Is FinTech Implementation a Strategic Step for Sustainability in Today's Changing Landscape? An Empirical Investigation

Abstract

In today's changing landscape, digitalization and sustainability are the core drivers for financial services industry transformation. While both concepts have been researched in recent years, their intersection, often conceived as “FinTech,” remains under-determined. The literature in this domain has emerged recently and is characterized by a specific focus on isolated aspects of FinTech and does not provide a comprehensive perspective on the topic yet. To fill this gap, this study explores linkages between process-related indicators and sustainable performance outcomes resulting from FinTech implementation. This research analysed the interplay of Technology-Organization-Environment (TOE) based FinTech framework including sustainable technology orientation, efficiency, environmental performance, and organizational value creation, through in-depth interviews and a structural model. The comprehensive framework was tested using 303 survey responses. The findings indicate the relative significance of proposed linkages of the process-related indicators and the variables, namely sustainable technology orientation, efficiency, and environmental performance, leading to value creation. The study contributes to the ongoing debate on environmental sustainability through sustainable operations management and value creation using cutting-edge technologies. The managers can draw upon the findings to improve their understanding of the factors for creating value through improved and sustainable technology orientation, efficiency, and environmental performance of FinTech applications.

Keywords: FinTech; Sustainability; Strategic Step; Technology-Organization-Environment.

1. Introduction

Technological innovations constitute the crucial drivers of favourable transformation and development of all sectors of the economy [1]. Across the world economies, the emergence and implementation of sophisticated technologies have entirely revolutionized the financial services industry. Constituting a noteworthy part of the financial services sector, the banking industry makes a prodigious contribution to the country's economic growth and the rise of FinTech has led to the birth of a new era for banking organizations [2]. FinTech refers to the setup where the organizations use different technologies based on the internet, communication, and automated information processing along with the bank's expertise to change the way of offering financial services while functioning outside their traditional business models [3].

Even though banking companies are amongst the early and biggest adopters of innovative technology solutions, the emergence of digital finance and banking has led to substantial transformation for traditional organizations in the financial services landscape [4]. Although their pace of adopting digitalization has been slower as compared to other sectors of society, the banks are offered the opportunities to reap several payoffs resulting from the adoption. This way, the banks have begun cultivating their core competencies and capabilities by implementing digital technologies and systems into their strategic functioning [5].

Recent years have witnessed a growing interest of researchers from academia and industry in FinTech phenomena [6]. Banks are increasingly adopting and integrating cutting-edge technologies such as blockchain, cloud computing, big data, and AI & machine learning technologies in the financial services landscape that can bring several paybacks, and thus technological innovations are taking place in the banking industry. As argued by Coombs and Bierly [7], innovations lead firms to attain a competitive advantage and enhance the firm's value. In the consistently dynamic business environment, bringing innovations in business by leveraging its internal as well as external capabilities to respond effectively to the rapid changes is crucial to improving its overall performance, [8] and attaining sustainability [9] and

resilience [10]. The emergence of FinTech in the banking industry has enabled the growth of artificial intelligence, blockchain, cloud computing, big data analytics, and cyber security technologies at the operational levels as well as in the servitization mechanisms [11]. The banks are doing their best through significant investments and extensive research to catch up with the pace of digitalization initiated by other industries by integrating innovative technologies all over their operations.

Banks around the world are creating considerable monetary commitments for effective & efficient integration of digital technologies to increase productivity, profitability, efficiency, and improve operational processes [12]. Banks face significant challenges such as the effective management of diverse workforce, capacity development to gain competitive advantage, control of numerous products & services, and product differentiation in realizing operational level excellence and sustainability [13]. Like all other organizations, banks also encounter uncertainty resulting from unprecedented happenings, such as pandemic outbreaks and climate change and sustainability issues in their operations management [14]. Prior research argues that banks with higher investments in cutting-edge technologies, such as machine learning in bank teller processes, can yield better financial and operational performance [15]. The adoption of FinTech in banking not only leads to cost-effectiveness but also to precision in defining the target markets, greater customer engagement, and speedy service delivery [16]. Since the outcomes of implementing FinTech applications are pretty unpredictable and involve enormous expenses for the banking organizations, the uncertainty being such investments converted into paybacks are not sometimes able to generate value for the banks. To ensure the organization's resilience and sustainability during turbulent times, enhancing the efficiency of the operations and value generation through superior and environmentally-sustainable performance is indispensable [17]. Researchers have associated a firm's strategic orientation

with new technology implementation [18]. And therefore, it is important to understand the impact of FinTech adoption on the stated dimensions of organizational performance.

Several researchers have undertaken significant investigations of various banking technologies by measuring their impacts on financial performance, i.e., Return on Assets (ROA), Return on Equity (ROE), Loan Deposit Ratio (LDR), and other financial measures [19]. However, the financial and monetary measures provide a narrow view of organizational performance and its contribution to organizational value. A holistic perspective of how FinTech applications help achieve organizational value creation for the banks can only be gained by understanding the operational and organizational process-related outcomes. Therefore, a comprehensive framework comprising a holistic approach to scrutinizing the FinTech applications and their strategic association with the bank performance is required. To the best of our knowledge, none of the prior studies have explored this association so far in the extant literature. Recognizing the dare need to comprehend the strategic glimpse of FinTech and sustainable operations and to fill this void in the existing knowledge, empirical research has been undertaken. For this purpose, this study considered to employ technological-organizational-environmental (TOE) lens. The TOE framework is relevant when it comes to scrutinizing adoption of innovative technologies at the organizational level [20]. The current research will address the theoretical gap with respect to TOE by applying this lens beyond adoption as the investigation is based on the relationships of organizational process-related indicators of using FinTech applications and the sustainable performance outcomes in terms of efficiency, environmental performance resulting from FinTech, sustainable technology orientation, and ultimately organizational value creation. Also, the pertinence of using TOE framework in comparison to other theories of technology adoption, i.e., technology acceptance model (TAM) [21] and diffusion of innovation (DOI) [22] lies in the notion that it does not only considers technical factors but

also studies the organizational and environmental aspects associated with innovative technologies [23]. The current research aims to answer the following research questions:

(a) What are the process-related indicators of using FinTech applications based on Technological, Organizational, and Environmental (TOE) dimensions?

