Moderating impact of non-performing loans on the relationship between sustainable development goals and the financial performance of banks

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Abstract

Sustainability is a vital perspective for banks to keep their survival in the long run. While nonperforming loans (NPLs) also impact sustainability, this study aims to examine the moderating impact of NPLs on the adoption of sustainable development goals and the financial performance of the banks. The central hypothesis assumes that even after adopting sustainable development goals, banks cannot get high profits if their NPLs are high. Economic, social, and environmental indicators represent SDG measurement using an ESE index. We are performing panel data analysis through regression and the GMM technique. This study also conducts independent research on economic, social, and environmental indicators. We found that NPL significantly moderates the relationship between the SDGs and the financial performance. This paper has the following vital contribution. Bank that adopts sustainable development goals may have low profits if it has a high nonperforming loan ratio so banks must focus on the customer to whom they offer loans. The novelty of this study is adopting the ESE index for measuring the adoption of SDGs.

Keywords Nonperforming loans, SDGs, Financial performance, Moderating effect, Sustainability

Introduction

Sustainable development goals are a series of targets proposed by the United Nations from 2016 to 2030 to eradicate poverty, preserve all the aspects of the world that make it worth living place and guarantee that everyone lives in this world with peace, happiness, and prosperity. These goals aimed to address the empirical proofs that the world needs radical approaches and practices toward sustainability [41]. After their proposal, worldwide organizations began to adopt indicators for ensuring long-term sustainability. Banks were significant among these organizations because of the nature of their

functions, as they are money takers and money providers. Banks are concerned not only about the adoption of SDGs but also about the impact of their operations and their management of money in the form of loans and investments made on this adoption of SDGs [62]. That is why banks relate the SDGs adoption with their performance and other factors like the amount of loan given and how much accounts receivables are recovered. The uncollectible accounts receivable contribute toward nonperforming loans, which could be better for banks [57]. For a number of reasons, banks' participation in achieving the SDGs is essential. Banks serve as the go-between for savers and borrowers, collecting money from both individuals and institutions and directing it toward useful endeavors [34]. Due to their role in financial intermediation, risk management, access to financing, collaboration, and reputation management, banks must adopt SDGs. Banks may support sustainable economic growth, social

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inclusion, and environmental protection by aligning their practices with the SDGs [42].

Some banks have already started implementing these goals because banks are now required to give sustainable disclosure due to the pressure from stakeholders and to disclose the role of banks in sustainable development [51]. Although the banking sector is significant in achieving sustainable development goals because it provides funds for different investments, this industry also faces challenges like increased nonperforming loans [45]. Rising nonperforming loans are considered the failure of banks [24]. Nonperforming loans endanger the bank's ability to serve as an investor and also indicate the poor state of the debtor's business. As additional money for their businesses, people obtain financing or credit facilities. When their company does good business, they can fulfill their financial obligations and repay the loans [19]. However, when the business could be better, the borrower's ability to pay back the bank's lending declines. The modest returns that banks requested on credit supplied to society are used to demonstrate how banking has contributed to accelerating economic growth [7]. Banks' contribution toward society is helpful if the nonperforming loan ratio is low. If the NPL is high, the bank's financial performance is low, and they cannot contribute well toward adopting SDGs.

SDGs include 17 goals and more than 243 indicators that measure the adoption of SDGs [31]. The main three pillars of these SDGs are economic, social, and environmental, and the relationship between the bank's performance and non-performance loans with the SDGs are analyzed through these three pillars. As far as economic, social, and environmental sustainability is concerned financially sound banking industry contributes toward sustainable development by reducing the adverse environmental effects and poverty-related costs of economic activity. The long-term effects of investments and financial access to high-carbon emission enterprises on business are uncertain. Financially more accessible businesses can invest in more equipment and technology, which uses energy and emits more carbon gas and waste material. Due to the region's high intensity of carbon emissions, which contributed to a rapid climate change that would put Asia's GDP in danger of between $2.8 trillion and $4.7 trillion on average, climate change is more severe in Asia as compared to any other region [64]. Energy preservation is also related to sustainable development, and banks must play a part in energy preservation [47].

