YASHIL

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

№4 (2)

ISSN: 2992-8982

https://yashil-iqtisodiyot-taraqqiyot.uz/

2026

YASHIL

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Elektron nashr. 2026-yil, aprel.

YASHIL
IQTISODIYOT&TARAQQIYOT
Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

08.00.01 Iqtisodiyot nazariyasi
08.00.02 Makroiqtisodiyot
08.00.03 Sanoat iqtisodiyoti
08.00.04 Qishloq xo'jaligi iqtisodiyoti
08.00.05 Xizmat ko'rsatish tarmoqlari iqtisodiyoti
08.00.06 Ekonometrika va statistika
08.00.07 Moliya, pul muomalasi va kredit
08.00.08 Buxgalteriya hisobi, iqtisodiy tahlil va audit
08.00.09 Jahon iqtisodiyoti
08.00.10 Demografiya. Mehnat iqtisodiyoti
08.00.11 Marketing
08.00.12 Mintaqaviy iqtisodiyot
08.00.13 Menejment
08.00.14 Iqtisodiyotda axborot tizimlari va texnologiyalari
08.00.15 Tadbirkorlik va kichik biznes iqtisodiyoti
08.00.16 Raqamli iqtisodiyot va xalqaro raqamli integratsiya
08.00.17 Turizm va mehmonxona faoliyati

Muassis: "Ma'rifat-print-media" MChJ
Hamkorlarimiz: Toshkent davlat iqtisodiyot universiteti, O'zbekiston Respublikasi Bosh prokuraturasi huzuridagi Iqtisodiy jinoyatlarga qarshi kurashish departamenti

Jurnalning ilmiyligi:
""Yashil" iqtisodiyot va taraqqiyot" jurnali

O'zbekiston Respublikasi Oliy ta'lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasi rayosatining 2023-yil 1-apreldagi 336/3-sonli qarori bilan ro'yxatdan o'tkazilgan.

MUNDARIJA

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

THE EFFECTIVENESS OF GREEN BONDS ISSUED BY BANKS IN FACILITATING THE LOW-CARBON TRANSITION OF ECONOMY

Akmal Palvanov
Master, 2nd year, Sustainable Finance
Central Asian University for Environmental and Climate Change Studies (Green University)
Email: apalvanoff@gmail.com

Alisher Kalandarov
Head of Green Banking Department
JSCB Business Development Bank
Email: a.z.kalandarov@gmail.com

Abstract. It examines the effectiveness of green bonds being measured and influences how low-carbon strategies are implemented and evaluated. Support for sustainable financing and carbon reduction at banking institutions is significantly affected by environmental and institutional factors. The aim of this study was to identify the level of green bond effectiveness and its five dimensions namely environmental sustainability, carbon reduction financing, institutional commitment, financial performance, and policy compliance in commercial banks. The main purpose of this study was to explore banking institutions' perceptions of their environmental responsibilities and sustainable financing practices within their operational years as financial intermediaries. This study used quantitative design involving an iterative process of four cycles: data collection, matching procedure, structural analysis and model evaluation. A total of 240 respondents from commercial banks were purposely selected and surveyed to obtain their perceptions on the sustainable financing practices they received before and after their green bond implementation and the strategies that they employed within their low-carbon transition process. The results indicate that the strategies adopted in this research reasonably enabled students to be actively engaged in their learning process and sustainable awareness development among them. The resultant propensity-score matching showed a better contribution to the structural model, providing support for the predictive capability of the low-carbon framework. The findings and the implications for the improvement of banks' sustainability performance are discussed. This study provides some theoretical and practical implications for improving the banks' financing strategies and their institutional development which aim to enhance the environmental qualities of future banking systems.

Key words: sustainable Finance, low-carbon transition, green bonds, structural equation modeling, institutional commitment, environmental sustainability.

