

THE ROLE OF FINTECH ADOPTION IN DRIVING ORGANIZATIONAL SUSTAINABILITY: MEDIATING EFFECTS OF GREEN FINANCE AND CSR

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Abstract

In the evolving financial ecosystem, financial technology (FinTech) has significantly reshaped traditional financial practices by enhancing accessibility, operational efficiency, and sustainability-driven innovations. Concurrently, global attention towards sustainable development, particularly the United Nations Sustainable Development Goals (SDGs), has emphasized the importance of green finance and Corporate Social Responsibility (CSR) as pivotal instruments for fostering environmental and social sustainability. Despite the increasing relevance of these domains, limited empirical research has explored the integrated effects of FinTech adoption, green finance, and CSR on organizational sustainability, particularly within developing economies like Pakistan. This study aims to address this gap by investigating how FinTech adoption influences organizational sustainability through the mediating roles of green finance and CSR. Employing Institutional Theory as the guiding framework, this research conceptualizes FinTech adoption as a strategic response to shape sustainable business practices. A quantitative, cross-sectional methodology was employed, targeting senior managers from 279 small and medium-sized enterprises (SMEs) within Pakistan's manufacturing sector. Data were collected using a structured questionnaire with validated scales and analyzed through SPSS, applying regression-based mediation analyses. The findings reveal that FinTech adoption significantly enhances organizational sustainability. Moreover, CSR and green finance partially mediate this relationship, indicating that FinTech's contribution to sustainability is maximized when aligned with CSR practices and green financial initiatives. The study confirms that technology, when strategically embedded within social responsibility frameworks and green financial pathways, substantially advances sustainability outcomes. This research contributes to the growing discourse on sustainable financial innovation by offering an integrated model that elucidates the complex interplay between FinTech, CSR, green finance, and sustainability, specifically within developing country contexts.

INTRODUCTION

The emergence of financial technology (FinTech) in the mainstream financial sector has disrupted traditional financial practices to offer more inclusive, efficient, and transparent financial services in the fast-changing financial environment (Li et al., 2023). FinTech is widely understood as the creative use of technology in the delivery of financial services, which include mobile banking, blockchain, digital payments and investment platforms (Kou et al., 2021). FinTech has specifically impinged on the traditional financial systems by making them more accessible, cheaper to operate, and better in customer experiences (Liu et al., 2023). Consequently, companies are rampantly turning to FinTech to engage in operational efficacy and a strategic sustainability target.

Globally, the sustainable development agenda has gained significant traction, particularly with the growing urgency of addressing environmental degradation and climate change. It is stated that responsible consumption and sustainable industrialization, as well as climate action, are vital in the achievement of global sustainability in the United Nations Sustainable Development Goals (SDGs) (Zhao et al., 2022). In that regard, green finance has become a strategic facilitator of the sustainable development, as it directs financial flows toward environmentally sustainable projects and initiatives, including renewable energy, energy efficiency, and green infrastructure (Chen et al., 2023). Green finance helps in the process of shifting to a low-carbon economy and establishes the fact that business should consider sustainability as part of their mainstream financial planning. At the same time, Corporate Social Responsibility (CSR) has emerged as essential part of the contemporary business strategies. CSR is a concept that incorporates corporate actions oriented to strike a balance amid economic, social, and ecological urgencies and create long-term stakeholder benefit (Javeed et al., 2021). CSR helps to build a better reputation of the firm, as well as it helps to promote social equity and environmental safety that are critical to the promotion of sustainable business performance (Ullah et al., 2022). Over time, the corporate world is coming to the realization that the advantages of CSR practices extend to customer

retention, better employee retention rates, and the creation of strong corporate brands in competitive business environments.

Developing countries, particularly in South Asia, are witnessing a surge in FinTech adoption as a means to overcome financial exclusion and infrastructural constraints (Ahmed et al., 2021). As an example, in Pakistan the digital finance industry is growing fast due to the government support, technological modernization and rising smartphone ownership (Raza et al., 2022). Nevertheless, the aspect of FinTech as a part of sustainable organizational strategy is under researched in new economies, regardless of the aforementioned developments. In the same breath, green finance is building momentum in Pakistan, yet several challenges are still present because of a lack of supporting regulation, insufficient investor education, and the lack of accessibility to green financial products (Khan et al., 2021). The market is still in its infancy stages although some of the financial institutions have begun to issue green bonds and sustainable investment products, in line with the developed nations. Moreover, the trend in CSR practices in Pakistan has shifted towards well-organized, strategized actions that are linked to the global sustainability standards, as opposed to the philanthropic activity (Ali et al., 2022). Nevertheless, resource constraint, absence of stakeholder participation, and inadequate enforcement of regulations continue to undermine successful implementation of CSR in most organizations.

