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# BOOSTING ORGANIZATIONAL PERFORMANCE THROUGH FINTECH INTEGRATION AND CIRCULAR ECONOMY PRACTICES IN PAKISTAN

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**Abstract**

***Purpose:*** *This study examines the influence of fintech adoption on the innovation performance and sustainability performance of manufacturing small and medium-sized enterprises (SMEs) in Pakistan. It further investigates the mediating role of circular economy practices in these relationships.*

***Design/methodology/approach:*** *The study applies a quantitative, cross-sectional survey design. Data were collected from 299 managers of manufacturing SMEs in Pakistan through purposive sampling. The data were analyzed using SPSS version 25 and partial least squares structural equation modeling (PLS-SEM).*

***Findings:*** *The findings indicate that fintech adoption has a positive effect on circular economy practices, innovation performance, and sustainability performance. Circular economy practices also show positive effects on innovation performance and sustainability performance, supporting their role as an important mechanism through which fintech adoption contributes to improved SME outcomes.*

***Practical implications:*** *The study provides practical guidance for SME managers and policymakers by showing that fintech adoption, when combined with circular economy practices, can strengthen innovation capability and sustainability outcomes in resource-constrained manufacturing environments.*

***Originality/value:*** *This study extends the literature by integrating fintech adoption and circular economy practices in a single framework and by examining their combined influence on both innovation and sustainability performance in Pakistani manufacturing SMEs.*

## 1. INTRODUCTION

Small and medium-sized enterprises (SMEs) play a central role in the economic development of developing countries. They contribute to employment generation, local production, and livelihoods for a large segment of society (Jha & Kumar, 2020). In increasingly competitive environments, SMEs are also encouraged to adopt open innovation strategies and digital technologies to support sustainable development (Bogers et al., 2018). However, many SMEs in developing economies continue to face substantial financial constraints, especially when they attempt to expand operations, improve

technology, or access international markets. One major reason for this financing gap is information friction, which limits lenders' ability to assess SME credibility and performance (Nassiry, 2018).

Fintech adoption can reduce these constraints by improving information processing, digital documentation, payment efficiency, identity verification, and access to alternative finance (Pizzi et al., 2021). Fintech refers to the use of advanced digital technologies in financial products and services and has become one of the most dynamic areas of financial innovation (Liu et al., 2021; Najaf et al., 2022). By creating new financial models, revenue channels, and investment opportunities, fintech has disrupted traditional financial systems and opened new pathways for business financing (Arslan et al., 2021). For SMEs, fintech-based tools such as mobile payments, peer-to-peer lending, crowdfunding, and digital financial platforms can be particularly useful because they reduce dependence on physical collateral and traditional bank-based procedures (Havrylchyk & Verdier, 2018; Thakor, 2020).

At the same time, the sustainability of SMEs remains a major concern. Many SMEs prioritize short-term economic performance over environmental and social responsibilities because they operate under resource constraints and strong competitive pressure (Malesios et al., 2021). This concern is particularly relevant for manufacturing SMEs because manufacturing activities often produce greater environmental impacts than service-sector activities (Zaid et al., 2018). In Pakistan, SMEs contribute to industrial output and labor absorption; therefore, understanding how they can become more innovative and sustainable is important for economic and environmental development.

Innovation is widely considered a critical driver of firm performance, productivity, and long-term competitiveness (Tellis et al., 2012). For resource-constrained SMEs, innovation can support more efficient use of limited resources and help firms develop new products, processes, and business models (Lumpkin & Dess, 1996; Sandvik & Sandvik, 2003). Circular economy practices can support this process by encouraging firms to reduce waste, reuse resources, extend product life cycles, and redesign production systems. A circular economy replaces the traditional take-make-consume-dispose logic with a restorative and regenerative model in which the value of resources is retained for as long as possible (Ellen MacArthur Foundation, 2013; Kristoffersen et al., 2021; Lopes de Sousa Jabbour et al., 2018).

This study contributes to the literature by examining how fintech adoption influences innovation performance and sustainability performance through circular economy practices. Grounded in the practice-based view and dynamic capabilities theory, the study argues that fintech adoption can enhance SMEs' ability to implement circular economy practices, which in turn can improve innovation and sustainability outcomes. The findings offer useful guidance for SME managers, policymakers, and researchers interested in digital finance, circular economy transformation, and sustainable business performance in emerging economies.

### 1.1 Research Questions

RQ1: What is the influence of fintech adoption on innovation performance?

RQ2: What impact does fintech adoption have on sustainability performance?

RQ3: How does fintech adoption influence circular economy practices?

RQ4: How do circular economy practices mediate the impact of fintech adoption on sustainability performance?

RQ5: How do circular economy practices mediate the impact of fintech adoption on innovation performance?

## 2. Literature Review and Hypotheses Development

### 2.1 Circular Economy Practices and Innovation Performance

Circular economy practices (CEP) have emerged as an important driver of innovation because they require firms to rethink resource use, product design, production processes, and business models. CEP encourage firms to adopt models such as circular suppliers, resource recovery,

product life extension, shared platforms, and product-as-a-service systems (Zucchella & Previtali, 2019). These models require technological, operational, and strategic innovation because firms must create value while minimizing waste and improving resource efficiency.

