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# Sustainability Performance: Measuring impact of FinTech and Digital Transformation in Future of Green Finance

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## Abstract

Bank and financial institutions help to promote sustainable development through the integration of digital technologies and environmentally responsible financial practices. This study investigates the impact of Digital Transformation, FinTech Adoption, and Green Finance on Sustainability Performance in the banking sector, with a focus on an emerging economy context. Using a survey research design primary data were collected from 401 bank employees during July-September 2025.-. A convenience sampling technique was employed, and the data were analyzed using descriptive statistics and structural equation modeling (SEM). The findings revealed that Digital Transformation had the strongest positive effect on Sustainability Performance, followed by Green Finance and FinTech Adoption. These results indicate that the integration of digital systems, technology-driven financial services, and green financing initiatives significantly enhances banks' economic, environmental, and social performance. The study highlights the importance of adopting an integrated sustainability strategy that aligns technological innovation with green financial practices. From a practical perspective, the findings offer valuable insights for bank managers and policymakers seeking to strengthen sustainability performance through digital and green initiatives. The study contributes to the growing literature on sustainable banking by demonstrating how digital and FinTech-driven innovations can serve as strategic enablers of sustainability in the financial sector.

***Keywords:*** banking sector, green finance, FinTech adoption, Nepal, sustainability performance

## 1. Introduction

Sustainability performance is an emerging issue in contemporary economic and financial system in the world. It emerges the attention of sustainability challenges of climate change, environmental degradation, and growing social inequalities through economic and

financial system. Traditional financial institutions were primarily focused on their success with financial indicators. This scenario has been transforming into sustainability agendas at present and expanded performance evaluation to include environmental and social dimensions. This shift is strongly grounded in the triple bottom line framework, which emphasizes the integrated pursuit of economic prosperity, environmental protection, and social equity (Elkington, 2013). This paradigm shift reflects sustainability performance measured as an organization's ability to create long-term value for multiple stakeholders rather than focusing solely on short-term financial returns (Harrison & Wicks, 2013). Empirical studies constantly show that institutions incorporating sustainability practices into their core strategies demonstrate enhanced resilience, reputational capital, and competitive advantage (Adu, 2022; Bose et al., 2021; Masud et al., 2019).

Sustainable performance in bank and financial institutions closely depends upon the green finance and sustainable banking practices (Neupane, 2024). Green banking practices includes green lending, environmental risk assessment, ESG disclosure and responsible investment practices. These initiatives enable sustainable development goals through financial intermediation goals ( Kumar & Prakash, 2019; Weber, 2014). Prior research highlights that transparent ESG reporting and sustainability-oriented governance mechanisms positively influence both environmental outcomes and financial performance (Alsayegh et al., 2020; Olteanu et al., 2023; Ye et al., 2022)..Furthermore, green finance has been shown to mediate the relationship between sustainability practices and institutional performance, reinforcing its strategic importance in modern banking systems ( Kumar et al., 2024; Zhang & Wellalage, 2022).

Currently, global banking and financial system is undertaking rapid digital transformation. In this process digital technologies such as artificial intelligence, big data analytics, blockchain, and cloud computing are fundamental components. Using such technologies helps reforming financial service delivery, operational efficiency, and risk management (Forcadell et al., 2019; Zhao et al., 2019). It also enhance banks' ability to collect, process, and analyze ESG-related data, thereby improving sustainability assessment, reporting accuracy, and green credit allocation (Zhou et al., 2023) Abdulrahman et al.(2025). The research findings of Abdulrahman et al.(2025), claim that this transformation acts as a critical enabler of green finance. It reduced information asymmetry, lowering transaction costs, and supporting innovative green financial products.

The FinTech innovations have further accelerated this transformation. It introduced platform-based financial services, digital payments, peer-to-peer lending, and blockchain-enabled green instruments. Beyond efficiency gains, FinTech plays a vital role in promoting financial inclusion and expanding access to green financial services, particularly in emerging economies (Asif et al., 2023; Lutfi et al., 2021)..Literature suggests that FinTech-driven green finance solutions such as digital green loans, carbon footprint tracking, and sustainability-linked financing support environmental objectives while maintaining financial viability (Nikhil et al., 2024). The integration of FinTech with green banking strategies thus represents a significant shift toward digitally enabled sustainable finance ecosystems.

