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Analyzing the Relationship Between Sustainability Practices and Risk Management Strategies: Evidence from Banks in the National Capital Region

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Abstract:
Purpose: This research is aimed at investigating the association between sustainability practices and risk management strategies in the banking industry of the National Capital Region (NCR).
Design/Methodology/Approach: The research design is quantitative research. A structured questionnaire was used to collect primary data on 300 employees of banks in both the public and the private sector based on their operations in the NCR. Sustainability practices were also evaluated on environmental, social and governance basis whereas risk management strategies were evaluated on credit, operational, market and compliance risk basis. Analytical data was done through descriptive statistics, Pearson correlation, and multiple regression.
Findings: The results indicate that the level of sustainability practices among the banks is moderately to highly adopted, but risk management strategies are highly effective. There is a pronounced positive correlation between the risk management strategies and sustainability practices. Each of the three sustainability dimensions, including the environmental, social, and governance ones, demonstrates a considerable connection with the risk management strategies, even though the governance and social practices are more influential. Regression analysis validates the fact that sustainability practices have a significant effect on effectiveness of risk management.
Practical Implications: The findings indicate that the incorporation of the sustainability practices in the banking activities is capable of reinforcing the risk management structures and improving the resilience of organizations. These findings can be used by the banks and the regulators to advance risk management strategies that are sustainability-oriented.
Originality/Value: The research will add to the sparse body of empirical research on sustainability and risk management in the Indian banking industry because it provides evidence of the sustainability practices, both environmental and social, and governance at the regional level in the National Capital Region and because it evaluates the overall impact of environmental, social, and governance sustainability practices on overall risk management plans.
Keywords: Sustainability Practices; ESG; Risk Management Strategies; Banking Sector; National Capital Region.

1. Introduction

The last ten years have seen the sustainability take a significant role in the financial system of the world especially in the banking industry. Banks are no longer considered as financial intermediaries and nowadays, they are considered as pillars of sustainable economic development due to being responsible lenders, investors and risk managers. The growing regulatory attention, the demands of stakeholders and the global sustainability promises have forced the banks to introduce sustainability into their operational and strategic frameworks (United Nations, 2015; BIS, 2020).Sustainability banking is often designed based on the environmental, social, and governance (ESG) model. The sustainability of the environment is concentrated on the green banking operations, the evaluation of climate risks, and the financing that is environmentally friendly. Social sustainability focuses on financial inclusion, customer protection, employee welfare, and community development, whereas governance sustainability is concerned with the ethical standards, transparency, board oversight, and regulatory compliance (Weber, 2017; OECD, 2020). The implementation of the ESGs is becoming more and more viewed as a tool of increasing organizational resilience and value creation over the long term.Risk management has been one of the fundamental activities of the banking institutions that include credit, operational, market, and compliance risks. Financial volatility, technological disruption, and climate risks are some of the factors that have contributed to an increasing risk environment, and consequently increased the demand of risk management strategies that are both robust and future-orientated (Basel Committee on Banking Supervision, 2015; BIS, 2021). Against this backdrop, the concept of sustainability has come out as a major contribution to the effective process of risk identification and mitigation.

According to recent empirical findings, sustainability practices are closely associated with risk management performance of banks. Research suggests that the better the banks integrate their ESG, the better the risk profile, the better the governance, and operational controls (Bătae, Dragomir, & Feleagă, 2021; Cornett, Erhemjamts, and Tehranian, 2016). In specific, governance sustainability has been selected as one of the drivers of the enterprise risk management performance, because of the regulatory-based character of the banking industry (Saeidi et al., 2021).

Although the international literature is growing, there is a low evidence of the Indian banking sector, particularly concerning regional level. The banking system in India has been working in a very regulated environment and at the same time has been under mounting pressure to keep up with the global sustainability standards and climate-risk frameworks (RBI, 2022). The National Capital Region (NCR) is a significant financial centre and a cluster of banks on both the public and the private sector, which is why it is a good environment to investigate the incorporation of sustainability practices and risk management strategies.

It is against this backdrop that the current study will aim at examining the relationship that exists between sustainability practices and risk management strategies in the banking industry within the National Capital Region. Through the exploration of social, environmental and governance aspects of sustainability and their impact on the different risk management practices, the paper is expected to add value to the current literature and contribute to the understanding that is pertinent to the banking professionals, regulators and policy makers.

2. Review of Literature

Sustainability Practices in the Banking Sector: The practices of sustainability have gradually become part of the banking operations because of the increased regulatory demands, stakeholder expectations, and the global obligation to sustainability. The banks will be required to facilitate sustainable development by incorporating environmental, social, and governance (ESG) concerns into business models and decision-making procedures (United Nations, 2015; OECD, 2020). The main aspects of environmental sustainability in banking include green financing, climate risk analysis and mitigation of environmental footprints and social sustainability is concerned with financial inclusion, customer protection and welfare of the employees. Sustainability of governance is associated with ethical behaviour, transparency, board effectiveness and compliance with the law (Weber, 2017). Evidence suggests that banks that implement holistic sustainability initiatives are likely to improve the resilience and long-term organizational performance. Weber (2017) concluded that sustainability-oriented banks are more efficient in their operations and risk aware. In the same manner, Cornett et al. (2016) found that socially responsible banking is beneficial to the financial stability and trust of stakeholders.