Prior research suggests that circular business model transformation creates pressure for firms to innovate and develop new capabilities (Frishammar & Parida, 2018; Urbinati et al., 2017). Therefore, firms that adopt circular economy practices are more likely to improve innovation performance through better resource utilization, process redesign, and sustainable value creation.

H1: Circular economy practices have a positive effect on innovation performance.

### 2.2 Circular Economy Practices and Sustainability Performance

CEP are widely viewed as a pathway for improving sustainability performance because they promote the efficient use of resources and reduce environmental burden (Geissdoerfer et al., 2017; Corona et al., 2019; Rodríguez-Espíndola et al., 2022). The circular economy is based on restorative and regenerative principles, including reducing, reusing, and recycling materials (Ghisellini et al., 2016). At the firm level, CEP help organizations align environmental and economic objectives by reducing waste, improving resource productivity, and extending product life cycles (Zhu et al., 2010).

In manufacturing contexts, CEP can support sustainability by increasing resource reuse, reducing dependence on virgin materials, and involving multiple stakeholders in sustainable value creation (Bai et al., 2020; Dey et al., 2020; Gupta et al., 2019). Therefore, SMEs that adopt circular economy practices are expected to achieve stronger economic, environmental, and social sustainability outcomes.

H2: Circular economy practices have a positive effect on sustainability performance.

### 2.3 Fintech Adoption and Circular Economy Practices

Digitalization supports circular economy transformation by converting data, ideas, and transactions into valuable information for decision-making (Antikainen et al., 2018). Fintech and related digital technologies, including blockchain, artificial intelligence, mobile payment platforms, and Internet of Things applications, can improve transparency, resource tracking, financial access, and operational efficiency (Kristoffersen et al., 2020; Pizzi et al., 2021).

From the perspective of the practice-based view, fintech adoption can help SMEs implement circular economy practices by enabling better financial coordination, transaction traceability, and access to investment for sustainable projects. Fintech tools can also help SMEs shift from traditional linear business models toward circular economy business models by improving strategic flexibility and adaptability (Pizzi et al., 2021; Ramakrishna, 2022).

H3: Fintech adoption has a positive effect on circular economy practices.

### 2.4 Fintech Adoption and Innovation Performance

Fintech adoption can strengthen SMEs' innovation performance by improving financial flexibility, reducing transaction costs, and enabling access to digital platforms that integrate internal and external information. Digital financial platforms can help SMEs coordinate activities, interact with customers, automate financial processes, and make faster decisions (Frishammar & Parida, 2018; Giotopoulos et al., 2017).

Fintech tools such as mobile payment systems, peer-to-peer lending, and crowdfunding can help SMEs develop new business models and respond more effectively to market changes (Teece, 2018). These tools may also improve access to funding for research and development, process improvement, and product innovation (Helfat & Raubitschek, 2018; Jun et al., 2021; Scuotto et al., 2017; Zeng et al., 2010).

H4: Fintech adoption has a positive effect on innovation performance.

### 2.5 Fintech Adoption and Sustainability Performance

Fintech adoption is increasingly linked with sustainable digital finance and environmental sustainability (Yan et al., 2022). Digital finance can support the deployment of energy-efficiency and renewable-energy solutions by improving automation, data analytics, and resource allocation (Liu et al., 2022). Fintech can also encourage investment in energy efficiency, environmental projects, and corporate social responsibility activities (Deng et al., 2019; Liu et al., 2021).

For SMEs, fintech may influence sustainability performance by improving access to capital, supporting environmental investment, reducing transaction inefficiencies, and enabling more transparent resource management (Croutzet & Dabbous, 2021; Muganyi et al., 2021). Industry 4.0-related technologies can also improve social sustainability by helping firms respond to stakeholder expectations and create broader social value (Tasleem et al., 2019).

H5: Fintech adoption has a positive effect on sustainability performance.

### 2.6 Conceptual Framework

The proposed framework links fintech adoption with circular economy practices, innovation performance, and sustainability performance. Circular economy practices are positioned as the mediating mechanism through which fintech adoption contributes to improved SME outcomes.

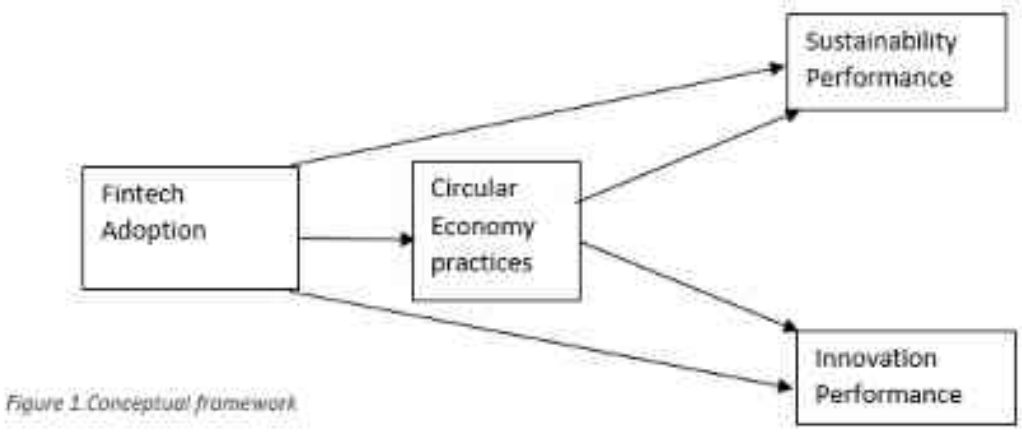


**Figure 1. Conceptual framework**

## 3. Research Methodology and Design

### 3.1 Research Design, Population, and Sample

This study employed a quantitative, cross-sectional research design to examine the effect of fintech adoption (FA) on sustainability performance (SP) and innovation performance (IP) through circular economy practices (CEP) in manufacturing SMEs in Pakistan. The target population consisted of managers working in Pakistani manufacturing SMEs because these respondents were expected to have relevant knowledge of fintech adoption, circular economy practices, and firm-level performance.

