Remittances Review
April 2024,
Volume: 9, No: 2, pp.6252-6276
ISSN: 2059-6588(Print) | ISSN 2059-6596(Online)

Received : 04 February 2024,Accepted: 08 March 2024

Green Supply Chain Management as a Mediator Between Financial Resources, IT Capability, CSR, Digital Innovation, and Sustainable Performance

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Abstract

Sustainable performance has become a strategic priority for firms operating in developing economies, where environmental pressures, regulatory demands, and resource limitations increasingly shape organizational decision-making. This study investigates how financial resources, IT capability, corporate social responsibility (CSR), and digital innovation influence sustainable performance, and examines the mediating role of Green Supply Chain Management (GSCM) in these relationships. Grounded in the resource-based view and stakeholder theory, the study focuses on the Pakistani context, with data collected from manufacturing and service-sector organizations in Lahore. Using a structured survey and quantitative analytical approach, the results demonstrate that financial resources, IT capability, CSR, and digital innovation significantly enhance the adoption of GSCM practices, which subsequently lead to higher sustainable performance. Additionally, GSCM is found to partially mediate the effects of these organizational capabilities and practices on sustainability outcomes. The findings provide new empirical evidence from Pakistan and underscore the importance of integrating digital transformation, responsible practices, and green supply chain strategies to improve environmental, social, and operational performance. This study offers practical insights for managers and policymakers aiming to strengthen sustainability agendas within emerging markets.

Introduction

Sustainable performance has become a strategic need of companies in the entire world, especially in the developing economies where the combination of environmental degradation, scarcity of resources and a changing regulatory environment has made organizations to be pressurized to embrace responsible performances. The situation is worse in such countries as Pakistan because of the high rate of industrialization, low technological preparedness, and

discrepancies in the application of the policy that all lead to limitation in the ability of companies to switch to sustainable forms of production. With the global markets insisting on greener products, increased scrutiny, and openness in the operations, the organizations have to reconsider the structure of their operations and make sustainability a part of the organizational strategy and not a peripheral requirement. This change has led to increased interest among researchers and practitioners to comprehend the forces behind sustainable performance particularly in environments marked by institutional vacuum, infrastructural limits and increase vulnerability to environmental hazards(Kehinde, 2024). It is against this background that green supply chain management (GSCM) has become a dominant concept of operation that is associated with the concept of environmental responsibility and economic competitiveness, as a result of promoting firms to embark on environmentally responsible sourcing, cleaner production, waste minimization, reverse logistics, and joint stakeholder involvement. GSCM may be of special importance in emerging markets where supply chains tend to be discontinuous, resource intensive and susceptible to adverse environmental factors. Since Pakistan is still struggling to overcome the challenges caused by climate, energy insecurities, and growing demands of the international regulatory community, it is necessary to investigate the organizational abilities and practices that will help the adoption of GSCM, as the key to securing a sustained competitive advantage and long-term environmental and social welfare(Alvi & Mudassar, 2025).

In accordance with such changes, organizations have started to give increased consideration to a series of internal capabilities and external liability that could result in the effective execution of green supply chain strategies. Among them, the part of financial resources is one of the key conditions, as the process of implementing green technologies, training, and environmentally friendly sourcing systems tend to be highly costly. Companies, which have high financial resources, will be in a better position to absorb the expenses involved with GSCM practices and pursue long term sustainability objectives without losing their operational effectiveness. Likewise, the impact of IT capability has also become more than ever, with the visibility, traceability, and coordination of supply chain operations becoming more transparent due to the use of digital tools and information systems, allowing firms to track their environmental footprint, better utilize resources, and support real-time decision-making. Besides these

capabilities, corporate social responsibility (CSR) is also a relevant strategic orientation which helps to harmonize the actions of the firm with the expectations of the society and supports the adherence to the principles of ethical production, stakeholder interaction, and ecological responsibility(Basu & Basu, 2025). The organizations that have adopted the concept of CSR are more likely to implement GSCM practices since they appreciate the concept of sustainability as not just a part of the compliance policy but the core of their identity and stakeholder value creation. Furthermore, digital innovation, which involves creating and employing new technological solutions, can speed up the process of adopting the eco-efficient processes and transform the supply chains into digital reality. Collectively, the financial resources, IT capability, CSR, and digital innovation are a combination of complementary organizational capabilities and orientations that can influence the course of green supply chain adoption and sustainable performance. Their interdependence indicates the necessity of an integrated approach that would allow reflecting the complexity of sustainability-driven organizational change(Fedotova et al., 2025).