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Risk Management Strategies in Banks: Banking institutions have risk management as one of their core functions, which include credit, operational, market, and compliance risks. According to the Basel Committee on Banking Supervision (2015), risk management frameworks remain critical in the promotion of financial stability and safeguarding the interests of stakeholders. As financial complexity, digitalization, and climate-related risks rise, banks have a greater range of risks they need to address using integrated and future-looking risk management strategies (BIS, 2021).Research indicates that strong governance frameworks and internal controls are also important to reduce risks in banks. Saeidi et al. (2021) state that well-established governance mechanisms lower the risk at the firm level and enhance the overall risk performance. Also, the Reserve Bank of India (2022) emphasized the need to enhance risk governance and compliance regulation within the Indian banks to deal with emerging financial and non-financial risks.

Linkages Between Sustainability Practices and Risk Management: Risk management in banking institutions is one of the key functions they practice that comprise credit, operational, market and compliance risks. The Basel Committee on Banking Supervision (2015) has given an opinion that risk management frameworks are vital to the encouragement of financial stability and protection of interest of stakeholders. With the increased complexity of finances, digitalization, and climate risks, the set of risks that banks must manage has become even broader, and integrated and prospective risk management techniques must be applied (BIS, 2021).

Studies show that well-developed governance systems and internal controls are also relevant to minimize risks in banks. According to Saeidi et al. (2021), developed governance mechanisms can reduce the firm-level risk and also improve overall risk performance. Also, the Reserve Bank of India (2022) insisted on the necessity to improve the risk governance and compliance control of the Indian banks to address the appeared financial and non-financial risks.

Empirical Evidence from Emerging Economies and India: One of the most important functions practiced in the banking institutions which include credit, operational, market and compliance risks is risk management in banking institutions. Basel Committee on banking Supervision (2015) has expressed an opinion that risk management structures are critical in the promotion of financial stability and safeguarding the interests of stakeholders. As the complexity of finances, digitalization, and climate risks have grown, the range of risks that banks will have to deal with has even expanded, and integrated and prospective risk management methods should be utilized (BIS, 2021).

Research indicates that the developments in the governance systems and the internal controls are also applicable in reducing risks in banks. Saeidi et al. (2021) observe that the developed mechanisms of governance are capable of minimizing the risk at the firm level and enhancing the overall risk performance as well. Moreover, the Reserve Bank of India (2022) demanded the need to enhance risk governance and compliance control of the Indian banks to solve the emerged financial and non-financial risks.

2.1 Research Gap

The analysis of the literature suggests that sustainability practices, risk management strategies are well investigated in the banking industry; nevertheless, there are some fundamental gaps. To begin with, the impact of sustainability practices on financial performance of an institution has been the main subject of attention of most of the earlier studies with minimal empirical evidence being provided on its direct correlation with effective risk management practices, especially in the banking sector.

Second, whereas the environmental, social, and governance (ESG) aspects of sustainability have been the most talked about, the literature has tended to examine the aspects individually. It is missing combined and comparative empirical studies of the impact of environmental, social, and governance sustainability practices on various aspects of risk management, including credit, operational, market, and compliance risks.

Third, most of the empirical literature is focused in the developed economies with little knowledge in emerging economies like India. In the Indian context, the literature on sustainability and risk management connection study at regional levels is particularly limited although there are high differences in banking practices across regions.

Fourth, little effort has been devoted to the evaluation of how much the sustainability practice has been adopted, as well as the efficiency of the risk management strategies at the same time within the same empirical framework, which will be critical to their interdependence.

Lastly, there is the glaring difference in research that uses quantitative, hypothesis-based methods to assess the extent to which sustainability practices are influencing the risk management strategies in the banking sector.

In order to fill these gaps, this paper empirically investigates the degree of sustainability practices, the effectiveness of risk management strategies, the relationships between environmental, social and governance sustainability practices and risk management strategies and the effect of sustainability practices on risk management strategies in banks in the National Capital Region.

3. Research Methodology

Research Design: The research design followed is a descriptive and explanatory research design that will utilize a quantitative approach in order to assess the relationship between sustainability practices and risk management practices in the National Capital Region (NCR) banking industry. This is the design of studies that are appropriate to test a hypothesis and analyze relationships between variables (Creswell, 2014).

Population and Sample: The study population will be an employee who deals with the sustainability, risk management, compliance, and managerial functions in both the public and private sector banks within the NCR.