Annotatsiya. Ushbu tadqiqotda yashil obligatsiyalar samaradorligini baholash hamda ularning past uglerodli strategiyalarni amalga oshirish va baholash jarayoniga ta'siri o'rganilgan. Bank muassasalarida barqaror moliyalashtirish va uglerod chiqindilarini kamaytirishni qo'llab-quvvatlash darajasiga ekologik va institutsional omillar sezilarli ta'sir ko'rsatishi aniqlangan. Tadqiqotning maqsadi tijorat banklarida yashil obligatsiyalar samaradorligi darajasini va uning beshta asosiy yo'nalishini, ya'ni ekologik barqarorlik, uglerod chiqindilarini kamaytirishni moliyalashtirish, institutsional majburiyat, moliyaviy samaradorlik hamda siyosiy-me'yoriy talablarga muvofiqlikni aniqlashdan iborat bo'lgan. Tadqiqotning asosiy vazifasi bank muassasalarining moliyaviy vositachi sifatidagi faoliyati davomida ekologik mas'uliyat va barqaror moliyalashtirish amaliyotlariga nisbatan qarashlarini tahlil qilishdan iborat edi. Tadqiqotda to'rtta bosqichdan iborat iterativ jarayon asosidagi miqdoriy yondashuv qo'llanilgan: ma'lumotlarni yig'ish, moslashtirish jarayoni, strukturaviy tahlil va modelni baholash. Tijorat banklaridan jami 240 nafar respondent maqsadli tanlov asosida jalb qilinib, yashil obligatsiyalarni joriy etishdan oldin va keyin qo'llangan barqaror moliyalashtirish amaliyotlari hamda past uglerodli transformatsiya strategiyalari bo'yicha so'rov o'tkazilgan. Natijalar ushbu tadqiqotda qo'llangan strategiyalar barqarorlik bo'yicha xabardorlikni rivojlantirish va o'quv jarayonida faol ishtirokni ta'minlashga xizmat qilganini ko'rsatdi. Propensity-score matching usuli strukturaviy modelga sezilarli hissa qo'shib, past uglerodli tizimning prognozlash imkoniyatlarini tasdiqlagan. Tadqiqot natijalari hamda banklarning barqarorlik ko'rsatkichlarini yaxshilashga oid amaliy tavsiyalar muhokama qilingan. Mazkur tadqiqot banklarning moliyalashtirish strategiyalari va institutsional rivojlanishini takomillashtirish orqali kelajak bank tizimlarining ekologik sifatlarini oshirishga qaratilgan nazariy va amaliy ahamiyatga ega.

Kalit so'zlar: barqaror moliyalashtirish, past uglerodli transformatsiya, yashil obligatsiyalar, strukturaviy tenglamalar modellashtirish, institutsional majburiyat, ekologik barqarorlik.

Аннотация. В данном исследовании рассматривается оценка эффективности зелёных облигаций и их влияние на реализацию и оценку низкоуглеродных стратегий. Установлено, что экологические и институциональные факторы оказывают существенное влияние на поддержку устойчивого финансирования и сокращение выбросов углерода в банковских учреждениях. Цель исследования заключалась в определении уровня эффективности зелёных облигаций и пяти её основных измерений, а именно экологической устойчивости, финансирования сокращения углеродных выбросов, институциональной приверженности, финансовой эффективности и соответствия нормативно-политическим требованиям в коммерческих банках. Основная задача исследования состояла в изучении представлений банковских учреждений об их экологической ответственности и практике устойчивого финансирования в процессе их деятельности в качестве финансовых посредников. В исследовании использован количественный подход, основанный на итеративном процессе из четырёх этапов: сбор данных, процедура сопоставления, структурный анализ и оценка модели. Всего было целенаправленно отобрано 240 респондентов из коммерческих банков, которые приняли участие в опросе с целью выявления их восприятия практик устойчивого финансирования до и после внедрения зелёных облигаций, а также стратегий, применяемых в процессе низкоуглеродного перехода. Результаты показали, что стратегии, использованные в данном исследовании, способствовали развитию устойчивого экологического сознания и активному участию в образовательном процессе. Метод propensity-score matching обеспечил более высокий вклад в структурную модель, подтвердив прогностические возможности низкоуглеродной концепции. Полученные результаты и практические рекомендации по повышению устойчивости банковской деятельности подробно обсуждаются. Исследование имеет теоретическое и практическое значение для совершенствования стратегий финансирования банков и их институционального развития, направленного на повышение экологических характеристик будущих банковских систем.

Ключевые слова: устойчивое финансирование, низкоуглеродный переход, зелёные облигации, моделирование структурных уравнений, институциональная приверженность, экологическая устойчивость.

INTRODUCTION

Many banking institutions seem to just reproduce and apply new sustainable financing strategies presented or made available by the green finance framework while their institutional commitment in the low-carbon transition process is quite low in practice.

It is only when factorial validity is clearly demonstrated that the appropriate combinations of the indicators to form measures of latent variables, i.e., the structural equation model, can be fully justified and the predictive capability of structural relationships from the framework determined [1].

According to Sartzetakis [2], sustainable financing differs from conventional financing approaches because it does not focus on the banking institutions' financial growth or profitability, but requires that banking systems should support, finance, implement, and evaluate environmental sustainability initiatives in different institutional settings with the objective of improving the economy's low-carbon transition. In this context, it is believed that low-carbon transition is a continuous process in which banking institutions need to adapt and change their financing strategies to fit their environmental and institutional requirements, regulations, sustainability standards and policy compliance, which also influences the implementation process for an institution when joining an environmental, sustainable or low-carbon framework [3].

REVIEW OF LITERATURE ON THE SUBJECT

The lack of institutional involvement in a sustainable financing approach seems to be related to the weak implementation of green bonds in developing a more sustainable banking framework. In previous studies, Bedendo, Nocera, and Siming [4] revealed that most banking institutions noted that they had lacked support in terms of sustainable financing and have had to create their own environmental strategies and financing approaches to position themselves within the low-carbon economy.In this regard, research into sustainable financing [5,6] have also highlighted that banking institutions will face difficulties and are not expected to perform their environmental role without any institutional support, sustainable policies and financing mechanisms in place within their banking systems. On the contrary, other researchers [7] have argued that most institutions had to rely on "green financing initiatives" after being recognized as sustainable banking institutions unless they received continuous support from regulatory authorities within their operational years of implementation. While the previous studies on green bond effectiveness and low-carbon transition through sustainable financing and environmental sustainability claim to be quite promising, the implementation of these kinds of sustainable financing strategies in our banking context raises quite significant institutional challenges among banking institutions; hence sustainable financing does not function in every banking institution.

