21 and UNECE, 2022). However, energy subsidies favoring fossil fuels pose obstacles, with Uzbekistan's share at 6.6% of GDP in 2020, remaining notably high compared to neighboring countries (IEA, 2021). Uzbekistan has committed to constructing 10 GW of new power generation facilities by 2030, comprising solar PV, wind, and hydropower (Ministry of Energy of the Republic of Uzbekistan, 2021). This marks a significant leap towards a sustainable energy future, aligned with Paris Agreement commitments (OSCE, 2024). The government offers fiscal incentives and state support, including loans, guarantees, and tax benefits, to promote clean energy adoption. Subsidies incentivize citizens to transition to renewables, particularly for solar PV installations (REN21 and UNECE, 2022).

4. Green Finance Initiatives in Poland and Uzbekistan: An Analytical Perspective on Policies and Stakeholders

4.1 Poland: Policy framework

Poland stands as a significant example within Central and Eastern Europe regarding the advancement and challenges of green finance. As a member of the European Union (EU), Poland's initiatives in green finance are partly driven by EU regulations and commitments.

The European Green Deal is a comprehensive strategy by the European Union to address climate change and environmental degradation, with the ambitious goal of making the EU climate-neutral by 2050 (European Commission, 2019). This initiative includes a wide range of policies aimed at reducing greenhouse gas emissions, enhancing energy efficiency, promoting renewable energy sources, and fostering sustainable agriculture and transportation. Poland's involvement in this green transition is evident through its recovery and resilience plan, which aligns with the Deal's objectives. European Green Deal introduces the European Green Deal Investment Plan (Sustainable Europe Investment Plan), which seeks to attract at least €1 trillion in sustainable investments over the next decade. This financial strategy is crucial for enabling the necessary investments in energy transition, biodiversity, and circular economy, among others, ensuring that the financial sector contributes to achieving the EU's climate neutrality goal by 2050 (European Commission, 2019).

Additionally, there are integral components of the European Green Deal's strategy:

- EU Taxonomy.
- Sustainable Finance Disclosure Regulation (SFDR).
- Non-Financial Reporting Directive (NFRD).
- Corporate Sustainability Reporting Directive (CSRD).

The EU Taxonomy for Sustainable Activities is a critical component of the European Union's strategy to direct investments towards more sustainable economic activities, essential

for achieving the European Green Deal objectives. This taxonomy is a classification system establishing criteria for what constitutes an environmentally sustainable economic activity, playing a vital role in enhancing market transparency and helping prevent greenwashing. Integrating the EU taxonomy into the Poland`s policy frameworks can significantly influence the country's sustainable finance ecosystem. (European Commission, 2020). The Sustainable Finance Disclosure Regulation (SFDR) (European Parliament, & Council of the European Union, 2019), the Non-Financial Reporting Directive (NFRD) (European Parliament, & Council of the European Union, 2014), and the proposed Corporate Sustainability Reporting Directive (CSRD) (European Parliament, & Council of the European Union, 2022) aim to improve the disclosure of sustainability information, thereby enabling investors to make informed decisions. The SFDR, in particular, imposes mandatory ESG disclosure obligations for asset managers and financial market participants, emphasizing the importance of disclosing the degree of taxonomy alignment of underlying economic activities.

Table 1 provides a comprehensive overview of Poland's strategic plans and policies aimed at fostering environmental protection, energy transformation, and climate adaptation. These policies demonstrate Poland's commitment to transitioning towards a sustainable and resilient economy by focusing on various pivotal areas.

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4.2 Poland: Key Stakeholders

The Polish government, financial institutions, and various stakeholders are actively involved in shaping the country's green finance landscape to align with these broader goals.

The Ministry of Climate and Environment (MoCE) in Poland plays a pivotal role in the country's green transformation, overseeing environmental policy, legislation, and standards

enforcement (World Bank, 2022). Meanwhile, the Ministry of Finance in Poland has been instrumental in advancing green finance through the issuance of Poland's first green bonds in 2016, fostering investments in environmental programs and promoting ESG compliance (Hajdys, 2020). Continuing its support for sustainable finance, the Ministry is developing a roadmap to enhance the Polish capital market's alignment with Europe's climate neutrality goals, including the creation of the Polish Sustainable Finance Platform (Ministry of Finance, 2022).

The Polish Development Fund (PFR) plays a crucial role in transitioning Poland toward a sustainable economy by facilitating investments in renewable energy and supporting green technology initiatives. One of the notable aspects of PFR's approach to green finance is its ability to mobilize financial resources from both public and private sectors. By acting as a bridge between government-backed initiatives and private investment, PFR amplifies the impact of its green finance projects. Furthermore, PFR encourages entrepreneurial and innovative ventures in the green economy through consulting, grants, training, and the support of venture capital funds. As part of its efforts, PFR Ventures has invested €55 million in four green investment funds under its PFR GreenHub FoF program. The selected funds, including well-known entities like Contrarian Ventures and General Atlantic's BeyondNetZero, focus on financing projects and companies that tackle crucial climate and energy challenges, promising to drive forward Poland's environmental and economic objectives[2].

The 2024 PwC report on Green Finance in Poland reveals a significant trend of Polish banks integrating ESG strategies. The report highlights that a significant 83% of banks plan to expand sustainable finance offerings, focusing on CO2 reduction loans and other green initiatives. Additionally, 58% of banks are preparing to introduce loans with subsidies from national or EU funds to encourage investments in sustainable projects. The report also notes

[2] https://pfrventures.pl/en/news/pfr-ventures-invests-eur-55m-in-four-green-investment-funds.html

that 75% of banks are adding services to support their clients' transition to sustainable practices. These statistics underscore a robust commitment within the Polish banking sector to support the green transition, aiming for a climate-neutral economy by 2050 (PwC Polska, 2024). Notably, BNP Paribas Bank Polska is noted for being a pioneer in introducing products and services to facilitate customers' sustainable transformations, with a significant volume of sustainable financing within its portfolio. Santander Bank Polska is another mentioned bank, recognized for its active involvement in financing environmentally sustainable projects and planning to expand the scope of its business to include new technologies such as hydrogen installations and energy storage (PwC Polska, 2024).

