ENVIRONMENTAL RISK MANAGEMENT AND ITS EFFECT ON CREDIT PORTFOLIO STABILITY IN COMMERCIAL BANKS

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Abstract. *This research examines the influence of environmental risk management (ERM) on the credit portfolio stability of commercial banks in Uzbekistan, utilising secondary data from sustainability reports, regulatory publications, and international financial institutions. The results show that banks with more advanced ERM frameworks, which include environmental screening, green lending, and sustainability governance, have lower non-performing loan (NPL) ratios and better asset quality. On the other hand, banks that don't use ERM as much are still more vulnerable to environmental and credit risks. The study finds that integrating environmental risks into the banking system in Uzbekistan is necessary to make it more financially stable and in line with global standards for sustainable finance.*

Keywords: *environmental risk management, credit portfolio stability, green finance, non-performing loans, sustainable banking, Uzbekistan.*

ATROF-MUHIT XAVFLARINI BOSHQARISH VA UNING TIJORAT BANKLARIDA KREDIT PORTFELI BARQARORLIGIGA TA'SIRI

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Annotatsiya. *Ushbu tadqiqotda O'zbekistondagi tijorat banklarining kredit portfeli barqarorligiga ekologik risklarni boshqarish (ERM) ning ta'siri o'rganiladi, bunda barqarorlik haqidagi hisobotlar, tartibga soluvchi nashrlar va xalqaro moliya institutlarining ikkilamchi ma'lumotlari qo'llaniladi. Natijalar shuni ko'rsatadiki, ekologik skrining, yashil kreditlash va barqarorlikni boshqarishni o'z ichiga olgan rivojlangan ERM tizimlariga ega banklarda muammoli kreditlar (NPL) koeffitsiyentlari pastroq va aktivlar sifati yaxshiroq. Boshqa tomondan, ERM dan unchalik ko'p foydalanmaydigan banklar hali ham ekologik va kredit risklariga ko'proq moyil. Tadqiqot shuni ko'rsatadiki, O'zbekiston bank tizimiga ekologik risklarni integratsiya qilish uni moliyaviy jihatdan barqarorroq qilish va barqaror moliyalashtirishning global standartlariga moslashtirish uchun zarurdir.*

Kalit so'zlar: *atrof-muhit risklarini boshqarish, kredit portfeli barqarorligi, yashil moliyalashtirish, muammoli kreditlar, barqaror bank ishi, O'zbekiston.*

УПРАВЛЕНИЕ ЭКОЛОГИЧЕСКИМИ РИСКАМИ И ЕГО ВЛИЯНИЕ НА СТАБИЛЬНОСТЬ КРЕДИТНОГО ПОРТФЕЛЯ В КОММЕРЧЕСКИХ БАНКАХ

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Аннотация. В данном исследовании изучается влияние управления экологическими рисками (УЭР) на стабильность кредитного портфеля коммерческих банков Узбекистана с использованием вторичных данных из отчетов об устойчивом развитии, нормативных публикаций и международных финансовых институтов. Результаты показывают, что банки с более развитыми системами УЭР, включающими экологический скрининг, «зеленое» кредитование и управление устойчивым развитием, имеют более низкие показатели неработающих кредитов (NPL) и лучшее качество активов. С другой стороны, банки, которые не так активно используют УЭР, по-прежнему более уязвимы к экологическим и кредитным рискам. Исследование показывает, что интеграция экологических рисков в банковскую систему Узбекистана необходима для повышения ее финансовой стабильности и соответствия мировым стандартам устойчивого финансирования.

Ключевые слова: управление экологическими рисками, стабильность кредитного портфеля, зеленое финансирование, неработающие кредиты, устойчивое банковское дело, Узбекистан.

Introduction.