Data were collected from 299 SME managers using purposive sampling. This sampling approach was appropriate because the study required respondents with practical experience and knowledge of the constructs under investigation. The questionnaire was distributed through digital platforms, including Google Forms, and through paper-based surveys. Participation was voluntary, and respondents were informed about the purpose of the study before completing the questionnaire.

The survey was conducted from January to April 2024. A pilot test with 30 SME managers was

conducted to assess the clarity and wording of the questionnaire. Based on feedback from the pilot survey, ambiguous items were revised for greater clarity and precision. After data collection, responses were coded and analyzed using SPSS version 25 and SmartPLS-SEM.

### 3.2 Procedural Controls and Ethical Considerations

To improve response quality and reduce potential response bias, the questionnaire included a cover letter explaining the academic purpose of the study and emphasizing voluntary participation. Respondents were assured that their responses would be used for research purposes only. The pilot test also helped improve item clarity and reduce misunderstanding.

Because the study used self-reported survey data, procedural remedies were applied to reduce potential common method concerns. These remedies included voluntary participation, a clear explanation of the academic purpose of the study, pilot testing of the questionnaire items, and careful wording of the survey instrument. If required by the target journal, the authors should additionally report the statistical diagnostic used to assess common method bias.

### 3.3 Measurement of Variables

All constructs were measured using previously validated scales and a five-point Likert scale. Fintech adoption was measured using seven items adapted from Dwivedi et al. (2021). Sustainability performance was measured using four items adapted from Kamble et al. (2020) and Helleno et al. (2017). Innovation performance was measured using four items adapted from Rashid (2022). Circular economy practices were measured using eleven items adapted from Mura et al. (2020).

**Table A. Constructs and measurement sources**

| Construct | Role in model | Items | Measurement source |
|---|---|---|---|
| Fintech adoption (FA) | Independent variable | 7 | Dwivedi et al. (2021) |
| Circular economy practices (CEP) | Mediating variable | 11 | Mura et al. (2020) |
| Innovation performance (IP) | Dependent variable | 4 | Rashid (2022) |
| Sustainability performance (SP) | Dependent variable | 4 | Kamble et al. (2020); Helleno et al. (2017) |

## 4. Results and Discussion

### 4.1 Demographic Profile of Respondents

The demographic profile of the respondents was assessed using gender, age, education, experience, and location. Out of 299 respondents, 63.87% were male and 36.12% were female. Most respondents were between 25 and 34 years old (161 respondents), followed by the 35-44 age group (120 respondents), while 18 respondents were between 45 and 54 years old. In terms of education, 179 respondents had a bachelor's degree, 88 had a master's degree, and 32 had high school-level education. Approximately 50.83% of the SMEs had been operating for 5 to 10 years. Most respondents were from urban areas (85.61%), while 14.38% were from rural areas.

### 4.2 Measurement Model Assessment

PLS-SEM involves two main stages: measurement model assessment and structural model assessment. In the measurement model, reliability and validity were assessed through outer loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity. Cronbach's alpha values of 0.70 or above are generally acceptable, while values above 0.60 may be acceptable in exploratory research (Hair et al., 2011; Kline, 2016; Nunnally & Bernstein, 2010). CR values between 0.70 and 0.90 indicate satisfactory internal consistency reliability (Hair et al., 2017), while AVE values of 0.50 or above indicate acceptable convergent validity.