(b) How do the TOE process-related indicators of using FinTech applications lead to organizational value creation for the banks?

In this regard, this research attempts to study the managerial perspectives using a quantitative approach based on structural equation modelling (SEM) following a semi-structured qualitative investigation. This research expects to contribute to the rich body of literature by presenting a novel framework comprising an all-inclusive lens for sustainable operations management in terms of organizational process-related indicators of using FinTech, sustainable technology orientation, environmental performance, efficiency, and organizational value creation due to FinTech. Following comprehensive research, this study expects to add to the emerging digitalization literature by providing a profound understanding of the interplay of the aforementioned aspects, which have been often overlooked in the literature so far. In addition, the study contributes to the TOE literature concerning operations management by categorizing process-related indicators of FinTech implementation on TOE dimensions since prior researchers have mainly adapted this framework for examining the adoption of digital technologies [20], [24].

2. Literature Review

The study reviewed relevant literature on FinTech and its implications for organizations from a variety of angles. The relevant literature was extracted using a systematic literature search using keyword search method. The keywords used for search were: FinTech, digital finance, operations, organizational performance, sustainability, sustainable performance, environmental performance, and banking industry. After the synthesis of the rich literature

extracted, the review has been categorized into process-related indicators (i.e., TOE-based variables) and organizational performance outcomes (i.e., sustainable technology orientation, an environmental performance due to FinTech, efficiency, and value creation).

2.1 FinTech and Organizational Process-related Indicators

The term 'FinTech' is made of two terms, i.e., finance and technology. It can be defined as the use of information technology applications in offering financial services to improve service quality and efficiency [25]. Another definition of FinTech [26] articulates it as new-age frontier technologies comprising AI & machine learning, big data, blockchain, and cloud computing that help promote innovative and sustainable business models, sophisticated applications, and advanced product and service offerings. With all such advanced features, FinTech has led the pathway towards a revolutionized digital banking by suppressing traditional and outdated banking methods. Milian et al. [27] categorized FinTech applications based on activity sectors, namely blockchain/cryptocurrency, payments technology, personal asset management, institutional capital market technology, equity crowdfunding, money transfer, and security technology [28]. Technology has been reportedly disrupting the financial service industry by revolutionizing the banking processes, removing the friction between consumers and banks, and improving the resilience and sustainability of the business [29]. The rise of FinTech has provided a new paradigm to the banking sector as an enabling force for innovation, and the FinTech applications are capable of unbundling core dimensions of banking methods. Banks today face massive pressures for transforming their business models, and as a result, they are increasingly changing their product-centric model to a customer-centric model [30].

Dewett and Jones [31] state that information technology moderates the linkages between organizational characteristics and the efficiency, innovation, and strategic outcomes of using IT. The digital transformation of the operational processes influences the organizational outcomes associated with a firm's digital and technical capabilities in attaining superior value

[32]. For this purpose, the TOE framework is quite relevant in understanding the organizational-level adoption of new technologies; and the linkage to the context-specific factors can be studied accordingly [33]. The TOE framework incudes three types of aspects: technological variables that include the existing and novel technologies relevant to the organization; organizational constructs are the organization-level aspects such as size and type of firm, the scope of its operations, and other managerial-level issues; and environmental factors which include the climate, i.e., internal and external, in which the firm operates, for instance, institutional framework, competitors, customers, and other agencies [34]. However, the current research does not limit itself to the organizational adoption of FinTech, but it tends to explore how the process-related indicators (i.e., classified in terms of TOE characteristics) of using FinTech can influence organizational value creation through improved sustainable technology orientation and efficiency.

2.1.1 Technological Indicators

The technological indicators are the variables concerning the existing and new technologies relevant to the organization [35]. In this study, these are the operational functionalities associated with FinTech and comprise interactivity (Inter), improved transaction processing (ITP), and reduced human intervention (RHI). With the increased adoption of FinTech applications, banks can improve their technological processes such as interactivity and transaction processing [36]. The banks can better satisfy their customers through greater interactivity and speedy processing of transactions through AI & ML applications. Henderson & Venkatraman [38] argues that IT-based solutions offer augmented interactivity by increasing the speed of communications involving high volumes of data at an incredible rate. Earlier studies have pinpointed the role of AI technologies in reducing organizational complexity through faster task completion and intelligent decisions [20]. Organizations experience more usability if there is lesser complexity in using the new technologies [39]. Using sophisticated

technologies, banks have improved their operational performance through effective communication with their customers and prospects and by getting timely feedback [40]. By implementing FinTech applications, including blockchain, the banks focus on providing best-in-class service to their customers through better transaction processing practices. FinTech facilitates the fast and cost-effective processing of transactions [30]. For instance, Nguyen [41] stresses the advantage of having lower transaction charges because of blockchain technology with no verification requirement by a trusted third-party banking institution. Evidence shows that digitalization of the organizational operations lead to improvement in information processing which further significantly influences efficiency of the operations [42].

