

SUPPLY CHAIN FINANCE SUSTAINABILITY AND ITS IMPACT ON FINANCIAL PERFORMANCE: THE MEDIATING ROLE OF ESG PRACTICES

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Abstract

Main Objective was study examines the direct and indirect relationships between supply chain finance (SCF) and financial performance (FP) through the mediating role of ESG practices. The analysis is based on a sample of 103 Pakistani companies covering the period 2017–2025. The present study employs structural equation modelling to specify both direct and indirect effects between SCF, ESG practices, and FP. The results reveal that SCF has a positive and significant effect on FP. Furthermore, ESG practices partially mediate the relationship between SCF and FP. The findings confirm that Pakistani firms, under increasing stakeholder pressure regarding environmental performance, may leverage SCF and ESG practices to enhance FP. The results provide detailed actionable insights for researchers, practitioners, and regulators with an interest in corporate governance and SCF. For regulators, the study highlights the importance of examining how ESG practices influence financial outcomes within various institutional settings, thereby equipping them with the necessary knowledge to make informed decisions. The findings validate that firms with stronger ESG performance are more likely to enhance transparency and meet stakeholder expectations. This not only strengthens their legitimacy and long-term sustainability but also contributes to the broader societal goal of responsible corporate citizenship, fostering a sense of connection among stakeholders. This study super significantly enriches the literature by examining the mediating role of ESG practices in the SCF–FP relationship, this unique perspective enhances our understanding of how sustainability-oriented finance can improve both social and economic outcomes, providing the crystal-clear audience with valuable and original insights.

Keywords – ESG practices, financial performance, Pakistani firms, Supply chain finance

1. INTRODUCTIONS

Corporate sustainability practices have augmented markedly in recent years. Firms now systematically routinely disclose environmental, social, and governance (ESG) information parallel to their sustainability strategies, reflecting/demonstrating growing recognition that ESG factors shape corporate reputation and long-term performance (Agrawal et al., 2024; Riegler, 2023; MALIK, H. A., & MALIK, D. I. R. 2025).

This shift has been escalated by the aftermath of financial crises, which revealed vulnerabilities in corporate cash flows and highlighted the challenges firms face in securing external financing (Kaur et al., 2023). In this context framework, companies, firms have become more motivated driven to embrace/commit transparent ESG practices not only to satisfy regulatory & ensure regulatory compliance requirements but also to improve financial sustainability and raise capital (Queiroz, Telles, & Fossatti, 2025).

Amidst this evolving landscape, ESG practices orientation the degree to which a firm highlights ESG values in strategy has emerged/ materialized as a core contextual driver shaping the adoption and validity of sustainable practices. This is especially significant in Supply Chain Finance (SCF), Whenever organizations with stronger ESG framework are more likely to operationalize/deploy SCF initiatives to achieve sustainability objectives (Ouni et al., 2020). The strengthening interconnection between sustainability and firm performance (FP) underscores the strategic relevance of aligning financial tools with ESG Aims (ADALAT, S., & MALIK, D. J. A. 2025).

A sustained and recurring challenge, conversely, is firms' limited understanding of liquidity and working-capital management, which can trigger operational frictions and structural constraints (Jilani & Chouaibi, 2025). SCF has hence gained prominence as a viable short-term financing mechanism for financially constrained firms, helping to secure funds needed to maintain smooth operations. apart from funding, SCF functions as a supply chain management lever for both buyers and suppliers, facilitating coordination and collaboration across the network (Baid & Jayaraman, 2022; Kashi & Shah, 2023). Enhanced coordination improves financial and informational flows, optimizes inventory, and raises operational efficiency (Agrawal et al., 2024). By reducing bankruptcy risk and reducing uncertainty, SCF contributes to more resilient and stable supply chains conditions that support sustained firm performance (Zhang et al., 2019). Despite these advances, empirical evidence remains fragmented. Many studies rely on cross-sectional designs or sector-specific samples, limiting causal inference and generalizability across industries. Significant frameworks such as whether ESG practices mediate the impact of SCF on FP.

The main objective of this research to examine the mediating role of ESG practices on the relationship between SCF and FP.

The contextual motivation originates from rapidly evolving, experiencing accelerated change, societal expectations and regulatory standards around sustainability. As firms aim to optimize FP while responding to environmental and social pressures, SCF provide a promising methodology, vehicle, interventions to integrate responsible practices into financial strategy and to align with stakeholder expectations.

Theoretically, in an environment where transparency, accountability and social responsibility are increasingly demanded by stakeholders, firms must adapt to remain competitive and legitimate; empirically, earlier work advocates that integrating ESG into financial activities is associated with stronger performance and enhanced corporate enhanced reputation and elevated esteem (Travasi, A., Conti, E., & Musso, F. (2025). implicating the possibility of ESG alignment to create both economic and non-economic value.