The socioeconomic effects of climate change have raised the frequency of default rates, payment delays, and nonperforming loans, which increase the bank's credit risk. In developing countries of Asia, nonperforming loans are considered the main danger to sustainability

and financial soundness [63]. The NPL ratio was 48.6% in Indonesia and 13% in Thailand during the Asian Financial Crisis, leaving the banking industry prone to corruption and lax underwriting standards. Therefore, banks must mitigate their NPL ratios so that their sustainability practices can positively affect financial performance. Enhanced NPL ratio must let the banks manage their funds appropriately and adopt sustainable development goals. Inability to collect the loans back from customers increases the banks' credit risk and leaves fewer funds for SDGs. Even if the banks invest in SDGs but at the same time are unable to collect their loans back from customers, what will happen to the performance of the banks? As the banks are motivated to adopt the SDGs for the extended run survival by increasing the performance, but meantime NPLs decline the performance of the banks, the adoption of SDGs will be useless. So NPL moderates the relationship between SDGs and the performance of the banks.

Therefore, with the increased NPL ratio, despite adopting sustainability practices, banks cannot enhance their long-term financial performance and threaten long-term survival [16]. Increasing the NPL rate is the main reason for the reduction in the profits of the banks. Hence, the NPL moderates the relationship between the SDGs adoption and the performance of banks. If the banks adopt sustainable development goals, it will ultimately impact the financial performance of banks and make them more sustainable in the long run [56]. Despite the adoption of SDGs and sustainability practices, which are related to high financial performance in the long run, if banks do not get back their loans given to customers or if the high customer's default rate results in high nonperforming loans, does this adoption of SDGs and financial performance show different relationship? Studies show a positive relationship between SDGs and financial performance, but can the existence of NPL moderate this relationship between the adoption of SDGs and financial performance?

This study aims to determine the moderating impact of nonperforming on the relationship between the adoption of SDGs and the performance of banks. There are many contributions of this study to the existing literature. First, to date, the nonperforming ratio of banks is not related to sustainable development goals, and their moderating impact has yet to be previously analyzed. The SDGs adoption is the UN's requirement, and the bank's contribution must be analyzed in every possible way. This study is conducted in the countries of the Asia Pacific region. Before this study, the moderating effect of NPL on the adoption of SDGs and the financial performance of banks is not conducted in a different region. This area needs sustainability practices even though disaster-prone;

long-term sustainability is highly required. So, this study implies that the banks in this area adopt SDGs and reduce their bad loans to remain profitable in the long run. Thirdly, the adoption of SDGs is measured by constructing an ESE index which contains 21 indicators of SDGs related to the economic, social, and environmental aspects of SDGs. All the indicators have been taken from the UN's statistical division. Hence, this study offers a thorough analysis of moderating impact of NPLs on the relationship between the adoption of SDGs and the performance of banks.

Section 2 contains a literature review of economic, social, and environmental sustainability and NPLs. Section 3 develops the hypothesis. Section 4 explains the data and methodology. Section 5 explains empirical findings. Section 6 presents the results, conclusion, and discussion, along with the practical implication.

Literature review
SDGs and financial performance
The 2008 financial crisis made it clear that the traditional financial system cannot address the modern banking system's issues and the effects of social, economic, and environmental factors on finance. Due to a lack of practices for managing money, debt, risk, and sustainability, this financial crisis demonstrated that traditional finance still needs to address long-run sustainability. Banks promote sustainable development goals by funding projects of economic, social and environmental sustainability. Incorporating sustainable development goals into the bank's strategies may improve long-term financial success. Businesses should implement SDG-aligned business models to secure the present and future of generations [29]. Many studies suggest that corporate sustainability as part of strategic objectives enhances financial performance [2]. The relationship between the sustainable development goals and the financial performance of the banks is also supported by legitimacy theory which asserts social values. Also, the stakeholders appreciate sustainable ventures and products [26].

United Nations suggest SDGs for the betterment of the world. Since then, many organizations are adopting these goals to remain sustainable for the long term [15]. Banks are also trying to adopt these goals for the betterment of the world. Banks operate to give funds for the most effective use. If the loans given by the banks are used purposefully, people's living standard is increased. However, when these funds are not used correctly and are invested in environmentally destructive ventures, they can worsen climate change. So, banks should be vigilant while giving applicants loans so that they may be used purposefully. [55].

SDGs and nonperforming loans
Economic sustainability and nonperforming loans
Data from the US banks are analyzed, and the results showed that GDP per capita and inflation significantly impact the NPLs. A study found that nonperforming loans increase when economic growth decreases [21]. NPL increases as unemployment increases because the debtor does not find enough funds to repay the loan [27]. A low inflation rate positively impacts the debtor's financial condition and the quality of loans. It means when inflation is high in the economy, the nonperforming loans will increase [1]. NPLs are viewed by many academics as financial pollution that negatively impacts social and economic growth.