Digital transformation, FinTech adoption and green banking initiatives are increasing trends in south Asian countries. Peoples are more aware, regulatory provisions are reformed, sustainability practices are institutionalized by regulators and banking sector. Countries such as India, Bangladesh, and Nepal have introduced policy guidelines encouraging green finance, ESG disclosure, and digital financial services (Bose et al., 2021; K. Kumar & Prakash, 2020; G. Zheng et al., 2021). Empirical studies from South Asia indicate that green banking practices positively affect sustainability performance and profitability, particularly when supported by institutional governance and technological readiness (Gazi et al., 2025; Jain & Sharma, 2023).. However, the pace and effectiveness of adoption vary significantly across countries, reflecting differences in regulatory capacity, digital infrastructure, and market maturity. Banks and

financial institutions in south Asian countries increased digital transformation practices. Mostly banking sector operationalize green finance initiatives, including paperless banking, digital credit appraisal, and online sustainability reporting through digital platforms (Siswanti et al., 2024). FinTech solutions have also enhanced customer engagement and green product innovation, enabling banks to reach underserved populations while supporting environmental objectives (Asif et al., 2023; Taneja & Ali, 2021). But literatures concluded their findings with challenges related to data quality, technological integration, and alignment between sustainability goals and business strategies in the region (Zulbetti & Muzaffirah, 2025).

Nepal represents an important country having unexplored context mostly in sustainable banking and FinTech adoption. As a developing economy with highly vulnerable to climate change and environmental risk, Nepal has recognized the strategic role of the banking sector in supporting sustainable development (Rastra Bank, 2021). Nepalese commercial banks have begun implementing green banking initiatives, including green lending policies, environmental risk management, and digital banking services (Bhandari et al., 2024; Tiwari, 2024). Regulatory guidelines issued by Nepal Rastra Bank have further encouraged banks to integrate sustainability considerations into their operational and lending decisions. However, the adoption of FinTech-enabled green finance in Nepal remains at an early stage. It constrained limited digital infrastructure, technological capabilities, and empirical evidence on performance outcomes. Existing studies on Nepalese banking largely focus on descriptive assessments of green banking policies and practices, with limited attention to the role of digital transformation and FinTech in enhancing sustainability performance (Bhandari et al., 2024; Tiwari, 2024). This creates a critical research gap, particularly in understanding how digital tools and FinTech innovations can strengthen green finance mechanisms and contribute to sustainable banking performance in Nepal. Given the country's developmental priorities and environmental vulnerabilities, such insights are both timely and policy-relevant.

Considering the above-mentioned research gaps, this study seeks to examine role of digital transformation and FinTech in shaping the future of green finance within the Nepalese banking sector. The study is significant for three key reasons. First, it contributes to the sustainability and green finance literature by integrating digital transformation and FinTech perspectives within a developing-country context. Second, it offers empirical insights relevant to policymakers, regulators, and banking practitioners seeking to design effective green finance strategies supported by digital technologies. Finally, the study aims to enhance understanding of how Nepalese banks can leverage digital innovation to improve sustainability performance while supporting broader economic and environmental objectives. Accordingly, the primary objective of this research is to analyze the interrelationships among digital transformation, FinTech adoption, green banking practices, and sustainability performance in Nepalese commercial banks.

## 2. Literature Review

Sustainability performance in banking has changed from a peripheral concern to a strategic imperative, driven by regulatory pressure, stakeholder expectations, and global sustainability agendas. Unlike traditional performance metrics focused solely on profitability, sustainability performance captures the integrated economic, environmental, and social outcomes of banking operations (Elkington, 1998, 2013). Prior studies emphasize that banks achieving superior sustainability performance tend to demonstrate stronger long-term financial resilience, reputational advantages, and stakeholder trust (Harrison & Wicks, 2013; Masud et al., 2019). Empirical evidence from both developed and emerging economies indicates that sustainability-oriented banks are better positioned to manage environmental risks, comply with ESG regulations, and align with sustainable development goals (Adu, 2022; Bose et al., 2021; Weber, 2014).