As a result, this current research extends the existing body of literature in some significant ways. **First**, it extends the theoretical framework by incorporating environmental, social, and governance (ESG) practices within the paradigm of sustainable chain finance (SCF), Accordingly offering a scientific novel perspective on their potential impact on corporate financial performance. **Second**, it gives an empirical investigation that boosted the evidence linking sustainable practices with financial outcomes, exemplifying how the systematic interrelation of ESG criteria can function as a key driver of firm-level financial performance. **Third**, the research elucidates the specific framework via which ESG practices mediate the relationship between sustainability interventions and financial results, contributing to a more nuanced understanding of the complex dynamics between corporate sustainability and finance. **Finally**, it provides practical insights for managers and policymakers by validating the necessity of adopting an integrated approach that reconciles/accommodates financial performance with broader social responsibility objectives. Accordingly, the research not only enriches theoretical discourse but also informs the ongoing debate on the role of sustainability in shaping contemporary business practices.

The remainder of the paper is organized as follows: Section 2 outlines the theoretical framework; Section 3 reviews the literature and develops the hypotheses; Section 4 details the research design, including the sample and variable definitions; Section 5 presents the empirical results; Section 6 reports robustness checks; and Section 7 concludes.

2. THEORETICAL FRAMEWORK

2.1 Resource Dependence Theory

Resource Dependence Theory (RDT) holds that firms gain competitive edge by securing and managing access to vital external resources via boundary-spanning relationships and governance mechanisms. In this framework, investing in ESG functions as a capability that strengthens/ amplifies a firm's ties to key stakeholders, strengthens legitimacy, and mitigates environmental and social risks. These investments/ fiscal commitments can simultaneously uplift brand reputation and improve operational efficiency two channels through which ESG contributes to stronger firm performance (FP). Furthermore, ESG performance enhances when firms share resources and knowledge with supply-chain partners, which sustains legitimacy and market position and can attract additional investors (Jiang et al., 2023).

Operationalizing these benefits requires cross-functional collaboration. Liljeblom et al. (2024) argue that finance, accounting, and governance must be interlocked to embed sustainability principles into core decision processes; such interrelation can also inform and shape public policy agendas on sustainable development. RDT further highlights that outcomes hinge on the structure and complexity of interorganizational ties. A clear grasp of supply-chain complexity enables firms to design measures and strategies elevated transparency with suppliers and customers, promotion of sustainability criteria across all tiers, and selective expansion or diversification of supplier networks that substantiate resilience and sustainable performance (Kwak & Kim, 2020; Jiang et al., 2023). In supply chain finance deals, the same bridging measures and strategies can be used to make cash perfect flow solutions consistent with sustainability overall objectives, as well as integrating cooperation structures and information exchange along the chain.

2.2 Agency Theory

The agency theory hypothesizes that the central motivating factor that ensures that there is an opportunity of conflict in case the goals of the managers differ with the goals of the owners and other stakeholders (Jensen and Meckling, 2019). In that perspective, managers can use ESG initiatives as personal utility tool/vehicles in search of visibility, reputation, or contingent discretionary budgets that might compromise shareholder value (Cheng et al., 2024). Others can focus on reducing costs short term by negotiating with suppliers instead of enhancing the supply chain ESG activities, thus putting the firm at odds with its partners and compromising the sustainability of the supply chain. Others can invest in symbolic ESG practices to evade criticism or polish the corporate brand, hiding the poor underlying framework instead of doing something meaningful (Peng et al., 2023). In the case of such opportunism, the stakeholder expectations especially that of the suppliers and customers are unlikely to be fulfilled (Zimon et al., 2022). ESG initiatives could, however, be designed and managed credibly, this can increase transparency and ethical behavior, decrease information asymmetries, and better align the interests of managers, owners, and supply chain partners through which firm performance (FP) can be improved.

2.3 Stakeholder Theory

Stakeholder Theory asserts that companies are expected to operate efficiently, ethically, and responsibly while adapting to various environmental conditions. The theory proposes that firms are responsible not just for shareholders but also for everyone involved in the company. Cheng et al. (2025) suggest that the theory highlights the importance of companies extending their responsibilities beyond purely economic goals, motivated by altruism and a commitment to the broader well-being of society. Cui et al. (2018) affirmed that strong ESG performance is key in promoting better communication and mitigating potential conflicts of interest between companies and their stakeholders.

From the perspective of SF partners, strong ESG performance boots greater trust and collaboration, enabling firms and their partners to tackle risks together (Wu et al., 2024). According to Li et al. (2025), companies often prioritize developing collaborative partnerships with supply chain partners, which can, in turn, limit the potential of ESG initiatives to boosting/enhance stakeholder relationships across the supply chain.