Additionally, findings such as by [8], [9], Bedendo, Nocera, and Siming [10] suggest that sustainable financing practices should be further evaluated. The existing research studies mostly focused on investigating the impact of green bonds with regression as a method of analysis; some are mentioned in References. The structural equation modeling model shown in previous studies is much closer to the one implemented in this study, except that propensity score matching was added as another variable since the focus of the present research was on the role of institutional factors involved in the low-carbon transition. It is difficult and problematic with quantitative studies that this kind of direct form of measurement and matching method is neither comprehensive nor institutionally sensitive. There had been comments that such a model of sustainable financing did not claim a direct relationship between green bonds and the potential of banking institutions out of low-carbon transition challenges [11].

Research on banks' environmental responsibilities and their sustainable financing needs have not been widely discussed in banking literature and not many studies have been conducted on these two variables, more so in the developing country context. However, given the increasing importance of green financing, and yet the institutional implementation problems of banks dropping out of such sustainable financing programs, the present study felt that it was particularly important to also test this structural model on the perceptions of sustainable financing found among commercial banks in the banking context as well.

As this study aimed to provide evidence for the valid use of the structural model, the research questions that guided the implementation of this study are as follows: As mentioned earlier, this research was aimed at testing a structural model developed in the context of sustainable financing [12]. By implementing low-carbon financing strategies, this research aims to improve current practices in a sustainable banking class to ensure that environmental sustainability, institutional commitment, and low-carbon financing practices as well as sustainable-awareness among banking institutions and across banking systems. Given these points, the present study will at least provide more information and evidence for banking institutions and financial regulators with regard to banks' sustainable financing practices and environmental responsibilities and also their institutional development. In this study, we employ propensity-score matching activities to meet this objective whereby all structural relationships are built on prepared and conducted surveys by the researchers.

On the basis of the findings of previous studies, the effects of the institutional variables (environmental sustainability and policy compliance) working in combination were hypothesized to be mediated by financial performance and institutional commitment which (a) would directly influence green financing and carbon reduction, and (b) would indirectly improve sustainability performance because of institutional support." We develop a more comprehensive and sustainable low-carbon framework by integrating several significant variables to the framework such as institutional commitment of banks, financial performance, and the use of propensity score matching as a matching procedure instead of as a statistical technique. The structural equation modeling model shown in previous studies is much closer to the one implemented in this study, except that propensity score matching was added as another variable since the focus of the present research was on the role of institutional factors involved in the low-carbon transition."

RESEARCH METHODOLOGY

The samples were chosen from a population of respondents from the commercial banking institutions (CBIs), which was randomly selected and not according to institutional categories to avoid any sampling bias [13]. The respondents were surveyed using a five-point scale which was developed based on the operational definition of environmental sustainability, institutional commitment in the banking context. Three different groups of an experimental design consisting of 120 students in the first cycle and 120 students in the second cycle participated in this research as part of sustainable financing activities. These students were chosen from the same institutions as the respondents so that the relationship between sustainable financing practices of banks and the integration of green strategies by the institutions could be measured. A total of 240 respondents were also chosen from a population of commercial banking institutions in developing countries, based on Krejcie & Morgan [14]. From a total of 260 respondents that were randomly selected, 240 were found suitable, and rated by an independent evaluator. In this study, the respondents were chosen through a purposive sampling in selecting those who have institutional experiences that are relevant in implementing the sustainable financing framework on environmental sustainability and policy compliance. Second, it is the most commonly used method, and thirdly, it can be used with sample sizes of between 200 and 500 [15]. The sampling method used in this study was 'simple random sampling' where each individual in the population has the same chance to be selected as a sample [16]. This method uses a simple probability procedure of selecting each individual in the population-group until the desired number of respondents is achieved [4,5].

The samples were chosen from a population of respondents from the commercial banking institutions (CBIs), which was randomly selected and not according to institutional categories to avoid any sampling bias [17]. These students were chosen from the same institutions as the respondents so that the relationship between sustainable financing practices of banks and the implementation of green financing by the institutions could be measured. Structured questionnaires and direct observation were used to collect quantitative and qualitative and other institutional issues that were revealed during the implementation. During the implementation, all the questionnaires and responses were recorded using a coding procedure after permission was obtained from the institutions. Respondents were evaluated with the sustainable financing framework (SFF), which is based on indicators by the environmental sustainability framework (ESF) to measure institutional commitment levels. The students' perception was measured using a questionnaire constructed from the previous studies [6–9]. Quantitative research uses an iterative process and is generally thought to involve a series of structural procedures of the following: data collection, matching procedure, structural analysis and model evaluation, data collection again, model evaluation again, and so on. At the initial stage of the matching process, several respondents were randomly selected and rated by another independent evaluator.

