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Linking Intellectual Capital, Financial Resources, and Corporate Social Responsibility to Organizational Sustainability: The Mediating Role of Green Supply Chain Management

1. Dr. Najib Ullah Khan, 2. Dr. Arshia Hashmi, 3. Dr. Mahad Jehangir, 4. Engr. Nimra Zafar, 5. Khawar Abbas (Corresponding), 6. Dr Hafiz Ahmed Ullah

1.Assistant Professor, Department of Business and Management Sciences, University of Lakki Marwat,**Email: najibkhanbs18@yahoo.com**

2.Associate Professor, Faculty of Management Sciences, University of Central Punjab, Lahore
Email- **arshia.hashmi@ucp.edu.pk**

3.Lecturer, Department of Business and Management Sciences, University of Lakki Marwat
Email: mahad@ulm.edu.pk

4.Lecturer, Construction Management Department, Institute for Art & Culture, Lahore ,Email-
nimra.zafar@iac.edu.pk

5.Lecturer Department of Commerce Thal University Bhakkar ,
Email- **khawarabbaschheena@gmail.com**

6.Assistant Professor, Department of Construction Management, Institute for Art and Culture, Federal Charted degree awarding Institute, HEC-recognized University, Lahore, Pakistan.
Email-hafiz.ahmed@iac.edu.pk

Abstract

In response to growing environmental and social pressures, organizations are increasingly adopting green and responsible business strategies to achieve long-term sustainability. This study investigates the effects of intellectual capital (IC), financial resources (FR), and corporate social responsibility (CSR) on organizational sustainability performance (OSP), while emphasizing the

mediating role of green supply chain management (GSCM). Grounded in the Resource-Based View (RBV) and Natural Resource-Based View (NRBV), the research proposes that intangible assets, adequate financial capacity, and social commitment collectively enhance green operational practices that drive sustainable performance. Using a quantitative survey approach, data were collected from large manufacturing firms in emerging economies, and analyzed through PLS-SEM. Findings reveal that IC, FR, and CSR significantly influence GSCM adoption, which in turn positively impacts organizational sustainability performance. Moreover, GSCM fully mediates the relationships between the three predictors and sustainability outcomes, confirming its central role in translating internal and external resources into environmental and economic value. This study contributes to the sustainability and supply chain literature by highlighting how integrating intellectual, financial, and social resources through green practices can enhance firms' long-term competitiveness and ecological responsibility.

Keywords: Intellectual Capital, Financial Resources, Corporate Social Responsibility, Green Supply Chain Management, Organizational Sustainability, RBV, NRBV

Information

In the contemporary business landscape, sustainability has become an indispensable element of organizational strategy, driven by growing environmental challenges, heightened stakeholder awareness, and the global pursuit of sustainable development. The acceleration of climate change, resource depletion, and industrial pollution has compelled organizations—especially in manufacturing sectors—to reconsider traditional operational paradigms and transition toward more sustainable and responsible models of value creation. Over the last decade, corporate sustainability has evolved from a peripheral initiative to a core strategic concern, influencing how firms manage resources, design supply chains, and engage with stakeholders. The United Nations' Sustainable Development Goals (SDGs) have further reinforced the necessity for organizations to integrate economic, environmental, and social dimensions into their business strategies(Sharma & McLean, 2025). In emerging economies, where industrial growth often conflicts with ecological preservation, achieving organizational sustainability performance (OSP) is both a challenge and an opportunity. Firms that effectively leverage internal resources,

enhance social responsibility, and adopt environmentally conscious practices can simultaneously achieve competitiveness and sustainability. This paradigm shift underscores the importance of examining the drivers that enable firms to align resource utilization and environmental stewardship to secure long-term viability(Liu, 2025).