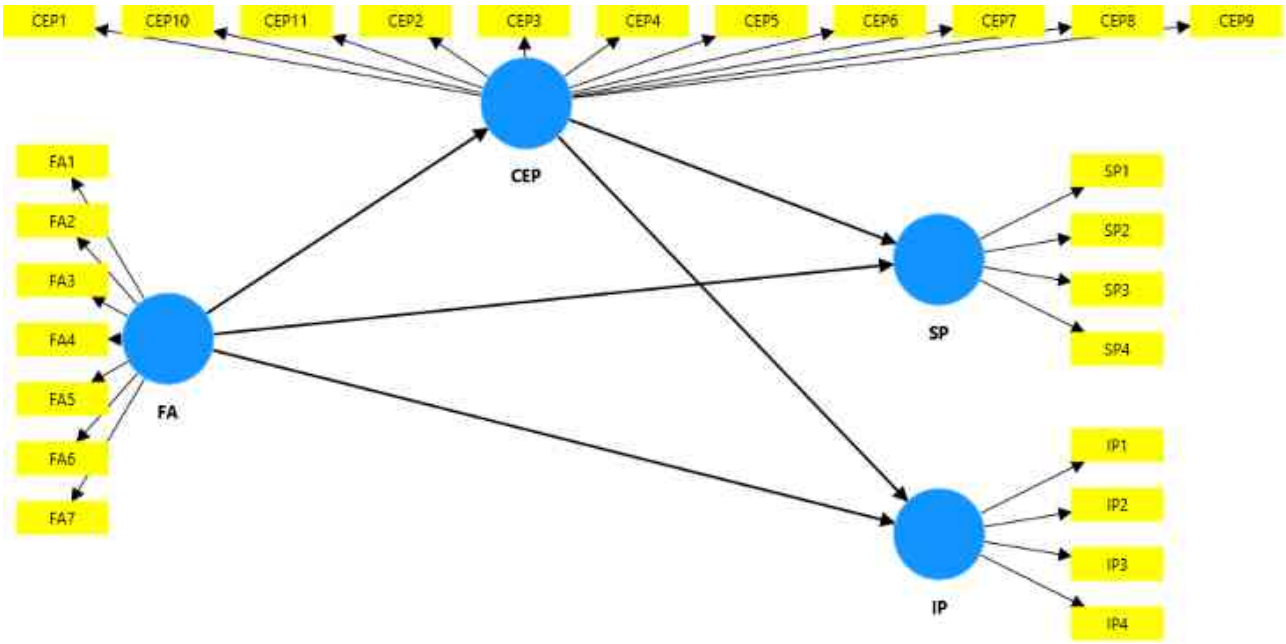


**Figure 2. Measurement model**

Table 1 presents the measurement model results. Cronbach's alpha values ranged from 0.754 to 0.889, CR values ranged from 0.763 to 0.893, and AVE values ranged from 0.500 to 0.633. These results indicate acceptable internal consistency reliability and convergent validity for all constructs.

**Table 1. Measurement model reliability and validity results**

| Latent variable | Items retained | Outer loadings | Cronbach's alpha | CR | AVE | Validity status |
|---|---|---|---|---|---|---|
| Circular economy practices | CEP1-CEP11 | 0.619, 0.669, 0.727, 0.734, 0.705, 0.763, 0.697, 0.735, 0.637, 0.702, 0.676 | 0.889 | 0.893 | 0.500 | Accepted |
| Innovation performance | IP1-IP4 | 0.760, 0.865, 0.824, 0.727 | 0.805 | 0.811 | 0.633 | Accepted |
| Fintech adoption | FA1-FA7 | 0.673, 0.782, 0.804, 0.800, 0.810, 0.723, 0.813 | 0.888 | 0.893 | 0.599 | Accepted |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sustainability performance | SP1-SP4 | 0.753, 0.751, 0.822, 0.706 | 0.754 | 0.763 | 0.576 | Accepted |

Discriminant validity was evaluated using the heterotrait-monotrait ratio (HTMT). The HTMT values were below the recommended threshold of 0.90, indicating that the constructs were empirically distinct and did not substantially overlap (Henseler et al., 2015).

**Table 2. Heterotrait-monotrait (HTMT) analysis**

| | CEP | IP | FA | SP |
|---|---|---|---|---|
| CEP | - | | | |
| IP | 0.660 | - | | |
| FA | 0.645 | 0.680 | - | |
| SP | 0.708 | 0.707 | 0.615 | - |

Note. CEP = circular economy practices; IP = innovation performance; FA = fintech adoption; SP = sustainability performance.

### 4.3 Structural Model Assessment

The structural model was assessed using bootstrapping with 5,000 subsamples. A hypothesis was considered supported when the t-value exceeded 1.96 and the p-value was below 0.05. The structural model results show that all five direct hypotheses were positive and statistically significant.