The Warsaw Stock Exchange (WSE) significantly enhanced its role in promoting green finance in Poland with two major initiatives. First, the launch of the Warsaw Sustainable Segment, a dedicated platform for showcasing sustainable debt instruments, marks a direct contribution to the Ministry of Finance's efforts to establish Poland as a regional hub for green finance (Warsaw Stock Exchange, 2023a). This segment specifically highlights bonds intended for sustainability projects, attracting investors focused on sustainable finance. Secondly, the WSE hosted the ESG Warsaw conference, a key event that assembles financial experts to discuss global ESG trends, share best practices, and strategize on sustainable finance (Warsaw Stock Exchange, 2023b). This conference is pivotal in aiding companies to adopt green strategies and helping institutional investors incorporate sustainability into their investment decisions. Together, these initiatives underscore the WSE's commitment to advancing sustainable finance in the region and supporting companies with their ESG compliance and educational needs.

Poland has forged significant partnerships with EU organizations to advance its green finance initiatives. A notable collaboration is between the European Investment Bank (EIB) and the Polish Development Fund (PFR), focusing on sustainable environmental protection, climate

change mitigation and adaptation, and promoting renewable energy sources. This strategic cooperation involves co-financing investments, providing consulting, and offering technical assistance across sectors like renewable energy, green mobility, and energy efficiency. The commitment of both institutions to financing green transformation is evident, with the EIB aiming to allocate at least 40% of its financing towards this goal, a figure expected to rise to 50% in the future (European Investment Bank, 2022). Furthermore, the European Bank for Reconstruction and Development (EBRD) has played a pivotal role. In 2018, it extended a €71 million loan to Millennium Leasing, a subsidiary of Bank Millennium S.A., to support small and medium-sized enterprises (SMEs) in enhancing energy and resource efficiency and deploying renewable energy solutions. In 2023, the EBRD significantly invested €1.3 billion in Poland as part of a broader strategy to bolster its transition to a sustainable and green economy. Notably, the EBRD's funding for Poland's first offshore wind farm, with a contribution of €140 million, stands out as one of its major projects in the country (EBRD, 2024a).

4.3 Uzbekistan: Policy framework

Uzbekistan's commitment to sustainable development and a greener economy is evident in its multifaceted approach. A key aspect of this strategy involves reducing the government's direct involvement in the economy, thereby fostering a more market-driven environment. By doing so, Uzbekistan aims to modernize critical sectors like agriculture and industry while simultaneously enhancing its appeal to foreign investors. (Tleuken et al., 2022)

Table 2 illustrates Uzbekistan's comprehensive approach to fostering a green economy and sustainable development through a series of strategic policy documents. These documents collectively outline the nation's commitment to transitioning towards environmentally responsible practices while simultaneously promoting economic growth and social well-being. By establishing clear focus areas such as green criteria for investments, renewable energy

promotion, and enhanced resource efficiency, Uzbekistan demonstrates a proactive position in addressing pressing environmental challenges. Moreover, the emphasis on international cooperation and partnerships underscores the country's recognition of the global nature of sustainability efforts.

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4.4 Uzbekistan: Key Stakeholders

In the rapidly evolving landscape of green finance in Uzbekistan, the collaboration between government bodies, financial institutions, and international partnerships is pivotal in steering the country towards a sustainable future. The Government of Uzbekistan, including its various ministries and departments, has shown a commitment to transitioning to a green economy.

Uzbekistan has been active in the issuance of sovereign bonds to support Sustainable Development Goals (SDGs) and green initiatives, demonstrating a robust approach to sustainable finance within the region. In July 2021, Uzbekistan issued its first Sovereign SDG Bonds, valued at $235 million, with a significant focus on financing public SDG-oriented projects across seven key areas: Education, Water Management, Health, Green Transportation, Pollution Control, Management of Natural Resources, and Green Energy. This issuance marked Uzbekistan as the first country in the region, and the second globally, to engage in such an initiative, attracting around 50 international investors. The SDG Bond Allocation and Impact Report detailed how these funds were allocated towards the government’s development priorities, showcasing the tangible impacts on various sectors (UNDP, 2022). Moreover, Uzbekistan embarked on its first-ever green sovereign Eurobonds issuance in October 2023, valued at UZS 4.25 trillion (approximately US$660 million), listed on the London Stock

Exchange. This marked a significant step towards financing environmentally focused projects such as water-saving technologies, expansion of transportation systems, and establishment of protective forests, all adhering to global "green" standards (UNDP, 2023).

The Ministry of Economy and Finance, in collaboration with international partners like United Nations Development Programme (UNDP), has been at the forefront of these initiatives, emphasizing the alignment of bond issuances with national SDG targets and indicators. The issuance of these bonds not only represents a strategic move to attract necessary funds for achieving SDGs but also reflects the government's commitment to sustainable development and climate action. The successful placement of these bonds, supported by UNDP's technical expertise and the broader UN's integrated approach to financing frameworks, demonstrates international investor confidence in Uzbekistan's sustainable development and green economy transitions.

The World Bank, in collaboration with Uzbekistan's Ministry of Economy and Finance and other partners, has developed several key reports and frameworks to guide the green transition. This includes:

- The "Just-in-Time Green Growth Note," which frames Uzbekistan's potential for an innovative and green future.
- The "Analytical Report Towards a Greener Economy in Uzbekistan," offering in-depth analysis and recommendations for greening the economy.
- The "Uzbekistan Green Growth Policy Dialogues," facilitating multi-stakeholder engagement and setting priorities for the green transition.