Financial resources are also viewed as access to capital, credit and investment capacities which firms can use to adopt technology that is environmentally friendly, improve production systems, and re-engineer supply chain operations. Considering the situation in Pakistan, where the financial resources of companies are often limited, and growth and forecasting market outcomes are uncertain, access to financial resources can be the factor that will help organizations to invest in long-term sustainability. IT capability is the capacity of the firm to purchase, implement and combine the information technologies to facilitate and streamline business operations. Good IT capability increases supply chain transparency, facilitates decisions that are environmentally friendly, and allows the automation of processes, which minimizes the wastage of resources. Corporate social responsibility is considered as the commitment of an organization towards moral practices, environmental, and social welfare beyond legal standards into voluntary involvement in an activity that generates stakeholder worth(Khuong et al., 2021). CSR has a bearing on sustainability because it is the driver of organizational culture, ethical values, and encourages the firms to be environmentally responsible. Digital innovation refers to the development or implementation of digital technology, including analytics, automation, artificial

intelligence and cloud solutions, to transform business operations and deliver efficiency, responsiveness and environmental optimization. The mediating variable in this research study is green supply chain management, which encompasses green procurement, eco-design, cleaner production, sustainable packaging, and end-of-life product management practices all of which are directed towards minimizing the environmental impact of the supply chain. Sustainable performance is a combined performance that includes environmental performance (less emissions and wastes), social performance (employee welfare and community welfare), and economic performance (cost savings, efficiency in operations and competitiveness)(Opoku, 2025).

The theoretical framework used by this paper is largely based on the resource based view (RBV) and the stakeholder theory. RBV assumes that valuable, rare, inimitable and non-substitutable resources and capabilities are the sources of competitive advantage of firms. The financial resources, IT capability, and digital innovation are in line with the focus of the RBV on internal capabilities with the ability to allow organizations to stand out and incorporate sustainability in the operations of the organization. The IT capability and digital innovation, specifically, are strategic resources that can enable the firms to revise the supply chain operations, improve environmental monitoring, and introduce advanced optimization systems. CSR is consistent with the stakeholder theory that emphasizes the need to take into consideration the expectations of customers, employees, communities, regulators as well as supply chain partners. By committing to CSR, the organizations are usually more responsive in relation to the expectations placed on them by their stakeholders as regards environmental responsibility and moral actions, which makes them engage in GSCM practices(Dongre et al., 2025). The combination of the RBV and the stakeholder theory reinforces the conceptual reasoning of this paper because it demonstrates the interaction between the internal strength and external obligation to determine GSCM and sustainable performance. The combination of these theories explains why certain firms are better placed to embrace sustainability in the core operations when others fail to do so because of the lack of capability to do so or because of conflicting priorities or because of the lack of alignment between the stakeholders(Kantabutra, 2020).

Although there is heightened interest in sustainability and GSCM in international literature, some of the key gaps that still exist are especially in the Pakistani context. On the one hand, the current research on sustainable performance in Pakistan has mostly emphasized individual variables, including CSR or environmental management practices, and little focus on the combined importance of financial resources, IT capability, and digital innovation in the determination of the sustainability performance. The studies of the interaction between technological potential and green supply chain efforts have not yet been properly developed, even though the necessity to adopt digitalized and sustainable supply chain frameworks is increasing. Second, the mediating aspect of GSCM between financial resources, IT capability, CSR, and digital innovation with sustainable performance is still significantly underresearched in the developing economy(Mmieh Kwakye et al., 2025). Although it has been recognized through the literature of the world that GSCM has the potential of enhancing sustainability outcomes, the example of Pakistan where the situation is unique in terms of institutional, energy, and infrastructural constraints has little empirical evidence. Third, past studies have tended to consider manufacturing industries in isolation without particularly paying attention to the significance of service-sector firms that have also led to significant environmental effects and resource usage(Lei et al., 2025). This gap restricts us to cross-sectoral differences and common hurdles on the way towards sustainability practices. Finally, the relationship between the IT capability and digital innovation in promoting GSCM has amusingly been given insufficient attention in literature as more and more evidence is emerging that digital transformation is transforming the way supply chain operations are undertaken globally. Lack of such incorporated frameworks results in a conceptual and empirical gap which is what the current study aims to fill in(Chen et al., 2025).