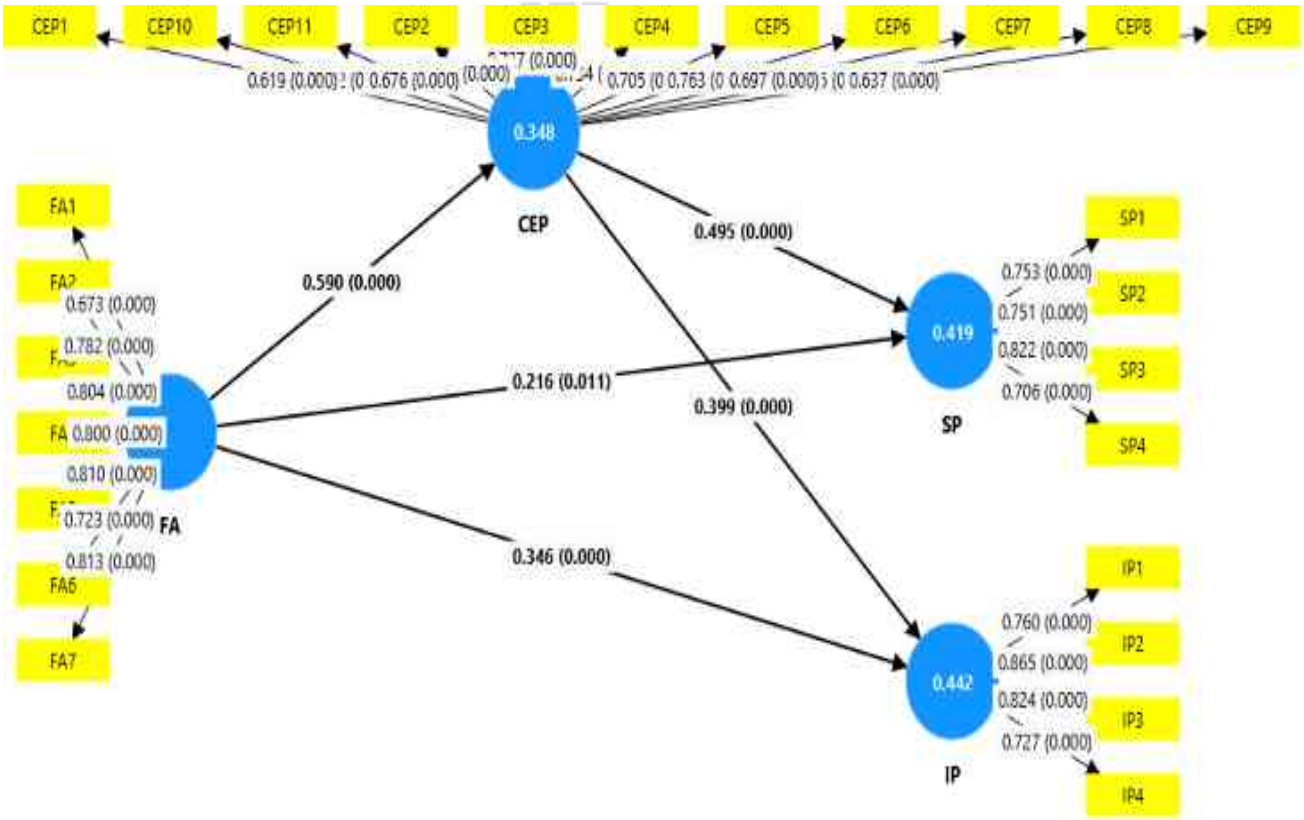


**Figure 3. Structural model**

Table 3. Structural path results

| Direct path | Beta (β) | t-value | p-value | Decision |
|---|---|---|---|---|
| CEP → IP | 0.399 | 5.843 | 0.000 | Supported |
| CEP → SP | 0.495 | 5.904 | 0.000 | Supported |
| FA → CEP | 0.590 | 12.974 | 0.000 | Supported |
| FA → IP | 0.346 | 4.932 | 0.000 | Supported |
| FA → SP | 0.216 | 2.453 | 0.011 | Supported |

The results demonstrate that circular economy practices positively affect innovation performance (β = 0.399, t = 5.843, p < 0.001) and sustainability performance (β = 0.495, t = 5.904, p < 0.001). Fintech adoption also positively affects circular economy practices (β = 0.590, t = 12.974, p < 0.001), innovation performance (β = 0.346, t = 4.932, p < 0.001), and sustainability performance (β = 0.216, t = 2.453, p = 0.011). Therefore, H1, H2, H3, H4, and H5 are supported.

The positive paths from fintech adoption to circular economy practices and from circular economy practices to both performance outcomes indicate that CEP operates as an important explanatory mechanism in the proposed model. These results support the logic that fintech adoption can strengthen SME performance partly by enabling circular economy practices.

### 4.4 Coefficient of Determination

Table 4. Coefficient of determination

| Endogenous construct | $R^2$ | Adjusted $R^2$ |
|---|---|---|
| Circular economy practices | 0.347 | 0.345 |
| Innovation performance | 0.426 | 0.422 |
| Sustainability performance | 0.397 | 0.393 |

The $R^2$ value for circular economy practices was 0.347, indicating that fintech adoption explained 34.7% of the variance in CEP. The $R^2$ values for innovation performance and sustainability performance were 0.426 and 0.397, respectively. These values indicate acceptable explanatory power for the endogenous constructs in the model (Hair et al., 2019; Henseler et al., 2009).

## 5. Discussion

The findings provide several theoretical and practical insights into the relationships among fintech adoption, circular economy practices, innovation performance, and sustainability performance in Pakistani manufacturing SMEs. First, circular economy practices were found to have a positive effect on innovation performance. This suggests that SMEs adopting circular practices are more likely to redesign processes, improve resource utilization, and develop new solutions that enhance innovation outcomes. This finding is consistent with the view that circular economy transformation requires firms to rethink products, processes, and business models (Frishammar & Parida, 2018; Ghisellini et al., 2016; Urbinati et al., 2017).

Second, circular economy practices positively influenced sustainability performance. This indicates that circular practices can help SMEs improve environmental, economic, and social outcomes by reducing waste, improving resource efficiency, and encouraging stakeholder-oriented value creation. This finding aligns with prior research showing that CEP can reduce environmental impact and support sustainable performance (Corona et al., 2019; Khan et al., 2023; Rodríguez-Espíndola et al., 2022; Walker et al., 2022).

Third, fintech adoption had a strong positive effect on circular economy practices. This result

suggests that digital financial technologies can help SMEs finance sustainability initiatives, improve transaction transparency, and support circular economy transformation. Fintech may facilitate CEP by linking financial information with operational data, product information, recycling processes, and supply-chain transparency (Kristoffersen et al., 2020; Pizzi et al., 2021; Ramakrishna, 2022).

Fourth, fintech adoption positively influenced innovation performance. Fintech provides SMEs with digital tools, flexible finance, and improved operational coordination, all of which can support innovation. This finding is consistent with research suggesting that fintech enables SMEs to access resources, reduce financial barriers, and improve competitiveness (Najib et al., 2021; Verma et al., 2023).