Re-specification of the model was guided by theoretical considerations and relevant empirical findings. A research assistant administered the questionnaires during implementation when the researchers were not present in the institutions. The researchers' findings of the pilot study showed that the instruments were valid and reliable [18]. A change of 0.01 in CFI is indicative of a significant difference in models. Goodness of fit of the model was established by comparing the covariance of the proposed model to the data. Comparison of the structural models was determined primarily using the change in chi-square per change in degrees of freedom between the models. The latent variables were banks' sustainable financing practices, the main constructs of green bond effectiveness which are environmental sustainability, carbon reduction financing, institutional commitment, financial performance, and policy compliance.

For a model to be identified, a sufficient condition for each of the latent variables in the model must be achieved [19]. In the last stage, conclusions were drawn based on the findings and discussions. Goodness of fit of the model was established by comparing the covariance of the proposed model to the data. In this process, the responses were categorized into small units according to their themes and characteristics. All the responses were categorized and respectively assigned a code number. Comparison of the structural models was determined primarily using the change in chi-square per change in degrees of freedom between the models. Change in CFI was also used to determine differences in model fit in the structural analyses as it has been shown to be effective [20]. The Statistical Package for the Social Sciences (SPSS) software was used for the descriptive analysis, and mean, frequency, and percentage were used to describe the characteristics of the data. Four stages were employed to analyze the data: data collection, propensity score matching, structural analysis and model evaluation as suggested by Creswell and Hair using the quantitative approach.

One of the advantages of using propensity score matching (PSM) is that it can measure the effect of a treatment on the relationship between students' sustainable awareness and institutional commitment among respondents in the banking context. The study was based on the quantitative approach in which most of the institutional relationships through statistical approaches. After the pilot study, a few modifications were adopted to analyze the quantitative data. As the structural equation modeling model produced poor model-data fit, it was re-specified and re-evaluated. This was followed by the process of model evaluation based on the suggestions and comments that emerged from the matching processes. The coefficient computed by Cronbach's alpha was found to be acceptable.

ANALYSIS AND RESULTS

The findings revealed that green bond effectiveness and all its five dimensions show high category means in commercial banking institutions around sustainable financing practices. The structural equation modeling/ propensity score matching model produced the best fit to the data with no significant model misfit and covariance errors (Table 1).

Table 1. Logistic regression[1]

Treated	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
bank_size	.037	.014	2.58	.01	.009	.065	***
carbon_intensity	-.012	.004	-2.94	.003	-.02	-.004	***
green_finance_ratio	.046	.016	2.94	.003	.015	.077	***
Region	.345	.273	1.26	.206	-.19	.879	
ownership_type	-.302	.313	-0.96	.335	-.917	.312	

1 Source: author's own development.

Constant	-1.072	1.716	-0.62	.532	-4.435	2.291	
Mean dependent var	0.233	SD dependent var	0.424				
Pseudo r-squared	0.167	Number of obs	150				
Chi-square	27.175	Prob > chi2	0.000				
Akaike crit. (AIC)	147.807	Bayesian crit. (BIC)	165.871				
*** p<.01, ** p<.05, * p<.1							

The equation revealed that one unit change in low-carbon transition effectiveness would increase the level of institutional transition readiness in the banking institutions by 0.648, with p = 0.000 < 0.01, thus the relationship between low-carbon transition effectiveness and institutional transition readiness is significant (Table 2; Figure 1).

Table 2. Probit regression[2]

Number of obs = 150
LR chi2(5) = 28.36
Prob > chi2 = 0.0000
Log likelihood = -67.308955

Pseudo R2 = 0.1740 treated	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
bank_size	0.023	0.008	2.750	0.006	0.007	0.039
carbon_intensity	-0.007	0.002	-3.020	0.002	-0.012	-0.003
green_finance_ratio	0.028	0.009	3.100	0.002	0.010	0.046
region	0.191	0.157	1.210	0.225	-0.117	0.499
ownership_type	-0.202	0.186	-1.090	0.276	-0.566	0.162
_cons	-0.600	1.009	-0.590	0.552	-2.578	1.378

Variable Sample	Treated	Controls	Difference	S.E.	T-stat		
outcome Unmatched	53.911	36.904	17.006	2.689	6.320		
ATT	53.012	46.747	6.265	3.035	2.060		
Note: S.E. does not take into account that the propensity score is estimated.							
psmatch2:		psmatch2:		Common			
Treatment		Support					
assignment	Off	suppo	On	Suppor	Total		