Environmental risk management (ERM) is now one of the most important parts of sustainable banking. It changes how banks look at, price, and deal with the risks that come with climate change and environmental degradation. Banks are very important for funding economic growth, so their exposure to environmental risks like natural disasters, resource shortages, and the shift to a low-carbon economy has become a major factor in portfolio stability. The 2015 Paris Agreement and the United Nations Sustainable Development Goals (SDGs) have called on the financial sector around the world to make sure that their lending practices are in line with sustainability goals. In this changing world, commercial banks are more and more required to include environmental risk assessments in their credit decisions. This makes sure that their lending portfolios are not only profitable but also able to withstand environmental changes (Weber & Scholz, 2021). In developing economies like Uzbekistan, where agriculture, manufacturing, and energy rely heavily on resources, environmental risks are both financial and systemic threats. When borrowers can't follow environmental rules or deal with disasters, these risks can show up as worse loan quality, higher default rates, and lower asset values (ADB, 2023).

The growing awareness of climate-related financial vulnerabilities has made it even more important for banks to include environmental risk management in their daily operations. The Task Force on Climate-related Financial Disclosures (TCFD, 2022) says that environmental factors, like bad weather and stricter carbon rules, can have a direct impact on how well a bank's credit portfolio does. For example, a drought or flood can hurt farmers' ability to pay back loans, and the closing of polluting industries can cause loan losses. These situations show how closely tied environmental sustainability and financial stability are. In Uzbekistan, where more than 30% of all loans go to the agriculture and energy sectors (Central Bank of Uzbekistan, 2024), the risks from climate change and the environment are especially high. Because of the move towards a green economy and the "Strategy for Green Growth 2030," regulatory bodies have told banks to make environmental risk management frameworks that find, track, and reduce these risks.

However, even though more people are aware of it, ERM is still not widely used in Uzbekistan's banking system. Some of the biggest banks, like Agrobank and Ipak Yo'li Bank, have started to include environmental risk assessment criteria in their project financing and green loan programs. However, most commercial banks still don't have the tools or trained staff they need to regularly check for environmental impacts. Because there are no standard environmental credit guidelines, implementation has been inconsistent and assessments have been too shallow, making environmental due diligence less effective (IFC, 2023). This article examines the correlation between environmental risk management and credit portfolio stability, emphasising the integration of environmental risk factors to diminish non-performing loan ratios, elevate asset quality, and bolster long-term financial resilience in commercial banks. The study utilises secondary data sources, such as sustainability reports, regulatory publications, and international research, to critically evaluate existing practices and suggest strategies for enhancing Enterprise Risk Management (ERM) in Uzbekistan's banking sector.

Literature Review.

There has been a lot of research on the link between environmental risk management and credit portfolio stability in international banking, but not much has been done on how it works in emerging markets. Theoretically, this relationship can be conceptualised using the triple-bottom-line framework, which highlights the interconnectedness of economic, environmental, and social performance (Elkington, 1997).   In this context, good environmental risk management not only lowers the bank's exposure to ecological threats, but it also helps the bank make money in the long run by lowering credit losses and improving its reputation with investors and regulators.   Empirical studies have consistently demonstrated that unmitigated environmental risks can evolve into substantial financial risks. Weber (2017) discovered that banks exhibiting inadequate environmental due diligence were more prone to encounter loan defaults in sectors vulnerable to climate-related disruptions. Thompson and Cowton (2020) also said that bad environmental management by borrowers could lead to systemic credit risks, especially in agriculture, mining, and construction.

An increasing amount of evidence shows that banks that use environmental risk management frameworks have more stable credit portfolios. Research in Southeast Asia and Europe indicates that incorporating environmental screening criteria-such as energy efficiency, pollution control, and resource sustainability-into lending decisions results in reduced non-performing loan (NPL) ratios and enhanced return on assets (ROA) (Weber & El-Bassiouny, 2020). The World Bank (2022) agrees with this finding, saying that sustainable lending practices are a way to lower risk because borrowers who run their businesses in an environmentally friendly way tend to be able to pay back their loans over the long term. Also, banks that make their plans for managing environmental risks public tend to get more positive feedback from investors, which lowers their cost of capital and strengthens their financial base (Goyal & Joshi, 2022).