The Organization for Economic Co-operation and Development (OECD) highlights Uzbekistan's initiative, led by the Ministry of Economy and Finance, to attract domestic and international private financing for green infrastructure projects through the issuance of green bonds (Herrick, 2023). Leveraging its experience with its first sovereign sustainability bond,

Uzbekistan is encouraged to explore further opportunities for sovereign green issuances. Green bonds are deemed suitable for projects with significant upfront capital costs and long-term fixed income streams, such as renewable energy generation. The document suggests that large-scale renewable projects financed by international firms could benefit from refinancing through green bonds, potentially at more competitive rates. It recommends leveraging lists of priority infrastructure projects from various ministries to develop a bankable pipeline of high-impact projects for green bond issuances (Herrick, 2023).

The Ministry of Economic Development and Poverty Reduction (MEDPR) of Uzbekistan, alongside partners like the World Bank and the Regional Environmental Center for Central Asia (CAREC), spearheaded efforts towards a green economy. Initiatives in 2021 included policy dialogues to expedite this transition, addressing green growth and climate change. An e-forum, involving government officials, UNDP, the United Nations Economic Commission for Europe (UNECE), and the EU, stressed the need for low-carbon solutions post-pandemic, highlighting green finance and private sector involvement. Resulting from these discussions was a policy brief on "Green Recovery and Transition to Green Economy in Uzbekistan," outlining sector priorities and strategies for efficiency, waste management, and renewable energy (World Bank, 2021, 2022).

The Ministry of Ecology, Environmental Protection and Climate Change of Uzbekistan focuses on various environmental and climate initiatives. They are actively engaged in international cooperation, including efforts to conserve migratory species and combat illegal wildlife trade. The ministry also supports the implementation of national adaptation plans as part of its climate change agenda. They have initiated the process to open a representative office of the International Union for Conservation of Nature (IUCN) in Tashkent, demonstrating their commitment to global environmental standards and practices.

Financial institutions in Uzbekistan are emerging as pivotal players in the green finance sector, essential for steering the economy towards sustainable development.

Uzpromstroybank, in collaboration with the International Finance Corporation (IFC), actively promotes green growth and SME lending in Uzbekistan. With a $75 million agreement, they aim to finance environmentally friendly projects and expand SME lending. This initiative aligns with Uzbekistan's national strategy for transitioning to a green economy (IFC, 2021). Notably, Uzpromstroybank's efforts were recognized internationally, winning the "Best project in the field of green finance" award from the EBRD. This accolade underscores the bank's commitment to attracting green investments and implementing green banking practices. To further these efforts, Uzpromstroybank established a dedicated Green banking department, enabling the development and implementation of green financial products and the financing of green projects across various customer segments. Hamkorbank in Uzbekistan is actively participating in green finance initiatives through a partnership with the EBRD. This collaboration includes a $10 million loan from the EBRD's Green Economy Financing Facility (GEFF) aimed at promoting green lending practices, particularly among small and medium-sized enterprises (SMEs). This is part of a wider strategy to foster investments in environmentally sustainable technologies and practices within Uzbekistan. Additionally, EBRD is extending its support with a new $20 million financing package for Ipoteka Bank under the GEFF Uzbekistan II program, which seeks to enhance access to green technologies for businesses and households. This initiative also supports women entrepreneurs under the Central Asian Women in Business (WiB) program, emphasizing inclusive and green economic growth (EBRD, 2021; EBRD, 2024).

Islamic Green Finance is gaining momentum in Uzbekistan. According to Muzaffarova and Muneeza (2024) Uzbekistan with over 34 million people is one of the most promising markets for this financial system in Central Asia. The involvement of international bodies such

as the UNDP and the Islamic Development Bank (IsDB) underscores the strategic importance of these initiatives. For instance, the UNDP has been collaborating with Uzbekistan to enhance the regulatory framework necessary for the introduction of Islamic finance and green sukuk. This collaboration aims to attract both domestic and foreign investment to fund significant sustainable development projects across the country, like renewable energy and energy-efficient technologies (UNDP, 2021). Furthermore, the Islamic Development Bank Institute (IsDBI) has been actively involved in assisting Uzbekistan to build a resilient Islamic finance industry. This includes efforts to develop a comprehensive Islamic Finance Country Assessment Framework, which helps tailor the Islamic financial services to the specific needs of the country (IsDBI, 2023).

International organizations play a crucial role in the development and promotion of green finance in Uzbekistan, offering both financial support and expert advice to help the nation meet its sustainability goals.

The World Bank and Uzbekistan are deeply engaged in accelerating the country's transition to a green economy through collaborative efforts. Policy dialogues and stakeholder consultations focus on green growth and climate change mitigation and adaptation. Notably, a significant initiative resulted in the allocation of $46.25 million towards the Innovative Carbon Resource Application for Energy Transition Project (iCRAFT), marking a pioneering step globally in supporting policy reforms through emissions reduction payments. This underscores Uzbekistan's commitment to international climate goals and efficient energy resource utilization (World Bank, 2023). Furthermore, Uzbekistan's partnership with the Islamic Development Bank (IsDB) and the European Bank for Reconstruction and Development (EBRD) plays a crucial role in its socio-economic development. For instance, a $200 million financing agreement with IsDB supports the Sustainable Rural Development Project, addressing socio-economic, environmental, and climate challenges through vital infrastructure development

(IsDB, 2021). Meanwhile, EBRD's substantial investments of $690 million in 22 projects in 2021, mainly aimed at renewable energy development, green lending, and infrastructure modernization, highlight Uzbekistan's position as a significant recipient of EBRD funds in Central Asia. Notably, EBRD's support includes assisting Uzbekistan in developing a low-carbon development strategy and achieving carbon neutrality in the electricity sector by 2050, aligning with the goals of the Paris Agreement (Usov, 2022).