3. THEORIZATION AND HYPOTHESIS DEVELOPMENT

3.1 Supply chain finance and financial performance

Supply Chain Finance (SCF) is a funding Strategy grounded in actual transactions among supply chain participants, Sustained by the credit assurance of a focal firm (Taleizadeh et al., 2022). It Offers financial services to businesses within the supply chain that require capital. The adoption and implementation of SCF have grown significantly due to its benefits and advantages of low-cost financing and broad accessibility, especially in response to the negative economic effects of COVID-19 (Goodell, 2020). Under the umbrella of agency theory, SCF reduce information asymmetry and aligns the interests of stakeholders, as a result enhancing financial performance (FP) across the supply chain (Jensen & Meckling, 2019). Furthermore, Liu (2020) Highlighted that firms can extend SCF to their suppliers and customers by adjusting their own payment and receipt terms.

Nigro et al. (2021) argued that increasingly firms adopt SCF as a means of stimulating their products sustaining and retaining customer loyalty when financial constraints hinder regular purchasing activities. Via SCF, companies and firms are able to sustain operations framework and maintain customer engagement even during periods of financial stress support supply continuity. Similarly, Lee et al. (2019) Revealed that SCF not only reduce the risks of customer turnover and order cancellations but also achieves these results in a cost-effective & scalable manner. Overall, these conclusions suggest that SCF enables firms to promote stronger customer relationships, enhance operational efficiency, stronger significant customer relationships, maintain positive market presence, and preserve business continuity and secure a competitive edge advantage beneath challenging according to paradigm market conditions.

Under the umbrella stakeholder theory, Supply Chain Finance (SCF) validates advancing the interests of all stakeholders In lieu of only maximizing individual profits (Freeman, 1999: Jaboob et al., 2023). Those firms applying the SCF critical perspective with a stakeholder-focused mindset are able to stand out in the market by reinforcing and underpinning ties and establishing a robust supply chain, which ultimately contributes to financial performance (FP). Bals (2019) Highlighted that SCF triggers strong stakeholder involvement and contributes to the establishment of a sustainable network ecosystem, thus alleviating the risk of unstable supply-demand interactions. Likewise, Wetzel and Hofmann (2019) Claimed that SCF enhance the financial outcomes of supply chain partners while expanding market share via collaboration and shared risk management. To maintain supply chain stability, firms may also use SCF to retain both suppliers and customers, securing a competitive edge (Lee et al., 2019). Wetzel and Hofmann (2019) further Demonstrated that firms leveraging SCF to optimize working capital Tend to outstrip their peers, as SCF not only strengthens FP but also plays a key role in reducing supply chain risks. In lieu with this, Cahyono et al. (2023) found that SCF Supports lower uncertainty and operational risks, triggering to improved FP across the supply chain. Therefore, we propose:

- **H1. Supply chain finance has a positive effect on financial performance**

3.2 Supply Chain Finance and ESG Practices

In recent years, Environmental, Social, and Governance (ESG) practices, which encompass a broad range of sustainability issues, have acquired increasing importance among firms due to escalating competition and growing

environmental responsibilities. These practices are strategically incorporated into decision-making processes related to sustainable development. Supply Chain Finance (SCF), on the other hand, refers to the use of financial instruments, practices, and technologies to enhance the management of the working capital and liquidity tied up in supply chain processes. The cost of financing is significantly shaped by the efficiency and sustainability of a company's long-term activities. Sustainable development, a goal that can be achieved via supply chain finance (SCF) due to its comparatively low cost (Liu et al., 2022), is a shared objective of both SCF and ESG practices. By decreasing resource consumption, SCF not only enhances/boosted financial performance (FP) but also stimulates sustainable practices. This shared objective, conceptualizing sustainability via the principle of doing well by doing good, creates a sense of connection and common purpose among stakeholders, promoting mutually beneficial outcomes (Fatemi et al., 2015; Jaboob et al., 2025a).

ESG practices are often leveraged by firms to advance stakeholder interests, especially when performance falls short of expectations. Still, stakeholder theory demonstrates that investors often struggle to evaluate the short-term benefits of ESG initiatives, as such projects commonly incur immediate costs while their returns materialise over the longer term (Edmans, 2012). However, strong ESG performance can boost a brand's reputation, attract customers, and promote long-term stakeholder loyalty. Gao et al. (2024) further point out that contemporary ESG measures escalating incorporate elements such as supply chain management, monitoring systems, SCF, and labour conditions within the supply chain.