Social sustainability and nonperforming loans
Developing countries face social issues like gender equality, poverty alleviation, wages and social protection, health issues and combating epidemics. Social issues increase socioeconomic risk and financial crisis [22]. Social inequality decreases the effectiveness of the banking industry as it decreases access to credit [13]. Ng et al. [43] has confirmed easy credit availability at a reasonable rate for improving the infrastructure to increase the health and education facility can increase the economic opportunities for poor people and the quality of their life. Still, credit availability can lead to an increase in bad debts. People take more and more loans from banks but still need to repay their debts. This increase in bad debt can affect social sustainability and the relationship between the SDGs and the performance of the banks [66]. Malik et al. [33] found that social inequality, an indicator of social sustainability, is negatively correlated with the NPLs.

Environmental sustainability and nonperforming loans
A limited study has been done on the relationship between bad loans (NPLs) and environmental sustainability, and the results are varied. NPLs negatively affect the banking system's efficiency and environmental sustainability [14]. In many countries, an increase in the NPL ratio resulted in a decrease in environmental footprints. For example, when Morocco's NPL increased from 5.5 to 7.8% environmental footprints reduced from 1.83 to 1.70 global hectares from 2009 to 2016. Similarly, in Nigeria, when the NPL increased from 7.2 to 12.8% from 2008 to 2106, environmental footprints reduced from 1.24 to 1.09 hectares. [58]. NPL has worsened the financial sustainability in Pakistan [53]. One study found that NPL has a negative effect on the carbon emissions of developing nations [59]. Asia Pacific region is generating electricity from coal compared to the world [50].

Therefore, it creates substantial environmental challenges on a local and global scale. A lot of investment and funding is needed to make this energy production process greener, and banks should make the funds available to the different sectors to make the world environmentally sustainable [36].

ESE index

The study utilizes three pillars of sustainability which are economic, social, and environmental indicators. Each pillar contains seven indicators, and 21 indicators have been selected from the United Nations statistical division. Only those indicators have been selected which are related to the banking industry.

Theoretical background

Nonperforming loans are negatively related to the financial performance of the banks [60]. The theories that support the impact of nonperforming loans on the financial performance of banks are the stakeholder theory, the new institutional sociology theory, the theory of adverse selection, the theory of symmetry, and the theory of moral hazard. They offer helpful information on the conventional reasons for loan default, which translates into the financial stability of the banking system. The first theory that supports the SDGs adoption is the stakeholder theory by [17]. According to the stakeholder theory, businesses should consider the interest of all stakeholders like employees, customers, society, and the environment. This theory asserts that when businesses actively interact with and address all stakeholder interests, they can establish stronger bonds, boost their reputations, and increase financial success. Companies show their dedication to sustainability and satisfy the demands of diverse stakeholders by adopting the SDGs.

Regarding sustainability practices, the new institutional sociology theory (NIS) provides clear analytical reasoning about the external factors that determine sustainable activities. According to this theory, coercive, normative, and mimetic influences are the institutional factors that drive the adoption of sustainability practices. Key stakeholders like regulatory bodies, influential service providers, and customers affect coercive influence. The social players like social activists, NGOs, and institutional financiers take the normative effect. At the same time, mimetic influence is employed when businesses replicate the best practices of a leading competitor who is deemed a role model. When the external dependency on the entities increases, firms strive harder to adopt these sustainable practices, and ultimately, banks strive to adhere to all the regulatory compliances on sustainable banking [25].

Alchian et al. [3] applied the theory of information asymmetry, which says that if the bank does not analyze the credit risk and the tendency of the borrower to pay back the loan (default risk), it will lead toward unfavorable selection and moral hazard problems making the repayments of loans difficult by the borrower. It increases the banks' nonperforming loans, negatively affecting financial performance [9]. The argument also applies to the increasing withdrawals when the customers have incomplete knowledge about the crisis hitting the banks and the kind of shocks that are likely to hit the banks [12]. According to the theory of adverse selection, the likelihood of loan default rises as interest rates rise, and the quality of borrowers declines as borrowing costs rise [35]. Banks must select creditworthy borrowers, the worst selection leads to a bad loan, which must be collected. The moral hazard theory proposed by [5] suggests that parties entering into the contract can take advantage at the other party's cost. It occurs when one party does not enter into the contract with good intentions, mostly in loan transactions. One party takes a loan from the bank and intends not to repay the loan to the bank, thus increasing the NPL ratio of banks and affecting their financial stability.