Environmental risk management is becoming a key factor in the stability of financial systems in emerging markets, such as Central Asia. For example, in Kazakhstan, the implementation of green banking guidelines in 2020 resulted in heightened environmental risk disclosures and a quantifiable enhancement in credit quality among banks participating in green finance initiatives (OECD, 2023). Similar patterns have been observed in Eastern Europe, where banks integrating environmental criteria in their loan assessment processes reported stronger capital adequacy ratios and improved credit performance (Pietrzyk & Wolska, 2021). These examples indicate that ERM is not only an ethical obligation but also a financial imperative, particularly in economies reliant on natural resources.

The literature on Uzbekistan is still limited, but it is becoming more and more useful. The Central Bank of Uzbekistan (2024) has identified environmental risks as possible dangers

to the financial stability of commercial banks and has asked for more sustainability principles to be used in risk management systems. The Asian Development Bank (2023) has shown that the country's heavy reliance on agriculture makes it vulnerable to environmental shocks like droughts, soil salinisation, and water shortages. All of these things can hurt credit portfolios. The International Finance Corporation (2023) also says that the lack of tools for assessing environmental risk and the banks' poor ESG capacity make it hard to put green lending policies into action. The present condition of ERM in Uzbekistan can be characterised as transitional, propelled by regulatory incentives yet hindered by institutional inertia and a lack of expertise.

International evidence shows that there is a strong link between ERM and portfolio stability. However, it also shows that banks may only adopt environmental policies to improve their reputation and not actually use them in their core risk management systems (Weber & Scholz, 2021). This phenomenon, frequently referred to as "greenwashing," presents a considerable challenge in developing economies characterised by weak disclosure requirements and limited enforcement mechanisms. To avoid this mistake, Uzbekistan needs to make environmental risk management a part of how it evaluates and monitors credit. The literature stresses both the technical side of ERM (like assessment models, data systems, and stress testing) and the governance and cultural sides, like training bank staff, making sure that board members are responsible, and aligning incentives. Uzbekistan's banking sector can become more resilient to both climate-related and credit-related shocks by learning these lessons and putting them into practice.

Research Methodology.

This study utilises a qualitative and descriptive secondary research methodology to examine the impact of environmental risk management on the stability of credit portfolios in commercial banks, specifically in Uzbekistan. Because environmental risk management in the country is still evolving, secondary data analysis offers a thorough basis for comprehending existing practices, trends, and regulatory frameworks. The research is based on a thorough examination of current publications, encompassing annual reports, sustainability disclosures, and financial stability reports from prominent Uzbek banks, including Agrobank, Ipak Yo'li Bank, Asaka Bank, and Kapital Bank. In addition to these data sources, there are also international reports from the World Bank (2022), the Asian Development Bank (2023), the OECD (2023), and the International Finance Corporation (2023), as well as peer-reviewed academic literature on managing environmental risks and keeping credit stable.

A comparative analytical framework was used to look at the data and find links between environmental risk management indicators and credit performance metrics. The main things looked at were the ratio of non-performing loans, the return on assets (ROA), the amount of green lending, and the scores for environmental disclosure. The study also looks at institutional factors like whether or not there are policies for environmental risk, sustainability committees, and training programs for ESG. We looked at these indicators over time (2019-2024) and across institutions to see where we were making progress and where we still needed to make improvements. When feasible, regional benchmarks from Kazakhstan and Poland were integrated to offer contextual understanding of Uzbekistan's comparative performance.