In recent years, sustainability performance in banking has been increasingly linked to innovation-driven mechanisms, including green finance, digital transformation, and FinTech adoption. These mechanisms enable banks to operationalize sustainability strategies, enhance transparency, and improve resource efficiency (Forcadell et al., 2019; Zhou et al., 2023). As such, sustainability performance is no longer viewed as an outcome of isolated environmental initiatives but as the result of systemic transformation within financial institutions. Research on monetary and financial systems also shows that structural limitations, shallow financial markets, and external economic shocks affect risk management practices in Nepalese banks (Joshi, 2022; Shrestha et al., 2025). Furthermore, empirical studies emphasize that improving regulatory frameworks and strengthening financial sector institutions are crucial for enhancing risk mitigation and maintaining banking sector stability in Nepal (Shrestha et al., 2025) . These findings suggest that robust risk management practices are essential for sustainable banking operations in developing economies like Nepal.

### 2.1 FinTech Adoption and Sustainability Performance

FinTech adoption refers to the integration of technology-driven financial innovations such as digital payments, peer-to-peer lending platforms, blockchain applications, and data analytics into banking operations. The literature increasingly recognizes FinTech as a catalyst for sustainable finance by enhancing financial inclusion, operational efficiency, and access to green financial products (Asif et al., 2023; Lutfi et al., 2021). FinTech platforms reduce transaction costs, minimize paper-based processes, and facilitate real-time monitoring of financial and environmental impacts, thereby supporting sustainability objectives.

Abdulrahman et al.(2025) argue that FinTech adoption plays a transformative role in green finance ecosystems by enabling digital green lending, ESG-linked financing, and transparent sustainability reporting. Empirical studies further demonstrate that FinTech-driven innovation positively influences banks' environmental and social performance by improving outreach to underserved populations and supporting low-carbon investment initiatives (Nikhil et al., 2024; Siswanti et al., 2024). From a stakeholder theory perspective, FinTech adoption allows banks to better address stakeholder demands for accessibility, transparency, and responsible financial practices (Harrison & Wicks, 2013).

In emerging economies, FinTech adoption has shown particular relevance in overcoming institutional constraints and accelerating sustainable banking practices (Asif et al., 2023). By leveraging digital platforms, banks can align technological innovation with sustainability goals, leading to improved sustainability performance.

H1: FinTech adoption has a positive and significant effect on sustainability performance in the banking sector.

### 2.2 Digital Transformation and Sustainability Performance

Digital transformation represents a broader organizational shift involving the integration of digital technologies into core banking processes, business models, and strategic decision-making. Unlike isolated FinTech solutions, digital transformation encompasses cultural change, process reengineering, and data-driven governance (Forcadell et al., 2019). The literature suggests that digital transformation enhances sustainability performance by improving efficiency, reducing resource consumption, and enabling more accurate ESG measurement and disclosure (Zhao et al., 2019; Zhou et al., 2023).

Digital banking initiatives such as paperless transactions, automated credit scoring, and digital customer engagement significantly reduce environmental footprints while enhancing service quality (Siswanti et al., 2024; Yip & Bocken, 2018). Furthermore, digital transformation supports sustainable business model innovation by enabling banks to transition toward service-oriented, low-carbon, and value-sharing models (Bocken et al., 2014; Yip & Bocken, 2018). These digitally enabled models align with the triple bottom line framework by

simultaneously generating economic, environmental, and social value (Elkington, 1998; Geissdoerfer et al., 2018).

Empirical evidence from the banking sector confirms that digitally mature institutions exhibit superior sustainability performance, particularly when digital strategies are aligned with environmental and social objectives (Forcadell et al., 2019; Siswanti et al., 2024). In developing economies, digital transformation also enhances regulatory compliance and transparency, strengthening institutional sustainability outcomes (Zulbetti & Muzaffirah, 2025).

H2: Digital transformation has a positive and significant effect on sustainability performance in the banking sector.