Hypothesis development

If purposeful use of the loans given by the banks is not made, people cannot return these loans to the banks, thus increasing the nonperforming loans or bad debts. An increase in nonperforming loans decreases the banks' profits [49]. The adoption of sustainability practices is related to the financial performance of the banks. Suppose the debtor is not repaying the loans to banks due to the unfavorable condition of the debtor's business. In that case, it is not affecting the debtor's financial health but also the financial health of banks. Banks need high profits to sustain and provide good profits to investors. Banks having increased nonperforming loans cannot maintain high profits. Thus, they cannot contribute enough toward sustainable development goals [32]. Sustainability practices enhance the financial performance of banks. Still, if the bank's NPL ratio is high, the adoption of SDGs and their significant impact on the financial performance of the banks will be affected, and banks will no longer sustain. Ultimately, the banks, despite adopting sustainable development goals, cannot sustain for the long term because of the negative relationship between nonperforming loans and the financial performance of the banks. Since we measure the SDGs adoption by the economic, social, and environmental indicators, a separate analysis of the moderating impact of NPL with these indicators is also the study's objective.

The main hypothesis of this research is:

H_1 Nonperforming loans significantly moderate the relationship between the adoption of SDGs and financial performance of banks.

Besides analyzing the relationship between SDGs and performance with NPL as moderating variable, a separate analysis of economic, social and environmental aspects of SDGs has also been done.

Following are the subhypothesis of economic, social and environmental indicators of SDGs.

H_{1a} Nonperforming loans significantly moderate the relationship between the economic indicators of SDGs and the financial performance of banks.

H_{1b} Nonperforming loans significantly moderate the relationship between the social indicators of SDGs and the financial performance of banks.

H_{1c} Nonperforming loans significantly moderate the relationship between the environmental indicators of SDGs and the financial performance of banks.

Data and methodology

While NPLs modify the relationship between the adoption of SDGs and financial performance, researchers have yet to research this issue. SDGs are new agenda, and moderating the impact of nonperforming loans is a new aspect of sustainability and financial performance. The population of this study is the banking industry, and the sample is the Islamic and conventional banks in the Asia Pacific region. Countries are selected based on GDP. We have selected only countries with at least one Islamic bank or any Islamic financing available. We have selected five banks from each country. Banks have been selected based on the ranking of the strongest banks given by The Asian Banker.

The choice of countries available for this analysis depends on the countries' GDP as the most vital countries likely to adopt sustainability practices. We chose the period of data from the very next year when the United Nations proposed sustainable development goals. We collected data from the annual reports of the banks from the period 2017 to 2021. The data on financial ratios are collected from the statement of financial position in the annual reports. At the same time, the disclosure of the adoption of indicators of SDGs is either present in the annual report directly or in the separate sustainability report. These indicators are related to sustainable development goals' economic, social, and environmental aspects. If the bank has

disclosed adopting a particular indicator, a score of 1 is given; otherwise, a zero score is given to that indicator.

ESE index

This study uses the ESE index as the proxy for measuring the adoption of sustainable development goals. ESE stands for economic, social, and environmental pillars of SDGs. Inter-agency and expert group on SDG indicators (IAEG-SDGs) has developed the global indicator framework, which includes 248 indicators [37]. UN developed these indicators to measure the adoption of SDGs under the United Nation's 2030 agenda. The ESE index used in this study is comprised of 21 indicators that are taken from the global indicator framework. Out of the 21 ESE index indicators, seven are related to the economic aspects of SDGs, seven are related to the social aspect of SDGs, and seven are related to the environmental aspects. The study has selected indicators that formed the ESE index based on their relatedness to the banking industry.

The disclosure frequency method calculates the ESE index value [44]. Cheung et al. [11] used a similar disclosure index method, in which a quantitative dimension is given to disclosure measures by setting the criteria of 56 indicators. [23, 30] measure business risk using the risk disclosure index, assigning a quantitative score to business risk indicators.

Banks usually disclose the adoption of sustainable development goals in their annual or sustainability reports. A textual analysis helped to identify the related texts and the frequency of the text in the annual report and sustainability reports of the banks. If the bank adopts a particular indicator mentioned in its annual or sustainability report, we assign a score of 1; otherwise, we assign a zero score to that indicator. The total ESE score is 21, the sum of the three separate economic, social, and environmental indicators.

This study's novelty lies in using this index based on SDGs indicators for SDGs measurement, which has yet to be done. The purpose of these indicators is to measure the adoption of sustainable development goals. Previously, no study has related these indicators to the banking industry. The detail of the indicators is shown in the table below.

