Determinants of Sustainability Performance of Indian Commercial Banks: In context with FinTech Adoption, Green Finance &Innovation

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Abstract

Purpose: Finding the variables influencing Indian commercial banks' sustainable performance was the goal of the study. An additional objective of the study was to investigate the link between Fintech Adoption (FA), Green Finance (GF), and Green Innovation (GI), and their influence on the Sustainable Performance (SP) of commercial banks in India.

Research Methodology: A well-defined questionnaire was used to collect primary data from employees of a few selected commercial banks in Delhi, Noida, and Gurugram in order to achieve this. Consequently, 388 served as the final sample size for this study. SEM shows the hypothesis testing and path analysis results of hypothesized model. Further, AMOS-SEM was used to establish the association between dependent and independent variables in 388 samples.

Findings: The reliability and validity of the model constructs have been checked by using CFA technique with the help of AMOS-SPSS version 20. The mean values of all statements were found to be higher than average, which means respondents agreed with the survey statements. Descriptive statistics also displayed standard deviation values. The results of path analysis indicated that FA, GI, and GF have a positive impact on SP, which means H1, H4, and H5 are supported. Further, a positive association of FA has been found with GF and FI, which means H2 and H3 are also accepted.

Practical Implementation:

The study's conclusions will help Indian commercial banks perform better in terms of sustainability. The management of these banks could focus on implementing new financial technologies to improve their business operations. By promoting green financing activities, the government of India can find ways to reduce carbon emissions from banking activities. This is also useful for policymakers in banking activities to make benefit plans for financial initiatives.

Originality/value:

For the Indian government, this study is extremely important. The Government of India can discover strategies for lowering carbon

emissions from banking operations by encouraging green finance initiatives. In order to enhance their business operations, managers of Indian commercial banks and those who set policy for banking activities should both take note of this study and apply modern financial technology.

Key words: Green finance, Indian commercial banks, Sustainable performance, Fintech adoption, green innovation

Introduction:

In the past few years, environmental sustainability and FinTech have become increasingly popular among academics, practitioners, and researchers in the securities industries, asset management, and banking operations (Peng & Zheng, 2021; Guang-Wen & Siddik, 2022). Emerging economies around the world have taken many initiatives to promote sustainable banking, green finance, improve environmental sustainability. The objective of sustainable economic development can be achieved by promoting digitalization.Positive impacts of digitalization (like online shopping, mobile banking's, etc.) have been found on sustainable performance of companies (Nassiry, 2018). FinTech and sustainable digital finance measures have recently been the subject of a growing body of research exploring the connection between environmentally sustainable practices and digital finance (Chen et al., 2022).In order to reduce inequalities and promote environmental sustainability, it is essential to implement reliable and efficient electronic payment systems at both national and global levels (Akter, Siddik & Mondal, 2018). The banking institution has taken advantage of the latest technologies, such as blockchain and green banking, as well as online banking, to fund numerous green initiativesandfor the development of the green industry (Awawdeh etal., 2021; Indriastuti et al., 2021). This is of utmost importance for the development of a sustainable society, so this study focuses on factors that influence SP of commercial banks of developing countries, such as India. FinTech can help meet sustainability standards by using green finance technologies (like big data sciences, block-chain technologies, IoT, etc.) (Nassiry, 2018; Wang, 2022). Green innovation (GI) is used to describe technological innovations aimed at reducing

waste and use of fossil fuels, reducing air pollution, reducing environmental degradation and energy consumption, etc. (Guang et al., 2022). The current study aimed at finding out the effect of the FA on SP of banks of emerging nation like India. In the last few years, customers' awareness about India's FinTech industry, like online payment systems, mobile financial services, etc., has increased (Chaudhary, 2023). This study is based on primary information that was gathered by using modified structured questionnaires from already existing studies (Al Nawayseh, 2020; Yan et al., 2021). Thus, for this study, a well-defined measurement scale was used to collect primary data from employees of some selected commercial banks operating in Delhi, Noida, and Gurugram. These commercial banks were IDFC, HDFC, ICICI, and IndusInd banks.

Research Objectives: The study aimed at;

1. To find out the factors affecting the sustainable performance of Indian commercial banks
2. To assess the impact of FA, GI, and GFon Sustainable Performance (SP) of commercial banks in India as well the association of FA with GI and GF.

