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FINTECH ADOPTION AND SUSTAINABLE PERFORMANCE IN BANKING INSTITUTIONS: THE ROLE OF DIGITAL TRANSFORMATION

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ABSTRACT

Grounded in Resource Based View (RBV) and Technological Innovation System (TIS); this study aims to explore the role of FinTech in sustainability performance through mediating role of digital transformation. The data is collected through an adapted self-administered survey questionnaire from employees (N=349) of commercial banks in Pakistan. The PLS-SEM results revealed that FinTech has a significant and positive effect on sustainable performance of Banks. Further, digital transformation significantly mediates the relationship between FinTech and sustainable performance. This suggest that FinTech solutions improve performance, increase access to financing and sustainability goals through the use of improved technology and digital applications. The findings provide novel insights and contribute to existing theorical knowledge in of sustainability. Moreover, findings provide practical guidance to the policymakers and banking professionals for enhancing sustainability performance through Fintech and digital transformation.

Keywords: *FinTech, Sustainable Performance, Digital Transformation, Technological Innovation System.*

INTRODUCTION

The current dynamic financial services sector experiences rapid changes with the innovation of a new form of financial industry known as Financial Technology, or FinTech (Suseendran et al., 2020). As an enabler of change, FinTech brings new mechanism like blockchain, Artificial Intelligence, Internet of Things (IoT) and big data and revolutionizes the solutions to various banking services, customer experience, and organizational performance (Wang, Liu, & Luo, 2020; Naz et al., 2023). It causes a significant impact on existing banks, and digital transformation intensifies this impact as it allows banks to reposition and redesign their services as well as delivery models in a converging digital environment (Jardak & Ben Hamad, 2022; Hidayat-ur-Rehman & Hossain, 2024). This dynamic transformation holds profound implications for banking sustainability, starting an emerging debate both in the academic literature and in practice. Ensuring that the banking systems achieve stability while delivering both economic value and positive economic impact to the environment and society has emerged as a major concern to the financial institutions (Lee et al., 2021). Therefore, exploring the interaction of FinTech with digital transformation offers a novel insight to respond to sustainability challenges.

Although FinTech has emerged as an important area for research, knowledge about how it can lead to sustainable performance through digital transformation in the Pakistan's banking sector is limited. Moreover, there is significant pressure for global banking to adopt sustainable development goals, where FinTech is seen as a key facilitator to green banking and efficiency. However, in the context of Pakistan, regulatory issues, digital illiteracy, and infrastructural constraints are some of the challenges face the FinTech industry to fully unlock its advantages (Ahmed et al., 2024). This research fills the void by investigating the impact of FinTech on sustainable performance in Pakistan's banking sector with mediating role of digital transformation.

Filling this gap is important both for improving the productivity of the Pakistani banking industry and for achieving other macroeconomic objectives. Banking sector being a part of the financial systems, has a strategic significance in promoting the sustainability concepts identifying and implementing the technological solutions. Previous research has primarily addressed the effectiveness and technological readiness of FinTech integration but disregarded the application of FinTech in achieving sustainable growth and competitive advantage in the long run, particularly for developing countries (Naz et al., 2023). This research aims to address this important gap by offering a detailed methodological analysis of how FinTech integration with digital transformation can help Pakistani banks achieve both sustainability and long-term goals.

The theoretical foundation of this research is the Resource-Based View (RBV) theory which assert that resources and capabilities are central to attaining competitive advantage and superior performance (Siddik, Rahman & Yong, 2023). Digital innovation and FinTech can be conceptualized as strategic assets that help banks transform themselves, improve clients' satisfaction, and secure operational viability (Mushtaq et al., 2024). Moreover, the Technological Innovation System (TIS) framework explains the function of technology in influencing organizational resilience and performance, especially in unstable markets like Pakistan (Hassan, Kushwaha & Sharma, 2023; Hidayat-ur-Rehman, 2024). These theoretical frameworks form the foundation on which the relationships between FinTech adoption, digital transformation, and sustainable performance can be examined. This research adopted these frameworks in order to explain the dynamic nature of the Pakistani banking sector and provide insights to the use of technological advancements for sustainability.