Indicators of sustainable development goals

Economic	Score
GDP per capita	1

Economic	Score
Full and productive employment and decent work without gender in equality	1
Foreign tourist	1
Inflation rate	1
Unemployment rate	1
Local investment	1
Industry innovation and infrastructure	1
Total of Economic Disclosure	7
Social	
Adoption of wage and social protection policies	1
Gender equality	1
Poverty alleviation	1
Social work collaboration with NGOs	1
Health financing	1
Upgrade education facility	1
Alleviation of epidemics	1
Total of Social Disclosure	7
Environmental	
Access to affordable energy services	1
Renewable energy and energy efficiency	1
Clean environment	1
Waste reduction through recycling	1
Climate change and CO_2 emission	1
Education and awareness on climate change mitigation	1
Investment in energy efficiency	1
Total of Environmental Disclosure	7
Total of ESE	21

Source: Report of the Inter-Agency on Sustainable Development Goal Indicators.

Models

The major methodology used to find the moderating effect of NPL on the relationship between the SDGs and financial performance is panel data methodology. This strategy not only has more degrees of freedom but also fixes the issue with omitted variables [18]. The econometric models for this study are as follows:

$$P = \alpha + \beta_1(P)_{i,n-1} + \beta_2(\text{IT}_{\text{ESE}})_{i,n} + \beta_3(\text{CR})_{i,n} + \beta_4(\text{LEV})_{i,n} + \beta_5(\text{BS})_{i,n} + e$$

$$P = \alpha + \beta_1(P)_{i,n-1} + \beta_2(\text{IT}_{\text{eco}})_{i,n} + \beta_3(\text{CR})_{i,n} + \beta_4(\text{LEV})_{i,n} + \beta_5(\text{BS})_{i,n} + e$$

$$P = \alpha + \beta_1(P)_{i,n-1} + \beta_2(\text{IT}_{\text{soc}})_{i,n} + \beta_3(\text{CR})_{i,n} + \beta_4(\text{LEV})_{i,n} + \beta_5(\text{BS})_{i,n} + e$$

$$P = \alpha + \beta_1(P)_{i,n-1} + \beta_2(\text{IT}_{\text{env}})_{i,n} + \beta_3(\text{CR})_{i,n} + \beta_4(\text{LEV})_{i,n} + \beta_5(\text{BS})_{i,n} + e$$

whereas, P is the financial performance of banks measured by ROA and ROE and they dependent variables. $\beta_1(P)_{i,n-1}$ is the 1-year lagged value of the dependent variable. This variable is included to measure how persistent the dependent variable, i.e., profitability is inside the model. The detailed discussion of GMM estimation is given in [4]. IT is the moderator which is calculated by multiplying the ESE index and NPL ratio and it act as independent variable. CR is capital ratio; LEV is leverage ratio and BS is the bank size. These three variables are used as control variables. The detail of all the variables is given in Table 1 and in the following section.

Dependent variables

Two dependent variables have been used as a proxy for the financial performance of banks. First is ROA, return on asset, which measures the financial performance from a management perspective [46]. The second dependent variable is the return on equity which measures the

Table 1 Variables

Variable	Type	Explanation
Return on asset (ROA)	Dependent	ROA is the measure of profitability in the banks from management perspective
Return on equity (ROE)	Dependent	ROE is the measure of profitability in the banks from shareholder's perspective
ESE*NPL = IT_{ESE}	Independent	IT means interaction term
Economic indicators*NPL = IT_{eco}	Independent	IT_{eco} means interaction term for only economic indicators of sustainable development goals
Social Indicators*NPL = IT_{soc}	Independent	IT_{soc} means interaction term for only social indicators of sustainable development goals
Environmental Indicators*NPL = IT_{env}	Independent	IT_{eco} means interaction term for only environmental indicators of sustainable development goals
Capital ratio (CR)	Control	Capital Ratio is used as control variable
Leverage (LEV)	Control	Leverage is also used as control variable
Bank size (BS)	Control	Bank size is also used al control variable

IT is the interaction term that has been calculated by multiplying the ESE index and nonperforming loans. ESE index consists of economic, social and environmental indicators that gives insight in the adoption of sustainable development goals. These indicators are disclosed by the banks in their annual report or sustainability report

financial performance from the shareholder's perspective [40]. Both ROA and ROE ratios are taken directly from the banks' annual reports.