While substantial research has examined the individual impacts of FinTech, green finance, and CSR on organizational performance and sustainability, limited empirical studies have explored their interconnectedness, particularly in the context of developing economies like Pakistan (Liu et al., 2023; Chen et al., 2023). The current literature is largely disjointed, with either the financial or environmental aspect considered separately and insufficiently representing the combined routes through which FinTech implementation can impact on the sustainability of organizations through green finance and CSR. The exact problem of the research that is tackled in the proposed project is the lack of empirical knowledge on how the use of FinTech can

promote green financial operations and improve CSR involvement to create sustainable organizational performance. This gap is very relevant to the developing nations where the financial systems are young, and the practices of sustainability are under transition.

Addressing this research gap is crucial for several reasons. Understanding the dynamic relationship between FinTech adoption, green finance, CSR, and organizational sustainability can help businesses in emerging markets devise more effective strategies to achieve competitive advantage while fulfilling their social and environmental responsibilities (Kou et al., 2021). The research is useful to policymakers in reinforcing regulatory frameworks towards supporting sustainable financial innovation. Green financial instruments and policies can be effective in encouraging business to develop CSR practices as part of their sustainability policies. This study would be relevant to investors and stakeholders as they are beginning to take Environmental, Social, and Governance (ESG) factors increasingly seriously when making investment decisions (Zhao et al., 2022). This study helps to advance the discussion about FinTech role in supporting responsible investment and corporate governance in developing economies by explaining how the FinTech adoption can support better sustainability results. On a theoretical level, the paper contributes to the currently available knowledge by providing an elaborate framework that combines FinTech, green finance, CSR, and organizational sustainability. This coupled strategy gives a more comprehensive picture of the avenues towards sustainable business operations in the digital age.

This study extends the conceptualization of sustainability in the digital finance context by integrating FinTech adoption with green finance and CSR as key mediators. This is a multi-dimensional framework that contributes to theory in understanding how financial innovation could be used to achieve sustainable organizational performances. The research offers empirical investigation of interrelationships in the developing economy of Pakistan where the topic is under researched. The report can be used as a point of reference to other economies of a similar size with matching financial and sustainability constraints.

Practitioners can also find practical implications of the study, as they can learn how to strategically use FinTech tools to maximize the effects of green finance initiatives and CSR activities and, therefore, increase sustainability performance. The study identifies the necessity of supportive policies that could ease FinTech innovation, green financial instruments, and the best practices of CSR adoption. The following suggestions can help regulators in creating more efficient sustainability policies.

Theory:

In the dynamic landscape of organizational studies, scholars have long debated which theoretical frameworks most effectively capture the complexities of technology adoption, corporate responsibility, and sustainability. On the one hand, Technology Acceptance Models (TAM) and Diffusion of Innovation Theory (DOI) provide an adequate explanatory scope regarding the financial technology's adoption, paying more attention to the inner decision-making mechanisms and individual acceptance (Venkatesh et al., 2012; Candi et al., 2021). Resource-Based View (RBV) and Dynamic Capabilities Theory explain that the primary force, which influences organizational change, is internal capabilities and competitive advantages (Teece et al., 2016). However, such solutions are likely to underestimate the powerful influence of the external forces such as system of regulations, social normativity and environmental demands on the development of the organizational strategies and behaviors in the contemporary globalized and sustainability-focused world. In particular, in the case of green finance and corporate social responsibility (CSR), internal motivation may be insufficient to comprehend why organizations adopt(ed) certain technologies or sustainability processes (Liu et al., 2021). In this regard, a recent stream of literature reveals that the external institutional pressures possess a significant influence on the organizational decision-making and encourage the firms to comply with the rest of the society, regulatory and market requests (Zhou et al., 2022; Zhang et al., 2023). It is this shift towards the cognition of the outer world that provides a more comprehensive way in which to seek the interdependencies among FinTech

adoption, green finance, CSR, and organizational sustainability.

Institutional Theory provides a useful lens to clarify the fact that the motivation to adopt FinTech, engage in green finance, and implement CSR practices are not solely the by-product of internal efficiency seeking efforts but are rather strongly influenced by coercive, mimetic, and normative forces of the institutional surroundings (DiMaggio & Powell, 1983; Mahmood et al., 2021). The organizations are pushed towards the legality and social legitimacy by the coercive forces, e.g., government regulations towards sustainable finance, which makes them use the green financial instruments and technologies (Zhou et al., 2022). Mimetic forces are also driving the adoption of FinTech solutions in organizations since they observe other organizations utilizing technology-based advantage to gain credibility and competence in the market (Zhang et al., 2023). At the same time, normative pressures, as the values imposed by

society, industry, and interested parties, induce companies to take part in CSR activities and coordinate their actions with the global sustainability agenda (Liu et al., 2021). The adoption of FinTech in this model is a manifestation of not just technological advancement, but also an organizational reaction to the conjunct institutional demands. Green finance is perceived as a compliance tool and as a reputational tool where CSR is perceived as an ethical alignment of their values with those of the society. Organizational sustainability is eventually realized when companies are able to balance and harmonize these institutional needs to their operations. In that way, the Institutional Theory offers a consistent and multidimensional reasoning behind the routes described in the proposed framework, whereby the adoption of FinTech affects the sustainability of organizations directly and indirectly via green finance and CSR, respectively, in a setting defined by the changing external pressure and expectations.