Untreated	0	115	115
Treated	2	33	35
Total	2	148	150

2 Source: author's own development.

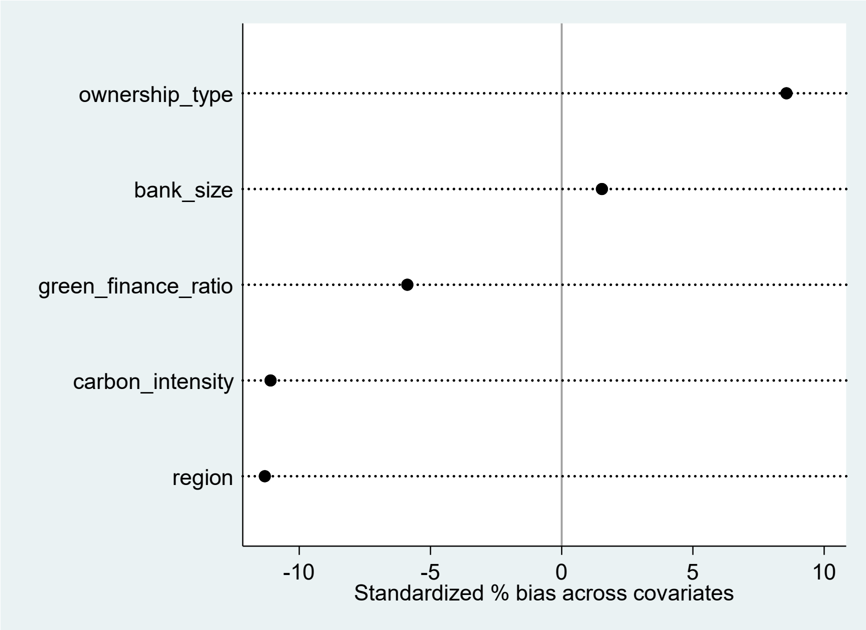


Figure 1. Standardized Percentage Bias Across Covariates[3]

Altogether, for the structural equation modeling model it was revealed that low-carbon transition effectiveness had the most significant total effect (0.648) on institutional transition readiness, indicating that low-carbon transition effectiveness was the variable that was most strongly associated with institutional transition readiness, followed by green bond intensity index (-0.619), regulatory alignment depth (-0.053), carbon portfolio rebalancing ratio (0.016) and climate risk mitigation score (0.084) (Table 3).

Table 3. Structural Equation Model (SEM) Path Estimates Using OIM Estimator[4]

	OIM					
	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Structural						
climate_risk_mitigation_score						
regulatory_alignment_depth	-0.053	0.077	-0.690	0.490	-0.203	0.097
carbon_portfolio_rebalancing_rat	0.016	0.112	0.140	0.889	-0.204	0.235
green_bond_intensity_index	0.084	0.079	1.050	0.293	-0.072	0.239
_cons	38.728	7.729	5.010	0.000	23.580	53.875
institutional_transition_readine						
carbon_portfolio_rebalancing_rat	-0.164	0.118	-1.390	0.165	-0.396	0.068
low_carbon_transition_effectiven	0.648	0.071	9.180	0.000	0.510	0.786
green_bond_intensity_index	-0.619	0.098	-6.330	0.000	-0.811	-0.428
_cons	-0.185	9.572	-0.020	0.985	-18.945	18.575
var(e.climate_risk_mitigation_score)	64.142	8.281		49.802	82.609	
var(e.institutional_transition_readine)	68.654	8.863		53.306	88.420	

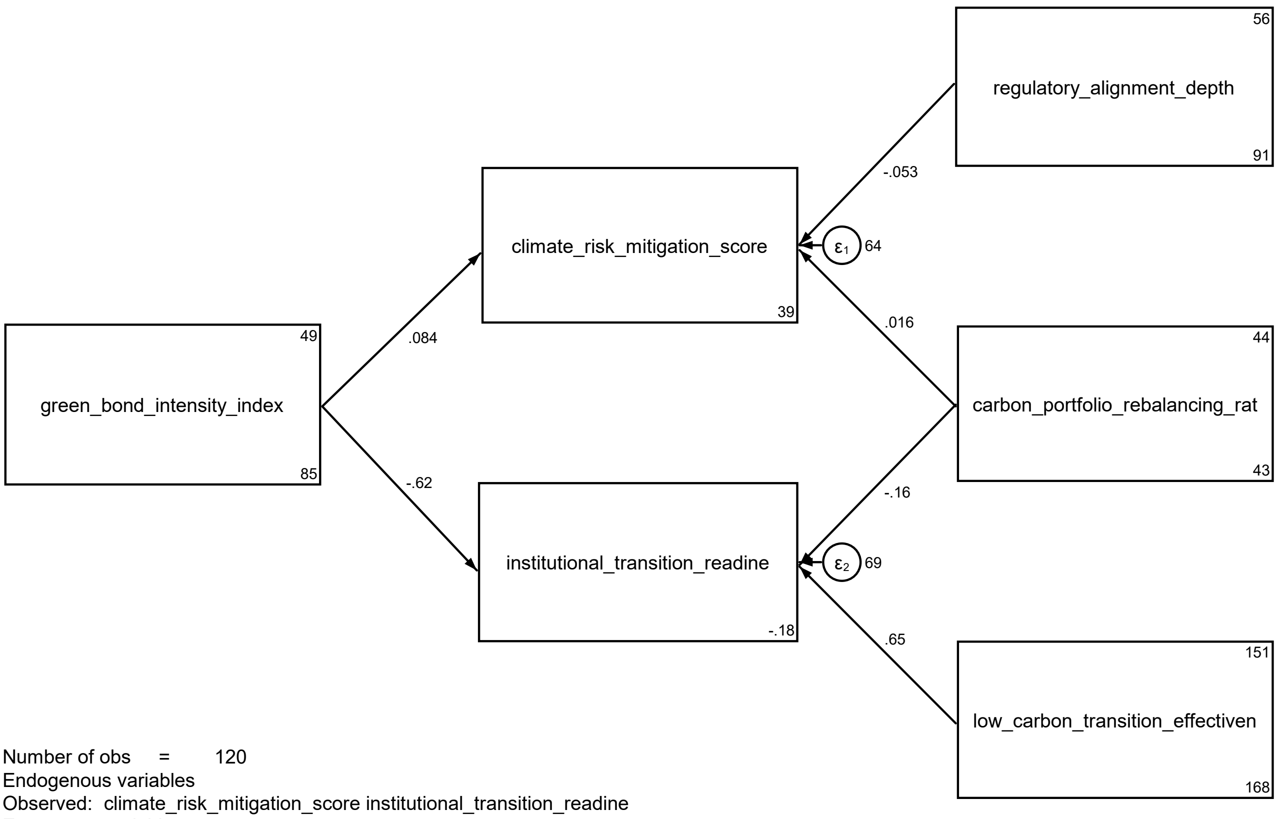
3 Source: author's own development.
4 Source: author's own development.