Among the key determinants of organizational sustainability, intellectual capital (IC), financial resources (FR), and corporate social responsibility (CSR) stand out as critical enablers that influence how organizations conceive, implement, and sustain green strategies. The modern economy increasingly relies on intangible assets such as knowledge, innovation capability, and intellectual property, collectively defined as intellectual capital, to achieve superior performance. Intellectual capital represents the cumulative knowledge embedded within employees, organizational systems, and relational networks that enhances problem-solving, innovation, and adaptive capacity. Similarly, financial resources serve as the fundamental enabler for executing strategic initiatives, particularly those requiring substantial investment in cleaner technologies, process innovation, and green infrastructure(Vassileva, 2022). Financial capacity ensures that organizations can allocate sufficient funds to environmental and social initiatives, absorb short-term costs, and capitalize on long-term sustainability benefits. In parallel, corporate social responsibility reflects an organization's ethical obligation to minimize its negative impact on society and the environment while contributing positively to stakeholders. CSR initiatives, such as community development, environmental conservation, and ethical supply chain practices, build legitimacy and trust, aligning corporate goals with societal expectations. Collectively, these three resources form the foundation upon which sustainable practices—especially those embedded in supply chain operations—are constructed(Silvestre et al., 2020).

Green supply chain management (GSCM) has emerged as a strategic bridge between organizational resources and sustainability performance. It involves the integration of environmental considerations into every stage of the supply chain, from product design and raw material sourcing to manufacturing, distribution, and end-of-life management. GSCM practices promote resource efficiency, waste minimization, and pollution prevention while enhancing operational effectiveness and stakeholder satisfaction. In recent years, organizations have increasingly recognized GSCM as not merely an environmental initiative but a strategic

mechanism that translates internal competencies into tangible sustainability outcomes(Cancela et al., 2025). Within this framework, intellectual capital provides the cognitive and innovative capabilities required to design and implement green processes, while financial resources enable the acquisition of sustainable technologies and the restructuring of supply chains. Simultaneously, CSR drives firms to extend environmental and social commitments beyond compliance, influencing suppliers, distributors, and partners toward collective sustainability goals. Thus, GSCM operates as a mediating process that channels intellectual, financial, and social resources into improved environmental and organizational performance, making it an essential element in the resource–sustainability nexus(Li & Thurasamy, 2025).

The Resource-Based View (RBV) provides a foundational theoretical framework for understanding how firms develop and deploy valuable, rare, inimitable, and non-substitutable resources to gain a sustainable competitive advantage. According to RBV, internal capabilities such as intellectual capital and financial resources enable firms to create unique strategic positions that competitors cannot easily replicate. Intellectual capital, encompassing human, structural, and relational capital, enhances innovation, decision-making, and process improvement—capabilities that underpin green supply chain initiatives. Financial resources, on the other hand, determine the extent to which firms can invest in environmentally sound technologies, R&D, and sustainable infrastructure. The Natural Resource-Based View (NRBV), an extension of RBV, enriches this understanding by emphasizing the firm's capacity to manage and protect natural resources as a strategic competence. NRBV posits that proactive environmental management, pollution prevention, and sustainable product design create pathways to long-term competitiveness(Sharma et al., 2024). Together, RBV and NRBV establish a theoretical linkage between a firm's resource endowments and its environmental performance, suggesting that sustainability can be achieved when resources are strategically aligned with ecological imperatives. In this context, GSCM acts as an operational mechanism through which these resources are mobilized and transformed into environmental and economic value, making it the ideal mediating construct in the relationship between IC, FR, CSR, and OSP(de Nogueira Vinha, 2020).

Empirical research supports the notion that intellectual capital significantly influences sustainable performance through knowledge sharing, innovation, and process efficiency. Firms with a strong base of human and structural capital are better equipped to adopt advanced green technologies, design eco-friendly products, and engage in environmental problem-solving. Knowledge-driven organizations tend to exhibit a higher level of environmental awareness and are more capable of implementing systemic sustainability initiatives. Similarly, financial resources play a vital role in operationalizing sustainability strategies. The availability of adequate financial capital allows firms to absorb the upfront costs associated with green transformation, such as retrofitting production facilities or adopting renewable energy sources(Mikalauskienė et al., 2025). Without sufficient financial backing, sustainability initiatives often remain superficial or short-term. Corporate social responsibility, meanwhile, extends the sustainability discourse by embedding ethical, environmental, and community considerations into corporate strategy. Empirical studies reveal that firms with robust CSR commitments tend to adopt more sustainable supply chain practices, enhance brand reputation, and strengthen stakeholder relations. Therefore, IC, FR, and CSR can be conceptualized as complementary resources that collectively influence the successful adoption of GSCM, which subsequently drives superior sustainability performance(Li & Thurasamy, 2025).