Literature review & hypotheses development

Association of FinTech Adoption (FA) with Sustainability Performance (SP):

The use of technology innovation to provide consumers with financial services and products is referred to as fintech (Adaba et al., 2019; Dwivedi, Alabdooli, & Dwivedi, 2021). These days, consumers are very conscious of user-friendly goods and services, and as a result, financial administrators are growing increasingly interested in implementing fintech within their companies. Fintech may assist financial institutions in expanding their financial business activities. Technological advances have made a significant contribution to the growth of any nation's financial institutions and economy (Al Nawayseh, 2020).ICTs have changed the financial industry in ways that make it more creative and efficient, which also means it's better for the environment (Yan et al., 2021). Earlier studies have concluded that technological innovation is a strong predictor of the sustainability performance of

commercial banks (Awawdeh, 2021). Thus, environmental sustainability may be observed as maintaining the quality of goods, business operations, and processing, as well as the management of goods or services. A healthy connection has been observed between technological advancement and environmental sustainability(Severo,2019). Thus, this study seeks to bridge the gap between FinTech adoption(FA) and sustainability performance (SP) in relation to banking institutions, particularly those in India.

Association of FinTech Adoption (FA) with Green Finance (GF)& Green Innovation (GI)

Many researchers have tried to establish a link between innovation and sustainability (Kraus, Rehman,& García, 2020). But very few research, particularly when it comes to banks in developing nations like India, have attempted to establish a link between FinTech Adoption, Green Finance, and Green Innovation in a single study. To bridge this gap, this study looks at the relationship between these variables. Green finance can help administrator and regulators to make energy more efficient and sustainable. This is possible only by developing new energy technologies and disruptive green innovation(Peng & Zheng, 2021). FinTech can help meet sustainability standards by using green finance technologies (like big data sciences, block-chain technologies, IoT, etc.)(Nassiry, 2018; Wang, 2022). Moreover, it was found that green finance investments and GI benefit from green insurance and green structures (Xiong & Sun, 2023). Consequently, more research is required to clarify the current lack of consensus in the literature regarding the relationship between FA, GF, and GI. However, it can be argued that GI, FA, and GF are essential to reaching an organization's SP.

Association of Green Finance (GF) with Sustainability Performance (SP)

Many studies have co-related Green Finance (GF)and a company's environmental sustainability (Chen et al., 2022). They have found a high-level of co-relation between GF and the environmental performance of companies (Zheng et al., 2021). In other words, the environmental sustainability of a company increases with its green financial practices. With an objective to increase share prices, banks desire to finance many environmentally friendly projects (green

projects)like Green Industrial Growth, Renewable Energy and waste management(Guang-Wen & Siddik, 2022; Awawdeh et al., 2021; Indriastuti, 2021). Thus, this research expected that Green Finance would have a positive influence on corporate sustainable performance.

Association of Green Innovation (GI) with Sustainability Performance (SP)

Green Innovation (GI) is used to describe technological innovations aimed at reducing waste, reducing air pollution, reducing environmental degradation and reducing the use of fossil fuels such as coal, oil, and electricity (Chen et al., 2022). In today's corporate world, Green Innovation (GI) plays an important role in mitigating climate change impacts. Many studies have identified green innovation (GI) as a technological development in the banking sector that helps banks achieve environmental sustainability goals by reducing environmental pollution within and outside the organization. (Zheng et al., 2021). Green innovation in the banking sector can be illustrated by Green Internet Banking, Green Marketing Strategies, etc. Green innovation has been proven to significantly improve sustainability performance(Guang-Wen & Siddik, 2022). Moreover, GI and organizational environmental performance have been observed to be positively correlated (Xu et al., 2020; Indriastuti & Chariri, 2021).

Research Hypothesis: On the basis of an extensive literature review, the following hypotheses have been developed:

H1: FinTech Adoption (FA) is significantly associated with the Sustainability Performance (SP) of Indian commercial banks.

H2: FinTech Adoption (FA) is significantly associated with green finance (GF) investments by Indian commercial banks.

H3: FinTech Adoption (FA) is significantly associated with green innovation (GI) in Indian commercial banks.

H4: Green finance (GF) is related to SP by Indian commercial banks.

H5: Green innovation (GI) is related to SP Indian commercial banks.