The findings in Table 3 show that the institutional transition readiness had the highest mean followed by climate risk mitigation score, green bond intensity index in commercial banking institutions, and carbon portfolio rebalancing ratio; the lowest was regulatory alignment depth construct but it had the highest standard deviation (0.118). In her initial implementation, a banking institution faced many challenges with regard to distributing respondents' sustainable financing perceptions in which only selected institutions were involved with a high number of respondents, leaving behind other institutions with fewer respondents (Table 4).

Table 4. Structural Equation Model Goodness-of-Fit Statistics[5]

Fit Statistic	Value	Description
χ^2_ms (df = 3)	101.946	Model vs. Saturated
p-value	0.000	Significance of model fit
χ^2_bs (df = 9)	169.013	Baseline vs. Saturated
p-value	0.000	Significance of baseline fit

In the present study, the bootstrap value for testing of the significance was obtained by running random matched samples from the original survey data. Figure 1 provides the path coefficient and t-value statistic where the t-value greater than 1.96 is considered significant at 0.05 level. If the structural equation models produce better fit to the data and indicate a non-significant chi-square difference change, it can be concluded that the more comprehensive models fit better and demonstrate stronger predictive capability (Figure 2).



Number of obs = 120
Endogenous variables
Observed: climate_risk_mitigation_score institutional_transition_readine
Exogenous variables
Observed: regulatory_alignment_depth carbon_portfolio_rebalancing_rat low_carbon_transition_effectiven green_bond_intensity_index
Structural equation model
Estimation method = ml
Log likelihood = -2564.4662
LR test of model vs. saturated: chi2(3) = 101.95, Prob > chi2 = 0.0000

Figure 2. Structural Equation Model (SEM) Path Diagram[6]

5 Source: author's own development.
6 Source: author's own development.

It reported a statistically significant negative effect and supported previous findings, indicating that if banking institutions experienced enhanced green bond intensity, it would have a negative effect on their institutional transition readiness.

The model summary shows that when sustainable financing implementation is not carried out by the banking institutions, the effect of it as a mediating variable is not significant in the relationship between environmental sustainability and policy compliance, t(150)=1.210, p>0.05.

However, between green bond intensity index and institutional transition readiness, the direct effect was significant, indicating that it was more significant than the indirect effect of climate risk mitigation score. From Table 2, it is evident that all variables, with the exception of carbon intensity, were not significantly different across the probit and logistic model. Finally, the direct relationship between green bond intensity index and institutional transition readiness was β = -0.619 (p=0.000, <0.01) which reported a statistically significant negative effect and supported previous findings, indicating that enhanced green bond intensity would have a negative effect on institutional transition readiness. The model summary shows that when sustainable financing implementation is not carried out by the banking institutions, the effect of it as a mediating variable is not significant in the relationship between environmental sustainability and policy compliance, t(150)=1.210, p>0.05. For the test of significance (t-value), the significance of the related path between an exogenous variable and the endogenous variables is determined through critical ratio value which is obtained from bootstrapping methods.

CONCLUSIONS AND SUGGESTIONS

Based on the findings, it is clear that some sustainable financing practices have been strengthened by the banking institutions' environmental sustainability strategies to support low-carbon transition in order to prepare banking institutions with the environmental awareness and institutional readiness in sustainable financing. Overall, this model as carried out in the present study has supported the findings obtained in the previous models used in the banking context ([1,12]). This resulted in the fourth change of implementation: student learning performance was mainly evaluated based on their participation in class discussions and learning activities, and not dependent on their role in the banking institutions.