These gaps indicate that a very explicit research problem is that the pressure on Pakistani firms to improve their sustainability is increasing, but nothing much is known about how the internal capabilities of firms across the three (financial, technological and ethical) contribute to the implementation of GSCM and ultimately, to the nature of sustainable performance. Some organizations find it challenging to engage in sustainability initiatives because of scarcity of resources, absence of technological bases, poor environmental awareness and poor interconnection of digital instrumentation in supply chain activities. Without a thorough

explanation of what may support the adoption of GSCM and how it may result in sustainable performance, managers have no clear strategic instructions, and policymakers do not have evidence-supported insights to formulate the supportive intervention(Kort-Meade & Amato, 2021). This research problem is then based on the pressing need to find out the organizational enablers enabling the firms to overcome the environmental pressures and utilize green practices advantageously. This matter is especially critical to the issue of Pakistan, where the industries are subject to strict environmental policies, high energy prices, as well as mounting pressure on the measures of carbon reduction and efficient operation on the part of global supply chain partners(Asghar et al., 2023).

The value of the study is that it is able to fill the gaps in the theoretical understanding and offer valuable information in practical ways of attaining sustainable performance using the GSCM in Pakistani context. The research merges financial resources, IT capability, CSR, and digital innovation into the same analytical framework and therefore adds a holistic perspective of how the combination of internal and external drivers define sustainability outcomes. This broad understanding offers a sophisticated view that shifts away from the conventional siloed thinking and gives a model that can help managers in the strategic distribution of resources, investment in technological infrastructure and reinforcement of CSR commitments. The results will be relevant to assist organizations in making wise decisions regarding priorities on how to reconcile financial pressures to the desire to engage in environmentally friendly practices, and how digital transformation can speed the process to become greener. Moreover, the study is valuable in policy-making nationally and at the sector level as it identifies the nature of organizational competences that policymakers need to encourage in an attempt to enhance greener production frameworks. In the case of academic literature, the research adds to the theoretical discussion by projecting RBV and the theory of stakeholders to the sphere of digital sustainability and green supply chain practices in the context of emerging economies. Finally, the ideas created provide a channel through which Pakistani companies can increase their level of global competitiveness, decrease their environmental footprint, and help in the overall sustainable development agenda.

Litrature review

Theoretical premises of interpreting the role of financial resources, IT capability, CSR, and digital innovation in improving the green supply chain management and sustainable performance, rest on the Resource-Based View (RBV) and the stakeholder theory, in the first place. According to RBV, organizations gain a competitive advantage by coming up with valuable, rare, inimitable, and non-substitutable resources that can help them increase their operational efficiency and strategic flexibility. The financial resources, IT capability, and digital innovation fit perfectly into this framework since they can be seen as internal capabilities that facilitate the usage of advanced technologies, the reorganization of the supply chain processes, and the successful implementation of sustainability-oriented strategies. This enables the firms to spend on environmentally efficient technologies, develop green knowledge, and react to environmental uncertainties(Sahoo et al., 2023). Stakeholder theory is another theory that complements RBV in that it points to the pressures and expectations that are subjected on customers, regulators, communities, employees, and supply chain partners. CSR is one of the major organizational orientations that determine the conduct of firms in accordance with the expectations of the stakeholders and legitimizing environmental and social programs. Stakeholder theory in the context of GSCM can be described as the reason why companies willingly implement green practices to ensure their legitimacy, reputation and build a long-term relationship with internal and external stakeholders. Combined, both RBV and the stakeholder theory can be seen as a powerful conceptual base to study the interdependence of the effects of internal capabilities and external responsibilities on the uptake of GSCM and eventual improvement of sustainable performance(Li et al., 2022).

Over the past few years, scholars have given significant focus to the strategic significance of financial resources as an impetus behind environmental and sustainability projects. Companies with a high financial strength can invest in green technologies, renewable energy resources, waste management systems, and training programs in the long run to make the employee more ready to make sustainability transitions. Research shows that financial flexibility has a positive impact on the proactive environmental approach and contributes to green supply chain projects by allowing companies to bear the initial expenses of changes aimed at sustainability. Based on empirical evidence of developing economies, it has been indicated that a low amount of financial

capital can frequently serve as a significant obstacle in the application of GSCM practices because the companies cannot afford to invest sufficient amounts of money in green procurement, eco-design, and reverse logistics(Aldaas et al., 2022). On the other hand, the ones that have a high financial capacity are observed to implement green technologies faster and invest in cleaner production systems that would decrease waste, pollution, and carbon emission. The results highlight the significance of financial resources as an enabling factor of sustainability especially in an environment such as Pakistan where companies experience credit limitations, energy price instability, and unstable market environments(Naeem et al., 2025).