### 2.3 Green Finance and Sustainability Performance

Green finance constitutes a central pillar of sustainable banking, encompassing green lending, environmental risk management, sustainable investment, and ESG-linked financial instruments. The literature consistently highlights green finance as a direct driver of sustainability performance by channeling capital toward environmentally responsible projects and discouraging environmentally harmful activities (K. Kumar & Prakash, 2019; Zhang & Wellalage, 2022).

Empirical studies demonstrate that green finance practices improve banks' environmental performance while also contributing to long-term financial stability (Bose et al., 2021; Jain & Sharma, 2023). Green financing mechanisms enable banks to internalize environmental risks, enhance ESG disclosure quality, and strengthen stakeholder confidence (Alsayegh et al., 2020; Ye et al., 2022) . Moreover, green finance has been found to mediate the relationship between green banking practices and sustainability outcomes, reinforcing its strategic importance (Gazi et al., 2025; J. Kumar et al., 2024).

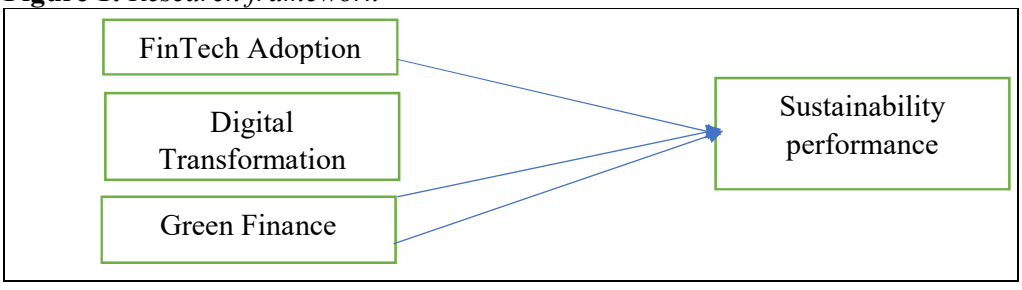
In emerging economies, green finance plays a particularly critical role in supporting sustainable development and climate resilience (Bhandari et al., 2024; G. W. Zheng et al., 2021). When supported by regulatory frameworks and digital infrastructure, green finance significantly enhances banks' sustainability performance by aligning profitability with environmental responsibility(Rastra Bank, 2021).

H3: Green finance has a positive and significant effect on sustainability performance in the banking sector.

### 2.4 Conceptual Integration

Drawing on stakeholder theory and the triple bottom line framework, this study conceptualizes sustainability performance in banking as an outcome of innovation-driven financial transformation. FinTech adoption and digital transformation act as enabling mechanisms that enhance the effectiveness of green finance initiatives, while green finance serves as a direct channel through which sustainability objectives are operationalized. Together, these factors form Figure 1 shows the conceptual research model.

**Figure 1:** *Research framework*



## 3. Methods and Materials

This study employed a quantitative research design to investigate the influence of FinTech adoption, digital transformation, and green finance practices on sustainability performance within the banking sector. A quantitative approach is considered appropriate because the study seeks to examine theoretically derived relationships among latent constructs and to test hypotheses using multivariate statistical techniques (Hair et al., 2014, 2019). By relying on numerical data and statistical estimation, the design allows for systematic evaluation of the proposed structural relationships and enhances the analytical robustness of the findings. A cross-sectional survey design was adopted, capturing employees' perceptions at a specific point in time. The empirical focus on bank employees was deliberate, as they were directly involved in implementing digital systems, FinTech-based services, and green finance initiatives, and are therefore well positioned to assess their institutional impact on sustainability performance. Data were collected over a four-month period (September–December 2025) through a structured questionnaire distributed to employees across commercial banks in Gandaki province of Nepal. This timeframe enabled adequate coverage while ensuring consistency in contextual conditions during data gathering.

Due to practical constraints in accessing a comprehensive sampling frame of banking professionals, a convenience sampling technique was utilized. Although probability sampling techniques are often preferred for maximizing representativeness, convenience sampling is frequently employed in organizational and banking research where access limitations are significant (Hair, 2007). Given that the study primarily aims to test theoretical relationships rather than to estimate population parameters, this approach remains methodologically defensible. Nevertheless, the implications for generalizability are acknowledged.