The main research question of this research is to explore the role of FinTech adoption in enhancing the sustainability of Pakistani banks with the help of the mediator variable of digital transformation. This study seeks to assess the specific objectives:

1. Examine the direct impact of FinTech adoption on sustainable performance.
2. Assessing the mediating roles of digital transformation between FinTech on sustainable performance.

The present study has manifold contribution to theory and practice. Firstly, it contributes to the existing dearth of studies that examine the sustainability impact of FinTech in Pakistan's banking industry that have mostly explored technological efficiency gains and customer satisfaction (Hussain et al., 2023). Second, it provides practical guidance to the policymakers and banking professionals who are interested in the integration of the sustainability into the operation strategies. Finally, the study has more general implications about emergence economies, revealing how digitalization can foster sustainable development in the condition of limited resources and infrastructures.

Literature Review

FinTech and Sustainable Performance

FinTech adoption in achieving sustainable performance has emerged as a topic of interest within the banking industry. Sustainability performance is a financial and non-financial metric that depicts an organization's capacity to run its operations in an efficient manner that also addresses the broader needs of the society. FinTech is defined as the use of advanced technologies in financial services, which provides solutions to improve global organizational productivity, extend financial access, and drive green finance, all of which contribute to sustainability (Hidayat-ur-Rehman & Hossain, 2024). This linkage is based on the Resource-Based View (RBV) theory because it identifies

technology as the strategic organizational asset. Blockchain, AI, and mobile banking are examples of FinTech solutions that act as strategic resources that can improve the use of resources and achieve competitive advantage for banks (Yan et al., 2022). In addition to the profit-based perspective, FinTech supports sustainable development goals by enabling change in finance and emerging green technologies, bridging the gap between the use of technology and sustainable results (Alsadoun and Alrobai, 2024).

Current research findings also show that FinTech has a robust impact on the bank's performance in achieving sustainable development goals. For instance, Bhuiyan et al., (2024) established that FinTech contributes to environmental performance through efficiency of employees and green finance (Bhuiyan et al., 2024). Likewise, research on Emerging markets like Pakistan depict that digitalization enhances the effects of FinTech on sustainability through competitive advantage and customers' satisfaction (Naz et al., 2023). However, certain issues including, legal frameworks and low digital literacy of consumer have prevented FinTech from achieving its full potential. In order to fill these gaps, FinTech needs to be incorporated into sustainability initiatives, as research emphasizing green innovation as the moderating variable in the path to sustainable performance (Joshi & Karmacharya, 2024). Based on the RBV theory and research findings, this research proposes that FinTech directly affects sustainable performance by efficient resource management and creativity. This leads to the hypothesis:

H1: FinTech has a significant effect on sustainable performance.

Digital Transformation and Sustainable Performance

Digitalization, the incorporation of digital technologies into the business processes, is the core process that drives sustainable performance by improving the environmental, social and economic results. For example, use of such technologies as AI, IoT, and big data makes firms to track cases where resources are wasted and consequently encourage green practices (Alojail & Khan, 2023). In addition, linking up of digital transformation with sustainability framework can support organizations in achieving the global imperatives like climate change in addition to creating economic value (Shafay, 2024). Emerging literature discusses the implications of digital transformation for sustainable performance in both direct and indirect manners. For instance, the digital technology-business alignment moderates the relationship between the transformation initiatives and sustainable innovation performance where there is low environmental turbulence (Lin & Mao, 2023). Likewise, furthering the adoption of digital transformation with the concept of green innovation has been found to enhance its effectiveness in improving on environmental and economic efficiency (Lin & Xie, 2024).

The TIS framework focuses on the systematic approach to technological advancement towards sustainable innovation; it captures dependencies on resource and adaptative capabilities (Lin & Mao, 2023). Nevertheless, there are gaps in understanding how operational models facilitate digital transformation for sustainability in low-resource environments. In order to fill this gap, this study seeks to examine the impact of digital transformation on sustainability in an effort to guide development of policies and strategies that would facilitate the achievement of sustainable business endeavors as mandated by sustainability standards of the world. Building on the TIS framework and empirical insights, this study hypothesizes:

H2: Digital transformation has a significant effect on sustainable performance.