Figure 1: Conceptual Model: Developed through extensive literature review (Yan et al., 2021)
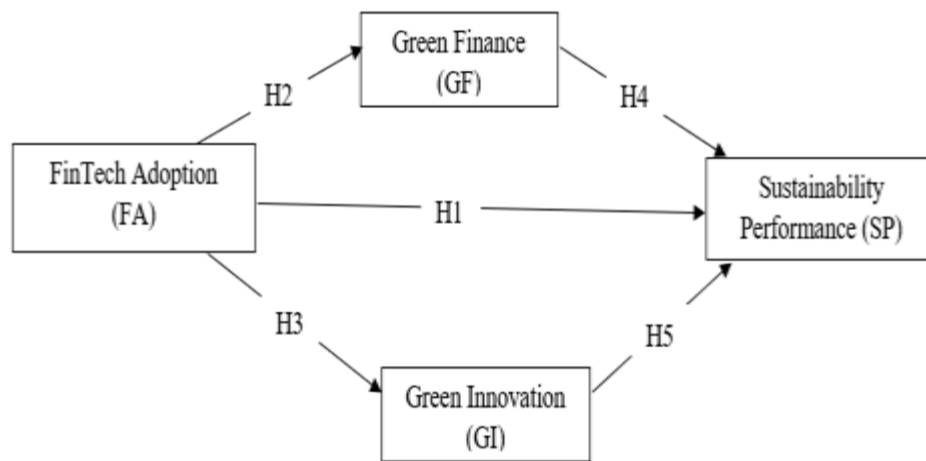
Source: Author's own

Research Methodology:

Sample Size & Data Collection:

In this study, a well-defined measurement scale utilized for primary data collection. It was collected from employees of some selected commercial banks operating in Delhi, Noida, and Gurugram. These commercial banks were IDFC, HDFC, ICICI, and IndusInd banks. Further, before going for final data collection, a pilot test was conducted by the researcher to check the accuracy of the survey questionnaire. For this pilot study, 50 commercial bank employees were chosen randomly. For the final collection of data, convenience sampling methods were used to select the respondents between July to December, 2022. The Authors gathered total 453 questionnaires, out of which 65 were later excluded from the final analysis due to erroneous or missing data. Thus, the final sample size for this work was 388.The demographics of these participants were listed in Table 1. Among respondents, 54.12% were married, whereas unmarried respondents were 45.87%. Male employees (52.83%) were more interested to participate in this research work than female employees (47.16%). Researchers considered only those employees who have worked more than one year at the same bank. The participation of these employees was 46.90%, whereas 53.09% were those who had more than 3 years of working experience in the same bank. Further, the number of respondents at HDFC bank (29.89%) was higher than that at other banks. Employees of IDFC bank were very rigid about participating in the survey, so the authors could collect 17.01% of responses from IDFC bank (Table 1).

Table 1: Demographic Status

Characteristics	Category	N	%
Marital Status	Married	210	54.12%
	Unmarried	178	45.87%
Age	19-29Years	112	28.86%
	30-39 Years	102	26.28%
	40-49 Years	98	25.25%
	More than 49 years	76	19.58%
Gender	Male	205	52.83%
	Female	183	47.16%

Characteristics	Category	N	%
Educational Background	Diploma/ Certificate	85	21.90%
	Graduate	109	28.09%
	Post graduate	101	26.03%
	Others	93	23.96%
Year of experience in same bank	Between 1-3 years	182	46.90%
	above 3 years	206	53.09%
Commercial Banks	IDFC	66	17.01%
	HDFC	116	29.89%
	ICICI	109	28.09%
	IndusInd bank	97	25.00%

Source: Author's collection

Development of Survey Instrument:

The measurement statements of all the variables (FA, SP, GI, and GF)in this study were assessed by an extensive literature review. This study is based on primary information that was gathered by using modified questionnaires extracted from already existing studies. This survey instrument consists of two segments: one is about the participant's demographic information, and other segment consists of questions related to variables. A five-point scale was used for questions on the measurement instrument, which ranged from strongly disagreeing to strongly agreeing. To measure FA, a total of 5 items were extracted from previous studies (Al Nawayseh, 2020; Yan et al., 2021). This scale examined banker employee's opinions about the influence of their company's Fintech Adoption (FA) intentions on SP, GF, and GI. The Cronbach's alpha (CA) values for all these items were 0.889.Furthermore, Green Finance (GF) was measured by taking five questions, whose language was modified as per the understanding level of the respondents(Zheng et al., 2021). These statements consist of questions related to the bank's investment in green infrastructure development, waste management, investments in renewable energy, etc. The Green Innovation (GI) was examined by using four statement items from existing studies(Tang et al., 2018; Kraus, Rehman & García, 2020). To assess GI, questions related to green implementations like green banking, online

services for customers, green technology, etc. were asked. Moreover, to evaluate the sustainability performance (SP)of banks, six modified questions were taken from the existing investigation (Zheng et al., 2021). In conclusion, the reliability values, or Cronbach's alpha, for these variables exceeded the normal standards shown in Table 2.