Independent and control variables

The primary independent variable is IT which is the interaction term. This interaction term is developed by multiplying the ESE score with nonperforming loans to see the moderating impact of nonperforming loans on the relationship between the adoption of sustainable development goals and the financial performance of the banks. ESE is a total index containing the three aspects of SDGs, i.e., economic, social, and environmental. A separate moderating impact of NPL on the relationship between the economic, social, and environmental indicators of SDGs and the financial performance of banks has also been made. IT_{eco} denotes the moderating impact of NPL on the relationship between the SDGs' economic indicators and the banks' financial performance. IT_{soc} denotes the moderating impact of NPL on the relationship between the SDGs' social indicators and the banks' financial performance. IT_{env} denotes the moderating impact of NPL on the relationship between the SDGs' environmental indicators and the banks' financial performance.

There are three control variables: capital ratio, leverage ratio, and Bank Size. The values of capital ratio and leverage are directly taken from the annual reports of the banks. In contrast, the value of bank size is calculated by taking the log of total assets. These variables are used as control variables in many prior studies like [48, 54].

This study has used a system GMM estimator to examine the moderating impact of nonperforming loans on the relationship between the adoption of SDGs and the financial performance of banks. This approach is better because it enables serial correlation of random errors and heterogeneity problems, which enhances estimate efficiency [4]. This study has assumed increase in sustainability practices has a positive impact on financial performance, as indicated by many previous studies, but bank not controlling their bad debts will still have decreasing financial performance even if they adopt sustainable development goals. So, this study is going to analyze the moderating impact of bad debts measured by the nonperforming loan ratio on the relationship between SDGs and financial performance in the Asia Pacific region.

Results and discussion
Descriptive statistics

Summary statistics of all the variables are given in Table 2. IT is the independent variable derived by multiplying the value of ESE index and NPL ratio. The mean value of IT which is the moderator is 25.51 and the

Table 2 Descriptive statistics

Variable	Mean	Standard deviation	Min	Max
IT	25.51	31.40	− 8	187.5
ROA	0.789	0.594	− 3.51	2.7
ROE	7.83	15.35	− 126.64	34.6
CR	13.82	6.07	− 6.5	25.2
Leverage	2.30	3.75	0.002	13.94
Bank Size	14.39	4.53	5.659	26.59

The value of IT is derived by multiplying ESE index with NPL ratio. IT is interaction term used as moderator. ROA and ROE is return on assets and return on equity, respectively, which represents bank's profitability; CR is the capital ratio; NPL is nonperforming loan ratio and Bank Size is the logarithm of total assets

standard deviation is 31.4 (including minimum value of -8 and maximum value of 187.5) indicating that ESE index and NPL ratio both have relatively good effect. Mean value of ROA and ROE shows the full employment of assets and equity.

Correlation

Table 3 represents the correlation between the variables. All correlation coefficients are less than 0.95, hence there is no need for concern regarding the variables' collinearity as explained by [61]. There some strong correlations like ROA have strong correlation with ROE, CR. ROE has strong correlation with CR. IT has more correlation with ROA as compare to the ROE.

OLS regression

Table 4 represents the results of main model which shows the moderating impact of NPL on the relationship between the adoption of SDGs and the financial performance of banks. The overall model is well fitted and the model is over all significant. The regression analysis showed that NPL significantly moderates impact the overall three dimensions (economic, social and environmental) of sustainable development goals and the financial performance of the banks. The moderating impact is significant for both ROA and ROE which are the proxies for calculating the financial performance of banks. The separate analysis of the indicators is however insignificant.

Table 5 shows the regression analysis of separate economic indicators and results show that economic indicators alone have insignificant moderating impact on the relationship between SDGs and financial performance.

Table 6 shows the regression analysis of separate social indicators and results show that social indicators alone

Table 3 Correlation table

	ROA	ROE	IT	CR	Bank Size	Leverage
ROA	1.0000					
ROE	0.7125	1.0000				
IT	0.2411	0.0.1952	1.0000			
CR	0.5305	0.4830	0.2739	1.0000		
Bank Size	0.1717	0.1503	0.0926	0.2036	1.0000	
Leverage	0.0722	0.0913	0.3008	0.0372	0.0729	1.0000

Table 4 Effect of IT (NPL*ESE) on the profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
IT	− 0.0017*	0.023
CR	0.048***	1.155***
Bank Size	0.008	0.164
Leverage	0.003	0.229
No of Obs	200	200
Prob > F	0.0000	0.0000
R-squared	0.2955	0.2429
F (4, 195)	20.44	15.64

*Correlation is significant at 0.1 level

***Correlation is significant at 0.01 level

Table 5 Effect of ITeco (economic indicators) on the profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
ITeco	− 0.000	− 0.024
CR	0.049***	1.202***
Bank Size	0.008	0.17
Leverage	0.007	0.298
No of Obs	200	200
Prob > F	0.0000	0.0000
R-squared	0.2955	0.2429
F (4, 195)	19.74	15.51