Despite the increasing attention devoted to sustainability and green supply chain management, several research gaps remain unresolved. First, much of the existing literature has focused on the direct effects of resources such as IC, FR, or CSR on performance, while overlooking the mechanisms through which these resources are converted into sustainable outcomes. This omission limits our understanding of the internal processes that connect resource endowment to environmental and social impact. Second, while numerous studies have explored the role of GSCM as a determinant of sustainability, few have examined its mediating role within the broader resource framework. Understanding mediation is crucial, as it clarifies whether and how GSCM acts as the conduit through which internal resources generate sustainability outcomes. Third, previous studies have largely been conducted in developed economies where institutional support, environmental regulation, and technological infrastructure facilitate sustainability adoption(Guo et al., 2020). In contrast, emerging economies often face institutional voids,

financial constraints, and weaker regulatory environments, making the resource–sustainability relationship more complex and context-dependent. Fourth, limited attention has been given to the integrative role of intellectual, financial, and social resources within a unified analytical model. Most studies have examined these constructs in isolation, failing to capture their synergistic potential in shaping sustainability performance through green operational practices(Alsaoudi et al., 2025).

The research problem thus arises from this lack of integrative understanding: while organizations in emerging economies possess varying levels of intellectual, financial, and social capital, the mechanism through which these resources foster sustainability remains inadequately explained. Firms may have intellectual and financial capabilities or demonstrate CSR initiatives, yet still struggle to achieve sustainability because these resources are not effectively aligned or operationalized through green supply chain management. Moreover, in resource-constrained contexts, the translation of resources into sustainable outcomes depends heavily on managerial ability to orchestrate knowledge, capital, and social engagement within an environmentally conscious supply chain framework. This research, therefore, seeks to address the central question: *How do intellectual capital, financial resources, and corporate social responsibility influence organizational sustainability, and what role does green supply chain management play in mediating these relationships?* By answering this question, the study aims to uncover the underlying processes that convert organizational resources into sustainable competitive advantages.

The significance of this study is multifaceted, offering both theoretical and practical contributions. Theoretically, it advances the Resource-Based and Natural Resource-Based Views by demonstrating how the integration of intangible and tangible resources through green supply chain mechanisms enhances sustainability performance. It contributes to the emerging discourse on the dynamic capabilities required for sustainable operations by conceptualizing GSCM as the mediating capability that translates internal resource configurations into external sustainability outcomes. The study also bridges the gap between CSR and supply chain management research, illustrating how socially responsible behavior not only strengthens stakeholder relations but also motivates the greening of operations. Furthermore, it enriches sustainability research in the

context of emerging economies, where institutional weaknesses, resource scarcity, and industrial pressures complicate the adoption of green practices. By empirically validating the model using data from large manufacturing firms, the study provides evidence-based insights into how resource-based strategies can be adapted to achieve both environmental stewardship and competitive success in such contexts.

Practically, the findings offer actionable implications for managers, policymakers, and sustainability practitioners. For corporate managers, understanding the interplay between intellectual capital, financial resources, CSR, and GSCM provides a roadmap for designing integrated sustainability strategies. Managers can leverage intellectual capital to stimulate innovation in green processes, allocate financial resources strategically toward eco-efficient technologies, and embed CSR principles into supplier and partner relationships. Policymakers can use the findings to design incentives, regulations, and institutional frameworks that encourage the alignment of corporate resources with national sustainability goals. Moreover, sustainability consultants and supply chain professionals can employ the insights to build collaborative networks that foster knowledge sharing and resource optimization across value chains. The study's emphasis on the mediating role of GSCM also underscores the need for organizations to view supply chains not merely as operational systems but as strategic platforms for sustainability transformation. This perspective can help firms transcend compliance-driven environmental actions and evolve toward proactive, innovation-driven sustainability management.

In conclusion, this study positions green supply chain management as the central conduit through which intellectual, financial, and social resources are transformed into organizational sustainability outcomes. By integrating RBV and NRBV perspectives, it captures both the strategic and ecological dimensions of resource utilization, contributing to a deeper theoretical understanding of sustainability as a resource-dependent capability. It addresses critical research gaps related to mediation, contextual diversity, and resource integration while offering practical guidance for firms striving to align competitiveness with environmental and social responsibility. As global challenges continue to intensify, organizations that strategically mobilize their

intellectual capital, financial strength, and social commitment through green supply chains will be better equipped to achieve resilience, reputation, and long-term sustainability.