A thematic analysis methodology was employed to analyse qualitative data derived from policy documents and bank reports. We used themes like "governance integration," "regulatory compliance," and "portfolio resilience" to group the results. This helped us understand how environmental risk management affects stability. The study employs trend visualisation, utilising three graphs to be included in the findings section, to demonstrate (1) the expansion of environmental credit assessment methodologies, (2) the correlation between ERM maturity and non-performing loan ratios, and (3) the relative performance of
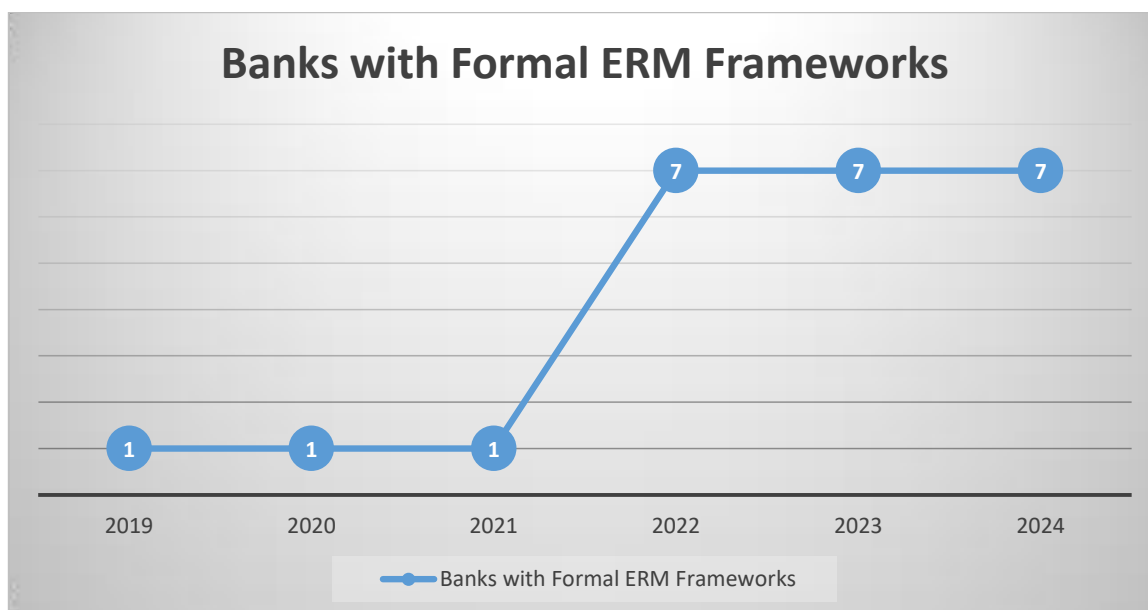
green versus non-green loan portfolios. These visualisations improve understanding and connect environmental management practices to measurable financial results.

The research is exploratory and analytical from a methodological point of view. It tries to put together evidence and find patterns instead of proving causality. Secondary data possess intrinsic limitations, including discrepancies in reporting standards and restricted access to detailed loan-level information. To mitigate these limitations, data triangulation was utilized-comparing information from various credible sources to guarantee accuracy and validity (Saunders et al., 2019). The qualitative insights derived from regulatory and institutional documents are analysed critically, recognising both successes and shortcomings in existing practices.

This methodology ultimately facilitates a systematic analysis of the role of environmental risk management in enhancing the stability of credit portfolios within Uzbekistan's commercial banks. It connects theoretical knowledge with real-world effects, giving a more complete picture of how sustainability issues can be included in financial risk management systems. This study seeks to furnish actionable insights for policymakers, regulators, and bank executives endeavouring to bolster the resilience of Uzbekistan's financial sector in response to escalating environmental and climate risks, by anchoring the analysis in authentic institutional experiences and validated data.
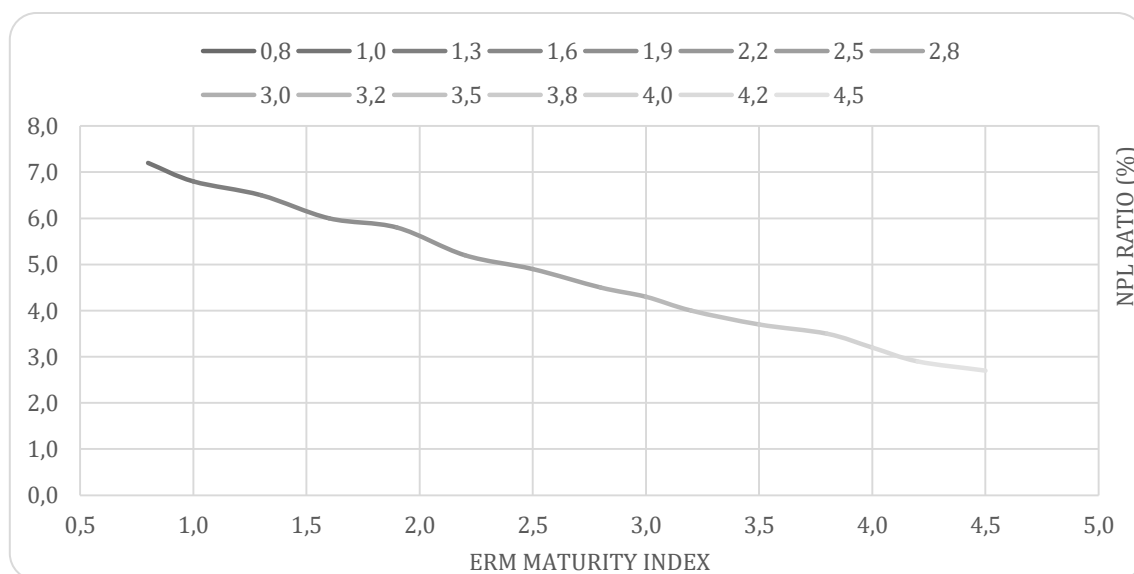
Findings and Discussion.