Digital Transformation as Mediator

Digital Transformation incorporates the use of digital technologies in order to support the organizational processes and improve the decision-making processes (Hidayat-ur-Rehman & Hossain, 2024). Whereas, FinTech brings new techniques it the financial marketplace like; artificial intelligence, blockchain and mobile banks, which help organizations to realize sustainable performance indicators. DT can be seen as an enabler that provides an interface between available FinTech solutions and sustainable results in terms of resource efficiency, promotion of digitalization, and development of green finance projects (Aldaarmi, 2024). Additionally, DT enhances the effects of FinTech as it allows for near real-time analysis of data,

increases transparency and optimizes processes regarding the UN's sustainability goals (Chueca Vergara & Ferruz Agudo, 2021).

DT has been identified in research as an essential factor of how FinTech converts the various technological advancements to sustainable performance improvements. For instance, research in the context of Pakistan's banking industry shows that DT contributes to improving FinTech-based green finance operations and helps banks to reach environmental and financial objectives simultaneously (Hidayat-ur-Rehman & Hossain, 2024). Likewise, DT strengthens customer satisfaction and reuse intention with regard to FinTech services, which in the long run enhances sustainability as a result of service quality improvement and service reliability (Aldaarmi, 2024). The Technology Innovation System (TIS) perspective accounts for DT and its ability to mediate by efficiently utilizing technological resources for sustainability. Cohen et al. (2020) noted that there are still knowledge gaps in the interplay between FinTech usage and DT in context where resources are limited like Pakistan. This research aims to fill these gaps by explaining how DT can be used to improve the fit of new FinTech solutions with sustainable performance objectives. Based on the TIS framework and empirical findings, this study posits:

H3: Digital transformation has a significant mediating role between FinTech and sustainable performance.

Conceptual Model

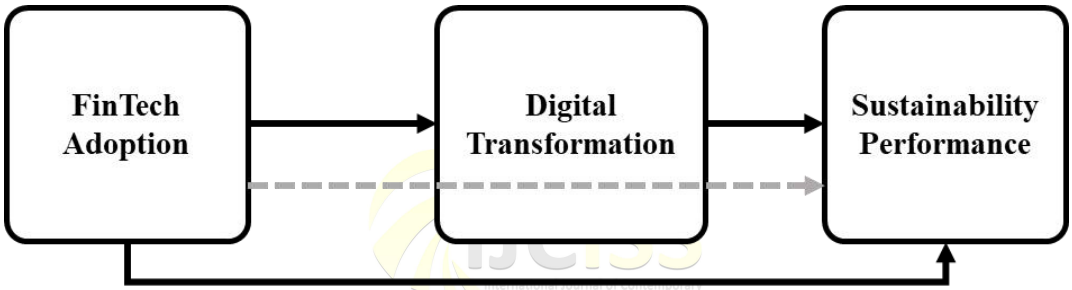

Figure 1: Conceptual Model Source: Author

Methodology

The present research uses a quantitative mono-method research approach with a survey technique to examine the moderated relationship between FinTech and sustainable performance in the banking industry through the lens of digital transformation. A structured questionnaire was used as the main tool for data collection, developed to assess the constructs of interests using scales from past research. This approach is suitable for the present study since it seeks to measure the degree of association between variables as well as test theoretical hypotheses.

Methodology and Procedures

The study adopted a deductive approach whereby hypotheses were developed from the literature based on the Resource-Based View (RBV) and Technology Innovation System (TIS). This paper relied on a self-completion survey distributed electronically among bank employees. The questionnaire included close-ended questions, each measured on the Likert scale ranging from 1 to 5, where 1 stand for "Strongly Disagree" and 5 for "Strongly Agree". In order to avoid bias and to minimize the potential for respondent manipulation of answers, all the respondents were assured of their anonymity.