Litrature review

The theoretical foundation of this study is primarily anchored in the Resource-Based View (RBV) and its ecological extension, the Natural Resource-Based View (NRBV), both of which explain how organizations leverage internal resources and capabilities to attain sustainable competitive advantage. According to the RBV, firms achieve superior performance by developing and deploying valuable, rare, inimitable, and non-substitutable resources that competitors cannot easily replicate. This theoretical stance emphasizes the internal heterogeneity of firms, suggesting that competitive advantage arises from the effective utilization of knowledge, capital, and capabilities embedded within the organization. The NRBV extends this logic by incorporating environmental considerations, asserting that sustainable competitiveness is derived not only from conventional resources but also from a firm's ability to manage its relationship with the natural environment(Tan et al., 2022). It proposes that proactive environmental management, pollution prevention, and sustainable product and process innovation constitute essential strategic capabilities for achieving long-term viability. These perspectives collectively provide a strong theoretical basis for understanding how intellectual capital, financial resources, and corporate social responsibility can be mobilized through green supply chain management to enhance organizational sustainability. Within this framework, green supply chain management represents the operational manifestation of both RBV and NRBV principles, transforming intangible and tangible resources into measurable environmental and economic outcomes(Martínez-Falcó et al., 2025).

Intellectual capital has gained significant attention as a critical intangible asset that drives innovation, operational efficiency, and strategic flexibility, all of which are essential for sustainability. It comprises three interrelated components: human capital, which refers to employees' skills, knowledge, and creativity; structural capital, which includes organizational systems, databases, and routines; and relational capital, which encompasses relationships with stakeholders, customers, and partners. Recent studies highlight that intellectual capital enables

organizations to integrate sustainability objectives into their strategic planning and operational processes by fostering knowledge creation and diffusion. Firms with higher levels of intellectual capital are more capable of implementing green practices, developing eco-innovations, and responding proactively to environmental challenges(Asiaei et al., 2023). Human capital, in particular, plays a central role in developing environmental awareness and technical expertise required for adopting green supply chain practices. Structural capital supports these efforts through institutionalized learning systems and digital platforms that enhance process transparency and efficiency. Similarly, relational capital strengthens collaboration with suppliers and customers, facilitating the adoption of environmentally friendly technologies across the supply chain. Empirical evidence from manufacturing and service sectors indicates that intellectual capital significantly enhances firms' ability to design sustainable products, optimize resource utilization, and achieve superior environmental performance, confirming its relevance as a key driver of organizational sustainability(Setyaningrum et al., 2025).

Financial resources are another essential determinant of sustainability performance, as the implementation of green initiatives often requires significant capital investment and long-term commitment. The availability of adequate financial capacity allows firms to invest in cleaner technologies, renewable energy, and eco-efficient production processes that reduce waste and emissions. From an RBV perspective, financial resources constitute a strategic asset that enables the deployment of other resources and capabilities effectively. Studies have shown that firms with strong financial health are more likely to engage in proactive environmental management and sustainability reporting because they can absorb the costs associated with green transformation and innovation. Financially constrained firms, by contrast, tend to focus on short-term profitability and compliance-based environmental activities rather than strategic sustainability initiatives(Homi & Malmborg, 2025). In emerging economies, where access to financial capital is often limited, firms that efficiently allocate and manage financial resources gain a competitive edge by being able to integrate sustainability principles into their core business models. Recent research also highlights that financial resources moderate the relationship between managerial commitment and sustainability outcomes, indicating that even the most committed leadership requires financial support to translate vision into actionable green

strategies. Therefore, financial resources not only act as a direct enabler of sustainability but also enhance the effectiveness of other organizational capabilities in achieving long-term environmental and social goals(Hermann, 2025).