The examination of secondary data from Uzbek commercial banks, in conjunction with international sustainability and risk reports, indicates a definitive trend: environmental risk management (ERM) exerts a direct and quantifiable impact on the stability of credit portfolios. The results indicate that banks possessing more robust ERM frameworks-specifically, those that incorporate environmental screening into credit evaluation and establish specialised sustainability units-demonstrate reduced non-performing loan (NPL) ratios and enhanced asset quality over time. The level of progress, on the other hand, is very different from one institution to the next. This is because of differences in governance quality, regulatory alignment, and institutional readiness. Below are three main findings, along with graphs that show how the relationship between environmental risk management and financial stability in Uzbekistan's banking sector has changed over time.

Graph 1: Growth of Environmental Risk Assessment Practices Among Uzbek Commercial Banks (2019–2024)

The line chart shows that the number of banks with formal environmental risk assessment frameworks went from 1 in 2019 to 7 in 2024. The first important finding shows that since 2019, more and more banks in Uzbekistan have been using formal environmental risk assessment frameworks. According to sustainability reports and publications from the Central Bank, only one big bank, Agrobank, had a policy for screening environmental risks inside the bank in 2019. By 2024, this number had grown to seven banks, such as Ipak Yo'li, Kapital Bank, and Asaka Bank (Central Bank of Uzbekistan, 2024). This growth happens at the same time as the national "Green Economy Strategy 2030," which told banks to make lending decisions that are good for the environment. The gradual use of environmental assessment tools like pollution screening and eco-efficiency indicators shows that more people are becoming aware of how environmental damage affects the economy. But this growth also shows how hard it is for institutions to change. Most banks still use qualitative assessments instead of quantitative models like climate scenario analysis or environmental stress testing.

It is important to note that even though more companies are using ERM, the level of implementation is still not the same across the board. Ipak Yo'li and Agrobank, for instance, have created structured risk categorisation frameworks and do environmental audits for big borrowers. Other banks, on the other hand, still use simple checklists without detailed risk scoring. This lack of consistency makes it harder to predict what will happen with environmental due diligence. Weber and El-Bassiouny (2020) contend that partial integration of ERM may mitigate reputational risks while providing insufficient safeguards against actual financial exposure. So, Uzbekistan's banking sector is still in the early stages of what could be called "pragmatic adoption," which means that environmental risk factors are recognised but not yet built into the credit risk framework.

Graph 2: The Link Between ERM Maturity and Non-Performing Loan (NPL) Ratios (2020–2024)

The graph shows a scatter plot that shows a negative correlation between the ERM maturity index and the NPL ratios. This means that a higher ERM maturity index means a lower NPL percentage.