5. Comparative Analysis

In this study, we utilized a combination of qualitative coding and thematic analysis (Williams & Moser, 2019; Kiger & Varpio, 2020). Initially, our methodology involved open coding of policy documents and related articles, through which we identified initial patterns. These patterns were categorized into broad themes (see Figure 2), facilitating the detailed presentation in Tables 3 and 4, which describe the historical backgrounds and economic developments of both countries. Table 5 outlines the environmental challenges they face. Subsequent selective coding highlighted crucial categories for our comparative study, aiding in the creation of Table 6, which lists key stakeholders in green finance initiatives. Our thematic analysis was further refined, helping to define significant themes that capture the essence of green finance, as illustrated in Tables 7 and 8. Table 7 displays the green finance instruments and their applications, while Table 8 compares the developmental stages of green finance initiatives in terms of policy diffusion and the entrepreneurship ecosystems in both Poland and Uzbekistan.

INSERT FIGURE 2 ABOUT HERE

5.1 Historical trajectories and economic development

The comparative analysis between Poland and Uzbekistan, as outlined in the provided Tables 3 and 4, offers a detailed examination of their historical trajectories and economic development. Despite their shared Soviet past, Poland and Uzbekistan have embarked on markedly different paths influenced by their unique historical, geopolitical, and economic contexts.

Poland and Uzbekistan both experienced Soviet influence, shaping their political and economic landscapes. The dissolution of socialist structures in the late 20th century marked a pivotal shift for both nations. Poland's push towards independence, driven by the Solidarity movement, facilitated its transition to democracy and market economics. In contrast, Uzbekistan's path to independence was shaped more by the collapse of the Soviet Union and its Central Asian identity, rather than a proactive movement. During the socialist era, both countries navigated centralized planning and state ownership, facing typical transitional challenges such as inflation and unemployment. This period also left a lasting impact on their social and cultural fabric. Poland's integration into the EU has enhanced its trade relations and economic integration through access to a larger market and the free movement of goods, services, capital, and labor. This has spurred economic growth and adherence to strict EU regulations. Conversely, Uzbekistan, while still resource-dependent, is diversifying its economy and increasing international engagements to attract foreign investments and integrate into global markets.

INSERT TABLES 3 AND 4 ABOUT HERE

5.2 Environmental Challenges and Green Finance Strategies

Poland and Uzbekistan share strikingly similar environmental challenges despite their diverse geographical and economic contexts (see Table 5). Both nations grapple with air pollution stemming from coal-burning, industrial activities, and vehicular emissions. Poland faces urban smog due to heavy coal usage, while Uzbekistan contends with dust from agricultural lands. Water quality management is a priority for Poland, while Uzbekistan tackles water scarcity, particularly in agriculture. Land degradation varies—Poland deals with forest management and soil erosion, while Uzbekistan combats desertification and soil salinity from improper irrigation. Waste management inadequacies plague both countries. In the energy sector, both seek to transition from fossil fuels to renewables; Poland driven by EU targets and air quality, Uzbekistan prioritizing energy security via solar and wind development to reduce reliance on natural gas and oil.

Table 6 provides an overview of the key stakeholders involved in green finance initiatives and sustainable development in Poland and Uzbekistan. Both countries involve a combination of governmental bodies, financial institutions, development banks and international institutions in governing green finance, reflecting a multi-stakeholder approach to sustainability. Each country benefits from partnerships with international institutions and development banks that provide both financial support and expertise for green projects. Poland's green finance stakeholders encompass a mature ecosystem due to its EU membership, featuring governmental support, advanced financial markets, and active participation from both domestic and international private sectors. In contrast, Uzbekistan's stakeholders are navigating a changing landscape, with the government playing a key role in initiating green projects supported by international development banks and institutions.

The comparative analysis of green finance instruments in Poland and Uzbekistan reveals distinct approaches tailored to the environmental and economic contexts of each country (see

Table 7). In Poland's robust financial market offers various green financial products support a broad range of initiatives from renewable energy and efficient buildings to innovative green technologies. On the other hand, Uzbekistan's green finance landscape is more nascent. However, the country is strategically positioning itself to expand its green finance capabilities through international partnerships and unique finance models like Islamic finance.

Table 8 shows the developmental stages of both countries in fostering green finance through their respective entrepreneurship ecosystems and the processes of policy diffusion.

The integration into the European Union (EU), provides Poland access to a strict regulatory framework and substantial funding opportunities which have fortified entrepreneurship ecosystem. The availability of diverse financial instruments, such as green bonds and green loans, supports a dynamic environment where green entrepreneurs can thrive. This ecosystem is further enhanced by EU-led incentives and directives that not only encourage but, in some cases, require the adoption of sustainable practices. Poland's green finance policies have evolved significantly under the influence of EU directives and standards, showcasing an example of policy diffusion through coercion (mandates) and emulation (adopting best practices).

In contrast, Uzbekistan's green finance ecosystem is in a nascent stage but shows promise through proactive governmental policies aimed at attracting investment in green energy. The approach involves shaping the green finance landscape through international cooperation, with partnerships playing a crucial role in introducing and implementing global best practices. Institutions like the World Bank and the Islamic Development Bank are pivotal in this development, providing both funding and expertise that guide the country’s green finance policies. While Uzbekistan’s policy diffusion relies more on learning from these international interactions, the entrepreneurial ecosystem for green finance is gradually developing. Significant growth potential exists for creating a supportive environment that nurtures startups

and SMEs in the green sector, which is crucial for the country's sustainable economic development.