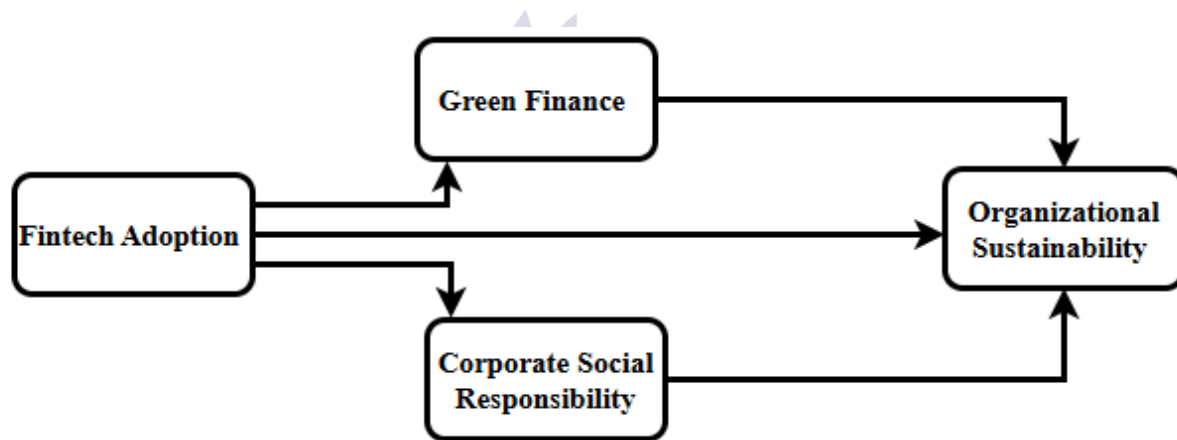


Fig 1: Research Model

Hypotheses Development

The impact of technological advancements on organizational sustainability has generated significant scholarly debate. On the one hand, certain scholars state that the implementation of financial technologies (FinTech) is efficiency-driven, aimed at such goals as the speed of transactions, their cost-effectiveness, and convenience of use, but not directly linked to sustainability performance (Cai, 2022; Lee & Shin, 2018). Such views point to the fact that FinTech, despite its revolutionary potential in financial systems, is a tool that is primarily focused

on optimizing financial operations, as opposed to ensuring sustainability. However, other researchers also indicate that FinTech may serve as an efficient supporter of sustainable practices through enabling green investments, enhancing financial transparency, and boosting the availability of green financial products (Li et al., 2022; Wang et al., 2023). FinTech ecosystem (such as blockchain, mobile payments and peer-to-peer lending) can shift financial flows to support environmentally and socially responsible projects (Chen et al., 2021). This point of view is also supported by recent empirical research. As an

example, using development of FinTech, Li et al. (2022) showed that the use of green finance instruments among firms is substantively increased, which positively influence corporate sustainability. Likewise, Wang et al. (2023) discovered that FinTech use amongst manufacturing companies in Asia has expedited their environmental, social, and governance (ESG) integration since it grants them the capacity to design real-time sustainability tracking and reporting systems. These results suggest that the use of FinTech is becoming more exposed to sustainability imperative as increasing pressure is put to organizations to align their operations to environmental and social objectives.

The Institutional Theory offers a powerful perspective to understand why organizations today are using FinTech not only to achieve operational advantages but also as the strategic way to react to the exterior institutional pressures (Zhou et al., 2022; Zhang et al., 2023). Within this perspective, the diffusion of FinTech is not merely a strategic choice, but it is greatly determined by the coercive forces such as regulatory pressures on sustainable finance, mimetic forces of a desire to be like the industry leaders, and normative forces associated with the shifting values in the broader society (Liu et al., 2021; Mahmood et al., 2021). The global regulators placed a special emphasis on sustainable finances, compelling organizations to resort to FinTech as the means of adapting to the new policies (Zhou et al., 2022). Moreover, mimetic forces drive organizations to implement FinTech solutions that other peer companies have already deployed successfully, particularly when its implementation creates an impression of environmental care and financial creativity to stakeholders (Zhang et al., 2023). The normative pressures, associated with professional networks, environmental advocates, and consumer demands also influence firms to embed FinTech solution, which facilitate sustainability reporting and green investment (Liu et al., 2021). The combination of these institutional forces pushes firms to accept FinTech not only as a financial instrument, but also as a means of sustainable practices and long-term legitimacy of the organization. On this theoretical and empirical basis, it would be reasonable to hypothesize that the effect of FinTech adoption on organizational sustainability is positive and

significant especially where regulatory, societal, and market forces intersect and create an environment where more transparent, responsible, and technologically empowered financial practices are expected.

FinTech adoption has a significant positive impact on organizational sustainability.