Population and Sample

The target population for this research comprises employees in the commercial banks in Pakistan. Purposive sampling approach was adopted include only those employees who had exposure to FinTech and digital transformation in their organizations. A total of 350 valid responses were received, which was above the minimum sample size needed for conducting PLS-SEM analysis. The demographics of sample respondents are presented in table 3.1 below:

Table 3.1: Demographic Profile of Sample

Variable	Category	Frequency	Percentage
Gender	Male	183	52.3
	Female	167	47.7
Age	20-30 years	125	35.7
	31-40 years	150	42.9
	41 years and above	75	21.4
Education	Bachelor	210	60.0
	Master	140	40.0
Experience Level	Less than 5 years	115	32.9
	5-10 years	155	44.3
	More than 10 years	80	22.9

Measurement Scales

Validated scales from prior research were adapted for measuring key constructs: Digitalization, FinTech's prospects, and sustainable performance. Four items for Fintech adoption were adapted from Rehman et al. (2023), alongside four items for sustainability were taken from Abuatwan's (2023) research. This study employed a three items scales concerning digital transformation were taken from Rodríguez-Espíndola et al.'s (2022) research. Internal consistency reliability of the scales was assessed using Cronbach's alpha and construct validity was determined by confirmatory factor analysis. This rigorous procedure increases the study's credibility since its conclusion can be generalized across other studies.

Data Analysis

To analyze the data, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used because of its ability in handling complex models with latent variables. To test reliability, validity and path analysis, PLS-SEM was used to assess the measurement and structural models. The use of this approach allowed for the evaluation of the interconnectedness of FinTech adoption, digital transformation, and sustainable banking performance.

Results

Testing for Assumptions

In order to check the robustness of the result, appropriate statistical tests were used to check normality and common method bias. For analyzing the normality of the data, skewness and kurtosis coefficients were computed, and both coefficients showed a normal distribution of the data. In an attempt to reduce common method variance, Harman's single-factor test was conducted and the results indicated that no single factor dominates more than 50% of the total variance which further indicates that the level of method bias is negligible. In addition, multicollinearity was tested using the Variance Inflation Factor (VIF) The VIF of all items in the model was less than 3. Hence, indicating the absence of multicollinearity.

Reliability and Validity

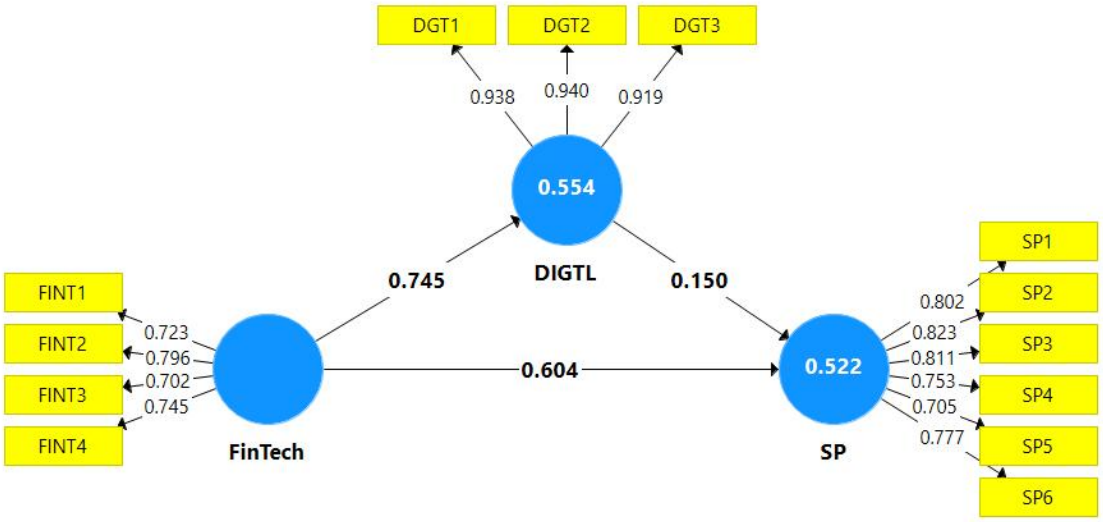

Figure 2: Measurement Model Source: Author

Table 4.1 presents the reliability and validity results for the study variables: Digital Transformation, FinTech and Sustainable Performance. All the items are above the acceptable level of 0.70 for factor loadings signifying adequate indicator reliability (Hair et al., 2017). Digital Transformation has a high internal consistency; Cronbach's Alpha (0.925), Composite reliability (0.952), and AVE equal to 0.869 which are higher than the recommended values set by Fornell and Larcker (1981). Likewise, FinTech also provide acceptable reliability; Cronbach's Alpha 0.733, Composite reliability 0.83 & AVE 0.551 all are above the lower acceptable level. Sustainable Performance has acceptable reliability with Cronbach's Alpha of 0.87, Composite reliability of 0.903 and AVE of 0.608. These statistics indicates that the measurement model is adequate and accurate enough to proceed with additional analysis.