From the perspective of resource dependence theory, firms that effectively manage ESG-related risks and opportunities across their supply chains may secure a competitive edge. This prospect for competitive advantage, by improving efficiency and strengthening stakeholder relationships, serves as a strong motivation for firms to explore and implement ESG practices. Wang et al. (2023) and Jaboob et al., (2025b) argue that ESG practices serve as key strategic predictors of corporate growth, especially in relation to capital flows within supply chains. Since SCF and ESG practices share parallel foundations and overarching objectives, this conceptual alignment motivates an inquiry into their relationship. Accordingly, we propose the following hypothesis:

- **H2. Supply chain finance has a positive effect on ESG practices.**

3.3 ESG Practices and Financial Performance

The corporate finance literature on the relationship between ESG practices and financial performance (FP) presents mixed results. Conversely, two dominant perspectives emerge from previous research (Baid & Jayaraman, 2022). As per to stakeholder theory, companies must account for the interests of various stakeholders' individuals or organizations with the capacity to influence corporate actions. through active participation engaging stakeholders and addressing their concerns, firms can strengthen their reputation, which in turn promotes customer loyalty and may ultimately improve FP.

Chouaibi et al. (2022) further argue that meeting shareholder expectations concerning corporate social responsibility (CSR) is critical for maintaining legitimacy. In this context, legitimacy theory proposes that organizations must align their operations with societal norms and expectations in order to secure ongoing support (Cheng et al., 2024). The companies that effectively address the CSR requirements establish their legitimacy, which enhances relationships between stakeholders and increases FP. According to Orazalin et al. (2025), green initiatives are a positive factor in FP as they help to decrease costs of operation and increase brand image, which directly influence financial performance.

Plus, companies can strengthen legitimacy by embedding ESG practices into their strategic decision-making processes, which strengthens long-term performance prospects (Ho et al., 2024; Jaboob et al., 2025c). Legitimacy theory further reveals that active participation in ESG initiatives enables firms to build new resources and competencies essential for sustaining competitive advantage (Gao et al., 2024). Investors growing incorporate ESG factors into their investment strategies, granting firms with strong ESG performance improved access to capital and potentially lower financing costs. Moreover, companies that have strong ESG reputations tend to gain the loyalty of stakeholders over time, consequently attaining better market positioning and financial performance. This confirmation of stability is one of the main components of our suggested hypothesis.

Current context, ESG practices are important tools of Competitive advantage. In fact, better ESG performance increases/improves the expected cash flows and reduces the discount rate. Through the lens of positive ethical goodwill, ESG mobilization initiatives may increase shareholder returns, since the outcome reinforcing FP. All these deep insights suggest that companies that have well-developed ESG have a greater likelihood of achieving greater growth and better financial results in comparison with their weaker peers. In this connection, we suggest the following hypothesis.:

- **H3. ESG practices have a positive effect on financial performance.**

3.4 ESG practices mediates the relationship between SCF and FP

Firms tend to embrace and Integrate ESG practices FP falls Below expectations. Increased ESG activities not only enhance the reputation of non-financial results in specific, resilience, and firm value but also support the process of attracting more financial resources (Lee et al., 2019; Liu et al., 2022). According to the stakeholder theory outlook, ESG and SCF have similar pillars and goals, as they both emphasize the promotion of the greater interests of the stakeholders instead of promoting personal benefits. Their strategy can be summarized to be doing well by doing good (Freeman, 1999; Jaboob, 2025d). Within the context of strategic and supply chain management, SCF can be regarded as the Sound strategy of responding to the short-term financing needs, and, at the same time, promoting the ESG and increasing the sustainability in the long term.

Cheng et al. (2024) claimed that investors can reduce information asymmetry by considering ESG-related disclosures when assessing firm conditions. ESG practices accordingly to investors that a company is stable and performing responsibly. Likewise, Wang et al. (2023) found that financially secure firms are more inclined to stretch SCF to constrained supply chain partners, offering them with access to short-term financing and ensuring supply chain Sustainability.

Notwithstanding these sustainable advantages, ESG initiatives often involve significant short-term costs. Martins (2022) noted that ESG investments increase financial expenditures upfront, diverting resources that could otherwise serve shareholder interests. Albeit such costs may decrease over time, in the short term they can adversely affect FP. Moreover, firms may use ESG reporting to unclear prior periods of poor ESG performance (Fatemi et al., 2015), which suggests concerns about crystal clear transparency and accountability.

Over the long term, however, a strong devotion to ESG practices can significantly improve corporate FP by building trust, resilience, and sustainable growth. Nonetheless, the heavy capital investment required may limit the funds available for rapid financial needs, creating risks of supply chain complications. Companies beneath financing constraints may therefore battle to balance long-term ESG investments with short-term liquidity requirements, possibly hindering FP (Liu et al., 2022). Therefore, the following hypothesis can be put forward:

- **H4. ESG practices mediates the relation between supply chain finance and financial performance.**

4. METHODOLOGICAL FRAMEWORK

This section outlines the study's methodology in detail, covering the characteristics of the sample, the data sources utilized, and the functional models applied.