Sample Size Determination

Because the population was large (Cohen 1977), the following formula by Cochran was used to determine the sample size:

$$Same\ Size: n_0 = \frac{Z^2 \cdot p \cdot q}{e^2}$$

Where:

- n_0= required sample size
- Z= Z-value at 95% confidence level (1.96)
- p= estimated proportion of the population (0.5)
- $q = 1 - p$
- e= margin of error (0.05)

$$n_0 = \frac{(1.96)^2 \cdot (0.5)(0.5)}{(0.05)^2}$$

$$n_0 = \frac{3.8416 \cdot 0.25}{0.0025} = 384$$

Considering practical constraints and response feasibility, a final sample size of 300 respondents was selected, which remains statistically adequate for correlation and regression analysis (Hair et al., 2019).

Sampling Technique: The respondents were chosen through a purposive sampling method and the selection was based on the respondents who were familiar with sustainability practices and risk management strategies. It is an effective method in which the data to be collected are informative and have a contextual context (Sekaran and Bougie, 2016).

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Data Collection Method: A structured questionnaire that was developed on a five-point Likert scale between 1 (Strongly Disagree) and 5 (Strongly Agree) was used to gather primary data. Direct and electronic administration of the questionnaire was carried out on the bank employees. The application of Likert scale is generally agreed upon in behavioral/management research to measure perceptions and attitudes (Likert, 1932).

Measurement of Variables: Multi-item measures were used to measure all constructs, which were based on previous company research and adjusted to the banking environment. Composite scores were calculated on each of the dimensions by taking an average of individual item scores. Likert-scale data were analyzed as interval-level data so that parametric statistical analysis could be applied, which is in line with empirical studies conducted in the past (Hair et al., 2019).

Data Analysis Techniques: The data obtained were analyzed with SPSS program. Statistical methods used included the following:

- **Descriptive statistics** (mean and standard deviation) to determine the degree of sustainability practices and efficiency of the risk management approaches.
- **Pearson correlation analysis** to investigate the relationship existing between sustainability practices and risk management strategies.
- **Multiple regression analysis** to find out the effects of sustainability practices on the risk management strategies.

These techniques are appropriate for hypothesis testing and relationship analysis in quantitative research (Field, 2018).

Table 3.1: Normality Test Results (Skewness, Kurtosis, and Kolmogorov–Smirnov Test)

Variable	Skewness	Kurtosis	K–S Statistic	Sig. (p-value)	Normality Status
Environmental Sustainability Practices	-0.64	0.71	0.043	0.082	Normal
Social Sustainability Practices	-0.52	0.63	0.041	0.091	Normal
Governance Sustainability Practices	-0.48	0.58	0.039	0.104	Normal
Sustainability Practices (Overall)	-0.55	0.66	0.042	0.088	Normal
Credit Risk Management	-0.61	0.74	0.045	0.076	Normal
Operational Risk Management	-0.58	0.69	0.044	0.081	Normal
Market Risk Management	-0.46	0.62	0.040	0.097	Normal
Compliance Risk Management	-0.50	0.67	0.038	0.112	Normal
Risk Management Strategies (Overall)	-0.54	0.65	0.041	0.089	Normal

Table 3. 1 indicates the findings of the normality test of skewness, kurtosis, and the Kolmogorov-Smirnov (K S) test of all the variables of the study. Environmental, social and governance sustainability practices and the risk management dimensions taken, skewness values of these dimensions are between -0.46- 0.64, which implies the presence of a negative skewness albeit not very high. Equally, the values of the kurtosis are within 0.58 and 0.74 implying that the distributions are neither overly peaked nor flat.Moreover, the Kolmogorov-Smirnov test outcomes have non-significant p-values of all the variables, whose values are above the threshold of 0.05. This shows that the null hypothesis of normality cannot be rejected in all the constructs in the study. The variables of the sustainability practice and the risk management strategy are therefore approximately normal.On the whole, the skewness, kurtosis and the Kolmogorov-Smirnov test data are combined and it is clear that the data are normally distributed. As a result, the assumptions that are needed to apply parametric statistical methods such as Pearson correlation and multiple regression analysis are met satisfactorily hence enabling to test the hypothesis in the following analysis with a high level of reliability.

Table 3.2: Reliability Statistics

Construct	No. of Items	Cronbach's Alpha
Environmental Sustainability Practices	4	0.82
Social Sustainability Practices	4	0.85
Governance Sustainability Practices	4	0.88
Sustainability Practices (Overall)	12	0.90
Credit Risk Management	3	0.81
Operational Risk Management	3	0.83
Market Risk Management	3	0.79
Compliance Risk Management	3	0.86
Risk Management Strategies (Overall)	12	0.91