Data Analysis & Interpretation:

To analyze the proposed model of this article, structural equation modeling (SEM) approach was used by IBM-AMOS software. To check the data reliability and data validity of hypothesized constructs, the CFA technique was used with the help of AMOS-SPSS version 20. The mean values of all statements were found to be higher than average, which means respondents agreed with the survey statements. Descriptive statistics also displayed standard deviation values. The SD values are relatively close to one (another), indicating that the components are distributed evenly. The standardized factor loading (SFL) was also found to be higher than 0.7, which means each statement well explained its variables. The values of Cronbach's Alpha (CA) were found to be more than 0.8, Composite Reliability (CR) values were> 0.7, and AVE (Average variance extracted) values>0.5. All these values were found to be higher than standard norms, which indicates the consistency, reliability, and convergent validity of the variables were satisfactory (Table 2).

Table 2: Measurement Instrument Summary Table

	Statements	Mean	Std. Deviation	Standardized Factor Loading (SFL)	CA	CR	AVE
FA (Fintech Adoption)	FAS1	3.879	0.891	0.768	0.889	0.799	0.760
	FAS2	3.891	0.886	0.721			
	FAS3	3.990	0.909	0.891			
	FAS4	3.768	0.910	0.781			
	FAS5	3.576	0.910	0.810			
SP (Sustainability Performance)	SPS1	4.190	0.788	0.900	0.876	0.814	0.788
	SPS2	4.089	0.898	0.711			
	SPS3	3.987	0.796	0.710			
	SPS4	4.188	0.809	0.801			
	SPS5	3.588	0.789	0.809			
GI (Green Innovation)	GIS1	3.879	0.887	0.701	0.890	0.781	0.723
	GIS2	3.679	0.854	0.723			
	GIS3	3.989	0.799	0.903			
	GIS4	4.563	0.764	0.812			
	GIS5	4.321	0.771	0.789			
	GIS6	4.230	0.730	0.821			
GF (Green Finance)	GFS1	3.909	0.821	0.724	0.811	0.820	0.720
	GFS2	4.560	0.771	0.806			
	GFS3	4.023	0.790	0.717			
	GFS4	4.185	0.757	0.799			

Source: Author's own

Note:

*Calculated Values AVE of constructs should above 0.5 (Ruvio et. al.,2008).

**Calculated Values CR of constructs should above0.7 (Chin,1998)

***Calculated Values of CAof constructs should above0.8 (Fornell et. al.,1981)

Discriminant Validity of Constructs (Co-relation Metrix):

To find out the discriminant validity of variables, the correlation ratio among research variables was calculated (Table 3).The findings professed that discriminant validity is not an issue because the correlation matrix among these variables was less than the square root of AVE (Hair et al., 2021).Table 3 represents co-relation (discriminant) values between variables, these values are nearly 0.50, which means there is no high co-relation between factors of hypothesized model. Relationship of FA with other factors like GI (0.414), GF (0.489) and with SP (0.461). Similarly, Relationship of GI with other factors like GF (0.510) and with SP (0.504).

Table 3. Discriminant Validity (Diagonal Elements)

	FA (Fintech Adoption)	GI (Green Innovation)	GF (Green Finance)	SP (Sustainability Performance)
FA (Fintech Adoption)	0.811	-	-	-
GI (Green Innovation)	0.414	0.696	-	-
GF (Green Finance)	0.489	0.510	0.758	-
SP (Sustainability Performance)	0.461	0.504	0.422	0.719

Source: Author's own

Hypothesis Testing Results:

The findings of this article's hypothesis testing are displayed using SEM. For 388 samples, the relationship between the independent and dependent variables was determined using AMOS-SEM. A substantial correlation between the variables in the proposed model was shown in Table 4. Findings showed that GF (: 0.199, p-value: 0.009), GI (: 0.389, p-value: 0.001), and FA (: 0.201, p-value: 0.010) all positively affect SP, supporting H1, H4, and H5. Moreover, a positive correlation between FA and GF (: 0.439, p-value: 0.00) and FI (: 0.469, p-value: 0.00) has been discovered, indicating the acceptance of H2 and H3.

Table 4. Path Analysis (SEM Results)

Path	(Beta)	p-values	T-statistics	Decision
H1: FA -->SP	0.201	0.010	3.001	Significant (Supported)
H2: FA -->GF	0.439	0.000	6.998	Significant (Supported)
H3: FA -->GI	0.469	0.000	8.991	Significant (Supported)
H4: GF -->SP	0.199	0.009	3.690	Significant (Supported)
H5: GI-->SP	0.389	0.001	7.410	Significant (Supported)

Source: Author's calculation

Model Fit Index

The model fit indices of the hypothesized model have been found satisfactory as compared with standard norms (Table 5).