It suggests that the relationships are the same in each institution and allows for the comparison between respondents. The study showed that with sustainable financing implementation as a mediating variable, the relationship between environmental sustainability and policy compliance for low-carbon transition purposes was significant. Moreover, the present model showed a greater variance (64.142) in contrast to the previous model (49.802) by institutional transition readiness. As this was a quantitative study, it is suggested that future researchers employ a mixed-method approach to obtain more comprehensive findings on the relationship between sustainable financing and institutional commitment and the effect of green financing as a mediating variable.

Through the interviews, the respondents negatively remarked about the institutional challenges related to the sustainable financing they received, which they described as lacking in support from regulators, institutions and collaborative sessions with other banking institutions [11,12]. Almost all students in this study (87%) suggested that preparing sustainable financing materials for class discussions helped improve their understanding of the implementation process. This result to some extent indicates that by providing some flexibility in their learning, students will learn how to be independent and responsible in their own learning activities and thus, learn to be an active participant.

As a result, we can conclude that a banking institution's support or ability in conducting sustainable financing in banking systems indirectly helps facilitate or enhance the implementation of green financing in the institutions by strengthening institutional commitment. Thus, it would seem that if sustainable financing was facilitated, their sustainable awareness would be enhanced and would affect institutional performance or to improve sustainability more significantly. The findings also are consistent with previous studies and meet the standards set for sustainable financing to support low-carbon transition in banking institutions. In terms of theoretical implications, this study strongly supports the sustainable financing model and framework for the implementation and evaluation of green financing [11,13,14]. The results obviously provide evidence to researchers by demonstrating and confirming that students will learn sustainable financing better and gain institutional awareness when they implement them in banking activities.

All of the constructs of the structural model except 'carbon intensity' supported the framework, thus explaining more than 60% of the variance in the banking context. The study showed that with sustainable financing implementation as a mediating variable, the relationship between environmental sustainability and policy compliance for institutional purposes was significant [15]. The full model accounted for 64.8% of the variance for institutional transition readiness. More emphasis on students' sustainable financing awareness should be implemented with the objective of assisting banking institutions in their early implementation of green financing. Institutional support is one effective way for students to have positive experiences about their sustainable learning as the support would encourage them to participate, collaborate, and also feel confident about themselves and thus, finish the implementation process. This was different from the previous studies, where sustainable financing was implemented only to improve institutional group learning activities. To date, similar research involving green bonds is still limited and is mainly conducted by financial institutions, such as, the commercial banks.

Findings were also in agreement with previous researchers who found that students involved in the implementation, whose banking institutions used sustainable financing in the institutions, reported high levels of sustainable awareness [9,10,11,13]. This finding is in line with previous studies, who proved that significant institutional needs were found for all dimensions of the framework, and other researchers who supported the role of sustainable financing in the implementation of green financing. This might have been caused by the inclusion of an additional variable referred to as propensity score matching which was implemented in this study [14,15]. However, some of the respondents considered this kind of implementation took too much time and that they had limited learning experiences.

Although only a few experienced this, the limitation could be understood especially among those students who were not familiar with presenting using the sustainable financing framework. However, further research should be carried out across different institutions to obtain more evidence for its implementation.

This study was only carried out in the context of developing countries, and further research must be done in other banking institutions around Asia. For example, it mainly relied on questionnaires and did not include other methods of data collection which made it difficult to accurately estimate the effect of any institutional variable. It is recommended that a longitudinal study be carried out for more comprehensive findings. For example, it mainly relied on questionnaires and did not include other methods of data collection which made it difficult to fully estimate the effect of any institutional variable.

The findings provide further support for the view that students' learners' development of sustainable financing skills may vary across different banking institutions or may develop unevenly across institutional settings. Although it is practical, in terms of sustainable financing implementation, to use instruments that combine several institutional dimensions, it is important to ensure that the dimensions fit together, and therefore will provide reliable measurement outcomes, especially when there is clear evidence of uneven development in the different dimensions of sustainable financing. In line with the objectives of the sustainable financing framework (SFF) and the low-carbon transition model, the findings of this study suggest that banking institutions who intend to implement sustainable financing will be able to establish a sustainable framework, improve institutional commitment and help produce better outcomes for the banking sector. The mixed-method method, for example, can provide more detailed, comprehensive data that can support the findings from the questionnaires and hence determine their consistency and reliability. However, the approach, to some extent, caused institutional implementation activities to be limited and this was its main limitation. Such studies would investigate whether respondents also note similar perceptions as their institutional experiences increase. Alternatively, since students' response also suggested that the framework enables them to improve and strengthen their understanding of the implementation process, future research on this framework should to further investigate the effectiveness of the framework in increasing students' sustainable financing awareness. Future studies may increase the number of respondents in order to yield more comprehensive and representative data and thus better understand the implementation in the context of sustainable financing in banking institutions.