INSERT TABLES 5-8 ABOUT HERE

6. Conclusion

This research aimed to conduct a comparative analysis of green finance initiatives in Poland and Uzbekistan, focusing on identifying the differences and similarities in their approaches, particularly in the context of environmental challenges and the development of green finance. The main findings revealed significant contrasts between the two countries, both shaped by their distinct historical and geopolitical backgrounds. For Poland, an EU member state, the integration into European markets has facilitated a robust green finance framework, supported by strict EU regulations and substantial financial support. Conversely, Uzbekistan, as a central country in Central Asia, is still developing its green finance mechanisms but shows potential through proactive governmental policies and increasing international collaborations.

The analysis, particularly highlighted in the comparative tables, reveals that while both countries are tackling severe environmental issues, their strategies and financial instruments vary. Both countries are committed to transitioning from fossil fuels to renewable energy, with Poland funding this shift through green finance instruments and Uzbekistan exploring solar and wind projects through international collaborations. To further enhance their capacity to address environmental challenges effectively, Poland and Uzbekistan could strategically expand their use of green finance instruments. As both nations refine their strategies through green finance mechanisms, integrating blue bonds presents a significant opportunity. This addition would offer a specialized financial tool designed specifically to tackle their critical water management issues. For Poland, blue bonds could be particularly useful in financing projects aimed at

improving water quality in rivers and lakes, addressing urban water management, and supporting sustainable fisheries and coastal management. Given Poland's access to the Baltic Sea and numerous inland waterways, investments funded by blue bonds could significantly enhance water resource management and conservation efforts. In Uzbekistan, blue bonds could support projects that address severe water scarcity issues, particularly in agricultural regions. These bonds could fund initiatives such as the development of efficient irrigation systems, the restoration of the Aral Sea area, and the implementation of water conservation technologies.

The findings suggest that the position of a country in terms of its entrepreneurial ecosystem and policy diffusion significantly influences the effectiveness of its green finance initiatives. For countries still developing their green finance systems, such as Uzbekistan, there is a need to strengthen policy frameworks, enhance international cooperation, and foster an environment that supports green entrepreneurship. For more developed systems like Poland's, continuous innovation in financial products and maintaining alignment with evolving international standards are crucial for sustaining leadership in green finance. These insights can guide other nations in shaping their policies and entrepreneurial ecosystems to better support green finance and sustainable development.

Strengthening partnerships between Poland and Uzbekistan could catalyze enhanced green finance initiatives and regional sustainability. By sharing best practices and co-developing policies, these nations can leverage Poland's advanced green finance market and Uzbekistan's strategic position and commitment to sustainability. Collaborations might focus on renewable energy, water management, and eco-friendly agriculture, benefiting both countries economically, environmentally, and socially. Such international cooperation could set a precedent for global efforts against climate change, highlighting the crucial role of diplomatic and economic relationships in achieving sustainable development goals.

This study's limitation lies in the representativeness of Poland and Uzbekistan as examples for their respective regions. While Poland offers a detailed look at green finance in Central and Eastern Europe, it may not capture the full economic and environmental diversity of other nations in the region. Similarly, Uzbekistan, a significant player in Central Asia, does not encompass the varied economic developments and stages of green finance seen across its neighboring countries. Future research could expand this comparative analysis to include a wider range of countries from these regions, providing a deeper, more nuanced understanding of green finance dynamics. This approach would help identify specific regional challenges and opportunities in green finance and allow for a more comprehensive evaluation of the effectiveness of different policy instruments and financial mechanisms in fostering sustainable economic practices.

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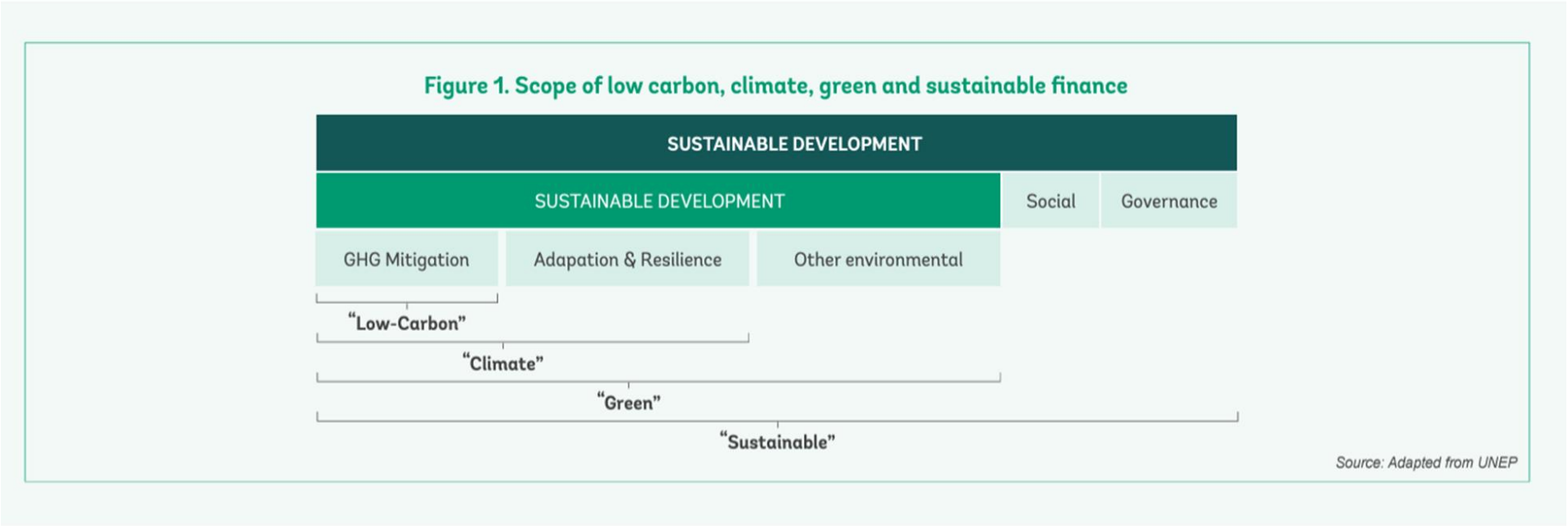
FIGURES AND TABLES

Figure 1. Scope of low carbon, climate, green and sustainable finance



Source: World Bank Group (2021). Toolkits for Policymakers to Green the Financial System. World Bank. Adapted from UNEP.