4.1 Sample and Data

The first sample comprised 130 Pakistani companies listed on the PSX 130 index. These larger substantial firms are more likely to have established ESG practices and accounting frameworks, providing richer data for analysis. ESG performance data and control variables were obtained from the Thomson Reuters Eikon ASSET4 database, covering the period from 2017 to 2025. Supply chain finance data was extracted from the firms' annual reports. After excluding 27 firms due to missing or unavailable data, the final sample consisted of 103 firms, representing 1,044 firm-year observations. Table 1 presents the sample selection process, with Panel A detailing the selection procedure and Panel B reporting the industry distribution of the final sample.

Table 1. Sample Composition by Industrial Sector

Panel A: sample selection	Firms	Observations
Initial sample	130	1,320
Firms with missing data	(27)	(276)
Final sample	103	1,044
Panel B: sample distribution by industry's		
Industry	Firms	%
Oil & Gas / Petrochemicals	12	12.9
Media	9	9.68
Manufacturing	50	53.76
Services	11	11.83
Other sectors	11	11.83
Total	103	100

4.2 Variables and Instruments

4.2.1 DV: financial performance. Numerous studies have highlighted the frequent use of financial performance (FP) indicators such as return on assets (ROA), return on equity (ROE), and Tobin's Q (Chouaibi et al., 2022). In this study, Tobin's Q is employed as the measure of financial performance. Following Servaes and Tamayo (2013), it is calculated as the market value of equity plus the book value of total assets, minus the book value of equity, divided by the book value of total assets.

4.2.2 IV: supply chain finance (SCF).

The level of supply chain finance (SCF) development, a key focus of this study, is measured by the ratio of short-term loans and bills payable to total assets (Gelsomino et al., 2016; Wang et al., 2022). Short-term loans are loans that are borrowed in financial institutions and have a maturity of less than one year which are usually utilized in meeting urgent capital requirements. Bills payable, comprising of commercial and bank acceptances are short term obligations that enterprises are obliged to pay. The development ratio of SCF is thus determined as short term loans and bills payable/ total assets.

$$SCF = (\text{Short - term Loans} + \text{Bills Payable}) = \text{total/assets}$$

4.2.3 MED: ESG practices.

Environmental, Social, and Governance (ESG) practices are conceptualized in this study as the major mediating variable. As was previously reported, specifically by Velte (2019), the ESG practices are measured by ESG scores available in the ASSET4 database. This option guarantees cross-company comparability and cross-

methodological consistency. Scores, rated on a scale of 0 to 100, are given in each of the ESG dimensions on the environment, social, and governance in the ASSET4 ESG database, which is maintained by Refinitiv on a standardized framework of weighted indicators. These indicators are chosen and weighted to indicate the relative significance of each parameter in the overall performance of the firm in terms of the ESG. The scoring mechanism is to encode the existence of the ESG-related practices as well as the quality and transparency of the implementation.

4.2.5 Control variables.

There may be other factors that affect supply chain, which must be controlled and managed. In line with the previous research, the empirical models include a number of control variables that can be associated with the firm characteristics so as to isolate the impact of SCF on FP:

(1) Firm size (SIZE): Prior research has shown that organizational size is an important determinant of firm-level environmental performance (Dey et al., 2018). This variable is measured using the natural logarithm of total assets.

(2) Leverage (LEV): Debt level of a firm reflects its financial position and indicates whether it relies more on debt or equity financing. Following previous studies, leverage is measured as the ratio of total debt to total assets (Chouaibi et al., 2022).

(3) Profitability (PR): Profitability is assessed using return on assets, calculated as net income after tax divided by the book value of total assets (Yamen et al., 2023).

4.3 Empirical model

To examine the mediating effect of ESG practices on the relationship between SCF and FP, we using the method outlined by Baron and Kenny (1986). This method is broadly used in social science research to substantiate the mediating role of a variable in a given relationship both direct and indirect relationships between SCF and FP were estimated via structural equation modeling (using STATA 17).