Further, with the increased usage of FinTech products in banking, human intervention is significantly reduced. The integrated use of blockchain, AI, and ML technologies helps maintain better record-keeping leading to fewer human-related errors [43]. Banking operations become more robust and efficient with the elimination of intermediaries in providing financial services [27]. All the benefits expected from the adoption of Fintech help develop and improve an organization's strategic orientation with respect to digitalization [44]. The initial operational outcomes witnessed in real terms will have a significant influence on technology orientation [45] that resultantly leads to greater operational performance in terms of augmented business, productivity, and efficiency [46]. With the augmented adoption of FinTech, the banks can bring in sustainable and robust technology orientation that further leads to the improved business value of IT in terms of operational savings, service enhancement, and increased sales [44] [47].

Based on the discussion, the following hypotheses are proposed:

H1: Technological indicators (Inter, ITP, and RHI) have a significant positive influence on efficiency.

H2: Technological indicators (Inter, ITP, and RHI) have a significant positive influence on sustainable technology orientation.

2.1.2 Organizational Indicators

The organizational indicators can be viewed as the variables about size, the scope of the firm's operations, and managerial-level issues [34]. The current research categorizes cost reduction (CR), innovation (Inno), and improved market standing (IMS) under such indicators because these constructs comprise the organization's internal characteristics and market scope [31]. Prior research has highlighted the direct and indirect advantages of integrating FinTech into banking [48]. FinTech applications enable improved organizational characteristics of the banks as the literature argues that these innovations have led to an increase in operational profitability and a reduction in the operational risk [15] for the banks. Adopting a new technology requires to be cost-friendly for the organizations. Therefore, cost reduction has been viewed as one of the most significant drivers of technology adoption by firms [49]. Implementing FinTech applications provides a significant advantage of cost reduction for the banks as they assist in lowering the transaction cost, processing cost, administrative cost, and overall operational cost [6]. This advantage thereby directs towards optimizing the business and operational banking processes [50].

FinTech applications represent a crucial element of innovation in banking and financial services since IT is considered to be a significant driver of innovation in organizations [51]. Innovation can be defined as an activity that conceptualizes a new idea to solve an existing problem and then utilises it for economic and social benefits [7]. It has been argued that IT can enable great innovations which improve operational performance [52] as well as the sustainability of organizations [53]. A wealth of knowledge exists around the role of IT innovations in influencing crucial aspects of an organization and leading to improvement in its profitability, performance, and efficiency [54]. Literature provides support for the positive association between innovation and organizational performance [55].

Integrating technological innovations helps the banks achieve improved brand value. For instance, with the provision of highly personalized banking services [56] along with the feature of customization through account management, fraud detection, personalized savings and investment plans, etc. due to AI-enabled self-service banking technologies such as AI-based mobile banking [57], the banking organizations can improve their market situation and the organizational performance [58], and gain a competitive advantage [59]. The operational benefits due to the implementation of cutting-edge technologies in business operations lead to improvement in the strategic technology orientation of the firm [60]. The researchers have established that the adoption of innovative technologies is closely related to the market scope of the business which directly increases their efficiency [61]. The discussion of relevant literature leads to the following hypotheses:

H3: Organizational indicators (CR, Inno, and IMS) have a significant positive influence on efficiency.

H4: Organizational indicators (CR, Inno, and IMS) have a significant positive influence on sustainable technology orientation.

2.1.3 Environmental Indicators

Environmental indicators are referred to as the internal and external environment influencing the organization [20]. The current study considers efficient technological infrastructure (ETI), quality customer service (QCS), and improved regulatory compliance (IRC) as environmental indicators. The emergence of technological innovations has provided the banks with improved and modernized infrastructure, service delivery, and customer orientation which act as instruments for attaining competitive advantage [62]. The implementation of the advanced FinTech applications has significantly improved the banks' technological/digital infrastructure, further facilitating cost-effective and cost-efficient banking operations [63]. The augmented adoption of digital technologies in banks has led to improvement in the infrastructure. In this

way, banks have attained well-developed technical infrastructure, including hardware, software, HR, employees' skills, and capabilities [64]. The organizational decision-makers will realize the value and efficiency of the operations only if they view the technological infrastructure as compatible with the organizational processes [65]. Establishing and maintaining an accurate fit between the IT and the organizational processes is indispensable to improving the capabilities of the technologies adopted by the organizations [66]. Further, better technology training programs for the employees enhance their job performance which ultimately leads to improvement in the overall efficiency of the banks [65]. Since organizations tend to adopt such technologies as a result of effective technological support in terms of vendor support, training, and customer service [67], it is expected that the adoption will lead to improved efficiency.

The new financial landscape that emerged with FinTech has a great potential to attain better customer service with increased customer outreach, improved service quality, and cost-effectiveness [68]. Adopting various AI-enabled customer-service platforms, such as mobile banking, digital payments, biometrics, and m-wallets, has directed the banks towards improved outcomes on the demand side [59]. Attaining demand-side excellence proves to be an essential antecedent to improvement in the operational and service performance, i.e., the efficiency of the banking service operations [57].

Researchers have reported the important role of various situational conditions including eco-political aspects, government rules and regulations in influencing the adoption and implementation of newer technologies in different countries [69]. As evident from the literature, several environmental factors such as regulatory pressure, competitive pressure, governmental policies, and customers' expectations determine the adoption of FinTech applications in banking organizations. However, when organizations are increasingly adopting such technologies into their operations [70], they tend to improve their compliance with the

regulatory environment [35]. In understanding the disruptive banking transformation due to FinTech, regulatory compliance needs to be investigated following the change [71]. Improved compliance is a crucial driving force for superior performance, i.e., effectiveness and efficiency of business operations and the welfare outcomes for all the stakeholders [65], [71]. Consequently, the following hypotheses are developed:

H5: Environmental indicators (ETI, IRC, and QCS) have a significant positive influence on efficiency.

H6: Efficiency has a significant positive influence on organizational value creation.