Corporate social responsibility (CSR) has evolved from a peripheral philanthropic activity into a strategic imperative that integrates ethical, social, and environmental concerns into organizational operations. CSR reflects an organization's commitment to contribute positively to society and minimize adverse environmental impacts while maintaining profitability. The NRBV posits that firms engaging in proactive CSR create environmentally responsible capabilities that support sustainable competitiveness. Empirical research consistently shows that CSR initiatives strengthen stakeholder relationships, enhance corporate reputation, and foster legitimacy—all of which are conducive to sustainability. Firms that integrate CSR into their strategic framework are more likely to adopt green supply chain practices because CSR provides the ethical and institutional foundation for responsible resource management(Le, 2023). Recent studies demonstrate that CSR-oriented firms often impose sustainability standards on their suppliers, collaborate with partners to reduce carbon footprints, and participate in circular economy initiatives. CSR also fosters employee engagement and customer loyalty, which contribute indirectly to sustainability outcomes. Furthermore, CSR acts as a signaling mechanism, communicating a firm's environmental and social commitment to investors and regulators, thereby improving access to financial capital and reducing reputational risks. This strategic dimension of CSR aligns closely with both RBV and NRBV, as it enhances a firm's resource base by cultivating trust, social legitimacy, and cooperative networks that support long-term sustainability objectives(Reyna-Castillo et al., 2023).

Green supply chain management (GSCM) has emerged as a critical operational strategy linking internal resources to external sustainability outcomes. It involves integrating environmental concerns into supply chain activities such as product design, procurement, manufacturing, logistics, and reverse logistics. The adoption of GSCM reflects a firm's commitment to environmental responsibility while maintaining competitiveness and efficiency. GSCM practices include supplier collaboration, green purchasing, eco-design, waste minimization, and life cycle assessment, all of which contribute to reducing ecological footprints and improving resource

efficiency. The NRBV emphasizes that such environmental management capabilities are valuable sources of competitive advantage because they enhance innovation, reduce operational costs, and strengthen stakeholder relationships(Al-Ali & O'Mahony, 2025). Recent empirical studies reveal that organizations that adopt GSCM achieve superior environmental, social, and economic performance compared to those that do not. These practices also stimulate organizational learning and technological innovation by fostering cross-functional collaboration and supply chain integration. Furthermore, GSCM acts as a dynamic capability that allows firms to continuously adapt to environmental regulations, stakeholder expectations, and market changes, thus ensuring long-term sustainability(Bağış et al., 2025).

The relationship between intellectual capital and green supply chain management has been explored in several recent studies, which indicate that firms with strong intellectual assets are more capable of implementing and maintaining green supply chain practices. Human and structural capital enhance the ability to design green processes and manage complex supplier networks that meet environmental standards. Knowledge-sharing mechanisms enable the diffusion of green innovations throughout the organization, fostering a culture of continuous improvement(Simmou et al., 2025). Empirical evidence shows that intellectual capital not only supports green innovation but also strengthens collaboration with suppliers and customers in environmental initiatives. Organizations that emphasize learning and knowledge exchange tend to achieve higher levels of green performance, confirming that intellectual capital functions as a catalyst for GSCM implementation. Therefore, it can be inferred that intellectual capital significantly influences the adoption of GSCM, which in turn leads to improved sustainability performance(Gallo et al., 2023).

Similarly, financial resources play a decisive role in facilitating the adoption of green supply chain practices. Implementing GSCM often requires investments in advanced technologies, training, supplier development, and system upgrades, all of which demand substantial financial commitment. Firms with greater access to financial resources are better positioned to bear these costs and reap the long-term benefits of sustainability. Empirical studies confirm that financial resource availability directly correlates with the extent of GSCM adoption, as financially robust firms are more likely to undertake eco-innovation projects and integrate sustainability criteria

into procurement decisions(Nigatu et al., 2024). Moreover, financial flexibility allows firms to experiment with new green technologies and supply chain configurations without jeopardizing short-term stability. Therefore, financial resources can be viewed as both an enabler and a precondition for effective green supply chain management, making them a critical component of the sustainability equation(Sabat et al., 2023).

The connection between corporate social responsibility and green supply chain management is also well-established in contemporary literature. CSR fosters an organizational culture that prioritizes ethical and environmentally responsible behavior, which naturally extends to supply chain operations. Firms driven by strong CSR commitments engage suppliers in sustainability initiatives, encourage waste reduction, and promote ethical sourcing practices. Studies indicate that CSR-oriented organizations are more proactive in adopting GSCM because their values align with environmental stewardship and stakeholder well-being(Baydeniz & Altin, 2025). CSR acts as a motivational force that guides supply chain partners toward common sustainability objectives, reducing resistance to change and enhancing collaboration. Furthermore, CSR initiatives often create pressure for continuous improvement, compelling firms to implement monitoring systems, certification programs, and sustainability reporting mechanisms within their supply chains. These actions not only improve environmental outcomes but also enhance transparency and trust among stakeholders, reinforcing the sustainability benefits derived from GSCM adoption(Cancela et al., 2025).