The relationship between financial technology (FinTech) and sustainability has sparked considerable academic discussion regarding the underlying mechanisms through which this association unfolds. Other researchers suggest that the application of FinTech is enough to improve organizational sustainability, and the main mechanisms are financial efficiency, green investments, and more transparency in resources allocation (Cai, 2022; Li et al., 2022). Based on this opinion, FinTech enables financial processes to be optimized and enables companies to directly meet sustainability goals without utilizing other strategic avenues like corporate social responsibility (CSR). Other researchers, on the contrary, believe that technology cannot promote sustainable change on its own unless it becomes part of a wider social and ethical engagement (Huang & Ye, 2022; Wang et al., 2023). Here, the CSR is important as it will enable the technological fintech potential to be applied into socially conscious actions in line with environmental and community-centered objectives. The mediating role of CSR in this process is gaining support in the recent empirical studies. To illustrate, Huang and Ye (2022) demonstrated that firms that utilized FinTech to seek social welfare and environmental stewardship through CSR actions were outperformed by their peers regarding sustainability performance, who merely sought technological efficiencies. Moreover, Li et al. (2022) determined that disclosure of CSR information through the FinTech products and services was significantly increased, which, in turn, worked positively on the reputation and sustainability of companies. These findings indicate toward the fact that CSR is a significant channel thanks to which the implementation of FinTech could be turned into long-lasting organizational practices, meaning that technology must be operated according to the socially responsible agenda so that it could deliver all of its sustainability promise.

The Institutional Theory has proven to be a strong explanation of this mediating pathway because it focuses on how CSR serves as a major organizational reaction to external institutional pressures (Zhou et al., 2022; Zhang et al., 2023). Coercive pressure in the form of regulatory pressures towards sustainability reporting is one of the aspects that tend to force organizations to not only adopt advanced financial technologies but also actively participate in CSR program to demonstrate their social and environmental responsibilities to the world (Liu et al., 2021). Mimetic forces also influence companies to copy other prominent institutions that have adopted and incorporated FinTech with conspicuous CSR practices since such confluence is viewed to bring social licensure and competitive edge (Zhang et al., 2023). Secondly, normative pressures, caused by the changing expectations of stakeholders, encourage organizations to use FinTech in a manner that brings significant value to the societal well-being, including by facilitating green investments and enabling community development via CSR (Mahmood et al., 2021). In such an institutional setting, CSR becomes a critical tool that directs the fruits of FinTech implementation into the attainment of wider sustainability goals. When organizations integrate FinTech into socially responsible operations, they do not only operate to the expectations of their institutions, but also boost their legitimacy and sustainability. Therefore, it could be hypothesized that CSR is the mediator between FinTech implementation and organizational sustainability, the translator of technology-induced progress into long-term environmental and social changes in an environment of institutional pressure.

Corporate Social Responsibility (CSR) mediates the relationship between FinTech adoption and organizational sustainability.

The pathway through which FinTech adoption influences organizational sustainability has been the subject of ongoing scholarly debate, particularly regarding whether financial technologies directly drive sustainability outcomes or whether intermediary mechanisms are essential in this relationship. According to some researchers, FinTech, due to its features and abilities in the field

of improving financial efficiency, digital money transactions, and automation, can itself, without any additional help, guide firms on the way of sustainable practices, making it easier to access, more effective in terms of financial inclusion and less paper-based (Cai, 2022; Wang et al., 2023). Nevertheless, the emerging literature is contradicting this belief by noting that the impact of FinTech on sustainability can be far more effective when it is synchronized with green financial instruments that explicitly channel capital to the environment-friendly projects (Li et al., 2022; Chen et al., 2021). This view also stresses that although FinTech enables the facilities of digital monetary exchange, it is the focused utility of green finance that prompts quantifiable sustainability results like carbon decrease, renewable energy investments, and enhanced natural environmental reporting (Wang et al., 2023). This argument is supported by recent empirical evidence. As an illustration, the study by Li et al. (2022) established that FinTech platforms in China meaningfully enhanced the proficiency and access of green bonds, which ultimately impacted the sustainability score of firms positively. Likewise, Wang et al. (2023) revealed that companies that used digital finance platforms to avail themselves green credit lines experienced significant positive changes in their environmental, social, and governance (ESG) performance. These papers imply that green finance does not represent a parallel trend but a mediating channel without which the adoption of FinTech would not imply real sustainability effects.

Institutional Theory provides a comprehensive framework to explain the growing integration of FinTech and green finance in shaping sustainable organizational outcomes (Zhou et al., 2022; Zhang et al., 2023). The institutional pressures are also driving the requirement that financial innovations should serve the societal and environmental objectives beyond the mere profit-making motive (Liu et al., 2021). Government regulations and guidelines by the central bank towards green finance and sustainable development are examples of coercive pressures that force organizations to use FinTech not only to achieve operational efficiency but also to support green financial products and sustainable investments (Mahmood et al., 2021; Zhou et al., 2022). Mimetic forces will also drive organizations