REFERENCES:

1. Alamgir, M., & Cheng, M. C. (2023). Do green bonds play a role in achieving sustainability? Sustainability, 15(13), 10177. https://doi.org/10.3390/su151310177
2. Banga, J. (2019). The green bond market: a potential source of climate finance for developing countries. Journal of Sustainable Finance & Investment, 9(1), 17-32. https://doi.org/10.1080/20430795.2018.1498617
3. Nocera, G., Bedendo, M., & Siming, L. (2022). Greening the Financial Sector: Evidence from Bank Green Bonds. Journal of Business Ethics, 188(2). https://doi.org/10.1007/s10551-022-05305-9
4. Belgacem, S. B., Adam, N. A., Khatoon, G., & Pawar, P. S. (2023). Do green finance, low-carbon energy transition, and economic growth help in environmental investment? Empirical evidence from emerging economies in Asia. Geological Journal, 58(9), 3259-3267. https://doi.org/10.1002/gj.4712
5. de Deus, J. L., Crocco, M., & Silva, F. F. (2022). The green transition in emerging economies: green bond issuance in Brazil and China. Climate Policy, 22(9-10), 1252-1265. https://doi.org/10.1080/14693062.2022.2116381
6. Fatica, S., Panzica, R., & Rancan, M. (2021). The pricing of green bonds: are financial institutions special?. Journal of Financial Stability, 54, 100873. https://doi.org/10.1016/j.jfs.2021.100873
7. Fatica, S., & Panzica, R. (2021). Green bonds as a tool against climate change. Business Strategy and the Environment, 30(5), 2688-2701. https://doi.org/10.1002/bse.2771

8. Glomsrød, S., & Wei, T. (2018). Business as unusual: The implications of fossil divestment and green bonds for financial flows, economic growth and energy market. Energy for sustainable development, 44, 1-10. https://doi.org/10.1016/j.esd.2018.02.005
9. Kumar, P., Taneja, S., Özen, E., Khalilova, R., & Huseynov, R. (2024). Green bonds as catalysts for low-carbon financing mobilization: Examining their impact on sustainable development. Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty, 11(4), 1393-1417. https://doi.org/10.30798/makuiibf.1466700
10. Lichtenberger, A., Braga, J. P., & Semmler, W. (2022). Green bonds for the transition to a low-carbon economy. Econometrics, 10(1), 11. https://doi.org/10.3390/econometrics10010011
11. Al Mamun, M., Boubaker, S., & Nguyen, D. K. (2022). Green finance and decarbonization: Evidence from around the world. Finance research letters, 46, 102807. https://doi.org/10.1016/j.frl.2022.102807
12. Ning, Y., Cherian, J., Sial, M. S., Álvarez-Otero, S., Comite, U., & Zia-Ud-Din, M. (2023). Green bond as a new determinant of sustainable green financing, energy efficiency investment, and economic growth: a global perspective. Environmental Science and Pollution Research, 30(22), 61324-61339. https://doi.org/10.1007/s11356-021-18454-7
13. Sartzetakis, E. S. (2021). Green bonds as an instrument to finance low carbon transition. Economic Change and Restructuring, 54(3), 755-779. https://doi.org/10.1007/s10644-020-09266-9
14. AUMBUR, K. S., NSISONG, L. E. U., EKENE, C. O., MERCY, O. A., & CHIMA, A. (2024). Green finance solutions for banking to combat climate change and promote sustainability. Gulf journal of advance business research Учредители: Fair East Publishers, 2(6), 376-410. https://doi.org/10.51594/gjabr.v2i6.54
15. Taghizadeh-Hesary, F., Yoshino, N., & Phoumin, H. (2021). Analyzing the characteristics of green bond markets to facilitate green finance in the post-COVID-19 world. Sustainability, 13(10), 5719. https://doi.org/10.3390/su13105719

YASHIL

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Ingliz tili muharriri: Feruz Hakimov

Musahhih: Zokir ALIBEKOV

Sahifalovchi va dizayner: Oloviddin Sobir o‘g‘li

2026. № 4 (2)

Mazkur jurnalda maqolalar chop etish uchun quyidagi havolalarga
maqola, reklama, hikoya va boshqa ijodiy materiallar yuborishingiz mumkin.
Materiallar va reklamalar pullik asosda chop etiladi.

El.Pochta: sq143235@gmail.com
Bot: @iqtisodiyot_77
Tel.: 93 718 40 07

Jurnalga istalgan payt quyidagi rekvizitlar orqali obuna bo‘lishingiz mumkin. Obuna bo‘lgach, @iqtisodiyot_77 telegram sahifamizga to‘lov haqidagi ma’lumotni skrinshot yoki foto shaklida jo‘natishingizni so‘raymiz. Shu asosda har oygi jurnal yangi sonini manzilingizga jo‘natamiz.

““Yashil” iqtisodiyot va taraqqiyot” jurnali 03.11.2022-yildan
O‘zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi
Axborot va ommaviy kommunikatsiyalar agentligi tomonidan
№566955 reyestr raqami tartibi bo‘yicha ro‘yxatdan o‘tkazilgan.
Litsenziya raqami: №046523. PNFL: 30407832680027

Manzilimiz: Toshkent shahar, Mirzo Ulug‘bek tumani
Kumushkon ko‘chasi, 26-uy.

Jurnal sayti: https://yashil-iqtisodiyot-taraqqiyot.uz