Figure 2. Data Structure and Thematic Progression in Green Finance Policy Analysis

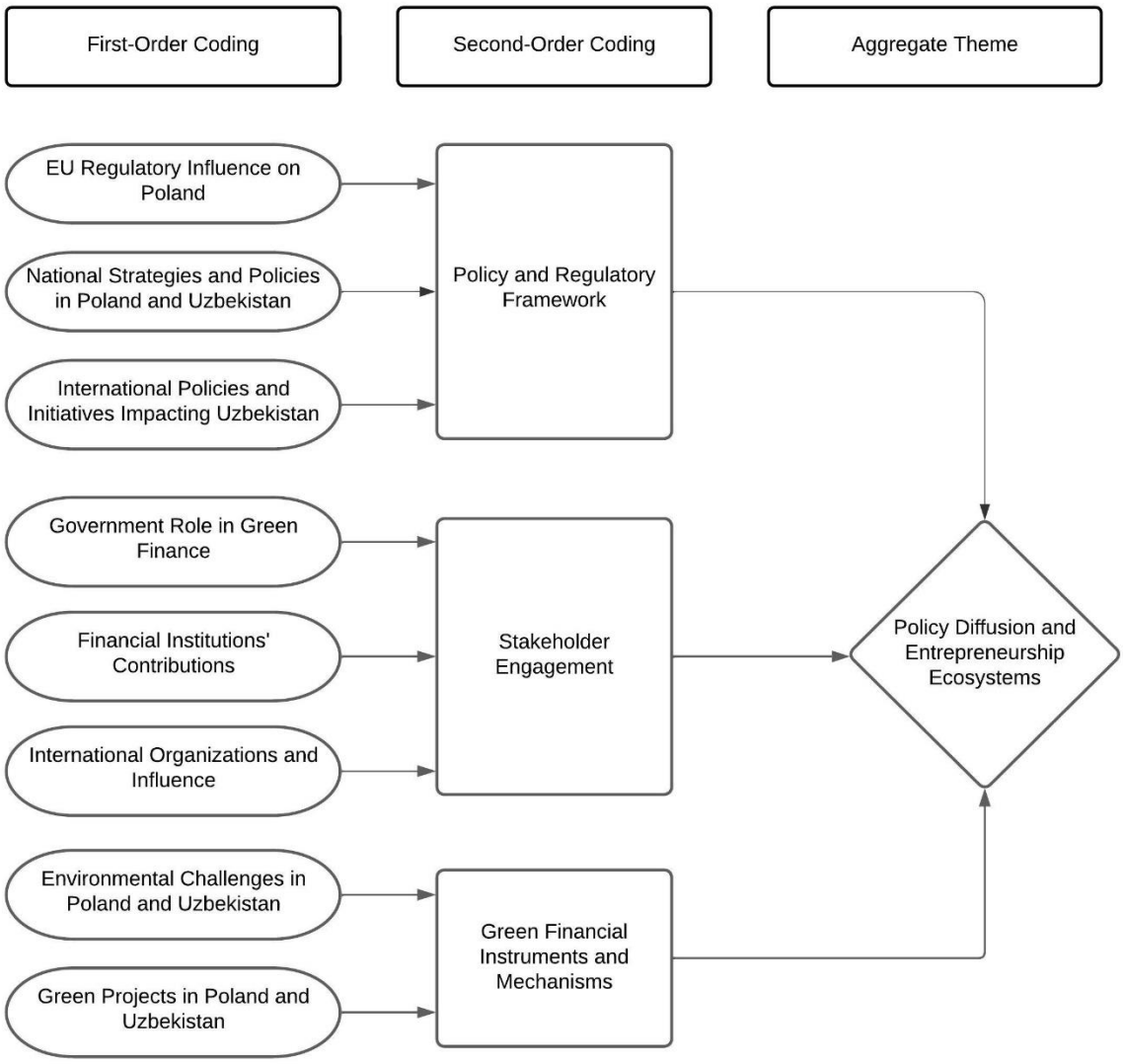


Table 1. Overview of Poland's Strategic Environmental and Energy Policies

Policy Document	Focus Area	Key Points
Poland's National Recovery Plan (Ministry of Funds and Regional Policy, 2021)	Green transition, digital transformation	Increases renewable energy usage Accelerates energy efficiency in buildings Focuses on offshore wind energy, green hydrogen technologies
National Regional Development Strategy (Ministry of Development Funds and Regional Policy, 2020)	Environmental protection at regional level	Expenditures by local governments for environmental protection Investments in waste management and sewage systems
Energy Policy of Poland until 2040 (Ministry of Climate and Environment, 2021)	Energy sector transformation	Aims for a zero-emission energy system by 2040 Focuses on renewable energy, nuclear energy, and natural gas Plans significant investments to modernize the energy system