towards mimicking the actions of the leading companies that managed to find a way of incorporating FinTech and green finance to produce better sustainability results, which also benefits the market standing and the confidence of the stakeholders (Zhang et al., 2023). Even further, normative pressures prompted by professional organizations, international sustainability networks, and consumer demands to see environmentally responsible operations further encourage organizations to integrate green financial instruments to their FinTech systems, to achieve institutional legitimacy and substantiate success over the long term (Liu et al., 2021). In such an institutional environment, the concept of green finance can be introduced as the most prominent intermediary pipe connecting the adoption of FinTech with sustainability as a strategic adaptation measure and an institutional imperative. Green finance is found to not only format financial flows into sustainable activities, but also meet regulatory, societal and normative demands which are mounting legitimacy of organizations. On this theoretical and empirical basis, it would be reasonable to suggest that green finance intercedes the relations between the use of FinTech and organizational sustainability by channeling financial resources toward sustainability-oriented initiatives and by positioning organizations in line with the current institutional requirements.

Green finance mediates the relationship between FinTech adoption and organizational sustainability.

Methodology:

A quantitative research methodology is most appropriate for this study, as it facilitates the empirical examination of the relationships between FinTech adoption, green finance, corporate social responsibility (CSR), and organizational sustainability through measurable variables. Quantitative research allows gathering numerical data that may be tested in a statistical manner and provides objectivity, replicability, and generalizability (Saunders et al., 2019). The research design of the study will be a cross-sectional research design because it aims at obtaining a data snapshot at a particular time to identify the current organizational practices and perception towards FinTech, green finance, CSR, and the sustainability outcome. Cross-sectional

studies are most helpful in learning about trends, behaviors and associations without the need of a long-term follow up (Creswell & Creswell, 2018). This study will consider the senior managers of the organizations, financial officers, and sustainability managers of the small and medium-sized enterprises (SMEs) manufacturing sector in Pakistan as the target population of the study. The suitability of this population is high since SMEs in the manufacturing industry are becoming under pressure by regulatory agencies, customers, and global collaborators to be sustainable in their operations besides actively engaging in digital financial transformation (Khan et al., 2022). The SMEs are usually restricted in resources, and thus their turn to FinTech and green financial solutions will be powerful in promoting sustainability initiatives (Ahmed et al., 2023). Senior management is the best place to get credible data because of their core mandate in making decisions and implementing policies in the organization.

The sample size will be determined using item to response theory that suggest 1:10 or 1:20 ratio questionnaire should be distributed among respondents and in this regard total 450 questionnaires were distributed and 279 responses obtained and use for data analysis. The sampling method involve stratified random sampling whereby the SMEs will be initially stratified into small or medium in terms of size and their geographic location so that there is a wide representation. Simple random sampling carried out in each stratum to reduce selection bias and to increase the generalizability of the results. A guided questionnaire utilized in gathering data; it will entail verified measurement scales that have been used in prior studies. To analyze the data, Statistical Package for the Social Sciences (SPSS) adopted especially in the descriptive statistics, correlation analysis, and regression-based mediation and moderation analyses. SPSS has been largely known to be solid in its capacity to utilize huge databank and appropriate in hypothesis testing in social science studies (Field, 2018).

Measurements:

The current study used a guided questionnaire with earlier confirmed measurement items that would give dependability and validity of the structures. Each of

the questionnaire items was evaluated on a seven-point Likert scale with the responses varying between 1 (strongly disagree) to 7 (strongly agree). This scale is common in social science studies because it allows the researcher to measure the perception and attitudes of the respondents with precision (Saunders et al., 2019).

As a measure of FinTech Adoption (FA), six items were used and modified accordingly based on the study of Al Nawayseh (2020), who designed a comprehensive scale reflecting the extent of digital financial technology use at the organizational level. A multidimensional scale was used to measure Organizational Sustainability (OS) based on the economic, environmental, and social aspects of sustainability as suggested by Varela et al. (2019). This holistic measurement concept acknowledges that sustainability is not just about financial performance but it explores environmental protection and social responsibility as well. To

measure the construct of Green Finance (GF), five items were adapted based on Chen et al. (2022) that were referring to the availability of and the use of financial products that were specifically created with environmental sustainability in mind. These instruments recorded green bond uses, green credit lines, environmental investment funds, and other financial instruments that aid eco-innovation and low-carbon projects. The Senior Executive Officer (SEO) but also in Senior Executive Officer (SEO)-level officers as well as the appropriate responses to them the five items used were adapted (Esparza Aguilar and Reyes Fong, 2019), who presented a refined measurement of Corporate Social Responsibility (CSR) based on the groundbreaking Galbreath and Shum. The scale evaluated the engagement of the organization in ethical conducts, community building, staff wellbeing, and ecological conservation.