2.2 FinTech and Organizational Performance Outcomes

2.2.1 Sustainable Technology Orientation and Value Creation

In the era of digital transformation of all industries, organizations strive to embrace it from all around to attain critical improvements in the form of operational effectiveness, creation of new business models, higher levels of customer satisfaction, and engagement to gain a competitive advantage [46]. The strategic orientation of an organization constitutes an important driver of its performance since it has an important role to play in determining how a firm's resources will be deployed and dynamic capabilities will be developed [72]. Firms adopt strategic orientation, i.e., technology orientation, market orientation, and entrepreneurial orientation, to gain competitive advantage and to maintain consistently superior performance [18]. Research suggests that integrating digital innovations into non-technological businesses such as banks is essential for their digitalization. Such innovative digital technologies offer numerous opportunities to organizations that they can leverage [73]. For achieving competitive advantage through digitalization, a firm must have a robust and sustainable technology orientation that can be defined as the organization's commitment to implementing new technologies and responsiveness towards digital transformations [74]. The effective implementation of digital technologies into business processes leads to improved commitment on the part of the firm,

thereby resulting in a stronger technology orientation of the firm [75]. The improved technology orientation complements the technological capabilities of the organization. Also, researchers have associated favourable performance implications with orientation for sustainable practices [18]. The issues concerning environmental sustainability might need new and innovative technology-based solutions leading to competitive advantage [76].

Empirical evidence shows how companies can achieve more potential gains in terms of better and sustainable organizational performance through improved technology orientation as an outcome of implementing technological innovations [77]. Therefore, the integration of FinTech applications provides banking organizations with better technological opportunities leading to stronger technology orientation [78]. As many of the FinTech applications provide the banks with green alternatives of operational processes and service delivery for reducing their carbon footprint [79], the banks are shifting their digital orientation to sustainable technology orientation to commit to greener technologies such as blockchain [80], [81]. Research has established a positive association between technology orientation and operational performance in terms of financial and non-financial performance in organizations [73], leading to overall value creation (VC) [44], [60]. Therefore, the following hypothesis can be proposed.

H7: Sustainable technology orientation has a significant positive influence on organizational value creation.

2.2.2 Environmental Performance due to FinTech and Value Creation

The strategic and operational decisions of a firm have consequences for both its internal and external environment [82]. The organization's attempt to consider the sustainability criteria in formulating organizational strategies and policies coupled with the complex nature of technology entails more concerns for the sustainability aspects, i.e., social, economic, and environmental ones [83]. Many prior researchers have tried to investigate the sustainability and environmental impacts of technological innovations in a diverse set of contexts [84]. Just like

all other organizations, the banks have incorporated sustainability strategies into their organizational strategic framework concerning the management of technological innovations and digitalization [85]. Concerning the sustainability viewpoint of the technology management process, Chavosh Nejad et al. [45] have identified internet banking, internal technology exploitation, and internal R&D as the best decision choices within the technology management process. To stay committed to sustainability, organizations are often required to be technology oriented as new technologies can create ample opportunities to improve regulatory compliance, business model innovation, and overall organizational performance [18]. Yip and Bocken [81] have articulated the significance of adopting sustainable digital business models for environmental sustainability in reducing greenhouse gas (GHG) emissions, waste reduction, and contribution to sustainable solutions [86]. It is evident that with the increased adoption of FinTech applications, banking companies can improve their environmental sustainability performance in addition to enhanced operational performance and improved customer value [87]. However, the literature sometimes reflects mixed results with respect to how environmental initiatives and orientation influence performance. For example, Bătae et al. [87] spotted a negative relationship between corporate social responsibility and financial performance of European banks. The mixed findings direct to a greater need for studying these relationships in different contexts. There is a positive relationship between technology orientation and sustainable performance resulting from new technology implementation [88]. Scholars have propounded that firms should have technology orientation if it wishes to be environmentally-relevant [18], [76]. This study also expects that if the banking organizations targets to improve their environmental performance with FinTech implementation, they are required to improve their technology orientation. Further, prior literature has stressed the role of environmentally-sustainable performance attained from technological innovations in banking in creating organizational value through improved brand value, sustainable

behaviours, and competitive advantage [81]. As per the above discussion, the following hypotheses are framed:

H8a: Environmental performance due to FinTech has a significant positive influence on sustainable technology orientation.

H8b: Environmental performance due to FinTech has a significant positive influence on organizational value creation.