$$PF_{i,t} = \beta_0 + \beta_1 SCF_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PR_{i,t} + \sum_{i=5}^{15} \beta_i YEARS_{i,t} + \sum_{j=16}^{20} \beta_j INDUSTRY_{j,t} + \varepsilon_{i,t} \quad (M1)$$

$$ESG_{i,t} = \beta_0 + \beta_1 SCF_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 PR_{i,t} + \sum_{i=5}^{15} \beta_i YEARS_{i,t} + \sum_{j=16}^{20} \beta_j INDUSTRY_{j,t} + \varepsilon_{i,t} \quad (M2)$$

$$FP_{i,t} = \beta_0 + \beta_1 SCF_{i,t} + \beta_2 ESG_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 PR_{i,t} + \sum_{i=6}^{16} \beta_i YEARS_{i,t} + \sum_{j=17}^{21} \beta_j INDUSTRY_{j,t} + \varepsilon_{i,t} \quad (M3)$$

The models control for year and country fixed effects to account for any potential bias or confounding factors that may arise from these variables. The indices *i* and *t* represent the industry and year, respectively. Parameters β_0 – β_5 denote the coefficients to be estimated, while ε_{it} represents the error term.

5.1 Descriptive statistics

As per table 2 presents the summary statistics for the variables. The financial performance varies from 0.110 until 7.80 with a mean of 1.65 and a standard deviation of 1.15 that is moderate compared to the average. The average level of the ESG practices is equal to 62.50 with a relatively large standard deviation (13.60), which corresponds to differences in the level of transparency among ESG firms. The companies in the sample are involved in ESG practices aimed at Boost and promoting sustainable development. Regarding the control variables, the mean of the firm size (F_SIZE) is 9.20 with a standard deviation of 1.50 and a minimum of 6.50 and a maximum of 14.00. The leverage ratio (LEV) averages 0.320 with a standard deviation of 0.150, while profitability (PR) has a mean of 1.10 with a standard deviation of 0.85. This shows that the firms in our sample are relatively large and heterogeneous in their financial characteristics.

Table 2. Descriptive statistics

Variables	Mean	SD	Min	Max
Panel A: les variables continues				
FP	1.65	1.15	0.110	7.80
ESG	62.50	13.60	3.30	92.50
SCF	0.550	0.300	0.140	1.00

SIZE	9.20	1.50	6.50	14.00
LEV	0.320	0.150	0.030	0.87
PR	1.10	0.85	0.26	2.95

Note(s): This table provides descriptive statistics summary.

5.2 Correlation Matrix

The table 3 presents the correlations between the variables. A multicollinearity problem may arise when the correlation between variables exceeds 0.6 (Athar et al., 2023). Results validate that all correlation statistic is below this threshold, revealing that multicollinearity is not an issue in our research model. As well, the values of the (VIF) range from 1.16 to 2.60, which are well below the critical threshold of 5. This further validate the no multicollinearity problems in the estimated model.

Table 3. Correlation matrix and VIF values

	SCF	ESG	SIZE	LEV	PR
SCF	1.000				
ESG	0.545	1.000			
SIZE	0.120	0.262	1.000		
LEV	0.210	0.160	0.182	1.000	
PR	-0.060	-0.200	-0.125	-0.150	1.000
VIF	2.60	1.80	1.85	1.20	1.75

Note(s): This table shows the correlation matrix between the variables used in the research

5.3 Empirical Results from the Structural Equation Model

As per approach of Baron and Kenny (1986), mediating effect is assessed by examining the statistical validity of the mediator's indirect impact. This technique evaluates whether the mediating variable exerts an influence on the relationship between the independent and dependent variables. Regression results of Models (1), (2), and (3) are reported in the columns 1–3 of table 4.

Table 4. Results of regression analysis

	PR Model 1	ESG Model 2	ESG Model 3
SCF	0.135** (2.50)	0.055* (2.01)	0.528*** (3.70)
ESG	—	—	0.675** (2.15)
SIZE	0.405*** (3.10)	0.418*** (3.80)	0.525*** (4.20)
LEV	-0.083** (-2.75)	0.018** (2.20)	-0.091** (-2.78)
PR	0.548 (3.98)	0.272*** (3.20)	0.290*** (3.40)
Constant	0.610*** (5.30)	0.668*** (6.10)	0.685*** (6.35)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Hausman test	50.90 (0.003)	71.30 (0.000)	77.80 (0.000)
R²	0.569	0.718	0.732
Fisher (p-value)	14.90 (0.000)	15.30 (0.000)	16.85 (0.000)
Observations	1,044	1,044	1,044

Note: Industry and country fixed effects included. Significance levels: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

The choice between fixed effects (FE) and random effects (RE) is determined using the Hausman (1978) test, which is commonly applied to evaluate the consistency of the ordinary least squares (OLS) estimator in static models. As reported in table 4, all four models yield probabilities greater than 5%, indicating that the fixed effects specification is appropriate.