Fifth, fintech adoption positively influenced sustainability performance. For SMEs facing financial limitations, fintech can provide access to capital for environmental and social investments. It can also support corporate social responsibility, green financing, and resource-efficient operations (Liu et al., 2021; Muganyi et al., 2021; Pizzi et al., 2021). Overall, the results show that fintech adoption and circular economy practices can jointly improve SME innovation and sustainability outcomes in emerging economies.

## 6. Implications

### 6.1 Theoretical Implications

This study contributes to the literature on fintech adoption, circular economy practices, and SME performance in emerging economies. By integrating the practice-based view and dynamic capabilities theory, the study shows how fintech adoption can support circular economy practices and improve innovation and sustainability outcomes. The framework extends prior research by examining both innovation performance and sustainability performance as outcomes of fintech-enabled circular economy transformation.

The study also responds to calls for greater understanding of how digital finance can support sustainable business model transformation in SMEs. The results indicate that fintech adoption should not be viewed only as a financial tool but also as a strategic capability that can support resource efficiency, process innovation, and sustainable performance.

### 6.2 Practical Implications

The findings suggest that SME managers should adopt fintech tools not only for payment efficiency or access to finance but also as part of a broader sustainability and innovation strategy. Digital financial platforms can help firms obtain resources, monitor transactions, and support investments in circular practices such as recycling, reuse, and resource recovery.

Policymakers should encourage fintech-enabled financing for SMEs that invest in environmental and circular economy initiatives. Training programs, digital finance awareness campaigns, and partnerships between fintech providers and SME support institutions can help manufacturing SMEs overcome financial and technological barriers. For developing economies such as Pakistan, such initiatives can contribute to sustainable industrial development and improved competitiveness.

## 7. Limitations and Future Research

This study focused on manufacturing SMEs in Pakistan; therefore, future research can extend the model to service, retail, technology-based, and export-oriented SMEs. Comparative studies across industries may reveal whether fintech adoption and circular economy practices operate differently across sectors.

Future studies can also examine SMEs in other developing and developed economies to test the generalizability of the findings. Longitudinal research is recommended to understand how the effects of fintech adoption and circular economy practices evolve over time. Future researchers may also investigate moderating and mediating variables such as organizational culture, leadership style, market competitiveness, digital literacy, and government support.

Finally, future studies can report complete bootstrapped indirect effects for the mediation hypotheses and include formal common method bias diagnostics. These additions would further

strengthen methodological rigor in this research stream.

## 8. Conclusion

This study examined the effect of fintech adoption on circular economy practices, innovation performance, and sustainability performance in Pakistani manufacturing SMEs. The findings support the proposed framework by showing that fintech adoption positively influences circular economy practices and both performance outcomes. Circular economy practices also positively affect innovation and sustainability performance, indicating their important role in transforming fintech adoption into broader organizational benefits. The study highlights the strategic value of combining fintech adoption with circular economy practices to improve SME performance in emerging economies.

## REFERENCES

Antikainen, M., Uusitalo, T., & Kivikytö-Reponen, P. (2018). Digitalisation as an enabler of circular economy. Procedia CIRP, 73, 45–49. https://doi.org/10.1016/j.procir.2018.04.027

Arslan, A., Buchanan, B. G., Kamara, S., & Al Nabulsi, N. (2021). Fintech, base of the pyramid entrepreneurs and social value creation. Journal of Small Business and Enterprise Development, 29(3), 335–353. https://doi.org/10.1108/JSBED-10-2020-0370

Bai, C., Dallasega, P., Orzes, G., & Sarkis, J. (2020). Industry 4.0 technologies assessment: A sustainability perspective. International Journal of Production Economics, 229, 107776. https://doi.org/10.1016/j.ijpe.2020.107776

Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33(5), 308–320. https://doi.org/10.1080/21681015.2016.1172124

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: Research, practices, and policies. California Management Review, 60(2), 5–16. https://doi.org/10.1177/0008125617745086

Corona, B., Shen, L., Reike, D., Rosales Carreón, J., & Worrell, E. (2019). Towards sustainable development through the circular economy: A review and critical assessment on current circularity metrics. Resources, Conservation and Recycling, 151, 104498. https://doi.org/10.1016/j.resconrec.2019.104498

Croutzet, A., & Dabbous, A. (2021). Do FinTech trigger renewable energy use? Evidence from OECD countries. Renewable Energy, 179, 1608–1617. https://doi.org/10.1016/j.renene.2021.07.144

Deng, X., Huang, Z., & Cheng, X. (2019). FinTech and sustainable development: Evidence from China based on P2P data. Sustainability, 11(22), 6434. https://doi.org/10.3390/su11226434

Dey, P. K., Malesios, C., Chowdhury, S., Saha, K., Budhwar, P., & De, D. (2020). Circular economy to enhance sustainability of small and medium-sized enterprises. Business Strategy and the Environment, 29(6), 2145–2169. https://doi.org/10.1002/bse.2492

Dwivedi, P., Alabdooli, J. I., & Dwivedi, R. (2021). Role of FinTech adoption for competitiveness and performance of the bank: A study of banking industry in UAE. International Journal of Global Business and Competitiveness, 16(2), 130–138. https://doi.org/10.1007/s42943-021-00033-9