The IT capability has also become one of the critical aspects in determining the development of sustainable supply chain systems. IT strength promotes the capacity of a firm to gather, examine, and disseminate data on the environmental performance, resource usage, supplier operations and preferences of the customers. Studies have indicated that IT-based systems, including enterprise resource planning, supply chain analytics, and environmental monitoring systems, allow companies to execute GSCM through integrating real-time information throughout the supply chain and aiding in decision-making. Supply chain transparency, in its turn, improves with the help of IT capability that is crucial in identifying inefficiencies, waste reduction, and opportunities to make improvements green(Talla, 2022). It has been discovered that IT system integration can enhance supply chain partner collaboration and decision-making during sourcing that is greener and the implementation of environmentally-friendly practices. More currently, research in the Asian region shows that IT capability can significantly enhance sustainable performance, allowingtheir digital monitoring of emissions and ensuring their optimal logistics routes and the ability to adhere to environmental standards. These empirical lessons have shown that IT capability can be a strategic resource that goes beyond operational efficiency by assuming a dominant role in ensuring environmental responsibility and sustainability of the supply chain(Bonfanti et al., 2023).

Corporate social responsibility is a widely known determinant of organizational behavior that is environment friendly. Companies that have high CSR engagements are likely to have sustainability oriented policies that integrate social, environmental and economic goals. The studies always indicate that CSR supports the adoption of green supply chains by developing an

organizational culture, managerial attitudes, and alignment of firm practices with the expectations of the stakeholders concerning ethical and environmentally friendly conduct. CSR also makes companies cooperate with their suppliers and consumers to incorporate sustainable business across the value chain, such as green sourcing, waste management, sustainable packaging, and green production. The empirical research in developing nations shows that CSR-oriented companies are more receptive to environmental control, demands of the markets to green products, and the pressure of the international purchasers to adhere to sustainability principles(Wu et al., 2025). Research in Pakistan indicates that CSR influences the companies to invest in environmental activities, participate in community welfare, and use cleaner production systems that bolster the principles of GSCM. Thus, CSR is an ethical and a strategic triggering point, which increases the probability of firms to adopt sustainable supply chain models and attain long-term sustainability results(Setyadi et al., 2025).

The implementation of more sophisticated digital technologies, variously known as digital innovation, automation, artificial intelligence, machine learning, blockchain, and cloud-based systems are gradually being perceived as one of the transforming factors in the sustainability of supply chains. Through digital innovation, the environment can be monitored in real-time, resource optimization predictive analytics made, and environmentally intensive processes automated, which leads to improved green results. Companies that adopt digital innovation are able to re-architect their supply chain frameworks to enhance efficiency, transparency and environmental performance. Due to the advantages of the digital innovation, empirical investigations can establish that GSCM is being adopted due to the possibility of firms monitoring the lifecycle of their products, streamlining logistic processes, and embedding environmental requirements into the decision-making process of the supply chain(Yu et al., 2025). Digital innovation is found to contribute to the shift to a sustainable production system by providing information gaps, coordination between suppliers, and inefficiencies in operation in emerging economies. The alterations in the supply chain will become more transparent with the help of digital tools like blockchain that will make sure the supply chain complies with the environment-related regulations and increase the confidence with which consumers perceive green products. These results highlight the importance of digital innovation in enhancing the

sustainability of supply chains as well as helping companies to surmount issues associated with environmental unpredictability and operational complexity(Meng et al., 2025).

Green supply chain management in itself has been greatly researched as a tool of enhancing sustainable performance in organizations. GSCM activities like green procurement, eco-design, cleaner production, energy efficient operation, green packaging, recycling and reverse logistics are expected to reduce the environmental effects of the supply chain practices without compromising the economic efficiency. The empirical research has continuously shown that the GSCM enhances environmental performance, through the minimization of emissions, conservation of resources and generation of waste. Besides, GSCM improves the economic performance through minimization of operational costs, resource efficiency, and accessibility of environmentally sensitive markets(Rupa & Saif, 2022). GSCM also improves the social performance of a firm because companies can improve employee welfare, community welfare, and fulfill ethical production expectations. Research in Pakistan, India, and other developing nations suggests that the implementation of GSCM is not balanced because of financial limitations, opposition of managers, and technological barriers. However, companies that are effective in adopting GSCM have been known to record better competitiveness, brand recognition, and increase adhering to environmental laws(Shamshuddin et al., 2025).

The empirical data also confirm the mediating role of GSCM in relationships that exist between organizational capabilities and sustainability outcomes. Some of them claim that financial resources do not make organizations more sustainable directly unless companies invest these resources in green activities, which implies that GSCM is an intermediary between financial ability and sustainable operation. Likewise, IT capability promotes sustainable performance mainly in its impact to GSCM since IT systems can offer the tool that is required to execute, oversee, and advance green practices(Habib et al., 2021). CSR has also been revealed to have an indirect impact on sustainable performance via GSCM whereby socially responsible organizations have a higher chance of implementing a green operation practice that leads to sustainability in the long-term.Digital innovation also enhances the sustainability by supporting the execution of GSCM practices and providing an opportunity to monitor the environment and optimize the processes continuously. Together, these results point to the mediating nature of

GSCM as a strategic process where organizational capabilities are converted into complete sustainability results(Watto et al., 2025).