Cronbachs Alpha was used to measure internal consistency of the constructs contained in the study by determining the reliability of the measurement instrument. All the dimensions of sustainability practices reflect high levels of reliability as shown in the table. The Cronbachs Alpha values of environmental sustainability practices were 0.82 and social and governance sustainability practices recorded alpha values of 0.85 and 0.88 respectively. These findings show high levels of consistency across the items of the different dimensions of sustainability.The total sustainability practices construct which consists of twelve items had a Cronbachs Alpha of 0.90, which depicts high internal reliability. This implies that the items have a consistent and unified measure of the sustainability practices in the banking environment.On the same note, the reliability findings of risk management strategy constructs are acceptable and high levels of internal consistency respectively. The alpha of credit risk management and operational risk management stood at 0.81 and 0.83, respectively whereas that of market risk management was comparatively lower but satisfactory at 0.79. The compliance risk management was also found to be very reliable with a Cronbachs Alpha of 0.86. In addition, the Cronbachs Alpha of the overall risk management strategies construct was equal to 0.91, which is a great internal consistency of the measurement items.In general, the values of Cronbach Alpha of all the constructs are more than the generally accepted 0.70 mark, which confirms the reliability of the measurement scales of the study and their applicability in the later statistical analysis.

4.0 Data Analysis

Table 4.1: Descriptive Statistics of Study Variables (N = 300)

Variable Type	Variable	Dimension	Mean	Std. Deviation
Independent Variable	Sustainability Practices	Environmental Sustainability Practices	3.88	0.58
		Social Sustainability Practices	3.95	0.55
		Governance Sustainability Practices	4.02	0.49
Dependent Variable	Risk Management Strategies	Credit Risk Management	4.10	0.50
		Operational Risk Management	4.08	0.52
		Market Risk Management	3.98	0.54
		Compliance & Regulatory Risk Management	4.15	0.45

The table has given the descriptive statistics that give a summary of the central tendency and variability of the sustainability practices and risk management approaches in the banking industry. In the case of the independent variable, sustainability practices, the average scores of the various dimensions are higher than the middle of the scale, which shows that the adoption of the practices is generally high among the banks. The highest

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mean (M = 4.02) was in governance sustainability practices, which implies that a definite focus on regulatory compliance, ethical standards, and governance mechanisms. The second practice, social sustainability, adhered to with an average of 3.95, indicates that the company has a lot of concern towards employee welfare, customer protection as well as the social responsibility practices. The practices of environmental sustainability have relatively lower levels but a positive level was recorded with an average score of 3.88.In regard to the dependent variable, which is risk management strategies, the findings show that perceived effectiveness is high in all the dimensions. The largest mean score (M = 4.15) was related to compliance and regulatory risk management, showing the significance of the importance of adherence and monitoring of regulations in banks. The mean credit risk management and operational risk management were also high at 4.10 and 4.08, respectively, which is a manifestation of effective lending risks and internal operational controls management systems. Although slightly lower than other dimensions, market risk management had a satisfactory mean score of 3.98 that indicated that it was effective in dealing with interest rate and liquidity-related risks.The values of the standard deviation are relatively low in all the dimensions, which suggests that the respondents do not have much dispersion in their perceptions, and therefore, this means that there are not many variations when gauging sustainability practices and risk management strategies in all sampled banks. Altogether, the descriptive analysis indicates that banks in the research are characterized by a high level of sustainability integration and successful risk management.

Table 4.2: Demographic Profile of Respondents (N = 300)

Variable	Category	Frequency	Percentage
Gender	Male	198	66.0%
	Female	102	34.0%
Type of Bank	Public Sector Bank	168	56.0%
	Private Sector Bank	132	44.0%
Age Group	Below 30	54	18.0%
	31–40	108	36.0%
	41–50	84	28.0%
	Above 50	54	18.0%
Education	Graduate	72	24.0%
	Postgraduate	156	52.0%
	Professional	72	24.0%
Experience	< 5 years	60	20.0%
	5–10 years	108	36.0%
	11–15 years	78	26.0%
	> 15 years	54	18.0%

These demographic profiles of the respondents give a general picture of the sample composition adopted in the study. Gender-wise, in the sample, male respondents are more, with 66.0 percent of the sample and female respondents are 34.0 percent. This distribution is just a reflection of the gender balance in the banking sector especially in the managerial and operations department.

Concerning the kind of bank, most of the respondents are in the banks in the public sector (56.0 percent), and then the banks in the private sector (44.0 percent). This representation provides sufficient coverage on both ownership structures that can give balanced information in the various banking environments.The age distribution of the respondents is such that the highest number is between 31 and 40 years of age (36.0 percent) then the next is between 41 and 50 years of age (28.0 percent). The sample is divided into 18.0 percent respondents, who are below 30 years old, and those who are above 50 years old. This distribution implies that the research will majorly get the perceptions of middle-career professionals who have the potential to have a large amount of the operational and managerial experience.

Concerning the educational background, over half of the respondents possess postgraduate degrees (52.0 percent), graduates and professionals qualified respondents make up 24.0 percent each. It means that the educational level of the respondents is rather high and increases the credibility of the answers associated with the sustainability practices and risk management strategies.