Ellen MacArthur Foundation. (2013). Towards the circular economy: Economic and business rationale for an accelerated transition. Ellen MacArthur Foundation.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/002224378101800104

Frishammar, J., & Parida, V. (2018). Circular business model transformation: A roadmap for incumbent firms. California Management Review, 61(2), 5–29. https://doi.org/10.1177/0008125618811926

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The circular economy: A new sustainability paradigm? Journal of Cleaner Production, 143, 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007

Giotopoulos, I., Kontolaimou, A., Korra, E., & Tsakanikas, A. (2017). What drives ICT adoption by SMEs? Evidence from a large-scale survey in Greece. Journal of Business Research, 81, 60–69. https://doi.org/10.1016/j.jbusres.2017.08.007

Gupta, S., Chen, H., Hazen, B. T., Kaur, S., & Santibañez Gonzalez, E. D. R. (2019). Circular economy and big data analytics: A stakeholder perspective. Technological Forecasting and Social Change, 144, 466–474. https://doi.org/10.1016/j.techfore.2018.06.030

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.). Sage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R: A workbook. Springer. https://doi.org/10.1007/978-3-030-80519-7

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Havrylchyk, O., & Verdier, M. (2018). The financial intermediation role of the P2P lending platforms. Comparative Economic Studies, 60(1), 115–130. https://doi.org/10.1057/s41294-017-0045-1

Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. Research Policy, 47(8), 1391–1399. https://doi.org/10.1016/j.respol.2018.01.019

Helleno, A. L., de Moraes, A. J. I., & Simon, A. T. (2017). Integrating sustainability indicators and lean manufacturing to assess manufacturing processes: Application case studies in Brazilian industry. Journal of Cleaner Production, 153, 405–416. https://doi.org/10.1016/j.jclepro.2016.12.072

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. Advances in International Marketing, 20, 277–319. https://doi.org/10.1108/S1474-7979(2009)0000020014

Jha, M. K., & Kumar, S. (2020). Does financial inclusion promote sustainable livelihood development? Evidence from microentrepreneurs. Journal of Financial Economic Policy, 12(4), 485–502.

Jun, S., Chen, Y., & Chen, J. (2021). FinTech and innovation in SMEs: Evidence from digital finance applications. Journal of Innovation & Knowledge, 6(4), 217–230.

Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2020). Achieving sustainable performance in a data-driven agriculture supply chain: A review for research and applications. International Journal of Production Economics, 219, 179–194.

Khan, S. A. R., Ahmad, Z., & Sheikh, A. A. (2023). Green technology adoption paving the way toward sustainable performance in circular economy: A case of Pakistani small and medium enterprises. International Journal of Innovation Science, 16(1), 1–20.

Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). Guilford Press.

Kristoffersen, E., Blomsma, F., Mikalef, P., & Li, J. (2020). The smart circular economy: A digital-enabled circular strategies framework for manufacturing companies. Journal of Business Research, 120, 241–261. https://doi.org/10.1016/j.jbusres.2020.07.044

Liu, H., Wang, Y., He, D., & Wang, C. (2021). Impact of green financing, FinTech, and financial inclusion on energy efficiency. Environmental Science and Pollution Research, 29, 18955–18966. https://doi.org/10.1007/s11356-021-16949-x

Liu, J., Li, X., & Wang, S. (2022). Digital technologies and circular economy in supply chain management: A systematic literature review. Annals of Operations Research, 333, 361–388.

Lopes de Sousa Jabbour, A. B., Jabbour, C. J. C., Foropon, C., & Godinho Filho, M. (2018). When titans meet: Can Industry 4.0 revolutionise the environmentally-sustainable manufacturing wave? The role of critical success factors. Technological Forecasting and Social Change, 132, 18–25. https://doi.org/10.1016/j.techfore.2018.01.017

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review, 21(1), 135–172. https://doi.org/10.5465/amr.1996.9602161568

Malesios, C., De, D., Moursellas, A., & Kumar, P. (2021). Sustainability performance analysis of small and medium sized enterprises: Criteria, methods and framework. Socio-Economic Planning Sciences, 75, 100993. https://doi.org/10.1016/j.seps.2020.100993

Mild, A., Waitz, M., Wöckl, J., & Raum, L. (2015). The role of peer-to-peer lending in sustainable finance. Journal of Sustainable Finance & Investment, 5(2), 95–110.

Muganyi, T., Yan, L., & Yin, Y. (2021). Green finance, FinTech and environmental protection: Evidence from China. Environmental Science and Ecotechnology, 7, 100107. https://doi.org/10.1016/j.ese.2021.100107

Mura, M., Longo, M., & Zanni, S. (2020). Circular economy in Italian SMEs: A multi-method study. Journal of Cleaner Production, 245, 118821. https://doi.org/10.1016/j.jclepro.2019.118821

Najaf, K., Najaf, R., & Hammoudeh, S. (2022). FinTech innovations and challenges in the financial services industry. Journal of Risk and Financial Management, 15(7), 287. https://doi.org/10.3390/jrfm15070287

Najib, M., Ermawati, W. J., Fahma, F., Endri, E., & Suhartanto, D. (2021). FinTech in the small food business and its relation with open innovation. Journal of Open Innovation: Technology, Market, and Complexity, 7(1), 88. https://doi.org/10.3390/joitmc7010088

Nassiry, D. (2018). The role of Fintech in unlocking green finance: Policy insights for developing countries (ADBI Working Paper No. 883). Asian Development Bank Institute.