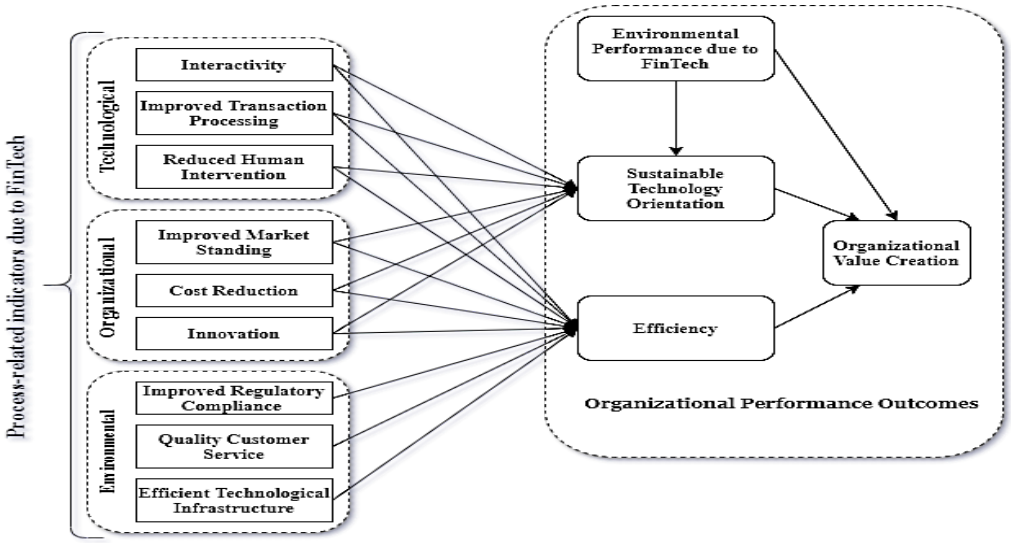

Figure 1: Conceptual Model

3. Research Methodology

The current research used quantitative methods to test the conceptual model (See Figure 1) for examining the proposed associations among the latent constructs by collecting survey data, following a qualitative investigation. Since this research is one of the newer attempts in the field of FinTech applications' role in achieving sustainable performance outcomes, it can be termed an exploratory study. The exploratory nature of this research was one of the motivations behind using a qualitative method as the precursor to designing and executing quantitative research [89]. This section details the procedures followed for sampling and data collection for achieving the research objectives. Figure A1 [as given in supplemental material (Online Appendix)] presents the research process adopted for the study.

3.1 Sample and Setting

To test the hypothesized relationships of the variables, a cross-sectional sample of 303 respondents was selected from the banks in India. The government of India has been making significant efforts for its transition to the digital economy, and the banking industry can lead this transformation in a great way by implementing innovative FinTech applications. The rationale behind conducting this research in India is that banking organizations are increasingly undergoing digital transformation with huge investments in advanced FinTech applications such as AI & ML, blockchain technology, big data analytics, internet of things, cognitive & analytics, and cloud computing to meet increasing government expectations towards a digital economy and to serve the fast-growing digital community [90]. The big players in the Indian banking industry are taking several initiatives by incorporating the latest technologies to improve their customer service and overall operational performance [6], therefore, it is vital for them to understand the interplay among FinTech implementation, operational processes, and performance. Also, there are some studies focused on FinTech and performance in other parts of the world [71], i.e., mostly in the developed nations, which paves the way for understanding the aforesaid linkages from the angle of a developing nation making significant efforts towards this end. The data collection was performed by seeking responses from the respondents working at different managerial levels in the banks from leading bank groups. The data were primarily gathered through a web-based survey, where some of the responses were attained through physical branch visits. The survey instrument, i.e., a structured questionnaire, was developed in the English language since language could not be a barrier as it was to be administered to bank managers. The questionnaire was first pilot-tested on 20 bank managers to ensure its reliability, content validity, clarity, understandability, and language effectiveness. The reliability was confirmed using the internal consistency measure of Cronbach's α. For final data, out of 400 questionnaires distributed among the respondents, 303 usable responses were

attained at a response rate of 75%. Concerning sample adequacy, any sample size greater than 200 provides appropriate statistical power for analyzing the data [91]. Moreover, the standard minimum sample size for employing CB-based structural equation modeling (SEM) is 200 [92]; hence the current sample of respondents is fit for this research. Table 1 presents the profile of the sample respondents.

Table 1: Demographic profile of the respondents

Variables	Category	Frequency	Per cent
Gender	Male	195	64.35
	Female	108	35.64
Age	Up to 25 years	10	3.30
	26-35 years	196	64.68
	36-45 years	97	32.01
Experience	Up to 5 years	110	36.30
	5-10 years	185	61.05
	10-15 years	8	2.64
Education	Graduate	44	14.52
	Post-graduate	136	44.88
	Professional degree	123	40.59
Bank Group Wise Distribution	SBI	41	13.53
	Nationalised banks	126	41.58
	New Private Sector Banks	136	44.88

3.2 Measures

The survey instrument was designed after an extensive literature search and in-depth interviews with eight chief bank managers (IT and Operations) who have extensive knowledge and experience dealing with digital finance technologies. The developed items were modified and reworded based on the expert's feedback and the outcomes of pilot testing. To measure the organization process-related indicators of FinTech applications, the variables are classified based on Technological, Organizational, and Environmental (TOE) framework-oriented bifurcation [23]. All the items were measured on a five-point Likert-like scale (i.e., strongly disagree (=1) to strongly agree (=5). The details on the measurement items and the respective sources are shown in Table A1 [as given in supplemental material (Online Appendix)]

4. Analysis and results

Using the conceptual model (Figure 1), the structural equation modeling (SEM) technique using maximum likelihood estimation (MLE) method was employed. IBM AMOS 21.0 was used for applying structural equation modeling because covariance-based SEM is considered effective in analyzing a phenomenon on a large sample and testing the unidimensionality, and is argued to be superior to PLS-based SEM [93]. Covariance-based SEM provides more accurate analyses of the model, a more robust test of model fit with a broad set of indices, and provides superior coefficient estimates as compared to other methods [93]. A series of preliminary analyses were conducted to test the unidimensionality, reliability, and validity of the scale developed for the research. The internal consistency of the scales was confirmed using Cronbach's alpha against the benchmark score of 0.7 [94]. To ensure the validity of the scale, the convergent and discriminant validity was tested using the measurement model as deliberated in the following section. And the content validity of the scale was established through a careful synthesis of relevant literature, pilot testing, and constructive feedback on the scale by the experts [95]. In addition, the data were tested for potential common method bias using Harman's Single Factor test [96] by finding unrotated factor solution. The current dataset was found to be free of any common method bias where the first factor constituted 29.36% of the total variance explained, far below the benchmark of 50% [97]. The two-stage approach to structural equation modelling technique [98] was employed.