Table 4.1: Reliability and Validity

Variable	Indicators	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Digital Transformation	DGT1	0.938	0.925	0.952	0.869
	DGT2	0.94			
	DGT3	0.919			
FinTech	FINT1	0.723	0.733	0.83	0.551
	FINT2	0.796			
	FINT3	0.702			
	FINT4	0.745			
Sustainable Performance	SP1	0.802	0.87	0.903	0.608
	SP2	0.823			
	SP3	0.811			
	SP4	0.753			
	SP5	0.705			
	SP6	0.777			

Structural Model

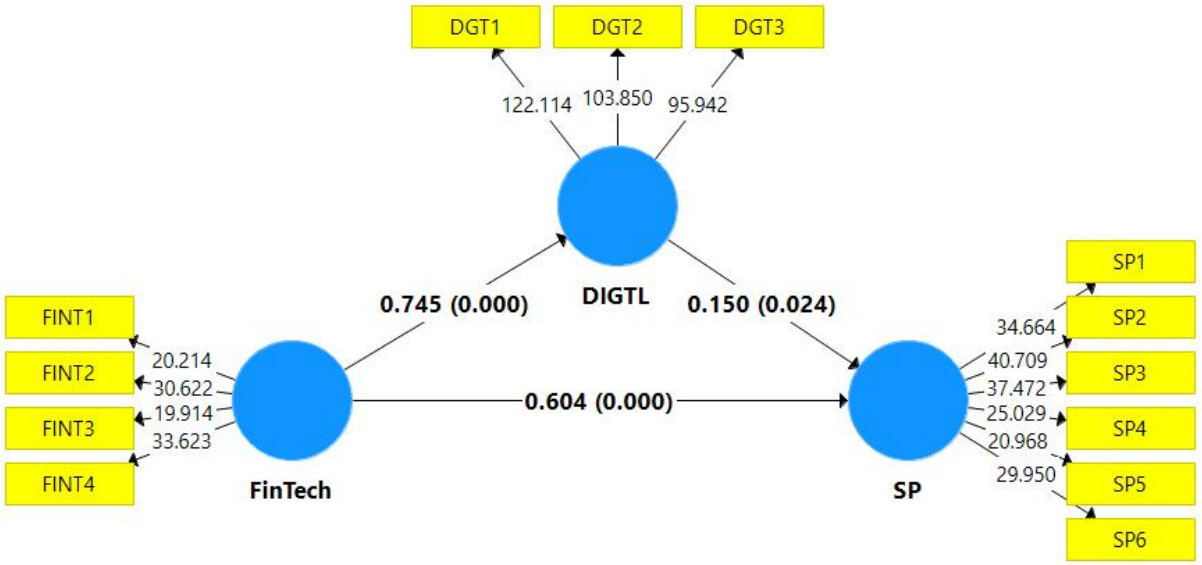

Figure 3: Structural Model Source: Author

The findings of the structural model analysis are as shown in Table 4.2, whereby FinTech, DIGTL and SP have been established. The findings, therefore, show that FinTech has a very strong effect on Digital Transformation; the coefficient is 0.745, t = 39.42 and 95% CI [0.707, 0.779] at $p < 0.05$. Also, the Hypothesis H2 asserting that Digital Transformation has a positive and significant relationship with Sustainable Performance is confirmed; the estimated regression coefficient is 0.150 with the $P < 0.05$ significance level; t-statistic equals 2.258, and the confidence interval ranges from 0.01 to 0.267. FinTech also directly affects Sustainable Performance; the regression coefficient of 0.604 is significant at $p < 0.05$ with a T-statistic of 10.521 and 95% confidence interval of [0.488, 0.718]. In addition, the indirect impact of FinTech for Sustainable Performance through the Digital Transformation is also significant (95% CI: 0.008 to 0.201; T-statistic = 2.235; $p < 0.05$, $\beta = 0.111$). The R-Square values of Digital Transformation of 0.554 and Sustainable Performance of 0.522 suggest that the model has a high level of explained variance, while Q-Square values of 0.477 and 0.308 are also significant, proving the relevance of the model in terms of prediction (Hair et al., 2017). These results further underscore the importance of FinTech and Digital Transformation in achieving Sustainable Performance.

Table 4.2: Structural Model

			Confidence Interval			
Path	**Beta**	**T Statistics**	**Lower CI**	**Upper CI**	**R Square**	**Q Square**
DIGTL -> SP	0.150**	2.258	0.01	0.267	0.522	0.308
FinTech -> DIGTL	0.745**	39.42	0.707	0.779	0.554	0.477
FinTech -> SP	0.604**	10.521	0.488	0.718	0.522	0.308
FinTech -> DIGTL -> SP	0.111**	2.235	0.008	0.201	0.522	0.308

** denotes significance at 5%; DIGDTL = Digital Trar

Discussion and Conclusion

Therefore, this study establishes relevant and significant correlations between FinTech adoption, digital transformation, and sustainable banking performance while aligning the conclusions with the current literature and providing both theoretical and practical contributions. The study findings show that FinTech positively influence digital transformation with a direct effect of 0.745 ($p < 0.05$). This finding supports previous literature that underlines the involvement of FinTech in digitalization of the banking industry through pushing technology advancement and process improvement initiatives (Verhoef et al., 2021). Technologies like artificial intelligence, blockchain, big data help the banks to transform their operations, and the customer experience to achieve competitive edge. This is in line with the resource-based view (RBV), which posits that utilization of other technological resources builds organizational competence and performance consequences (Barney, 1991)