Nunnally, J. C., & Bernstein, I. H. (2010). Psychometric theory (3rd ed.). McGraw-Hill.

Pizzi, S., Corbo, L., & Caputo, A. (2021). Fintech and SMEs sustainable business models: Reflections and considerations for a circular economy. Journal of Cleaner Production, 281, 125217. https://doi.org/10.1016/j.jclepro.2020.125217

Ramakrishna, S. (2022). Circular economy and sustainability pathways: FinTech-enabled solutions for carbon neutrality. Circular Economy and Sustainability, 2, 1–10.

Rashid, N. (2022). Towards innovation performance of SMEs: Investigating the role of digital platforms, innovation culture and frugal innovation in emerging economies. Journal of Innovation & Knowledge, 7(1), 100149.

Rodríguez-Espíndola, O., Cuevas-Romo, A., Chowdhury, S., Díaz-Acevedo, N., Albores, P., Despoudi, S., & Dey, P. K. (2022). The role of circular economy principles and sustainable-oriented innovation to enhance social, economic and environmental performance: Evidence from Mexican SMEs. International Journal of Production Economics, 248, 108495. https://doi.org/10.1016/j.ijpe.2022.108495

Sandvik, I. L., & Sandvik, K. (2003). The impact of market orientation on product innovativeness and business performance. International Journal of Research in Marketing, 20(4), 355–376. https://doi.org/10.1016/j.ijresmar.2003.02.002

Schroeder, P., Anggraeni, K., & Weber, U. (2019). The relevance of circular economy practices to the sustainable development goals. Journal of Industrial Ecology, 23(1), 77–95. https://doi.org/10.1111/jiec.12732

Scuotto, V., Del Giudice, M., & Carayannis, E. G. (2017). The effect of social networking sites and absorptive capacity on SMEs' innovation performance. The Journal of Technology Transfer, 42(2), 409–424. https://doi.org/10.1007/s10961-016-9517-0

Siddik, A. B., Yong, L., & Rahman, M. N. (2023). The role of Fintech in circular economy practices to improve sustainability performance: A two-staged SEM-ANN approach. Environmental Science and Pollution Research, 30(49), 107465–107486. https://doi.org/10.1007/s11356-023-25576-7

Tasleem, M., Khan, N., & Nisar, Q. A. (2019). Industry 4.0 technologies and social sustainability performance: Evidence from manufacturing firms. Sustainability, 11(18), 5062.

Teece, D. J. (2018). Business models and dynamic capabilities. Long Range Planning, 51(1), 40–49. https://doi.org/10.1016/j.lrp.2017.06.007

Tellis, G. J., Prabhu, J. C., & Chandy, R. K. (2012). Radical innovation across nations: The preeminence of corporate culture. Journal of Marketing, 73(1), 3–23. https://doi.org/10.1509/jmkg.73.1.003

Thakor, A. V. (2020). Fintech and banking: What do we know? Journal of Financial Intermediation, 41, 100833. https://doi.org/10.1016/j.jfi.2019.100833

Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. Journal of Cleaner Production, 168, 487–498. https://doi.org/10.1016/j.jclepro.2017.09.047

Verma, S., Sharma, R., & Sheth, J. (2023). FinTech in small and medium enterprises (SMEs): A review and future research agenda. European Management Journal, 41(6), 950–971. https://doi.org/10.1016/j.emj.2023.07.003

Walker, A. M., Opferkuch, K., Roos Lindgreen, E., Simboli, A., Vermeulen, W. J. V., & Raggi, A. (2022). What is the relation between circular economy and sustainability? Answers from frontrunner companies engaged with circular economy practices. Circular Economy and Sustainability, 2, 731–758. https://doi.org/10.1007/s43615-021-00064-7

Wang, Y., Zhang, M., & Sun, H. (2023). Sustainable business practices in resource-constrained SMEs: Drivers, barriers and performance implications. Journal of Business Research, 158, 113643.

Yan, C., Siddik, A. B., Yong, L., Dong, Q., Zheng, G. W., & Rahman, M. N. (2022). A two-staged SEM-artificial neural network approach to analyze the impact of FinTech adoption on the sustainability performance of banking firms. Sustainability, 14(9), 5438. https://doi.org/10.3390/su14095438

Zaid, A. A., Jaaron, A. A. M., & Bon, A. T. (2018). The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. Journal of Cleaner Production, 204, 965–979. https://doi.org/10.1016/j.jclepro.2018.09.062

Zeng, S. X., Xie, X. M., & Tam, C. M. (2010). Relationship between cooperation networks and innovation performance of SMEs. Technovation, 30(3), 181–194. https://doi.org/10.1016/j.technovation.2009.08.003

Zhu, Q., Geng, Y., & Lai, K. H. (2010). Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications. Journal of Environmental Management, 91(6), 1324–1331. https://doi.org/10.1016/j.jenvman.2010.02.013

Zucchella, A., & Previtali, P. (2019). Circular business models for sustainable development: A "waste is food" restorative ecosystem. Business Strategy and the Environment, 28(2), 274–285. https://doi.org/10.1002/bse.2216