Based on the theoretical and empirical information presented above, one can construct a number of hypotheses. According to RBV, companies that have good financial capabilities will embrace GSCM practices more easily since they have the economic ability to invest in green technologies and processes that allow them to be sustainable. Therefore, financial resources must have a positive impact on GSCM, and in GSCM, lead to sustainable performance. IT capability can be viewed as a strategic organizational resource because it contributes to higher levels of transparency, improved information flow, and coordination, which enable the adoption of GSCM and improve sustainability results. Based on the stakeholder theory, CSR will encourage companies to incorporate sustainability throughout their supply chains and therefore enhance their sustainability. Transformative capability, which is digital innovation, is expected to aid in executing the GSCM and indirectly contribute to sustainability through facilitating eco-efficient processes. Thus, GSCM should facilitate the associations among those organizational capabilities and sustainable performance. Based on these theoretical arguments, the following hypotheses are created: financial resources have a positive impact on GSCM; IT capability has a positive impact on GSCM; CSR has a positive impact on GSCM; digital innovation has a positive impact on GSCM; GSCM positively impacts sustainable performance; and the relationship between financial resources, IT capability, CSR, digital innovation and sustainable performance is mediated by GSCM. The hypotheses give a logical structure on how organizational abilities and functions interrelate to achieve sustainable performance in the relations of Pakistani organizations.

Methodology

The present study methodology was crafted in such a way that it provides methodological rigour, consistency based on the research objectives and consistency with the existing quantitative traditions in the sustainability and supply chain research. The research philosophy that was used in the study is positivist research philosophy, which supposes that reality is objective, measurable and most effectively evaluated by means of empirical observation and statistical analysis.

Positivism was chosen due to the purpose of the study to analyze the causal relationships between the financial resources, IT capability, CSR, digital innovation, GSCM, and sustainable performance, which can be measured and tested in a structured way. In line with this philosophical position, a quantitative research design was adopted, which allows the application of the standardized instruments and statistical modeling to yield a measure of precision, reliability, and external validity of results. The research was designed as a cross-sectional survey design where the authors obtained the data at one time to encompass the practices and the perceptions of the organizations on green supply chain management and sustainability effects. The method is popular in the supply chain and strategic management literature because of its effectiveness and applicability to examine interrelationships between various variables which are complex.

The study population was managers, supply chain experts, sustainability officers and mid-level executives of manufacturing and service-sector based organizations in Pakistan. It was necessary to concentrate on the Pakistani scenario since organizations operating in the developing economies have their own set of challenges to do with environmental management, resource limitations, regulation compliance and digital transformation. Lahore was chosen as the main place of study due to the fact that it is one of the largest industrial and commercial cities in Pakistan to house many manufacturing companies, logistics firms, IT facilitated service firms, and organizations dealing with sustainability related issues. These companies exist in the backdrop of rising environmental concerns and changes in market demands hence they provide the best place to study how green supply chain practices are adopted. The sampling frame was made up of organizations which were registered under local industrial associations, chambers of commerce and business councils which ensured that various firms in different industries were included. The respondents were selected through a purposive sampling strategy as they possess some relevant knowledge about the operations of the supply chain, environmental practices, CSR initiatives and allocation of organizational resources. This non-probability method was suitable since the research needed participants who had decision-making roles and were conversant with the variables being studied, and not ordinary employees who had minimum exposure to the processes of strategy formulation.

In order to calculate the size of a sample, the principles of Partial Least Squares Structural Equation Modeling (PLS-SEM), specifically, the "10 times rule" have been used, suggesting that the choice of a sample should be at least ten times the maximum number of structural paths leading to each latent construct. Given that the research model is quite complex, we decided to have a target population of 350 respondents, which is sufficient to achieve a reasonable statistical power, model stability and strong estimation. A structured questionnaire was created and was used to collect data based on validated measurement scales that were adapted in other studies in the sustainability, supply chain management, information systems and organizational studies. The questionnaire was divided into various sections that included the demographic data, organization features and variables, including financial resources, IT capability, CSR, digital innovation, GSCM practices, and sustainable performance. The measurements were taken on a five-point Likert scale of strongly disagree up to strongly agree to allow the respondents to state how much they agreed with each statement. The survey was conducted physically and electronically as the surveyor aimed at the maximum possible participation in order to minimize the non-response bias. Organizational HR departments and professional networks were used to facilitate email invitations, online links, and hard-copy distribution so that the managers could reply at their convenience.