4.1 Measurement model

The confirmatory measurement model was specified by loading all the constructs. Three categories of goodness-of-fit indices were used to measure the model fitness to the observed dataset. All the reported indices represented satisfactory model fit as per the recommendations of Hair et al. [99] as shown in Table A2 [as given in supplemental material (Online Appendix)] Concerning the reliability analysis, the composite reliability (CR) values for each construct were found to be greater than the threshold of 0.70 [100] , and the AVE for all the factors also

exceeded the acceptable limit of 0.5 [101]. Thereby, convergent validity was ensured as shown in Table A3 [as given in supplemental material (Online Appendix)]. To confirm the discriminant validity, the diagonal and off-diagonal elements of the inter-construct correlation matrix were compared. The diagonal scores of the inter-construct correlation matrix were found to be greater than the off-diagonal ones, i.e., the square roots of the AVE values are greater than the inter-construct correlations (See Table 2). Also, the inter-construct correlation estimates for all the pairs of constructs were below the cut-off value of 0.85 [102]. Besides, as the AVE for each construct was greater than their respective MSV scores, the discriminant validity was confirmed for the specified scale.

Table 2: Discriminant validity results/Inter-construct correlations

	EF	ETI	RHI	QCS	IRC	IMS	CR	Inno	Inter	ITP	STO	VC	EP
EF	**0.91**												
ETI	0.34***	**0.82**											
RHI	-0.20**	-0.53***	**0.89**										
QCS	-0.15*	-0.20**	0.09	**0.92**									
IRC	0.30***	0.37***	-0.42***	-0.22**	**0.87**								
IMS	0.49***	0.26***	-0.29***	-0.34***	0.35***	**0.82**							
CR	0.35***	0.25***	-0.44***	-0.17*	0.44***	0.29***	**0.90**						
Inno	0.36***	0.16**	-0.41***	-0.17*	0.34***	0.30***	0.46***	**0.89**					
Inter	0.39***	0.30***	-0.28***	-0.18*	0.35***	0.26***	0.29	0.30	**0.89**				
ITP	0.38***	0.27***	-0.24***	-0.15*	0.19**	0.28***	0.20**	0.25***	0.29***	**0.87**			
STO	0.28***	0.24***	-0.35***	-0.13*	0.34***	0.36***	0.42***	0.44***	0.34***	0.30***	**0.97**		
VC	0.77***	0.32***	-0.22**	-0.11	0.27***	0.42***	0.35***	0.33***	0.44***	0.34***	0.57***	**0.86**	
EP	0.45***	0.23***	-0.18*	-0.14*	0.34***	0.25***	0.34***	0.36***	0.44***	0.21**	0.53***	0.59***	**0.69**

Note: ** $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$; and the diagonal elements represent square-roots of AVE values for each construct*

Where, the diagonal elements represent the square-root of AVE scores, and the off-diagonal ones signify the correlations between the respective constructs. The correlation coefficients among the independent variables were found to be well below the threshold (i.e., 0.9) [103] for multicollinearity concerns with highest correlation equals 0.6. Further, the variables were tested for multicollinearity problem through the collinearity diagnostics. No issues concerning multicollinearity could be found as the coefficients of tolerance and variance inflation factor (VIF) were meeting the benchmarks of > 0.2 and < 5 respectively [104].

4.2 Structural model results

The structural model was stated by specifying the causal relationships among the latent constructs. The structural model was found a good fit with all the scores within the acceptable limits (see Table 2). The model testing included path analysis and path coefficient estimates. In the hypothesized model, nine constructs were considered as the exogenous variables, and four variables were taken as endogenous. The model was able to explain 73.4% (R^2) variation in organizational value creation (VC), and the R^2 values for sustainable technology orientation (STO) and efficiency were found to be 42.4% and 43%, respectively. Table 3 presents the statistical results of hypothesis testing using path analysis.

Table 3: Hypothesis testing

Name	Path	Estimate	S.E.	C.R.	P	Label
H1	EF ← Inter	0.16	0.05	3.31	***	Sig.
	EF ← ITP	0.13	0.05	2.92	0.00**	Sig.
	EF ← RHI	0.16	0.04	3.66	***	Sig.
H2	STO ← Inter	0.00	0.06	0.06	0.95	Non-sig.
	STO ← ITP	0.09	0.05	1.87	0.06	Non-sig.
	STO ← RHI	-0.09	0.04	-2.11	0.04*	Sig.
H3	EF ← CR	0.12	0.05	2.46	0.01*	Sig.
	EF ← Inno	0.14	0.05	2.74	0.01*	Sig.
	EF ← IMS	0.34	0.06	5.72	***	Sig.
H4	STO ← CR	0.11	0.05	2.05	0.04*	Sig.
	STO ← Inno	0.14	0.05	2.50	0.01*	Sig.
	STO ← IMS	0.14	0.06	2.38	0.02*	Sig.
H5	EF ← ETI	0.24	0.06	3.73	***	Sig.
	EF ← IRC	-0.01	0.05	-0.22	0.82	Non-Sig.
	EF ← QCS	0.08	0.04	2.10	0.04*	Sig.
H6	VC ← EF	0.71	0.05	13.62	***	Sig.
H7	VC ← STO	0.31	0.05	6.81	***	Sig.
H8a	STO ← EP	0.56	0.10	5.41	***	Sig.
H8b	VC ← EP	0.23	0.08	3.01	0.00**	Sig.