*Correlation is significant at 0.1 level

***Correlation is significant at 0.01 level

Table 6 Effect of ITsoc (social indicators) on the profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
ITsoc	− 0.000	− .041
CR	0.05***	1.222***
Bank Size	0.008	0.175
Leverage	0.008	0.321
No of Obs	200	200
Prob > F	0.0000	0.0000
R-squared	0.2881	0.2428
F (4, 195)	19.73	15.63

*Correlation is significant at 0.1 level

***Correlation is significant at 0.01 level

Table 7 Effect of ITenv (environmental indicators) on the profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
ITenv	− 0.002	− 0.047
CR	0.048***	1.224***
Bank Size	0.008	0.185
Leverage	0.007	0.300
No of Obs	200	200
Prob > F	0.0000	0.0000
R-squared	0.2872	0.2428
F (3, 196)	26.33	20.30

***Correlation is significant at 0.01 level

have insignificant moderating impact on the relationship between SDGs and financial performance.

Table 7 shows the regression analysis of separate environmental indicators and results show that environmental indicators alone have insignificant moderating impact on the relationship between SDGs and financial performance. It means that one pillars of Sustainable development goals is not sufficient, rather banks should focus on all the aspects of SDGs which are economic, social and environmental and they measured by ESE index in this

study. Regression analysis shows the overall fitness of model but due to the presence of multicollinearity and endogeneity problem more advanced GMM techniques has been used to analyze the models.

GMM

Two techniques have been used in this study one is OLS regression to see the fitness of model and the significance of model. But simple regression do not solve the problem of endogeneity and the omitted variable problem [38]. In order to cater this problem Generalized method of moments (GMM) has been used. Two step system GMM has been used analyze the models as two step GMM.

Table 8 represents the impact of nonperforming loan on the relationship between adoption of SDGs and the financial performance of the banks. Based on our first hypothesis if the nonperforming loans of the banks are high and they are unable to collect their loans back from the customers, it will have the negative impact on the financial performance of the banks even if the banks are adopting the sustainable development goals. Financial performance was measured by two proxies which are return on assets and return on equity. The results show that NPL has negative and significant moderating impact on the relationship between SDGs and the Return on assets, which accepts our main hypothesis. In many studies it is proved that sustainability practices increase the profits of banks [28]. But if the banks' credit quality is low, then profits cannot be increased. However, the moderating impact of NPL on the relationship between the adoption of SDGs and the return on equity

is insignificant. Return on assets and return on equity are two proxies used to evaluate financial success. The findings support our main hypothesis by demonstrating that NPL has a negative and significant moderating impact on the relation between the SDGs and return on assets. Sustainability practices enhance bank earnings, according to numerous research as supported by the previous studies [8, 20, 39]. However the NPL do no moderates the relationship between the SDGs and Return on Equity which is also supported by some of the previous studies like [52]. AR2 value confirms that there is no second order correlation. Sargan test shows instruments are exogenous and the value shows does not reject the null hypothesis.

Table 9 shows a separate analysis of the moderating impact of NPL on the relationship between economic indicators and return on asset and return on equity showed that NPL negatively and significantly moderates the relationship between the adoption of economic indicators of SDGs and return on asset but insignificant in impacting the relationship between the economic indicators of SDGs and return on equity as supported by the previous studies like [10].

Table 10 shows separate analysis of social indicators of SDGs showed that NPL significantly and negatively impacts the relationship between the social indicators of SDGs and return on asset but insignificant in moderating the relationship between social indicators of SDGs and return on equity. Previous studies have also shown that social responsibility would have a short-term detrimental effect on bank financial performance. Long term, nonetheless, this partnership proves to be fruitful [65].

Table 11 represents the analysis of environmental indicators showed that NPL significantly and

Table 8 Moderating Effect of NPL on the relationship between SDGS and profitability of banks Two Step System GMM

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
Lag (ROA/ROE)	− 0.04	0.837***
IT (moderator)	− 0.289*	0.174
CR	1.08*	− 0.163
Leverage	1.133	0.003
Bank Size	− 2.208	1.338
Prob > chi2		
No of obs	200	
No of instruments	26	
No of banks	40	
Sargan test (*p*-value)	0.2	0.211
Arellano−Bond test AR (2) (*p*-value	0.422	0.124