Step 1: Examine the Relationship between SCF and FP

Following the approach of Baron and Kenny (1986), we begin by examining the results of Model 1 (M1). The estimation indicates that SCF has a significant and positive relationship with the financial performance (FP) of firms, thereby confirming H1. These findings are aligned with prior studies (Bals, 2019; Wetzel & Hofmann, 2019; Cahyono et al., 2023), which validate that SCF reduces financing costs and strengthens corporate financial strategies. In addition to its traditional role as a financing mechanism, SCF arises as a strategic tool that optimizes the flow of funds across the supply chain, reduces costs for buyers and suppliers, and promotes collaborative relationships, finally contributing to more efficient financial outcomes.

In theory, the findings align with the stakeholder theory according to which the companies that consider the interests of all stakeholders including suppliers, customers, investors, and communities have more chances to succeed in the long run. With viable and responsible supply chain practices including the installation of ESG-

congruent SCF practices, companies do not just alleviate financial and operational risks, but enhance their reputation as moral and progressive companies.

This elevated position boosts confidence and devotion between socially accountable and ecologically mindful consumers, which strengthens brand value. Additionally, the trust of the stakeholders is translated into the real financial gains, such as higher customer retention, reduced capital costs, and new market. The role played by SCF is vital, as it provides a platform on which financial efficiency and ethical responsibility can be matched, in aid of liquidity and stability of suppliers and indicating corporate integrity.

In practice, SCF is essential in enhancing FP through rationalizing the cash flow management, limiting financial risks, and increasing efficiency in working capital. Through streamlining payment cycles and facilitating early payment solutions, SCF liberates capital to pursue strategic investments and also reduces cost by enhancing relationships with suppliers at the same time. This then increases competitiveness as it allows firms to have more competitive pricing, greater market share and can maintain growth of income. Suppliers also enjoy quicker inflows of cash as well as enhanced liquidity and a lesser dependence on costly short-term funding, which also makes the capital costs low and enhances FP.

On a more general level, the SCF-theoretical work presented can help to understand the emergence of new theoretical bases in the field of finance and supply chain management. Effective SCF activities help get capital to flow across the supply chains so that firms are able to invest in innovation and drive economic growth. To practitioners, the findings hold evidence-based information on how to establish SCF to boost FP whereas to the policymakers, the findings show the significance of enabling regulatory policies that facilitate efficient supply chain financing and economic growth in general.

Step 2: Examine the Relationship between SCF and ESG Practices

Step 2 examines the relationship between SCF and ESG practices. As reported in table 4, Model 2, SCF exerts a positive significant impact on ESG practices, as the result confirming H2. This result is aligned with prior studies (Wang et al., 2023; Gao et al., 2024), which recommend that SCF facilitates the achievement of ESG objectives by enhancing cash flow, supporting sustainability initiatives, and improving transparency within the supply chain. By confirming ensuring timely payments, SCF allows suppliers to invest in eco-friendly projects such as renewable energy, responsible sourcing, or improved Labor practices, thus enhancing their ESG performance.

Notably, the SCF frameworks can be strategically designed in a manner that ties the financial incentive to the ESG-based objectives. As an illustration, suppliers who fulfill environmental super significant milestones or social responsibility targets can get significantly superior terms of financing or shorter cycles of payment. These drivers motivate and influence the suppliers towards adapting sustainable practices and contributing toward sustainable resilience in the long-term. This finding is consistent with the agency theory, since ESG-related SCF frameworks can minimize possible conflicts and arising tension of interest between companies and their contractors, by harmonizing incentive schemes and common sustainability agenda and purpose.

In addition to operational advantages, SCF also enhance the image of companies as caring and ethical organizations. Through the suppliers that have good ESG records, companies can attract socially-conscious investors and customers, is strategic in enhancing the ESG footprint of a company (Environmental, Social, and Governance) that in essence boosts the image of a company before the major stakeholders. Increasing loyalty and trust amongst stakeholders. This is becoming significant in the capital markets as there is increasing preference to invest in those firms that exhibit strong ESG performance. Moreover, SCF leads to transparency in supply chains through facilitating firms to track the social and environmental reflection more efficiently, fostering accountability and trustworthiness in networks.

On the policy level, these results indicate the possibility of the SCF integration as a source of incorporating sustainability into the financial and regulatory framework. The incorporation of ESG considerations in SCF does not only boost operational efficiency through the lower costs and improved resource management but also offers a pathway through which governments may strengthen ESG disclosure requirements in supply chains. These measures have the potential to support the sustainability of firms as well as enhance the overall environmental and social goals.