Data analysis:

Table 1: Descriptive Statistics

Variable	N	Mean	Skewness	Kurtosis
FinTech Adoption (FA)	279	5.3871	-0.907	0.195
Organizational Sustainability (OS)	279	4.0729	0.037	-0.853
Corporate Social Responsibility (CSR)	279	5.4179	-0.915	0.147
Green Finance (GF)	279	4.9516	-0.586	0.102

Kline (2016) suggests that skewness values of between -3 to +3 and Kurtosis values of between -10 to +10 are reasonably acceptable in the determination of univariate normality in social science research. In the current research, the values of skewness of FinTech Adoption (-0.907), Corporate Social Responsibility (-0.915), Green Finance (-0.586), and Organizational Sustainability (0.037) are within the range of an acceptable limit

and thus there is no extreme symmetry distortion. Likewise, all variables have kurtosis values that indicate that the distributions are neither too peaked nor too flat (between -0.853 and 0.195), which also allows assuming that they are approximately normal (Byrne, 2016). Such findings suggest that the data is appropriately distributed to conduct parametric statistical tests, including regression and mediation testing.

Sampling Adequacy

Table 2: Kaiser-Meyer-Olkin Test

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.920
Bartlett's Test of Sphericity	
Approx. Chi-Square	5825.744
Degrees of Freedom (df)	231
Significance (Sig.)	0.000

The Kaiser-Meyer-Olkin (KMO) measure of 0.920 depicts that sampling adequacy is excellent since a KMO value of over 0.90 is deemed as magnificent in conducting a factor analysis (Hair et al., 2019). This indicates that the sample size is adequate and that the correlations among variables are correct in structure detection. Moreover, the Test of Sphericity

performed by Bartlett is significant ($\chi^2 = 5825.744$, $df = 231$, $p < 0.001$), which indicates that the correlation matrix is not an identity matrix and that variables are sufficiently interrelated to make factor analysis (Field, 2018). All these results confirm the suitability of additional multivariate analysis of the data.

Common Method Bias

Table 3: CMB Test

Component	Initial Eigenvalues			Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.113	45.967%	45.967%	10.113	45.967%	45.967%
2	3.257	14.805%	60.772%	3.257	14.805%	60.772%

According to the results of the Single-Factor Test conducted by Harman, the variance explained by the first unrotated factor was 45.97%, which is lower than 50% generally accepted as an indication of possible common method bias (Podsakoff et al., 2003). Based on this criterion, common method bias is not expected to be a significant issue in the study

results when a single factor fails to dominate the variance (Fuller et al., 2016). More than that, the extraction of several factors, the second component of which adds another 14.81%, makes the issue of CMB even less relevant, speaking in favor of the appropriateness of the received responses to be used in the further analysis.

Reliability Analysis

Table 4: Cronbach Alpha

Scale	Cronbach's Alpha	Number of Items
FinTech Adoption (FA)	0.914	6
Organizational Sustainability (OS)	0.939	9
Corporate Social Responsibility (CSR)	0.924	5
Green Finance (GF)	0.720	4

The reliability analysis indicates that each of the constructs has acceptable or better internal consistency. Nunnally and Bernstein (1994) state that the Cronbach alpha value of over 0.70 is acceptable, whereas above 0.90 is excellent reliability (Hair et al., 2019). In the current research, the internal consistency of FinTech Adoption (alpha =

0.914), Organizational Sustainability (alpha = 0.939), and Corporate Social Responsibility (alpha = 0.924) is above the 0.90 mark, indicating a high level of internal consistency. Green Finance (alpha = 0.720) also possesses the minimum acceptable level of reliability (Nunnally & Bernstein, 1994). These confirms that the measurement scales applied are reliable and valid to be used in further statistics.

Factor Loadings

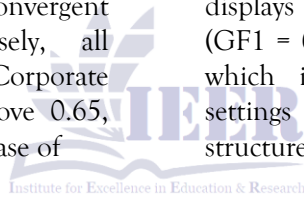
Table 5: Regression Weights

Item	Weights
OS1	0.833
OS2	0.792
OS3	0.811
OS4	0.717
OS5	0.836

OS6	0.842
OS7	0.816
OS8	0.824
OS9	0.725
CSR1	0.760
CSR2	0.786
CSR3	0.729
CAR4	0.736
CSR5	0.651
FA1	0.767
FA2	0.789
FA3	0.684
FA4	0.736
GF1	0.556
GF2	0.769
GF3	0.670
GF4	0.607

The results of factor loading illustrate that each item sufficiently loads on its corresponding construct, and the majority of loadings are above the suggested value of 0.60 to indicate acceptable convergent validity (Hair et al., 2019). Precisely, all Organizational Sustainability (OS) and Corporate Social Responsibility (CSR) items are above 0.65, which implies good item reliability. In the case of

FinTech Adoption (FA), the factor loadings are between 0.684 and 0.789, which indicates good construct representation. Green Finance (GF) displays somewhat lower loadings, though one item (GF1 = 0.556) is just below the optimal 0.60 mark, which is nonetheless acceptable in exploratory settings (Awang, 2015). In general, the factor structure is strong and statistically adequate.