***Correlation is significant at 0.01 level

*Correlation is significant at 0.1 level

Table 9 Moderating Effect of NPL on the relationship between economic indicators of SGDs and profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
Lag (ROA/ROE)	− 0.1733	0.78
ITeco	− 0.183*	0.118
CR	0.774	0.206
Leverage	0.575	− 0.18
Bank size	− 0.323	− 0.785
No of obs	200	
No of instruments	26	
No of banks	40	
Sargan test	0.22	0.011
Arellano−Bond test AR (2)	0.868	0.135

* Correlation is significant at 0.1 level

Table 10 Moderating Effect of NPL on the relationship between social indicators of SDGs and profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
Lag (ROA/ROE)	−0.139	0.841**
ITsoc	−.262**	0.141
CR	1.206**	−0.134
Leverage	1.052	−0.078
Bank Size	−2.08	1.194
No of obs	200	
No of Instruments	26	
No of Banks	40	
Sargan Test	0.99	0.071
Arellano–Bond test AR (2)	0.427	0.202

****Correlation is significant at 0.05 level

Table 11 Moderating Effect of NPL on the relationship between environmental indicators of SDGs and profitability of banks

Variables	ROA as dependent variable	ROE as dependent variable
	Coefficients	Coefficients
Lag (ROA/ROE)	−0.141	0.925***
ITenv	−0.274***	0.086
CR	1.26**	−0.189
Leverage	0.696	−0.04
Bank Size	−1.714	1.657
No of obs	200	
No of Instruments	26	
No of Banks	40	
Sargan Test	0.919	0.057
Arellano–Bond test AR (2)	0.34	0.108

****Correlation is significant at 0.05 level

***Correlation is significant at 0.01 level

negatively moderates the relationship between the environmental indicators of SDGs and return on assets but is insignificant in impacting the relationship between the environmental indicators and return on equity. Thus, the subhypotheses have been accepted in relevance to return on assets while rejected in relevance to return on equity.

Banks should decrease their bad loans to achieve sustainable development goals. Low-quality loans (high NPL) will achieve SDGs adversely. Because the economy is struggling, businesses are operating slowly, and the community cannot repay the bank loan, thus increasing the NPL. Therefore, this impacts the relationship between the sustainable development goals and the financial performance of the banks. Previous studies have supported these results like [19], as they proved that if a bank's credit quality is high, businesses growing and returning their loans to the banks can stimulate the adoption of sustainable development goals. Poor financing quality erodes the interpretation that sustainability practices lead to the increased financial profits that have been proved in our analysis.

This research also strives to change the perspective of the entity's operations. An entity should not only make focus on the economic benefits but also focus on the social and environmental performance. Banks should forgo the materialistic benefits to a certain extent to remain sustainable in the long run. This is what United Nations has proposed in the sustainable development goals agenda. Previous studies focusing on sustainable development goals used ESG (economic, social and governance) data to measure SDGs using data from the databases like Thomson Reuters [6]. In this study, SDGs are measured by the ESE index that has been constructed using the indicators of SDGs published by the statistical decision of the United Nations. The ESE index has been constructed using the disclosure frequency method.

Implications for the managers, investors and other stakeholders are that they must consider the economic, social and environmental pillars of sustainable development goals as the major sustainable tool to practice in their operations. Practitioners are also informed through this research about the noble cause of the banking industry. Last, organizations can achieve sustainable development goals if the business goals and patterns have focused on the social and environmental pillars and the economic pillars of sustainable development goals. The government must reformulate the orientation of the banks toward the real noble cause of why the banks were formulated. Sustainability has become a requirement of all businesses, including banks. Banks must incorporate sustainability practices into their operation, and the check and balances and positive after-effects of adopting sustainable development goals must be measured deeply.

Conclusion

This study looked into using the two proxies of financial performance, i.e., return on assets and equity. In the first hypothesis, the moderating impact of NPL on the relationship between the sustainable development goals and the financial performance of the banks. In this model, we have used three indicators of SDGs, including the economic, social and environmental indicators and saw their impact on Return on assets and equity. Based on our findings results are significant with Return on an asset but insignificant with Return on equity. It should be noted that rest of the three hypotheses analyzed the

moderating impact of NPL with economic, social and environmental indicators separately. As a result, separate analysis showed that NPL significantly moderates the relationship of economic, social and environmental indicators with Return on the asset while insignificant with the return on equity.

In conclusion, as long as the financing is of high quality and aligns with the bank's objectives, the bank can support SDGs and achieve the United Nations 2030 agenda. However, internal bank returns are significantly related to the adoption of SDGs, but investors should also pay attention to the sustainability practices of the banks while making investment decisions as it is collaborative effort between bank and shareholders.

Declarations

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