Table 2. Key Policy Initiatives for Uzbekistan's Green Economy Transition

Policy Document	Focus Area	Key Points
Strategy for the transition to a green economy (2019-2030) (Resolution of President of the Republic of Uzbekistan, 2019).	Transition to a Green Economy	Establish green criteria for investments and expenditures - Promote pilot green projects through incentives and partnerships Develop a skilled workforce aligned with green economy
Program and Action Plan for transitioning to a green economy (by 2030) (Resolution of the President of the Republic Uzbekistan, 2022)	Sustainable Development Goals, Green Growth	35% reduction in greenhouse gas emissions from 2010 levels Increase renewable energy production to 15 GW Achieve 30% share of electricity production from renewables Enhance industrial energy efficiency by at least 20% Reduce energy intensity per GDP unit by 30% through renewables Improve water efficiency across economic sectors Expand urban green spaces to 30% by planting 200 million seedlings annually Achieve 65% household waste recycling rate
National Development Strategy of Uzbekistan for 2030 (Decree of the President of the Republic of Uzbekistan, 2023)	Economic Development, Environmental Sustainability	Double energy efficiency across the economy - Increase renewable energy capacity to 25,000 MW (40% of consumption) Introduce green certificates and eco-labeling Reduce natural gas consumption Implement energy audit system Transition public transport to clean fuels Establish comprehensive greenhouse gas monitoring Reduce GHG emissions per GDP unit by 30% from 2010 levels

Table 3. Similarities in Historical Background and Economic Development

Themes	Poland	Uzbekistan
Historical Background		
Soviet Influence	Soviet satellite state	Soviet republic
Transition period	Post-communist transformation	Independence following the Soviet Union's dissolution
Economic Development		
Economic System Transition	Rapid shift to market economy	Gradual shift to market economy
Challenges of Transition	Inflation, unemployment, economic instability	Inflation, economic restructuring challenges, reliance on agriculture and natural resources

Table 4. Differences in Historical Background and Economic Development

Themes	Poland	Uzbekistan
Historical Background		
Historical Trajectories	European geopolitical entities, resistance movements	Central Asian heritage, integrated Soviet role
Communist Era Experiences	Strong push towards reform (Solidarity movement)	More integrated role within the Soviet Union
Economic Development		
Integration with International Markets	EU membership, access to trade and investment	Regionally focused, expanding international partnerships
Economic Sectors	Diversified economy	Resource-reliant economy

Table 5. Similarities in Environmental Challenges between Poland and Uzbekistan

Themes	Poland	Uzbekistan
Air Pollution	Coal-burning and vehicle emissions.	Industrial and vehicular emissions
Water Management	Pollution in rivers and lakes, management of water resources in urban areas.	Severe water scarcity, issues with water management, particularly in agriculture
Land Degradation	Forest management issues, soil erosion in certain areas.	Desertification, soil salinity increases due to improper irrigation practices
Waste Management	Increasing volumes of municipal and industrial waste, recycling challenges.	Challenges with solid waste management in urban areas, limited recycling infrastructure.
Energy Transition Challenges	Transitioning from coal to renewable energy sources	Developing renewable energy projects (e.g., solar, wind) to reduce reliance on natural gas and oil

Table 6. Key Stakeholders in Green Finance Initiatives and Sustainable Development in Poland and Uzbekistan

Stakeholders	Poland	Uzbekistan
Governmental Bodies	Ministry of Climate and Environment Ministry of Finance Polish Development Fund	Ministry of Economy and Finance Ministry of Ecology, Environmental Protection and Climate Change Ministry of Economic Development and Poverty Reduction
Financial Institutions	Private Banks The Warsaw Stock Exchange	Private Banks
Development Banks & International Institutions	European Investment Bank European Bank for Reconstruction and Development	World Bank European Bank for Reconstruction and Development Islamic Development Bank

Table 7. Green finance instruments and their applications in Poland and Uzbekistan

Country	Green Finance Instruments	Projects
Poland	Green Bonds	Renewable energy, efficient buildings, sustainable transport.
	Green/Sustainable Loans/ Loans for Reducing CO2 Emissions	Environmental projects like renewable energy installations and energy efficiency upgrades.
	Loans with Subsidies from National or EU Funds	Green projects
	Venture Capital Funds	Startups and businesses in green technology sectors.
Uzbekistan	Green Bonds/ Sovereign SDG Bonds	Early-stage environmentally friendly projects.
	Green Loans	Renewable energy, energy efficiency improvements, and other eco-friendly practices
	Islamic Green Finance	Sharia-compliant sustainable projects.
	International Collaborations	Green project development with international expertise and funding.

Table 8. Comparative Framework of Green Finance Initiatives in Poland and Uzbekistan

Framework	Poland	Uzbekistan
Entrepreneurship Ecosystem	Strong support for green entrepreneurs Access to a variety of green financial products	Emerging support for green entrepreneurship Focus on attracting investment in green energy
Policy Diffusion	Influenced by EU mandates and best practices Rapid adoption of green finance policies	Policy learning and adoption facilitated by international partnerships Gradual implementation of green finance policies

APPENDIX 1: Historical and Economic Transition toward Sustainability in Poland and Uzbekistan

Historical and Economic Transition toward Sustainability in Poland

Poland's journey from a centrally planned economy under communist rule to a dynamic market-oriented economy is a compelling story of transformation and resilience. The fall of communism in 1989 marked a pivotal turn in Poland's economic and political landscape, initiating a period of rapid transition and reform.

Socialist times witnessed ambitious economic policies in Poland. The country underwent a period of rapid industrialization (Feiwell, 1981), with an emphasis on heavy manufacturing and state-led development. Lipton et al. (1990) outline the comparatively high contribution of the industrial and construction sectors to Poland's GDP in 1987, at 52%, reflected the country's historical emphasis on heavy industry and manufacturing. This focus on industry, however, resulted in the stunted growth of the service sector, which employed only 35% of the labour force, significantly less than in other European countries like Greece, Spain, or Portugal, where the service sector played a more prominent role in the economy (Lipton D. et al., 1990). However, over support of industry during the socialist period leading to essential restructuring towards services, demand shocks, contradictory fiscal and monetary policies, collapse of the principal export market (Kharas, 1991). Poland underwent a profound socio-economic transformation (Kwasniewicz, 2003). The rise of a neoliberal strategy emphasized the importance of market-oriented policies. The coalescence of these reform strategies reflected broader changes in both material conditions and ideological orientations, ultimately shaping Poland's trajectory toward a more open engagement with transnational capital and a shift to a neoliberal economic framework (Frentzel-Zagorska & Zagorski, 1993).