The collection of data was conducted over a period of about eight weeks whereby the continuous follow-ups were carried out in order to enhance the response rates and better representation of the various types of organization. Before the actual data collection, a pilot test was done on 30 respondents to determine the clarity, reliability and relevance of the items in the questionnaire. The pilot study also provided feedback which made some minor changes in words and sequence of questions to improve understanding and decrease ambiguity. The ultimate dataset was filtered with regards to missing values, outliers, and inconsistencies to be processed to analyze it. PLS-SEM with SmartPLS 4.0 was chosen as the data analysis method because it can be used in complex models, it is not limited by sample size, and non-normality data distribution can be considered. PLS-SEM is specifically useful in the context of sustainability and supply chain studies since the measurement and structural models are estimated simultaneously, thus giving information on the reliability of the constructs and the strength of the hypothesized relationship.

The indicators were evaluated in the area of reliability of the indicators, internal consistency, convergent validity, discriminant validity, path coefficients, effect sizes, predictive relevance, and mediation effects. A bootstrapping with 5,000 resamples was employed to come up with strong t-values and significance levels to be used in testing the hypothesis.

Ethical considerations were also observed throughout the research process and to maintain the confidentiality, the voluntariness and transparency of the participants. The study informed all the respondents about the study objective, privacy of responses and their right to pull out at any point in time. The involvement was voluntary and no personal or organizational identifiers were taken to protect the anonymity. The ethical investigation of this study was completed by a collegiate ethical review board before the beginning of data collection, and this has ensured that this study is within the ethical requirements regarding informed consent, privacy of data, and responsible treatment of information. The information was stored in a safe place and accessed only to facilitate scholarly purposes with only the researcher having access to the information. Through these ethical guidelines and a strict methodological paradigm, it was possible to obtain credible, reliable, and valid results of the study that add value to the study of organizational capabilities, green supply chain management, and sustainable performance in the Pakistani context.

Results

Reliability Analysis (Cronbach's Alpha, Composite Reliability, AVE)

Table 4.1 Reliability Analysis

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Financial Resources (FR)	0.871	0.909	0.666
IT Capability (ITC)	0.884	0.923	0.708
Corporate Social Responsibility (CSR)	0.897	0.931	0.731
Digital Innovation (DI)	0.861	0.907	0.661
Green Supply Chain Management (GSCM)	0.911	0.939	0.724
Sustainable Performance (SP)	0.885	0.921	0.696

The results of reliability and validity indicate that the scales used to measure Financial Resources, IT Capability, Corporate Social Responsibility, Digital Innovation, Green Supply Chain Management, and Sustainable Performance have a high quality of measurement and are internally consistent and conceptually valid. The Alpha of all constructs is between 0.861 and 0.911, which is greater than 0.70, and it ensures that there is good internal consistency within the items measuring each of the latent variables. The reliability of the constructs in question is also supported by Composite Reliability (CR) values that range between 0.907 and 0.939 and indicate that the indicators of the constructs in question always depict their underlying concepts. Moreover, the values of the Average Variance Extracted (AVE) of all constructs are between 0.661 and 0.731, which exceeds the 0.50 threshold and justifies the presence of adequate convergent validity, i.e., each construct contributes to the measures of the construct a significant amount of variance. Taken together, these findings confirm the robustness and reliability of the measurement model so that the further structural analysis built on these constructs will be empirically constructed and meaningful.

Validity Analysis (HTMT Discriminant Validity)

Remittances Review
April 2024,
Volume: 9, No: 2, pp.6252-6276
ISSN: 2059-6588(Print) | ISSN 2059-6596(Online)

Table 4.2 Validity Analysis

Construct Pair	HTMT Value
FR → ITC	0.612
FR → CSR	0.541
FR → DI	0.584
FR → GSCM	0.633
FR → SP	0.602
ITC → CSR	0.569
ITC → DI	0.644
ITC → GSCM	0.688
ITC → SP	0.611
CSR → DI	0.657
CSR → GSCM	0.701
CSR → SP	0.655
DI → GSCM	0.728
DI → SP	0.672
GSCM → SP	0.713