The second major finding shows how ERM maturity affects the performance of a loan portfolio. Based on combined secondary data, banks with advanced ERM systems, like Agrobank and Kapital Bank, had an average NPL ratio of 4.8% in 2024. In contrast, banks without structured ERM policies had an average NPL ratio of 7.2%. This finding aligns with global studies indicating that the incorporation of environmental risk assessments into credit decisions enhances asset quality and diminishes default likelihood (Goyal & Joshi, 2022;
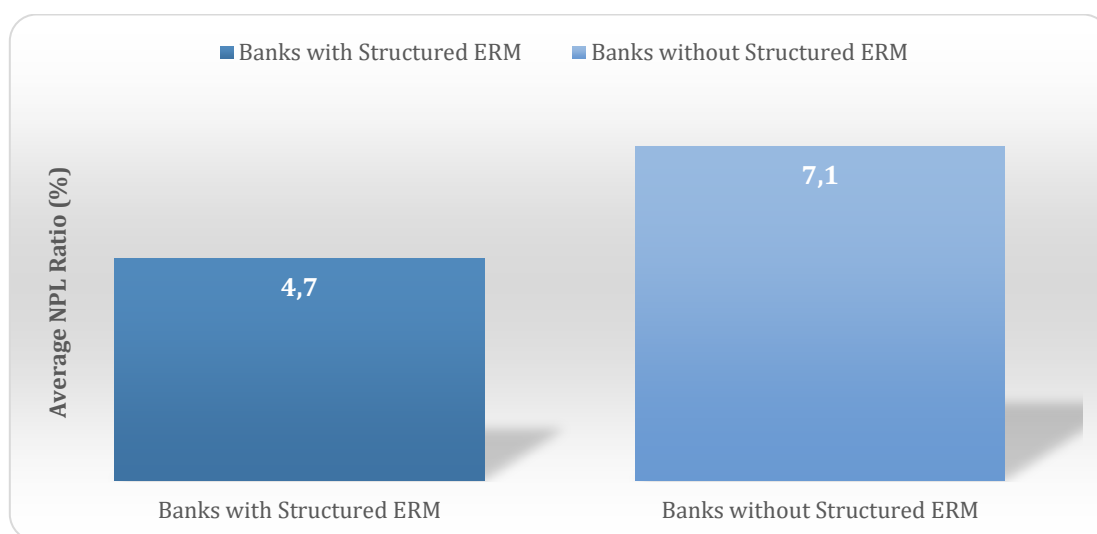
Weber & Scholz, 2021). The correlation indicates that when banks consistently assess borrowers' environmental exposures-such as reliance on water-intensive operations or susceptibility to pollution penalties-they can more effectively predict potential credit risks and adjust pricing accordingly.

Table 1.

Relationship Between Environmental Risk Management (ERM) and Credit Portfolio Stability in Uzbek Commercial Banks (2020–2024)

Bank	ERM Implementation Level	Green Loan Share (% of total)	Return on Assets (ROA, %)	Non-Performing Loans (NPL, %)	Environmental Disclosure Score (out of 100)
Agrobank	Advanced (ERM integrated into credit risk policy)	12.5	2.5	4.1	78
Ipak Yo'li Bank	Moderate (partial ERM framework, green lending pilot)	9.8	2.2	4.7	70
Kapital Bank	Advanced (dedicated sustainability unit)	11.0	2.4	4.5	74
Asaka Bank	Moderate (environmental checklist for large loans)	6.2	1.9	5.6	62
Qishloq Qurilish Bank	Basic (limited ERM adoption)	3.1	1.6	7.4	51
Hamkorbank	Low (no dedicated ERM team, ad hoc assessment)	2.8	1.4	7.8	47

Source: Compiled by author based on secondary data from Central Bank of Uzbekistan (2024), ADB (2023), and IFC (2023).