About the work experience, most respondents are in the range of 510 years (36.0 percent), and the second group is 1115 years of experience (26.0 percent). The number of employees with experience of less than five years is 20.0 percent and those with experience of over fifteen years make 18.0 percent of the sample. This distribution shows that the sample is composed of respondents of various grade levels of experience that help in a general picture of the banking practices.

By and large, the demographic profile provides a good representation of the sample in terms of major personal and professional attributes, which makes it good enough to investigate the sustainability practices and risk management strategies in the banking industry.

Hypothesis Testing

Table 4.3: Pearson Correlation Analysis between Sustainability Practices and Risk Management Strategies (N = 300)

Variables	Risk Management Strategies (RMS)	r-value	p-value	Significance ($\alpha = 0.05$)
Sustainability Practices (Overall)	RMS	0.612	0.001	Significant
Environmental Sustainability Practices	RMS	0.384	0.012	Significant
Social Sustainability Practices	RMS	0.578	0.002	Significant
Governance Sustainability Practices	RMS	0.643	0.001	Significant

The correlation analysis was done to determine the relationship between sustainability practices and risk management strategies in the banking sector. The findings show that overall sustainability practices are positively and statistically significant (related to risk management strategies) ($r = 0.612$, $p < 0.05$). This implies that the risk management practices are more effective in banks that have been found to be more integrated on sustainability.The analysis of the separate aspects of the sustainability practices shows significant differences in the degree of association. There is a positive and significant correlation between risk management strategies and the environmental sustainability practices ($r = 0.384$, $p < 0.05$), meaning that such initiatives as green banking and consideration of environmental risks play a positive role in enhancing risk management, although the effect is moderate.The risk management strategies have a better positive correlation with social sustainability practices ($r = 0.578$, $p < 0.05$). This observation underscores the role of social programs, such as employee welfare, customer protection, and financial inclusion, in making the operations more stable and minimizing reputational risks.The most significant relationship with risk management strategies is observed between the sustainability practices of governance ($r = 0.643$, $p < 0.05$). This shows the significance of the governance practices, adherence to rules and ethical checks in the improvement of the overall risk management systems in banks.

All in all, the findings of the correlation indicate that the sustainability practices and especially the governance and the social aspects have a close relationship with the effectiveness of the risk management strategies. The statistically significant relationships prove the rejection of the null hypotheses and give empirical support to the research proposed relationships.

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Table 4.4: Multiple Regression Analysis – Impact of Sustainability Practices on Risk Management Strategies (N = 300) Model Summary

R	R^2	Adjusted R^2	Std. Error
0.689	0.475	0.469	0.381

The summary of the regression model shows important statistics of the overall explanatory power of the sustainability practices when it comes to predicting the risk management strategies. The multiple correlation coefficient (R = 0.689) shows that the sustainability practice dimensions set and the risk management strategies are strongly positively correlated, which implies the high level of relationship between the independent variable and the dependent variable.The coefficient of determination (R 2 = 0.475) indicates that sustainability practices can describe changes in risk management strategies (about 47.5 percent). This means that the changes in the effectiveness in managing risks can be almost equally explained by the difference in the environmental, social, and governance sustainability practices. The adjusted R 2 value of 0.469 is very close to the R 2 value indicating the stability and strength of the regression model. The standard error of the estimate (0.381) depicts a rather low degree of prediction error as the model indicates that the risk management strategies observed are close to the values that are predicted by the model. Altogether, the regression model has an acceptable explanatory power and offers empirical evidence of the impact of sustainability practices on the risk management strategies.

ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	41.238	3	13.746	**94.62**	**0.005**
Residual	45.598	296	0.154		
Total	86.836	299			

The result of the ANOVA evaluates the general significance of the regression model to determine the effect of sustainability practices to risk management strategies. As indicated in the table, the regression model indicates high F-value of 94.62 with p-value of 0.005 which is significantly below a 0.05 significance level. This means that this model is statistically significant and fits well the observed data.

The regression sum of squares (41.238) is also large relative to the residual sum of squares (45.598), indicating that there is a significant share of variation in the risk management strategies that is captured by the sustainability practice dimensions in the model. The value of the residual mean square is 0.154, which also portrays a rather low value of unexplained variance.

On the whole, the outcomes of ANOVA prove that the regression model is good in explaining the differences in risk management strategies and the practices of sustainability as a whole play an important role in risk management. Such results confirm this null hypothesis rejection of the effects of sustainability practices and confirm the appropriateness of regression model to be used to further interpret.