The HTMT results indicate strong discriminant validity among the constructs, confirming that each variable in the model—Financial Resources, IT Capability, Corporate Social Responsibility, Digital Innovation, Green Supply Chain Management, and Sustainable Performance—is

empirically distinct from the others. All HTMT values range between 0.541 and 0.728, remaining well below the conservative threshold of 0.85, which ensures that the constructs do not overlap conceptually and measure different dimensions of organizational practices and performance. The highest HTMT value (0.728) between Digital Innovation and Green Supply Chain Management reflects a meaningful but acceptable level of association, consistent with theoretical expectations that innovation supports green practices, while still maintaining distinctiveness. Similarly, the moderate HTMT values between GSCM and Sustainable Performance (0.713) and between CSR and GSCM (0.701) reflect theoretically aligned yet discriminant constructs. Overall, the HTMT ratios affirm that the measurement model achieves strong discriminant validity, strengthening the credibility of the structural model and supporting the validity of the study's hypothesized relationships.

Collinearity Assessment (VIF Values)

Table 4.3 Collinearity Assessment

Indicator	**VIF**
FR → GSCM	2.11
ITC → GSCM	2.36
CSR → GSCM	2.52
DI → GSCM	2.27
GSCM → SP	2.94

The VIF values show that there is no problem of multicollinearity in the structural model because all of them are much less than the generally accepted value of 5, which proves that there is no problematic level of inter-correlation among the constructs used as predictors. The VIFs are between 2.11 and 2.94 indicating moderate, albeit acceptable relations between the independent variables as one would expect in the models where the constructs are theoretically connected but conceptually different. The largest VIF of 2.94 of Green Supply Chain Management predicting

Sustainable Performance is still within reasonable range and this means that Green Supply Chain Management does not play an overbearing role in the explanation of sustainability results, but rather it is individually affecting it in a positive manner. By the same measure, the VIF of the predictors like the IT Capability (2.36), CSR (2.52) and Digital Innovation (2.27) indicating how each predictor influences the GSCM, each has independent explanatory power in the determination of green supply chain practices. On the whole, the VIF analysis confirms the fact that the structural paths of the model are not subject to the problem of multicollinearity, and the regression estimates can be interpreted reliably.

Model Fit Indices (PLS-SEM Model Fit)

Table 4.4 Model Fit Indices

Fit Index	Result	Threshold	Interpretation
SRMR	0.041	< 0.08	Good fit
NFI	0.931	> 0.90	Good
RMS Theta	0.112	< 0.12	Acceptable
R^2 (GSCM)	0.532	Moderate	Strong explanatory power
R^2 (SP)	0.614	Moderate–Strong	High model predictive ability
Q^2 (GSCM)	0.387	> 0	Predictive relevance
Q^2 (SP)	0.412	> 0	Strong predictive relevance

The model fit and predictive relevance findings reveal that the structural model is very adequate, robust, and reliable in explaining Green Supply Chain Management and Sustainable Performance. The SRMR value of 0.041, which is significantly lower than the required 0.08, shows that the overall model fit is excellent, whereas the NFI value of 0.931 is more than the required 0.90 and this also proves that the proposed model is appropriate to the observed data. RMS Theta which is at 0.112 is within the acceptable range of 0.12 and as such, the model used

to do the measurement does not have problematic residuals. The R 2s indicate that the model explains a large percentage of the variance in GSCM (53.2) and variety of Sustainable Performance (61.4), which include 53.2 and 61.4 percent of the total variance respectively as predicted by the predictors, which is a moderate to strong predictive power of the model. Similarly, the Q2 of both GSCM (0.387) and Sustainable Performance (0.412) are above zero, which indicates high predictive relevance and indicates that the model is a good predictor of endogenous constructs. All this indicates that the model is statistical, fitted, and can provide meaningful and reliable information on the contribution to sustainability outcomes of organizational capabilities and practices.

Structural Model (Path Coefficients, t-values, p-values, f^2 Effect Sizes)

Table 4.5 Structural Model

Hypothesis	**Path**	**β**	**t-value**	**p-value**	**f^2**	**Decision**
H1	FR → SP	0.241	4.912	< 0.001	0.062	Supported
H2	ITC → SP	0.283	5.331	< 0.001	0.079	Supported
H3	CSR → SP	0.311	6.024	< 0.001	0.091	Supported
H4	DI → SP	0.267	5.004	< 0.001	0.074	Supported
		Mediation Analysis				
H1	FR → GSCM→ SP	0.331	3.412	< 0.000		Supported
H2	ITC → GSCM→ SP	0.393	3.421	< 0.000		Supported

Hypothesis	Path	β	t-value	p-value	f^2	Decision
H3	CSR → GSCM→ SP	0.421	7.044	< 0.001		Supported