Table 5. Structural Model: Fit Index

Model Fit-Index	Value Obtained	Range (Acceptable)	Supported References
Chi-Square/df	3.403	<5	Forza & Filippini, (1998)
GFI	0.903	>0.90	Lee, Hsing, & Li, (2021)
CFI	0.909	>0.90	Awang (2012)
RMSEA	0.063	<0.07	Awang (2012)
SRMR	0.039	<0.08	Lee, Hsing, & Li, (2021)

Source: Author's calculation

The fitness of the good indices GFI (0.903) and comparative fit index (CFI: 0.909) are found appropriate. Similarly, the badness of fit indices RMSEA (0.063) and SRMR (0.039) were also found satisfactory. Chi-Square/df values less than 5 are considered appropriate, which has also been found satisfactory (3.403).

Discussion: This article establishes relationship between Fintech Adoption, Green Innovation, Green Finance and sustainability performance of Indian commercial banks.

The participants of this research work were employees of some selected commercial banks in Delhi, Noida, and Gurugram. The commercial banks selected for the study were IDFC, HDFC, ICICI, and IndusInd banks. The sample size of the study was 388 employees of these commercial banks. To establish associations between variables, the SEM approach was used with the help of IBM-AMOS software. The mean values of all statements were found to be higher than average, which means respondents agreed

with the survey statements. Descriptive statistics also displayed standard deviation values. The SD values are relatively close to one (another), indicating that the components are distributed evenly. The standardized Factor Loading (SFL) was also found to be greater than 0.7 which means each statement well explained its variables. The values of Cronbach's Alpha (CA) were found to be more than 0.8, CR values were> 0.7, and AVE values>0.5. Which means the validity and reliability results were satisfactory. The results of discriminant validity (co-relation matrix) were also found satisfactory. The outcomes showed a strong correlation between the variables in the proposed model. Findings showed that GF (: 0.199, p-value: 0.009), GI (: 0.389, p-value: 0.001), and FA (: 0.201, p-value: 0.010) all positively affect SP, supporting H1, H4, and H5. Moreover, a positive correlation between FA and GF (: 0.439, p-value: 0.000) and FI (: 0.469, p-value: 0.000) has been discovered, indicating the acceptance of H2 and H3. This implies that the findings validated every hypothesis. Accordingly, this paper discovered a favorable correlation between all independent criteria and banks' sustainability performance.

Conclusion:

The purpose of the current study was to determine if Fintech adoption of green innovation projects, green finance systems, and Indian banks' sustainability performance were related. Furthermore, writers have also made an effort to determine how GF and GI affect banks' stock prices. This study investigated the effect of FA on banks' SP using confirmatory factory analysis and SEM methodologies. The study's findings supported every theory that was put forth. The empirical findings demonstrated that GF, GI, and FA had a favorable impact on the SP of Indian commercial banks. Furthermore, FA is advantageous to GF and GI. The study's findings also add to the body of theoretical and practical knowledge in the areas of sustainability, GF, and innovation. In order to improve environmental sustainability in their operations, this paper describes how financial institutions in poor nations may leverage innovation, green finance, and fintech. For bank executives and legislators, the study's conclusions provide a variety of useful management suggestions. These include leveraging

new technologies and funding eco-friendly initiatives to enhance overall environmental sustainability, improving management approaches to the environment, and creating a green innovation culture within banks.

Limitation of study & future direction:

This study has made an important contribution to the field of application of innovative technology and sustainability performance. But the study has some limitations too. The study considered only four commercial banks in India, i.e., IDFC, HDFC, ICICI, and IndusInd banks, whereas many other big commercial banks also operate in India and can be considered in future studies. Further, due to budget constraints, researchers could only find research participants from three cities, i.e., Delhi, Noida, and Gurugram. Results, which may not be applicable in other cities. Additionally, the sample size of this work was too small, i.e., only 388 participants. The data was collected through a structured questionnaire, which has its own limitations. The results of this study could not be applicable in other cities or at different sample sizes. Researchers will try to incorporate all these limitations into future research.

Practical Implementation:

Enhancing the sustainability performance of Indian commercial banks would be possible with the help of this study's findings. The management of these banks could focus on implementing new financial technologies to improve their business operations. By promoting green financing activities, the government of India can find ways to reduce carbon emissions from banking activities. This is also useful for policymakers in banking activities to make benefit plans for financial initiatives.

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