The survey instrument comprised multi-item scales measuring FinTech adoption, digital transformation, green finance, and sustainability performance. Measurement items were adapted from established studies of Abdulrahman et al. (2025) to ensure content validity and conceptual alignment with prior research. All items were assessed using a Likert-type scale ranging from "strongly disagree" to "strongly agree," a format widely applied in sustainability and financial services research to capture attitudinal and perceptual constructs.

Data analysis proceeded in two sequential stages. First, descriptive statistics were computed to profile respondents and to examine central tendencies and dispersion patterns across study variables. This step provided an initial understanding of the sample characteristics and overall response distribution. Second, Structural Equation Modeling (SEM) was employed to test the hypothesized relationships. SEM was selected because it enables the simultaneous estimation of multiple interrelated dependence relationships while explicitly accounting for measurement error (Hair et al., 2014). Furthermore, the technique is particularly appropriate for examining complex theoretical frameworks that integrate technological, financial, and sustainability constructs (Hair et al., 2019).

The analytical procedure involved assessment of the measurement model to establish internal consistency reliability, convergent validity, and discriminant validity prior to structural model evaluation. Subsequently, the structural model was examined to estimate path coefficients and determine the statistical significance of the proposed direct effects. Hypotheses were evaluated based on standardized path coefficients and associated p-values, providing empirical evidence regarding whether FinTech adoption, digital transformation, and green finance practices contribute meaningfully to sustainability performance in the banking sector.

## 4. Results and Discussion

This section includes the results and discussion of the study. The results include socio-demographic information of respondents, descriptive analysis, reliability and validity of data and structural model results. The discussion includes the findings of the study discussed with national and international literature.

**Table 1:** *Socio-demographic* Results

| ***Gender*** | ***Frequency*** | ***Percent*** |
|---|---|---|
| Male | 263 | 65.6 |
| Female | 138 | 34.4 |
| Total | 401 | 100 |
| ***Age*** | ***Frequency*** | ***Percent*** |
| 18-25 years | 128 | 31.9 |
| 26-35 years | 137 | 34.2 |
| 36-45 years | 85 | 21.2 |
| 46-55 years | 37 | 9.2 |
| above 55 years | 14 | 3.5 |
| Total | 401 | 100 |
| ***Education*** | ***Frequency*** | ***Percent*** |
| School Level | 68 | 16.96 |
| Bachelor Level | 271 | 67.6 |
| Master and above | 51 | 12.7 |
| Other technical and professional degree | 11 | 2.7 |
| Total | 401 | 100 |

Table 1 presents the demographic profile of the respondents indicates a representative sample of bank employees suitable for examining sustainability-related practices. Respondents were classified into two categories viz, male and female. Male respondents represented the majority of the sample (65.6%), while female respondents accounted for 34.4%, reflecting the gender composition. Regarding age distribution, most respondents were within the economically active age groups, with 34.2% aged 26–35 years and 31.9% aged 18–25 years. This suggests that the sample largely comprises early- and mid-career professionals who were more engaged with digital transformation and FinTech initiatives. In terms of educational background, the majority of respondents held a bachelor's degree (67.6%), followed by those with a master's degree or higher (12.7%). The presence of a well-educated workforce enhanced the reliability of responses related to green finance and sustainability practices, as education was closely linked to awareness and effective implementation of sustainable banking strategies.

**Table 2:** *Descriptive Results of Variables*

| Variables | Mean | Std. Deviation |
|---|---|---|
| FinTech adoption | 3.771 | 0.703 |
| Sustainability performance | 3.678 | 0.696 |
| Green finance | 3.729 | 0.602 |
| Digital transformation | 3.883 | 0.645 |

Table 2, reflects the descriptive statistics which indicate that respondents generally held positive perceptions toward all study variables. Digital transformation recorded the highest mean score (M = 3.883, SD = 0.645), suggesting that banks made notable progress in integrating digital technologies into their operations. FinTech adoption also showed a relatively high mean (M = 3.771, SD = 0.703), reflecting growing acceptance and use of technology-driven financial solutions. Green finance exhibited a favorable mean value (M = 3.729, SD = 0.602), indicating moderate to high implementation of environmentally oriented financial practices. Sustainability performance reported a comparable mean (M = 3.678, SD = 0.696), implying that banks were achieving a reasonable level of economic, environmental, and social performance.