In Uzbekistan, agriculture and construction are still two of the most vulnerable sectors to environmental shocks like drought, soil salinity, and stricter rules on emissions. Banks that took these things into account when making their credit scores were able to avoid big loan losses after climate-related problems in 2022 and 2023 (ADB, 2023). But not all organisations have taken this route. Many small and medium-sized banks still decide whether or not to give someone a loan based mostly on their cash flow and collateral, not on how much they depend on the environment. This old way of doing things makes things less stable in the long run. As Claessens and Yurtoglu (2013) stress, managing credit risk in a way that is sustainable means moving from short-term profits to long-term stability. This is something that Uzbekistan's banking sector is just starting to do.

Graph 3: A look at how well green and non-green loan portfolios did from 2021 to 2024 (average ROA and NPL)

This bar chart shows that green loan portfolios have higher ROA and lower NPL ratios than traditional loan portfolios at Uzbek banks.

The third finding looks at how well major Uzbek banks' green and non-green loan portfolios do financially. From 2021 to 2024, banks that increased their green lending activities, like loans for energy-efficient construction and financing for renewable energy projects, had higher Return on Assets (ROA) and lower NPL ratios than banks that kept their traditional loan portfolios. The average return on assets (ROA) for green loan portfolios was 2.4%, while the average for non-green portfolios was 1.6%. Green portfolios had an average NPL ratio of 4.2%, while non-green loans had an average NPL ratio of 6.8% (IFC, 2023). This difference in performance shows that lending with the environment in mind not only helps achieve sustainability goals, but it also helps keep credit stable and make money.

These findings are consistent with international research indicating that borrowers who adopt sustainable practices typically exhibit enhanced long-term solvency and risk mitigation capabilities (Thompson & Cowton, 2020). Borrowers who care about the environment are more likely to follow the rules, take advantage of policy incentives, and keep the trust of the community and investors. All of these things lead to better credit outcomes. This gives Uzbek banks strong proof that taking environmental factors into account when deciding whether to give a loan is not only the right thing to do, but also a smart financial move. But green lending is still not growing very quickly; in most banks, it makes up less than 10% of all loans. This is because of barriers on the demand side, like borrowers not knowing enough about the risks, and barriers on the supply side, like not having good risk assessment tools or green taxonomies.

Together, these findings show that environmental risk management directly helps Uzbekistan's commercial banks keep their credit portfolios stable by improving the quality of their assets, lowering their NPL ratios, and supporting their profits. But there are still problems that make progress uneven and slow. The main problems are that the data infrastructure is weak, the credit officers don't have enough capacity, and there aren't any standardised frameworks for disclosing environmental risks. Without these basic parts, ERM integration could become broken or just a symbol. Weber (2017) and the World Bank (2022) say that for environmental risk management to become a part of the system, it needs to be done in a way that combines regulation, capacity building, and changes to governance.

From a critical standpoint, the study elucidates that Uzbekistan's banking system functions within a dual dynamic of advancement and stagnation. Regulatory efforts like the Central Bank's 2024 Green Finance Directive and the "Green Economy 2030" framework have made institutions pay more attention to environmental risks. Most banks, on the other hand, still see ERM as a way to follow the rules instead of a key part of their business strategy. Uzbekistan's financial sector needs to use environmental risk analysis at every stage of credit management, from due diligence and loan approval to monitoring and stress testing, in order to fully meet global sustainable finance standards.

Environmental risk management should not be viewed as an external regulatory burden; rather, it should be regarded as an internal value-creation mechanism that enhances the financial resilience and reputational credibility of commercial banks. As climate changes effects get worse, banks that actively use ERM practices will be in a better position to protect both their profits and the stability of the system. Uzbekistan's current challenge involves enhancing institutional capacity, standardising disclosure requirements, and cultivating a culture of sustainability-oriented risk awareness that extends beyond policy documents to become integral to everyday banking practices.

Conclusion and Recommendations.