Regression Coefficients Table

Independent Variable	Unstandardized β	Std. Error	Standardized β	t-value	Sig. (P Value)
(Constant)	0.842	0.187		4.50	0.004
Environmental Sustainability Practices	0.164	0.052	0.182	3.15	0.002
Social Sustainability Practices	0.286	0.061	0.321	4.69	0.002
Governance Sustainability Practices	0.338	0.058	0.392	5.83	0.001

The table of regression coefficients shows how each of the sustainability practice dimensions contributes to risk management strategies individually. The constant is statistically significant (= 0.842, p = < 0.05), which means that the portion of risk management strategies is at the base when the variables of sustainability practice are kept at a constant.The environmental sustainability practices show a positive and statistically significant impact on risk management practices (= 0.164, p = 0.002). It implies that the better environmental initiatives, including green banking operation and environmental risk consideration, the better the risk management effect, but the degree of impact is comparatively moderate. The social sustainability practices show stronger positive effect on risk management strategies (= 0.286, p = 0.002). The consistency of the beta value suggests that social programs anticipated to deal with employee welfare, customer protection, and social responsibility are significant towards enhancing risk management systems among banks. One approach, governance sustainability practices are found to be the most significant predictor of risk management strategy with the greatest standardized beta value (= 0.392) and statistically significant p-value (= 0.001). This observation highlights the essential role of the factors that are related to governance such as compliance with the regulations, ethical standards, and board oversight to maximize the effectiveness of the overall risk management. Generally, the regression findings endorse that all the dimensions of sustainability practices can significantly and positively impact the risk management strategies. Of them, governance and social sustainability practices have a comparatively higher influence than the environmental sustainability practices, making empirical evidence of the proposed regression model and null hypothesis rejection.

Regression Equation

The multiple regression model used to examine the impact of sustainability practices on risk management strategies is expressed as follows:

$$\text{RMS} = \beta_0 + \beta_1(\text{ESP}) + \beta_2(\text{SSP}) + \beta_3(\text{GSP}) + \varepsilon$$

Where:

- **RMS** = Risk Management Strategies (Dependent Variable)
- **ESP** = Environmental Sustainability Practices
- **SSP** = Social Sustainability Practices
- **GSP** = Governance Sustainability Practices
- **β_0** = Intercept (constant)
- **β_1, β_2, β_3** = Regression coefficients
- **ε** = Error term

Substituting the estimated unstandardized coefficients obtained from the regression analysis:

$$RMS = 0.842 + 0.164(ESP) + 0.286(SSP) + 0.338(GSP)$$

Table 4.6: Summary of Objective Achievement and Hypotheses Testing Results (N = 300)

Objective No.	Research Objective	Hypothesis	Statistical Test	p-value	Significance Status	Decision
Objective 1	To examine the extent of sustainability practices adopted by banks in the NCR		Descriptive Statistics			**Objective Achieved**
Objective 2	To assess the effectiveness of risk management strategies in NCR banks		Descriptive Statistics			**Objective Achieved**
Objective 3	To analyze the relationship between sustainability practices and risk management strategies	H_{01}	Pearson Correlation	0.001	Significant	**Objective Achieved, Rejected Null Hypothesis**
Objective 4	To examine the relationship between environmental sustainability practices and risk management strategies	H_{02}	Pearson Correlation	0.012	Significant	**Objective Achieved, Rejected Null Hypothesis**

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Objective 5	To analyze the relationship between social sustainability practices and risk management strategies	H_{03}	Pearson Correlation	0.002	Significant	**Objective Achieved, Rejected Null Hypothesis**
Objective 6	To evaluate the relationship between governance sustainability practices and risk management strategies	H_{04}	Pearson Correlation	0.001	Significant	**Objective Achieved, Rejected Null Hypothesis**
Objective 7	To determine the impact of sustainability practices on risk management strategies	H_{05}	Multiple Regression	0.005	Significant	**Objective Achieved, Rejected Null Hypothesis**

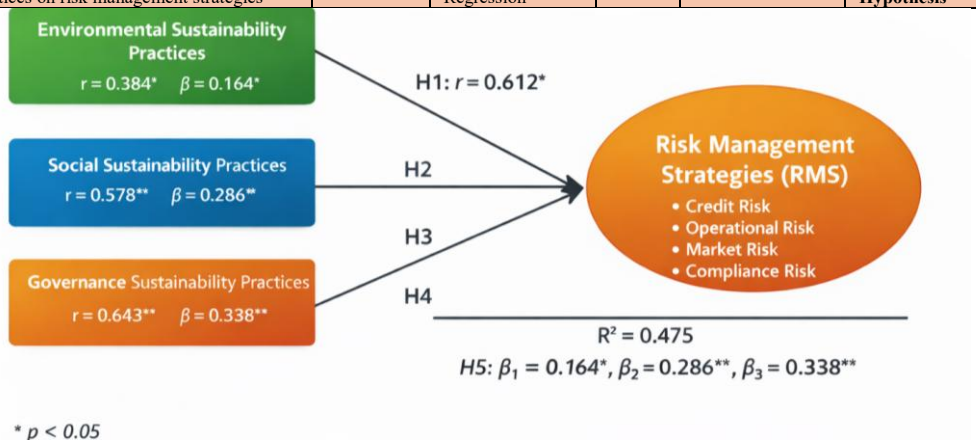

Figure 1: Conceptual Model

5.0: Results

In terms of Objective 1, the outcomes reveal that the practices of sustainability are moderately to highly embraced in the banks that operate in the National Capital Region, which show a growing institutional focus on sustainability-oriented banking practices. Thus, Objective 1 is achieved. When the findings relate to Objective 2, it is possible to state that risk management strategies of NCR banks are highly effective which indicates effective credit, operational, market, and compliance risk management mechanisms. In line with this, Objective 2 is met.