The structural model results show that all four organizational enablers—financial resources, IT capability, CSR, and digital innovation—significantly enhance sustainable performance in Pakistani organizations. Financial resources exert a positive influence on sustainable performance ($\beta = 0.241$, $t = 4.912$, $p < 0.001$), indicating that firms with stronger resource availability are better positioned to invest in sustainability-related initiatives. Similarly, IT capability ($\beta = 0.283$, $t = 5.331$, $p < 0.001$) and digital innovation ($\beta = 0.267$, $t = 5.004$, $p < 0.001$) play crucial roles, suggesting that technological strength and innovation-oriented cultures directly contribute to long-term environmental and operational outcomes. CSR demonstrates the strongest direct impact ($\beta = 0.311$, $t = 6.024$, $p < 0.001$), reinforcing the idea that socially responsible practices translate into superior sustainability performance.

The mediation analysis further reveals that Green Supply Chain Management (GSCM) is a significant mechanism through which these factors influence sustainability. The indirect effects of financial resources ($\beta = 0.331$, $t = 3.412$, $p < 0.001$), IT capability ($\beta = 0.393$, $t = 3.421$, $p < 0.001$), and CSR ($\beta = 0.421$, $t = 7.044$, $p < 0.001$) on sustainable performance through GSCM are all significant, demonstrating that organizations strengthen sustainability outcomes not only through direct investments and capabilities but also by integrating environmentally responsible supply chain practices. These findings confirm that GSCM acts as a strategic pathway that amplifies the impact of financial, technological, and social responsibility resources, thereby enhancing overall sustainable performance.

Discussion

The findings of this study highlight the strategic importance of financial resources, IT capability, CSR, and digital innovation in shaping sustainable performance within Pakistani organizations. All four predictors demonstrated significant positive effects, emphasizing that sustainability is not driven by a single dimension but emerges from a combination of economic, technological,

social, and innovation-based strengths. Financial resources directly enhance sustainable performance, suggesting that organizations with stronger capital availability are more capable of allocating funds toward green technologies, compliance mechanisms, and environmentally responsible operations. Likewise, IT capability contributes meaningfully to sustainability by enabling data-driven decision-making, digital monitoring, and process efficiencies that reduce waste and improve environmental outcomes.CSR emerged as the strongest direct predictor of sustainable performance, reaffirming that socially responsible actions build trust, improve stakeholder relations, and foster a culture where sustainability becomes a core organizational value. Digital innovation's positive impact further supports the argument that organizations that embrace new technologies, digital tools, and innovative processes position themselves for better long-term sustainability outcomes.

The mediation analysis offers additional insights by demonstrating that Green Supply Chain Management (GSCM) serves as a significant pathway that strengthens the impact of all three major driversfinancial resources, IT capability, and CSR—on sustainability outcomes. The significant indirect effects indicate that, beyond their direct contributions, these organizational enablers contribute more effectively to sustainability when firms adopt environmentally responsible supply chain practices. This implies that simply having resources, technology, or CSR orientation is not sufficient; firms must embed these strengths into operational systems such as procurement, logistics, waste reduction, and supplier collaboration to fully realize sustainable performance. The strong mediation effect of CSR through GSCM also suggests that socially responsible organizations tend to implement greener supply chain structures, which in turn amplify environmental and operational sustainability.Overall, the results underscore that GSCM is not merely an operational choice but a strategic mediating mechanism that translates internal capabilities and values into measurable sustainability outcomes. This reinforces the idea that sustainability in Pakistani organizations is best achieved when internal resources are aligned with environmentally conscious supply chain practices.

Conclusion

This study concludes that sustainable performance in Pakistani organizations is significantly shaped by financial strength, technological capability, CSR commitment, and digital innovation. Each factor directly improves sustainability outcomes, but their overall impact becomes substantially stronger when Green Supply Chain Management is integrated into organizational processes. GSCM plays a pivotal mediating role, demonstrating that sustainable performance is maximized when internal capabilities are channeled into environmentally responsible supply chain practices.

These findings offer practical implications for managers and policymakers. Organizations should prioritize investments in IT and digital innovation, strengthen CSR initiatives, and allocate financial resources toward green supply chain implementation. Policymakers and industry bodies can support this shift by providing incentives for green procurement, digital transformation, and CSR-driven sustainability programs.In summary, sustainability in Pakistani organizations is a multi-dimensional outcome driven by internal resources, digital and technological readiness, and socially responsible behaviors, all of which become most effective when operationalized through Green Supply Chain Management. The study highlights GSCM as a strategic bridge that converts organizational strengths into improved sustainable performance, offering a roadmap for firms seeking long-term environmental and operational resilience.

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