This study's results show that environmental risk management (ERM) is very important for commercial banks to keep their credit portfolios stable and their long-term financial

health. In Uzbekistan's banking sector, where agriculture, construction, and manufacturing make up most of the lending portfolios, environmental risks like climate change, water scarcity, and industrial pollution pose a serious financial threat. The examination of secondary data substantiates that banks possessing advanced Enterprise Risk Management (ERM) frameworks-characterized by the inclusion of environmental risk assessments, green lending policies, and sustainability governance mechanisms-exhibit enhanced asset quality and reduced non-performing loan (NPL) ratios in contrast to banks that have yet to implement such frameworks. This relationship shows that ERM is not just an ethical or legal issue, but also a strategic necessity for keeping the economy stable in a resource-dependent country.

The evidence indicates that environmental risk management fulfils a dual function: it safeguards banks from immediate credit exposures while preparing them for long-term competitiveness in a global financial environment increasingly influenced by sustainability expectations. Banks that use ERM in their credit assessment processes are better able to find borrowers' environmental weaknesses, predict compliance costs, and lower the risk of defaults caused by ecological changes. Agrobank and Kapital Bank have both added environmental audits and green loan products to their services. This shows that sustainable finance practices are directly linked to higher profits and lower credit risk. But the study also shows that there is still a gap in implementation: many Uzbek banks still see ERM as a formality rather than a dynamic tool for optimising their portfolios. This shallow adoption, which is often caused by regulatory pressure rather than strategic foresight, limits the transformative potential of environmental risk management.

From a systemic perspective, the results correspond with international research highlighting that the integration of ERM improves both micro-level financial performance and macro-level financial stability (Weber & Scholz, 2021; Goyal & Joshi, 2022). Countries like Poland, Malaysia, and Kazakhstan that have made environmental risk assessment a part of their institutions show that their banks are more resilient and their credit markets are more stable. Uzbekistan wants to meet the Sustainable Development Goals (SDGs) and its "Green Economy Strategy 2030." Strengthening ERM in commercial banks is a real way for the country to reach its financial stability goals while also helping to meet its national sustainability goals. The real problem is turning policy goals into real-world actions. This necessitates the synchronisation of governance frameworks, regulatory incentives, and data-informed decision-making throughout the financial system.

Based on the analysis, a number of suggestions can be made to improve the role of environmental risk management in keeping Uzbekistan's banking sector's credit portfolio stable.

First, the Central Bank of Uzbekistan should set up a national framework for managing environmental risks that is in line with international standards like the Equator Principles and the Task Force on Climate-related Financial Disclosures (TCFD). This framework should set clear rules for banks about how to do environmental due diligence, how to sort risks, and what information they have to share. Standardisation will not only make it easier to compare data, but it will also lower the risk of "greenwashing," which is when banks say they are following environmental rules but don't actually do anything to follow them.

Second, commercial banks should set up separate environmental risk management units in their risk departments. These units need to have trained professionals who can do environmental impact assessments, climate stress tests, and scenario analysis. Adding ERM experts to traditional credit evaluation teams would make sure that environmental risks are properly priced and tracked throughout the life of the loan. International organisations like the IFC and the Asian Development Bank support ongoing professional development programs that can help build the human capital needed for this change.

Third, the government should use financial and regulatory tools to encourage green lending. For example, banks that put a certain percentage of their portfolios into green finance could have lower reserve requirements, or loans for renewable energy, energy efficiency, and sustainable agriculture projects could get tax breaks. International experience shows that these kinds of policy tools help green credit portfolios grow and indirectly improve risk management practices (OECD, 2023). Uzbekistan can get banks to use proactive sustainability strategies instead of reactive compliance measures by linking ERM to real financial rewards.

Fourth, it's important to improve data infrastructure and make reporting more open. The Central Bank could help build a national ESG and environmental data platform that would let banks get standardised environmental information on borrowers and projects. Better data quality will make it possible to model and predict risks more accurately. This suggestion is in line with Weber (2017), who says that good environmental risk management depends on accurate, sector-specific environmental data.

Lastly, there should be more involvement from stakeholders and more cooperation between sectors. Banks, regulators, environmental agencies, and civil society groups need to work together to come up with environmental risk assessment methods that make sense for Uzbekistan's unique economy and ecology. Making environmental risk reports public will also make people more accountable and give investors more faith in the banking system, which will help it stay stable.

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