Correlation analysis:

Table 6: Correlation

Variables	1	2	3	4
FinTech Adoption (FA)	1			
Organizational Sustainability (OS)	.555**	1		
Corporate Social Responsibility (CSR)	.795**	.576**	1	
Green Finance (GF)	.213**	.273**	.210**	1

The correlation matrix reveals significant positive relationships among the study variables. FinTech Adoption (FA) is moderately correlated with Organizational Sustainability (OS) ($r = 0.555, p < 0.01$) and strongly correlated with Corporate Social Responsibility (CSR) ($r = 0.795, p < 0.01$), indicating substantial associations (Cohen, 1988). CSR also

shows a moderate correlation with OS ($r = 0.576, p < 0.01$), while Green Finance (GF) has weaker but significant correlations with FA ($r = 0.213, p < 0.01$), OS ($r = 0.273, p < 0.01$), and CSR ($r = 0.210, p < 0.01$). According to Hair et al. (2019), correlations below 0.85 reduce multicollinearity concerns, supporting the discriminant validity of the constructs.

Hypothesis Results

Financial technology adoption and Organizational Sustainability

Table 7: FA-OS

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
	B		Beta		
(Constant)	0.959	0.290		3.305	0.001
FinTech Adoption (FA)	0.578	0.052	0.555	11.114	0.000

Organizational Sustainability (OS)

The regression analysis demonstrates that FinTech Adoption (FA) has a significant positive impact on Organizational Sustainability (OS), with a standardized coefficient (β) of 0.555 and a highly significant p-value ($p = 0.000$). The R-squared value of 0.308 indicates that FA explains approximately 30.8% of the variance in OS, which reflects a

moderate effect size according to Cohen's (1988) guidelines. The high t-value ($t = 11.114$) further confirms the strength and reliability of this relationship. These results support Hypothesis 1 (H1), validating that the adoption of FinTech significantly contributes to enhancing organizational sustainability in the study context.

Hierarchical regression for Mediation

Table 8: FA-CSR-OS

Variables	M1 (β)	M2 (β)
Independent Variable		
FA	0.578***	0.274***
R ²	0.308	
Mediating Variable		
CSR		0.382***
R ²		0.358



The hierarchical regression analysis provides evidence of partial mediation of Corporate Social Responsibility (CSR) in the relationship between FinTech Adoption (FA) and Organizational Sustainability (OS). In Model 1, FA significantly predicts OS ($\beta = 0.578, p < 0.001, R^2 = 0.308$). When CSR is introduced as a mediator in Model 2,

the direct effect of FA on OS decreases to $\beta = 0.274$ ($p < 0.001$), while CSR itself significantly predicts OS ($\beta = 0.382, p < 0.001$), and the R^2 increases to 0.358. This reduction in the FA coefficient alongside the significant contribution of CSR supports H2, indicating a mediating effect (Baron & Kenny, 1986; Hayes, 2018).

Hierarchical regression for Mediation

Table 9: FA-GF-OS

Variables	M1 (β)	M2 (β)
Independent Variable		
FA	0.578***	0.542***
R ²	0.308	
Mediating Variable		
GF		0.195***
R ²		0.333

The hierarchical regression analysis indicates that Green Finance (GF) partially mediates the relationship between FinTech Adoption (FA) and

Organizational Sustainability (OS). In Model 1, FA significantly predicts OS ($\beta = 0.578, p < 0.001, R^2 = 0.308$). After introducing GF as a mediating variable

in Model 2, the direct effect of FA on OS slightly reduces to $\beta = 0.542$ ($p < 0.001$), while GF also shows a significant positive effect on OS ($\beta = 0.195$, $p < 0.001$), and the explained variance increases to $R^2 = 0.333$. This pattern supports H3, confirming partial mediation consistent with the criteria outlined by Baron and Kenny (1986) and Hayes (2018).

Discussion:

The results confirmed that FinTech adoption positively influences organizational sustainability. In theoretical terms, this result is highly consistent with the Institutional Theory, according to which organizations are becoming actively engaged in the implementing of financial technologies not only to achieve operational efficiency but also due to the pressure of the external institution, such as regulatory requirements, social norms expectation, and industry trends (Zhou et al., 2022; Zhang et al., 2023). Organizations are pushed by these institutional forces to include FinTech solutions improving transparency, environmental accountability, and sustainability reporting (Liu et al., 2021). On an empirical level, the present research substantiates previous findings that FinTech could make a major contribution to sustainability through enhancing financial inclusion, minimizing resource-intensive operations, and supporting green investments (Li et al., 2022; Wang et al., 2023). Namely, FinTech offers digital infrastructural support that can assist organizations in converting to a paperless operation, increase access to finance, and simplify the system of sustainability tracking (Chen et al., 2021). These technological features facilitate the actual implementation of the sustainability objectives, making more ground to the idea that FinTech can be considered an effective facilitator of sustainable operations (Li et al., 2022). Additionally, the conclusions are in line with the previous research on developing economies, which also underlines the potential of FinTech to promote inclusive development and environmental sustainability, especially in evolving financial systems (Ahmed et al., 2021; Raza et al., 2022). Consequently, this hypothesis has strong support, both theoretically and empirically because the adoption of FinTech is characterized as a two-fold strategy improving

operational efficiency and fulfilling institutional requirements of sustainable operations.