Where, ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

The statistical outcomes revealed the constructs pertaining to technological, organizational, and environmental indicators as significant determinants of efficiency, except for the improved regulatory compliance. For technological indicators, interactivity ($\beta = 0.16$, $p < 0.001$), improved transaction processing ($\beta = 0.13$, $p < 0.01$), and reduced human intervention ($\beta =$

0.16, $p < 0.001$) were found to be statistically significant predictors of efficiency. The organizational indicators, i.e., cost reduction ($\beta = 0.12$, $p < 0.05$), innovation ($\beta = 0.14$, $p < 0.05$), and improved market standing ($\beta = 0.34$, $p < 0.001$) were seen as significant antecedent to efficiency. Efficient technological infrastructure ($\beta = 0.24$, $p < 0.001$) and quality customer service ($\beta = 0.08$, $p < 0.05$) were significant environmental indicators influencing efficiency. The sustainable technology orientation was a statistically significant outcome of reduced human intervention ($\beta = -0.09$, $p < 0.05$) (i.e., significant but negative), cost reduction ($\beta = 0.11$, $p < 0.05$), innovation ($\beta = 0.14$, $p < 0.05$), improved market standing ($\beta = 0.14$, $p < 0.05$), and environmental performance ($\beta = 0.56$, $p < 0.001$). The independent variable, i.e., environmental performance was spotted as the most significant antecedent to sustainable technology orientation with the highest coefficient estimate. Further, efficiency ($\beta = 0.71$, $p < 0.01$), sustainable technology orientation ($\beta = 0.31$, $p < 0.001$), and environmental performance ($\beta = 0.23$, $p < 0.001$) were found to be statistically significant determinants of organizational value creation.

5. Discussion

The findings offer preliminary statistical viability to the conceptual model designed in the current research through the following propositions: (a) TOE captures the process-related indicators of using FinTech applications towards sustainable organizational performance, (b) the TOE process-related indicators interplay with environmental performance and sustainable technology orientation to create value for the organization. This research used a novel TOE-based framework to categorize the process-related performance indicators of using FinTech in the banking landscape. The study attempted to investigate the distinct linkage between these indicators and the organizational performance outcomes considering the sustainability element along. The research outcomes provide a solid support to the relevance of understanding the process-related indicators in leading the way to value creation for the organizations. This

research contributes to the body of knowledge on FinTech and value creation by undertaking a TOE-based investigation of not the antecedents but the role of process-related indicators of FinTech implementation in determining the organizational value creation. The study included important external variables, i.e., sustainable technology orientation, efficiency, and environmental performance due to FinTech as the predecessors to organizational value creation. The statistical analysis supported the majority of hypotheses proposed. Concerning the technological indicators, both interactivity and improved transaction processing were seen as significantly influencing efficiency. Earlier research argues that digitalization of the organizational operations result in improved speed of information processing and interactivity, ultimately leading to greater efficiency of operations [20], [42]. The reduced human intervention was observed as an antecedent to both the sustainable technology orientation and efficiency. However, the negative influence of reduced human intervention on sustainable technology orientation was found. Previous studies support these findings where Henderson & Venkatraman [38] has established the significance of improved interactivity and transaction processing in influencing operational performance and efficiency. Milian et al. [27] states that new technology implementation has helped organizations in reducing intermediaries leading to lesser human errors and increased efficiency. Further, it is to be mentioned here that in case of FinTech, reduction in human reliance inversely affect technology orientation. This finding is in contradiction to earlier studies on new technologies adoption by organizations [72]. It can be due to the different nature of financial service operations than other industries.

The organizational indicators, i.e., cost reduction, improved market standing, and innovation were found to be not only impacting the efficiency but the sustainable technology orientation as well. According to Mărăcine et al. [50], the operational processes and businesses can be optimized through cost reduction resulting from IT adoption. Prior studies have pinpointed that new technologies are capable of improving cost structure of the organizations by changing their

revenue models leading to technology orientation and better efficiency [18]. Diener & Špaček [78] argues that IT has been a significant driver of innovation, which further improves efficiency at the operational level [31]. Innovation has been found as an important indicator of technology orientation and sustainable performance by Klein et al. [18]. As per the current study, the improved market situation due to IT helps improve the organizational performance in line with the findings of Santos & Peffers [58]. Alshamaila et al. [61] have also established a significant association between market scope and positive efficiency. The research conducted by Khin and Ho [73] support our results concerning the effects of indicators such as digital technologies and their organizational benefits on sustainable performance. The study reveals the environmental factors, namely efficient technological infrastructure and quality customer services, as the determinants of efficiency. The finding is consistent with the previous literature [65], [68]. Amongst all hypotheses, the study could not establish a significant association between interactivity and improved transaction processing with sustainable technology orientation. It can be due to the elementary nature of these technological variables that might not be linked to the strategic outlook of the banks towards FinTech [105]. Also, improved regulatory compliance was not found to be a significant predictor of efficiency. The finding can be because of the possibility of not a direct but indirect relationship through other related variables (i.e., mediating variables) [35], which can be a potential consideration to be tested in future research.

Further, this research included an external variable, i.e., environmental performance of banks due to FinTech applications, as the importance of the sustainable performance of organizations is gaining momentum these days. The environmental performance expected out of FinTech implementation is also found to be significantly associated with sustainable technology orientation consistent with the notions underscored by Kennedy et al. [76]. It is worth mentioning here that environmental performance was found to be highly significant predictor

of sustainable technology orientation, depicting the huge importance of focusing on technologies with greater green implications as the more expectations associated with adoption of green and sustainable technologies, the better will be sustainable technology orientation of the banks. The environmental performance was found to significantly influence organizational value creation, in line with the findings of Yip and Bocken [81] and Chavosh Nejad et al. [45]. The study also found that the efficiency and sustainable technology orientation as the outcomes of using FinTech create value for the organization. It is believed that sustainable technology orientation and efficiency are among the crucial drivers of organizational value creation [18], [72], [106]. Efficiency has been argued as a significant antecedent to the business value of IT [47]. As per Khin and Ho [73], the improvement in digital orientation leads to the superior and sustainable organizational performance of the firms.