Lipton et al. (1990, p. 77) call Poland as “the first country to embark on a program of fundamental market reform under a non-communist government”. The economic transition program undertaken by the Polish government in the early 1990s aimed to liberalize and stabilize the economy following the collapse of the Soviet Union (Winiecki, 1990; Lipton D. et al., 1990). Stabilization measures included the implementation of restrictive monetary policies and budget balancing to control inflation and restore fiscal stability (Bliss, 1999). Concurrently, liberalization efforts encompassed domestic price liberalization and limited currency convertibility. Additionally, Lipton et al. (1990) outline the government's commitment to creating a favorable environment for market-based economic activity in Poland, characterized by privatization, competition, modernization of the banking system, and tax reform. Winiecki (1990) describes the initial challenges faced by the Polish economy, including sharp declines in industrial output and rising unemployment. These are typical features of the early stages of economic transition, as economies adjust to new market conditions and structures. Murrell (1993) mentions that the reforms in Poland in 1990 are often considered the best-known application of shock therapy to swiftly transition from a centrally planned to a market-oriented economy.

Poland has moved away from its historical emphasis on heavy industry such as steel, textiles, armaments, and heavy machinery (Domański, 2003), which was oriented towards the former Soviet Union and its Eastern European satellites. This shift is significant in terms of economic restructuring. While heavy industry was a cornerstone of the economy during the Soviet era, the move towards a more diversified and service-oriented economy aligns with contemporary global economic trends (Hunter & Ryan, 2006). Industrial policies play a crucial role in facilitating economic restructuring in Poland by providing a strategic framework and targeted interventions to shape the development of specific industries (King & Sznajder, 2006). However, a successful transition involves more than just the efforts of a developmental state

implementing industrial policies; it also relies on substantial Foreign Direct Investment (FDI) (Domański, 2003; King & Sznajder, 2006). FDI has contributed to enhanced competitiveness and narrowed the gap between Poland and the European Union. The inflow of foreign capital into Poland has helped modernize Polish industry by introducing new technologies, organization, and management techniques. As a result, Poland's industry has shifted towards an increased share of medium-technology and basic consumer goods at the expense of those dominant in the socialist era (Domański, 2003).

Historical and Economic Transition toward Sustainability in Uzbekistan

Uzbekistan, within the Soviet framework, experienced economic shifts toward industrialization, particularly in sectors like cotton production and mining. Despite significant economic growth and improved living standards during this period, the Soviet system, particularly as applied in Central Asia, also imposed notable barriers and lasting economic challenges. Local salaries and access to goods lagged behind the Soviet average, prioritization of agricultural production over industrialization hindered modernization, and expansionist planning contributed to ecological problems (Scarborough, 2021). In early 1990, Uzbekistan has a centralized strategy where it collectively leads the industrial sector in order to stabilize the economy and combat potential shocks (Iwasaki, 2003). The legacies of these economic strategies continue to influence their contemporary economic landscapes. Many economic ministries and sectoral production associations from the Soviet era still exist in these countries, either as semi-governmental business organizations or business concerns, but they serve as intermediaries to ensure state control over enterprises (Iwasaki, 2003).

The newly independent Uzbekistan pursued economic policies aimed at creating new national economies, involving various transformational measures such as implementing tight monetary policies, liberalizing foreign economic activities, restructuring property rights, and

fostering the development of entrepreneurship (Kalyuzhnova, 2000). These measures were designed to facilitate the transition from centrally planned to market-based economies, promoting economic growth and diversification in the region. The county during the post-Soviet period, economic reforms were influenced by a cautious approach, avoiding shock therapy in favor of maintaining societal stability (Blackmon, 2005; Yilamu, 2017). Yilamu, (2017) highlights the government prioritized principles such as the economy's precedence over politics, the leading role of the state in reforms, the rule of law, social protection, and a phased approach to market introduction. This approach allowed Uzbekistan to implement incremental reforms while safeguarding the well-being of its population, particularly vulnerable groups. Throughout the process, the government remained committed to nation-building and economic development, aiming to strike a balance between market-oriented policies and social welfare (Yilamu, 2017). Economic challenges, such as declining cotton harvests and fluctuating export revenues, led to the implementation of a distorted exchange rate system to manage balance of payments issues and protect foreign exchange reserves (Blackmon, 2005). Morevover, despite the status as independent state, Uzbekistan remained dependent on the Russian rouble until the introduction of own currency. However, introduction of new national currencies did not immediately resolve these challenges, leading to devaluation and economic turmoil, including hyperinflation and output collapse (Kalyuzhnova, 2000).

Uzbekistan's economic integration within the Soviet Union, where it was designated by central planning authorities to specialize in supplying cotton (Yilamu, 2017) Since Uzbekistan gained independence from the Soviet Union in 1991, the dynamics surrounding the politics of Uzbek cotton have been characterized by a mixture of continuity and change. Since the dissolution of the Soviet Union, the politics surrounding Uzbek cotton have exhibited both continuity, with the government maintaining central planning aspects such as mandated cotton cultivation areas and price controls, and change, notably with increased farmer autonomy in

land and water management, alongside the necessity to adapt trade practices (Abdullaev et al., 2007). Uzbekistan embarked on a cautiously liberalized foreign trade policy, seeking to reduce dependency on cotton and foster a more balanced economy, showcasing a deliberate move towards diversification and self-sufficiency, all while maintaining state control over foreign economic interactions (Yilamu, 2017).