The second hypothesis, proposing CSR as a mediating mechanism, is also supported. Hypothetically, the association is in line with Institutional Theory, which argues that organizations are exposed to coercive forces that pressure them to report on CSR actions, mimetic forces that encourage them to act like industry leaders in sustainability, and normative forces that pressure them to act according to societal values (Mahmood et al., 2021; Zhou et al., 2022). The use of FinTech, in turn, might not automatically convert into sustainability performance unless it is accompanied by active CSR involvement, through which the alignment of organizational practices with social and environmental concerns can be graphically demonstrated (Zhang et al., 2023). This implies that CSR does not merely exist as an accessory practice but rather, serves as a strategic pathway which directs the potential of FinTech into the finite goals of greater sustainability. The existence of this mediating effect is supported empirically in the previous literature, where the researchers emphasize that FinTech promotes superior CSR reporting and improves the responsiveness of firms to stakeholder issues (Li et al., 2022). Huang and Ye (2022) also established that organizations have high chances of attaining a better sustainability result when FinTech is combined with CSR initiatives. These conclusions are supported by the empirical evidence generated in this research, which demonstrates that CSR is an important factor that can convert the efficiencies created through FinTech applications into substantial social and environmental donations. This implies that the application of technology should be incorporated into an ethically responsible system so as to generate overall sustainability advantage. Therefore, the mediating position of CSR is theoretically founded and empirically supported.

The findings also support the third hypothesis that green finance mediates the relationship between FinTech adoption and organizational sustainability. The motivation behind the use of FinTech in organizations is viewed not only as the digitization of financial operations but the ease of access to green financial instruments, which directly impact environmental sustainability (Mahmood et al., 2021).

In empirical terms, this paper falls in line with previous literature that underlines that FinTech platforms have a considerable positive effect on the accessibility and efficiency of green finance products including green bonds and green credit (Li et al., 2022; Wang et al., 2023). Previous research proves that companies that utilize green finance channels made possible by FinTech are in a superior place to reach tangible sustainability results, especially carbon cutting and environmentally friendly investment (Chen et al., 2021). The results of this study have verified that FinTech develops the plumbing needed to make green financial flows a reality, and green finance enables the specific capital allocation that delivers sustainability. Green finance mediating role is therefore theoretically and empirically strong since it provides a strategic avenue upon which FinTech usage can practically lead to sustainable development.

Limitations and Future Directions

Even though this research provides quite some insights into how FinTech adoption, green finance, corporate social responsibility (CSR), and organizational sustainability are related in the context of Pakistani SMEs, various limitations need to be mentioned. Firstly, the research design used was cross-sectional and this disadvantageous feature restricts causal inference that could be made regarding the variables and across time. The evolution and interaction dynamics of FinTech adoption and sustainability practices would be better understood through longitudinal types of studies. Second, the study was limited to SMEs in the manufacturing industry in Pakistan and thus the results might not be generalized easily to other industries, larger organizations, or other geographical settings. The use of FinTech and sustainability measures could be substantially different in-service areas or in nations that have higher levels of developed regulatory and financial systems. Third, the research utilized self-reported data that was obtained using structured questionnaires and is, therefore, possible to show social desirability bias or common method variance, even after statistical control of these biases. This depends on managerial perceptions which might not wholly explain the real depth of FinTech integration and the long-term

viability effects. Fourth, the researchers did not address possible moderating factors, which could be organizational culture, technological readiness, or regulatory stringency, that can affect the magnitude or direction of the noted relations. These aspects may allow throwing lighter on the variability of institutional pressures in various organizational and environmental contexts. In future studies, it will be important to adopt longitudinal research designs in understanding causal routes and the temporal development of FinTech-spurred sustainability practices. Following up changes over time would enable the scholars to better reflect the dynamism of the technology adoption, development of green finance and maturity of CSR.

Future research ought to consider comparative studies between industries and between countries in order to determine the external validity of the results. Research on the role of FinTech in services industries or economies with strict regulations would be valuable to draw other conclusions and increase the situational coverage of the suggested model. In addition, to quantitatively reveal the insights about the challenges and opportunities related to FinTech-enhanced sustainability efforts, qualitative or mixed-method techniques might be used to contextually supplement the quantitative results with richer insight and managerial perception. There may be subtle organizational strategies that would be revealed through interviews or case studies but would be hard to pick up in a survey-based study. Additional investigation of the moderating factors is encouraged as well. Environmental uncertainty, technological infrastructure, leadership orientation, and regulatory enforcement are variables that might be incorporated into future models to provide a more comprehensive picture of the circumstances in which FinTech and green finance have the most considerable impacts on sustainability outcomes. Last but not least, the contribution of consumer-driven digital finance solutions (mobile wallets, crowdfunding platforms, etc.) that can enable the participation of wider stakeholders in green financing and CSR initiatives should be explored in future research. This would be in accordance with the increased societal needs and focus on participatory and inclusive financial systems, capable

of fostering sustainable development, both within organizations and communities.

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