Dissolving the Objective 3, the findings indicate that there is a statistically significant positive correlation between the overall sustainability practices and risk management practices. As such, the null hypothesis H 0 1 is rejected in favor of outing that there is a significant relationship and hence Objective 3 is achieved.

In reference to Objective 4, the analysis shows that there is a positive and significant relationship between environmental sustainability practices and risk management strategies. This leads to the rejection of the null hypothesis H 0 2 and Objective 4 is accomplished.

With regard to Objective 5, the results suggest a close and statistically significant association between social sustainability practices and risk management strategies. Thus, the null hypothesis H 0 3 is rejected, and this proves the attainment of Objective 5.

At Objective 6, risk management strategies were observed to have the most positive relationship with governance sustainability practices. In line with this, the null hypothesis H 0 4 is rejected, and Objective 6 is met.

Lastly, based on Objective 7, the regression outcomes indicate that the overall sustainability practices have a strong influence on the risk management strategies. Therefore, null H 0 5 is not accepted, which means that sustainability practices are a significant predictor of risk management effectiveness and proves the realization of The Objective 7.

In general, the findings indicate that the research aims have been met and all the null hypotheses disproved, which proves sustainability practices as important predictors of risk management practices in the banking industry of the National Capital Region.

5.1: Findings of the Study

- The research results in the conclusion that the sustainability practices at the banks of the National Capital Region (NCR) are moderately high, which means that there is an increasing institutional involvement in sustainability-oriented banking activities.
- The most evident dimension of sustainability practices was the aspect of governance sustainability practices then social sustainability practices and environmental sustainability practices even though positively adopted, were not as highly integrated. This is indicative of the regulation-based banking industry.
- The results show that NCR banks have very effective risk management strategies, which have strong institutional mechanisms in dealing with credit, operational, market, and compliance risks.
- The highest effectiveness was reported by compliance and regulatory risk management, which is associated with the rigorous adherence to regulatory frameworks and supervisory norms, which is typical of the highly regulated banking environment.
- It is shown that the overall sustainability practices are positively associated with risk management strategies, which also indicates that a more effective risk management system can be observed in banks with a greater sustainability orientation.
- The relationship between the environmental sustainability practices and the risk management strategies was found to be positive and significant which implies that green banking initiatives and environmental risk consideration can lead to a better risk mitigation in the long run, however, their impact is relatively moderate.
- The research has proved the existence of a very strong positive correlation between social sustainability practices and risk management strategies, which means that the activities concerning customer data protection, staff welfare, and financial inclusion are quite critical when minimizing operational and reputational risks.
- The strongest relationship between governance sustainability practices and risk management strategies is confirmed and proves that the ethical governance, board oversight, and regulatory compliance are essential predictors of effective risk management among banks.
- The results of the regression suggest that sustainability practices as a group influence significantly the risk management strategies, which support their predictive value to increase the overall effectiveness of risk management.
- Of the sustainability dimensions, the governance and social practices have a stronger impact on the presence of risk management outcomes compared to environmental practices, which supports the results of earlier banking and ESG literature.
- On the whole, the results prove that the concept of sustainability practices are not some ethical or compliance-based initiatives but serve as strategic enabling factors of a successful risk management within the banking industry.

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6.0: Conclusion

This paper has analyzed the connection between sustainability initiatives and risk management in the banking industry of the National Capital Region. The results prove that the sustainability practices are deeply embedded into the banking operations and contribute to the enhancement of the risk management efficiency crucially. Banks that have been found to be increasingly involved in sustainability practices were observed to have stronger and better organized risk management systems.The findings provide that there is a statistically significant correlation between and effect of sustainability practices on risk management strategies. The most significant of the dimension of sustainability was governance and social practices, which was associated with regulatory intensity and the stakeholder-oriented character of the banking industry. Although there is a positive relationship between environmental sustainability practices and risk management, the practices are not as embedded, which implies that more efforts can be made concerning strategic development.The research in general concludes that sustainability practices are not only an ethical or compliance issue but that they enable banks to manage risks effectively. The incorporation of sustainability into the main banking and risk management systems boosts the resilience of the organization, compliance with the regulatory regulations, and the stability in the long term. This research therefore, reinforces the need to integrate sustainability practices into the risk management approaches towards sustainable and resilient banking activities in the National Capital Region.