**Table 3:** *Reliability and Validity*

| Constructs | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) | VIF |
|---|---|---|---|---|---|
| Digital Transformation | 0.759 | 0.761 | 0.862 | 0.675 | 1.758 |
| FinTech Adoption | 0.698 | 0.701 | 0.823 | 0.609 | 1.403 |
| Green Finance | 0.766 | 0.774 | 0.842 | 0.516 | 1.825 |
| Sustainability performance | 0.745 | 0.746 | 0.840 | 0.567 | - |

Constructs reliability and validity results are shown in Table 3. The reliability and validity assessment results demonstrate that the measurement model meets established evaluation criteria. Cronbach's alpha values range from 0.698 to 0.766, indicating acceptable internal consistency for all constructs, as values close to or above 0.70 were considered satisfactory in social science research (Hair et al., 2014). Similarly, rho_A values exceed the recommended threshold, further confirming construct reliability. Composite reliability values varied between 0.823 and 0.862, surpassing the minimum criterion of 0.70 and suggesting strong internal reliability of the measurement scales (Hair et al., 2019).

Convergent validity was supported by the Average Variance Extracted (AVE) values, which range from 0.516 to 0.675. These values exceed the recommended minimum of 0.50, indicating that each construct explains more than half of the variance of its indicators (Larcker, 1981). Additionally, variance inflation factor (VIF) values for the independent constructs ranged from 1.403 to 1.825, which were well below the critical threshold of 5, suggesting the absence of multicollinearity issues among the predictor variables (Hair et al., 2019). The results reflect the adequacy of the measurement model in terms of reliability, convergent validity, and collinearity, supporting its suitability for subsequent structural model analysis.

### 4.1 Discriminant validity

**Table 4:** *Fornell-Larcker Criterion*

| Constructs | DT | FinTech | GF | SP |
|---|---|---|---|---|
| Digital Transformation (DT) | 0.822 | | | |
| FinTech Adoption (FinTech) | 0.468 | 0.780 | | |
| Green Finance (GF) | 0.632 | 0.498 | 0.719 | |
| Sustainability performance (SP) | 0.578 | 0.446 | 0.567 | 0.753 |

Table 4, presents the discriminant validity of the constructs, which was assessed using the Fornell–Larcker criterion. The Average Variance Extracted (AVE), shown along the diagonal, were higher than the corresponding inter-construct correlations for each construct. Specifically, Digital Transformation (0.822), FinTech Adoption (0.780), Green Finance (0.719), and Sustainability Performance (0.753) each demonstrate stronger associations with their own indicators than with other constructs. This satisfies the recommended criterion for discriminant validity, indicating that each construct was empirically distinct (Larcker, 1981). The correlations among constructs are moderate and remain well below the diagonal values.

**Table 5:** *Heterotrait-Monotrait Ratio (HTMT)*

| Constructs | DT | FinTech | GF | SP |
|---|---|---|---|---|
| Digital Transformation | | | | |
| FinTech Adoption | 0.65 | | | |
| Green Finance | 0.82 | 0.68 | | |
| Sustainability performance | 0.77 | 0.62 | 0.74 | |

Table 5 presents the results of discriminant validity which were further confirmed using the HTMT criterion. All HTMT values ranged between 0.62 and 0.82, remaining below the