Furthermore, the research affirms the direct relationship between digital transformation and sustainable performance ($\beta = 0.150$, $p < 0.05$) and shows that technology integration supports sustainability objectives as it enhances operations and resource utilization. This supports the observation made by Kane et al. (2021) which states that is digital transformation increases the adaptability of an organization and the achievement of sustainable results. This path reveals a rather low beta value, indicating that digital transformation is one of the enablers, but other factors may also play a role in achieving sustainable banking performance, and thus requires further investigation. The direct effect of FinTech on sustainable performance, $\beta = 0.604$, $p < 0.05$, confirms the vital role of FinTech in banking sustainability, cost optimization, financial inclusion and green solutions (Chen et al., 2021; Ozili, 2021). This supports the notion that the FinTech innovations are not only the enablers of the economic value, but tools to facilitate environmental and social goals.

The indirect effect of FinTech on sustainable performance through digital transformation (estimate = 0.111, SE = 0.041; $p < 0.05$) provides evidence that digital transformation serves as a mechanism by which FinTech leads to sustainability. This finding fills a significant void in the literature by demonstrating how the interaction between FinTech and digital transformation leads to sustainability, whereas earlier research compared these linkages separately (Vial, 2019; Arner et al., 2020). The findings of the study support the existing literature that FinTech integration and digitalization are crucial paths to sustainable performance in the banking industry. This study has theoretical significance and offers potential practical insights for banks that want to adopt new technologies to support sustainability goals in a highly competitive market.

Conclusion

The findings revealed that FinTech has a positive impact on banking efficiency for sustainable performance with mediating role of digital transformation. This suggest that FinTech with integration of digital transformation helps to transform the banking services. The results shown that FinTech solutions improve performance, increase access to financing and sustainability goals through the use of improved technology and digital applications. Digital transformation plays the role of an enabler, connecting technological use to sustainability performance. These findings advance prior academic research by providing evidence on the relationship between FinTech and digital transformation in the context of sustainability initiatives. Practically, the study therefore recommends that banks should adopt Fintech and should work on developing FinTech solutions to enable sustainable growth in the emerging financial world.

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