6.1: Implications of the Study

1. **Strategic Integration of Sustainability:**
   The sustainability practices should be incorporated within the main risk management systems of banks since sustainability programs can greatly contribute to the efficiency of risk identification, evaluation, and reduction.
2. **Enhancing Governance Mechanisms:**
   Since the governance sustainability practices are powerful, the banks ought to enhance board oversight, governance ethical frameworks, and internal control mechanisms in an effort to make risk management outcomes more robust.
3. **Pay at the Social Sustainability:**
   The quality of the social sustainability practices, including customer data protection, employee well-being, and financial inclusion, could be enhanced to make banks minimize the operational, reputational, and compliance-related risks.
4. **Developing Environmental Risk Integration:**
   The level of environmental sustainability practices that banks employ such as the assessment of environmental risks in lending processes should be intensified to enhance the resilience of risks in the long term and be in line with the new regulatory requirements.
5. **Policy and Regulatory Compliance:**
   The findings can also be used by regulators and policymakers to promote the use of sustainability indicators in the banking risk management and supervisory frameworks.
6. **Capacity Building and Training:**
   Sustainability and integration of risk management training can be used continuously to increase the knowledge level of managers and can be used to improve the effectiveness of implementation in the banking institutions.
7. **Competitive Advantage and Stability over the long term:**
   Implementation of sustainability holistic practices has the potential to be used as a strategic instrument of long-term financial sustainability, enhanced stakeholder confidence, and competitive banking industry.

6.2: Limitations of the Study

1. **Geographical Scope Limitation:**
   The research is limited to the banks in the National Capital Region (NCR); hence, the results might not be entirely applicable to other banks in other regions or nations.
2. **Sector-Specific Focus:**
   The research is specifically in the banking industry and therefore, its results cannot be generalized to other financial or other non-financial sectors.
3. **Cross-Sectional Research Design:**
   The research was conducted at one time and this did not allow observing the shifts in sustainability practices and risk management strategies with time.
4. **Self-Reported Data:**
   The research is based on self-reported responses of the bank workers, which are prone to response bias or social desirability bias.
5. **Inadequate Sustainability Dimensions:**
   The sustainability practices are analyzed in terms of environmental, social and governance aspects, but the other aspects like technological or innovation based sustainability were not put into consideration.
6. **Limited Demographic Variables:**
   The demographic description was restricted to selected variables and this might have limited further subgroup analysis.
7. **Use of Perceptual Measures:**
   Sustainability practices and risk management strategies are measured using the perceptual Likert-scale responses as opposed to being measured using objective performance indicators.

6.3: Recommendations

1. **Integration of Sustainability into Risk Frameworks:**
   The study is only restricted to the banks of the National capital region (NCR); therefore, the findings may not necessarily be generalizable to other banks in other regions or countries.
2. **Sector-Specific Focus:**
   The study is particularly in the banking sector and as such, the findings of the study cannot be extrapolated to other non-financial or financial sectors.
3. **Cross-Sectional Research Design:**
   The study was done once and it did not enable the researcher to observe how sustainability practices and risk management strategies changed over time.
4. **Self-Reported Data:**
   The study relies on self-reported data of the bank employees, which is likely to be affected by response bias, or social desirability bias.
5. **Poor Sustainability Dimensions:**
   The sustainability practices are studied in respect to environmental, social and governing factors, yet the remaining areas such as the technological or innovation based sustainability were not factored in.
6. **Restricted Demographic variables:**

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The demographic description was limited to specific variables and this could have constrained the possibility of further subgroup analysis.

7. **Use of Perceptual Measures:**
The responses on the perceptual Likert-scale are used to measure sustainability practices and risk management strategies as opposed to measuring them using objective performance indicators.

6.4: Suggestions for Future Scope

1. **Broadening of Geographical Area:** Future researchers can consider taking the research to other areas or engage in cross-regional and cross-country comparisons to make the findings more general.
2. **Longitudinal Research Design:**Longitudinal studies may be conducted to trace how the sustainability practices and risk management strategies will change over time and determine the causal links.
3. **Additional Sectors to be included:**Further studies can be undertaken to investigate sustainability-risk management nexus in non-banking financial institutions or other sectors to expand the insights into the sector.
4. **Application of Objective Performance Indicators:**The application of both financial and non-financial performance measures and the use of perceptual variables may offer better sustainability and risk management performance results.
5. **Analysis of moderating or mediating variables:**Future research can also examine how organizational culture, adoption of technology or regulatory strength can be used as a moderator or mediator in the sustainability-risk management dynamic.
6. **Disaggregated Analysis of Banks:**Contrasting the findings of the comparative studies with the public and the private sector banks would provide a more insightful understanding of the structural and operational differences between the sustainability and risk management practices.
7. **High-order Analysis Methods:**More empirical validation might be achieved through application of advanced statistical techniques to analyze structural equation modeling (SEM) or panel data.

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