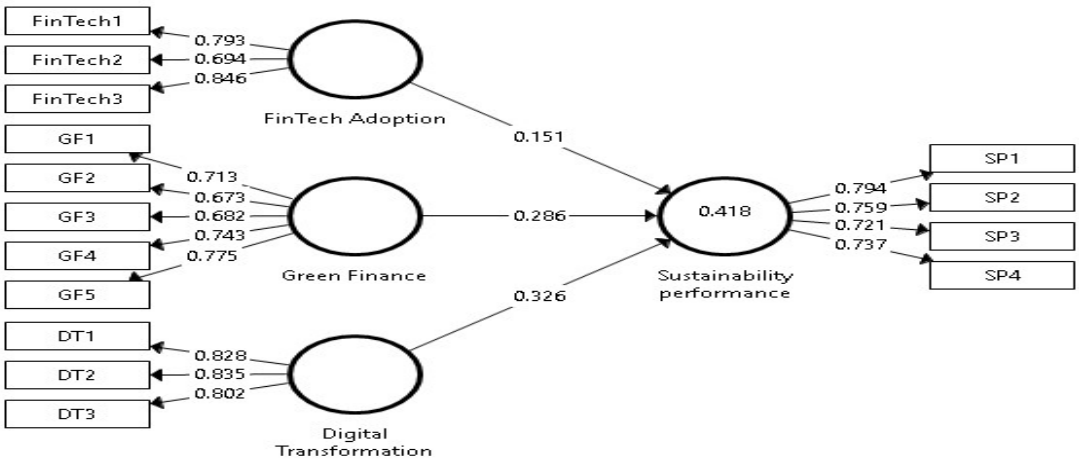
recommended threshold of 0.85, indicating adequate discriminant validity among the constructs. These results suggest that Digital Transformation, FinTech Adoption, Green Finance, and Sustainability Performance are conceptually distinct (Hair et al., 2019).

**Table 6:** *Hypothesis results*

| Hypothesis | Path-coefficient | Original Sample (O) | Sample Mean (M) | Standard Deviation | T Statistics | P Values |
|---|---|---|---|---|---|---|
| H1 | DT -> SP | 0.326 | 0.328 | 0.055 | 5.927 | 0.000 |
| H2 | FinTech -> SP | 0.151 | 0.152 | 0.058 | 2.620 | 0.009 |
| H3 | GF -> SP | 0.286 | 0.289 | 0.064 | 4.468 | 0.000 |

Table 6 presents the results of hypothesis testing. The structural model results indicate that all hypothesized relationships were statistically significant. H1 shows a positive effect of Digital Transformation on Sustainability Performance ($\beta = 0.326$, $t = 5.927$, $p < 0.001$), suggesting that higher levels of digital integration enhanced banks' sustainability outcomes. H2 demonstrates that FinTech Adoption positively influenced Sustainability Performance ($\beta = 0.151$, $t = 2.620$, $p = 0.009$), confirming that technology-driven financial solutions contributed to sustainable practices. H3 reveals that Green Finance significantly impacts Sustainability Performance ($\beta = 0.286$, $t = 4.468$, $p < 0.001$), highlighting the critical role of environmentally focused financial initiatives in improving overall sustainability. Collectively, these results validate the proposed model, indicating that innovation and sustainability-oriented financial practices jointly enhanced performance outcomes in the banking sector, supporting the theoretical premise that technological and green financial interventions are key drivers of sustainable banking (Abdulrahman et al., 2025; Kumar et al., 2024; Siswanti et al., 2024). The results of R square inner weights of each items are shown in Figure 2.

**Figure 2:** *Inner-model*




## 5. Discussion

The findings of this study provide strong empirical support for the positive relationships between Digital Transformation, FinTech Adoption, Green Finance, and Sustainability Performance in the banking sector. The results highlight that banks increasingly rely on technological innovations and environmentally oriented financial practices to achieve

sustainable development objectives. Results are aligning with prior research emphasizing the role of innovation in sustainable banking (Abdulrahman et al., 2025; Siswanti et al., 2024).

The effect of Digital Transformation on Sustainability Performance ($\beta = 0.326$, $p < 0.001$) underscores the critical importance of integrating digital technologies into banking operations. Digital transformation enhances process efficiency, reduces operational carbon footprints, and facilitates data-driven ESG reporting, thereby supporting the triple bottom line framework (Elkington, 1998; Zhao et al., 2019). These findings resonate with prior studies in South Asian contexts, where digital banking initiatives were linked to improved environmental and social performance (Siswanti et al., 2024; Zulbetti & Muzaffirah, 2025). This suggests that banks adopting digital solutions are better positioned to implement sustainability strategies effectively.