6. Implications

6.1 Theoretical Implications

This work provides several important implications for the FinTech, operations management, and organizational value creation literature. To leverage the increasing adoption of FinTech in banks, it is essential to understand the firm-level integration and outcomes for overall value creation for the firms. This investigation expects to contribute to the rich body of knowledge on FinTech by exploring linkages among the TOE aspects and the resulting organizational outcomes. The current research is the first to present a comprehensive framework concerning the interplay of various aspects of FinTech implementation and value creation for the banks. It provides a conceptual depiction of how TOE-oriented process-related indicators, sustainable technology orientation, environmental performance, and efficiency are interlinked in creating value for banking organizations. In addition, this study contributes to the TOE model literature [35] by implementing these dimensions for process-related indicators, where previously, it has only been studied in terms of the initial adoption of digital technologies [20] [34]. The research

also paved the way for including contextual and external variables, i.e., focused on the firm's strategic orientation and green performance in addition to the TOE constructs, as these aspects ought to be considered while adopting and implementing innovative technologies in the contemporary business world facing rising sustainability issues [106]. Therefore, this research extends the applicability of using TOE-based categorization beyond understanding the initial adoption of digital technologies [107], and widens its scope to examining post-adoption organizational and operational indicators, by additionally including green/environmental performance of using such technologies which is an important yet under researched aspect. This article sheds new light on how integrating innovative digital technologies lets the firm dynamics work towards value creation for the organizations. This study offers fruitful avenues for upcoming research by taking the debate forward on how FinTech capabilities can be leveraged for organizational value creation [105]. By putting together all the rich aspects of technology, operations, strategy, sustainability, and value creation, the proposed model provides a sound ground for more exhaustively theorizing and analyzing such associations.

6.2 Practical Implications

With the surge of innovative FinTech applications and digital transformation, the managers need profound insights into creating organizational value from increased investments in these opportunities. We explored the role of TOE-based characteristics of using FinTech on efficiency and sustainable technology orientation that ultimately leads to value creation for the banks. Focusing on value creation from business operations is quintessential to ensure organizational sustainability and resilience in a turbulent business environment [70]. Our research offers the managers the knowledge of the relative importance of various indicators in leading to value creation for the banks. The bank managers can draw upon the mechanism provided by our research to improve their understanding of what factors can lead to improvement and sustainability of technology orientation in the banking industry.

For instance, banking organizations can improve their technological infrastructure by incorporating cutting-edge digital technologies and customer service quality using machine learning algorithms by providing customized and personalized finance management alternatives. By leveraging the improved market standing due to greater integration of sophisticated technologies such as AI-enabled investment advisory services, they can gain the advantage of differentiating their products from their competitors. Further, the increased use of virtual assistants augments the interactivity and customer feedback with lesser need for human intervention leading to improved efficiency for the banks. Since the integration of FinTech has led to a significant reduction in transaction and operational costs for the banks, the integrated use of these technologies can help augment efficiency and digital orientation. For example, blockchain technology has been proven to be a lower-cost alternative to improving capabilities for digital service provision and operational effectiveness in the financial services sector [80] [6]. Our findings indicate the importance of innovation enabled by FinTech applications in this regard. As a result, the managers can emphasize initiating and implementing these innovations by leveraging innovation capabilities such as service innovation to improve their orientation and efficiency to attain resilience and sustainability [108]. As highlighted in our study, bank managers can leverage the technological and organizational indicators as they help attain superior strategic technology orientation. The technology orientation improves the capabilities of the organizations in adopting and implementing technologies in response to the dynamic business environment. During the COVID-19 outbreak, banks have been able to implement contactless payment platforms using AI/ML technologies and digital lending to SMEs using big data analytics that reflected their dynamic digital capabilities and improved digital orientation [109]. Since the enhanced environmental performance due to FinTech was underlined as the most significant driver of value creation, the managers and the policy-makers should attempt to invest more in environment-friendly or sustainable FinTech applications such

as blockchain and IoT to add more value for their organizatio. Based on the findings, the knowledge of these diverse and relative influences of various FinTech-oriented determinants of organizational performance can prove to be the basis of framing the guidelines and standards for the implementation and maintenance of FinTech applications in the banking industry.

6.3 Future Research Directions

The research recognizes certain limitations that provide an agenda for future research. Although the study found exciting insights on the role of various process-related indicators in achieving organizational outcomes and value creation, one of the limitations is that it was focused only on a single nation, i.e., India, which can restrict the generalizations of findings to the regions. Future researchers can apply the given model in different countries to test its generalizability. Also, as this study is focused on a developing nation, it would be interesting to see how the framework can be retested or modified to study FinTech implementation and its implications in developed countries. A comparative analysis between a developing and developed nation can be a fruitful avenue in this regard. The research unfolds the opportunity to extend the current model based on TOE lens by including the aspects of dynamic digital capabilities as an outcome of digital orientation in leading the way to organizational value creation for the banks. Since this research explored the linkages between the constructs under study, further efforts are required to validate such relationships in varied contexts such as in other industries like retail and healthcare in order to confirm the generalizability of our findings. This research has emphasized the environmental sustainability, i.e., one of the pillars of sustainability, amongst the implications of FinTech adoption. Future research can be undertaken by focusing on all the three pillars including environmental, economic and social sustainability as important considerations. Further, future researchers can focus on examining various challenges encountered at the organizational level in addition to the variables

considered in the present research to unfold profound insights and to advance the ongoing debate in this field.

7. Conclusion

This research used a TOE-based framework grounded on the process-related indicators of FinTech applications in banking. For this purpose, we developed a comprehensive conceptual framework to establish associations between the organization's process-related indicators and organizational value creation. Since the adoption of FinTech applications in banking has been increasing rapidly and IT has been considered to play a significant moderating role between the organizational characteristics and the operational performance outcomes [31], it was deemed necessary to understand this phenomenon in more detail in this context. To the best of our knowledge, our research is the first to study this critical linkage of process-related indicators and organizational value creation in the FinTech landscape. The researchers and practitioners can draw upon the insightful findings of the current research for effective implementation of FinTech and create value for the banking organizations by leveraging the linkages explored.

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