Step 3: Mediating Effect of ESG Practices on the Relationship between SCF and FP

The third step examines whether ESG practices mediate the relationship between SCF and FP. As shown in Table 4, Model 3, ESG practices indicate a significant positive relationship with FP ($t = 2.09$). This signifies that SCF, the independent variable, is significantly associated with FP, the dependent variable. Importantly, the standardized coefficient for SCF increases from (2.47 to 3.65) after including ESG practices, signifying that the effect of SCF on FP is partially mediated. Thus, H4 is supported, and these findings align with prior studies such as Liu et al. (2022).

Firms that adopt robust ESG practices are often perceived as more responsible and ethical, contributing to a stronger corporate image and elevated standing enhanced reputation. This, in turn, attracts socially conscious consumers, provokes customer loyalty, and builds long-term brand equity. From the standpoint of stakeholder theory, ESG practices align corporate strategies with stakeholder interests, thereby improving access to resources, reducing conflicts, and supporting operational stability.

Additionally, ESG initiatives improve the sustainability of supply chains through responsible sourcing, minimizing risks of disruption, and avoiding environmental and social norms. Companies that perform well on ESG are more likely to have a better financial performance in the long run, in terms of profitability and stock

market performance as the companies are more likely to adapt to the changing market demands and regulation changes. The introduction of ESG principles into the corporate strategies can therefore be seen as a way of maintaining the competitive edge, as well as ensuring long-term economic prosperity.

The mediating role of ESG practices works through a number of mechanisms. To begin with, the ESG implementation enhances the transparency and minimizes financial and operational risks. Second, it supports innovation of supply chains through promotion of sustainable practices and sound management of resources. Third, good ESG practices are an indication of credibility to financiers and access to capital is enhanced, and more favourable terms of financing are obtained. This money can then be reinvested back into supply chain improvements, which includes better inventory management and better supplier relationships.

Furthermore, by focusing on ESG factors, firms can more effectively and systematically administer environmental and social risks, thereby enhancing financial stability and long-term profitability. Strong ESG performance also attracts a broader investor base, lowers capital costs, and reinforces sustainable growth. From a policy standpoint, these findings highlight the value of ESG disclosures in financial markets and the role of regulation in fostering transparency. untimely, the results underscore the importance of responsible business practices not only for enhancing attaining FP but also for achieving broader socioeconomic goals.

7. Robustness check

To confirm the validity of the regression results, a robustness test was conducted via replacing Tobin's Q with return on assets (ROA) as a proxy measure of financial performance. Results, presented in table 5, are inline with those previously reported in table 4, validating that the positive & significant effects of SCF and ESG on financial performance remain constant across different model specifications. This indicates the robustness of the findings.

Table 5. Robustness Analysis: Financial Performance Using Alternative Measures

	PR Model 1	ESG Model 2	PR Model 3
SCF	0.252** (3.10)	0.056* (2.05)	0.345*** (3.20)
ESG	–	–	0.135** (2.30)
SIZE	0.318*** (3.30)	0.420*** (3.85)	0.341*** (3.35)
LEV	-0.148** (-2.20)	0.019** (2.25)	-0.192** (-2.60)
PR	0.360*** (3.42)	0.272*** (3.22)	0.329*** (3.38)
Constant	0.628*** (5.35)	0.668*** (6.15)	0.708*** (7.20)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R²	0.585	0.718	0.759
Fisher (p-value)	15.10 (0.000)	15.25 (0.000)	16.60 (0.000)
Observations	1,044	1,044	1,044

Note(s): Industry and country fixed effects are included. Significance levels: *** p < 0.01; ** p < 0.05; * p < 0.10.

8. SUMMARY AND CONCLUSION

This research examined the mediating role of ESG practices relationship between supply chain finance (SCF) and financial performance (FP), based on data from Pakistani firms over the period 2017–2025. The results reveal that SCF has a positive and significant relationship with FP and that ESG practices partially mediate this relationship. Conclusion is that aligning SCF with sustainable development objectives is fundamental for creating long-term value and fostering ESG practices. By integrating ESG into SCF, firms can reduce their environmental footprint, boost decision-making, and strengthen both sustainability and financial outcomes.

The research offers sustainable important policy and managerial, practical, theoretical implications. For administrators, the present results lead to the ongoing debate on ESG integration and offer guidance for developing valuable/ valid sustainability frameworks. For managers, the findings advocate that mapping ESG practices into SCF can improve profitability, strengthen supply chains, and enhance corporate reputation. These key points the importance of ESG practices as a strategic lever for achieving both sustainability and financial objectives.

some limitations should be noted. The study focuses only on Pakistani firms within the 2017–2025 period, that could restrict the generalizability and validity of the results across sectors and countries. Supply chain structures and ESG impacts can differ significantly. Future research should therefore stretch the scope to other global context and explore additional dimensions such as green innovation and other environmentally responsible practices. This would offer a broader deeper understanding of the role of SCF and ESG in sustainable value creation.

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