FinTech Adoption also demonstrated a positive yet relatively smaller effect on Sustainability Performance ($\beta = 0.151$, $p = 0.009$). This aligns with prior evidence that FinTech facilitates sustainable finance by enhancing financial inclusion, enabling green lending, and improving transparency (Asif et al., 2023; Lutfi et al., 2021). While FinTech adoption positively contributes to sustainability, its effect may be moderated by organizational readiness, regulatory support, and employee familiarity with digital platforms, highlighting the need for complementary organizational and human resource strategies (Zeshan & Cerchione, 2025).
The impact of Green Finance on Sustainability Performance ($\beta = 0.286$, $p < 0.001$) confirms the crucial role of environmentally focused financial initiatives. Green finance allows banks to channel capital toward low-carbon projects, improve ESG disclosure, and mitigate environmental risks, consistent with evidence from Nepalese and broader South Asian banking contexts (Bhandari et al., 2024; Gazi et al., 2025; J. Kumar et al., 2024). The findings indicate that banks actively investing in green finance initiatives achieve superior sustainability outcomes, supporting the notion that financial institutions serve as catalysts for environmentally responsible development.

Collectively, the results indicate that sustainability performance in the banking sector is driven by the synergistic integration of digitalization, FinTech, and green finance initiatives. This reinforces the theoretical premise that organizational innovation and green-oriented financial strategies are not mutually exclusive but mutually reinforcing mechanisms for achieving sustainable outcomes (Abdulrahman et al., 2025; Nikhil et al., 2024). The findings have particular significance for emerging economies such as Nepal, where banks are gradually transitioning toward digital and green financial practices in response to regulatory mandates, environmental concerns, and stakeholder expectations (Nepal Rastra Bank, 2021; Siswanti et al., 2024).

These results have practical implications for banking management. Investment in digital infrastructure, coupled with FinTech-enabled green financial products, can improve sustainability performance while fostering competitive advantage. Moreover, the findings highlight the need for continuous capacity-building, technological adoption, and green financing policy support to ensure that sustainability objectives are effectively integrated into banking operations.

## 6. Conclusion and Implication

This study examined the influence of Digital Transformation, FinTech Adoption, and Green Finance on the Sustainability Performance of banks, focusing on Nepal's emerging banking sector. The findings demonstrate that all three factors positively contribute to enhancing sustainability performance, with Digital Transformation showing the strongest impact, followed closely by Green Finance and FinTech Adoption. The results suggest that integrating modern digital technologies into banking operations significantly improves efficiency, data management, and reporting capabilities, which in turn supports economic, environmental, and social sustainability objectives. Similarly, FinTech solutions provide

innovative platforms for financial inclusion, transparency, and customer engagement, complementing digital transformation initiatives and enhancing the overall sustainability of banking practices. Green Finance initiatives, through environmentally focused lending, investment products, and risk management strategies, reinforce banks' role in promoting sustainable economic development and addressing climate and social challenges.

From a managerial perspective, the findings highlight the need for banks to adopt an integrated approach that combines technology-driven solutions with environmentally responsible financial practices. Investments in digital infrastructure, employee training, and green product development can significantly enhance sustainability performance while also improving operational efficiency and competitiveness. For policymakers, the study underscores the importance of creating regulatory frameworks that support both digital and green finance initiatives. Incentives for green lending, support for digital adoption, and guidelines for sustainability reporting can accelerate the transition toward more sustainable banking practices, especially in emerging economies. The study also emphasizes the strategic value of sustainability as a core component of banking operations. By leveraging digital transformation, FinTech, and green finance synergistically, banks can achieve long-term organizational resilience, strengthen stakeholder trust, and contribute meaningfully to broader societal and environmental goals. These insights are particularly relevant in contexts where banks are transitioning from traditional operations to innovative, sustainability-oriented models.

In conclusion, the research states that a complete focus on digitalization, FinTech adoption, and green finance is essential for enhancing sustainability performance in the banking sector. Adopting such an integrated approach allows banks to balance financial performance with social and environmental responsibilities, creating value for both the institution and society. The study provides actionable guidance for banking managers and policymakers seeking to embed sustainability into strategic planning, operational processes, and financial offerings, ensuring that the banking sector contributes effectively to sustainable development and long-term growth.

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