Organizational sustainability performance (OSP) represents the ultimate outcome of integrating economic, environmental, and social dimensions of business performance. It reflects a firm's ability to achieve long-term viability by balancing profitability with ecological preservation and social responsibility. Empirical studies demonstrate that the adoption of GSCM significantly enhances OSP by reducing waste, improving energy efficiency, and strengthening corporate reputation. GSCM practices lead to cost savings through resource optimization while simultaneously contributing to environmental protection and regulatory compliance(Xin, 2024). Moreover, firms that integrate GSCM into their operations report higher levels of customer satisfaction and stakeholder trust, which translate into sustained competitive advantage. Thus, GSCM serves as the critical link between internal resources—such as IC, FR, and CSR—and

sustainability outcomes. Without effective green supply chain mechanisms, the potential benefits of these resources may remain unrealized or only partially achieved(Miller, 2022).

Building on these empirical and theoretical insights, the present study proposes a conceptual framework that positions green supply chain management as a mediating mechanism between organizational resources and sustainability performance. Specifically, it is posited that intellectual capital, financial resources, and corporate social responsibility each exert a positive influence on the adoption of GSCM practices. In turn, GSCM mediates these relationships by translating internal capabilities and commitments into tangible sustainability outcomes. Drawing on RBV, intellectual capital and financial resources are conceptualized as strategic assets that provide the foundation for developing operational capabilities such as GSCM. The NRBV further emphasizes that the environmental orientation embedded within CSR initiatives enhances the development of green capabilities that drive sustainability. Therefore, the interplay among these constructs forms a coherent system where resources, ethical commitments, and operational practices collectively determine sustainability performance.

Methodology

The present study employed a quantitative research design to examine the relationships among intellectual capital, financial resources, corporate social responsibility, and organizational sustainability, while exploring the mediating role of green supply chain management within the context of manufacturing firms in Pakistan. A quantitative approach was deemed appropriate as it allows for the testing of hypothesized relationships through empirical evidence and statistical validation. This design is consistent with previous studies in sustainability and supply chain management, where the objective is to quantify the strength and direction of associations between constructs using standardized measurement instruments. The study's philosophical underpinning is rooted in positivism, which assumes that knowledge can be derived from observable and measurable phenomena. Positivism aligns with the study's objective to test theory-driven hypotheses underpinned by the Resource-Based View (RBV) and Natural Resource-Based View (NRBV), both of which posit that firm-level resources and capabilities can be objectively measured to predict organizational outcomes.

The study targeted large manufacturing firms operating in Pakistan, representing sectors such as textiles, chemicals, cement, automotive, and electronics. These industries were selected due to their significant environmental impact and growing emphasis on adopting sustainable and green practices in response to regulatory and market pressures. The population of the study comprised managerial-level employees, including supply chain managers, operations heads, production supervisors, and sustainability officers who possess in-depth knowledge of the firm's operational and environmental strategies. As these individuals are directly involved in implementing green supply chain initiatives and sustainability programs, they were considered suitable respondents to provide accurate and informed data regarding the variables under investigation.

The sampling frame was drawn from industry directories and chamber of commerce listings to ensure a diverse representation of manufacturing firms across major industrial cities such as Karachi, Lahore, Faisalabad, and Islamabad. A purposive sampling technique was employed to select respondents who meet the criteria of having at least three years of managerial experience in operations, supply chain, or sustainability functions. This non-probability sampling approach was appropriate because it ensured that only those with relevant expertise and organizational insights participated in the survey. To achieve sufficient statistical power for partial least squares structural equation modeling (PLS-SEM), a minimum sample size was calculated using G*Power software, which indicated that at least 200 responses would be necessary for robust estimation. Accordingly, a total of 400 questionnaires were distributed via email and professional networks, and 310 valid responses were received after excluding incomplete or inconsistent submissions, yielding a response rate of approximately 77.5%.

Data collection was carried out using a structured survey questionnaire designed based on established scales adapted from previous literature. The instrument was divided into sections representing intellectual capital, financial resources, corporate social responsibility, green supply chain management, and organizational sustainability. Each construct was measured using multiple reflective items rated on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Prior to the main data collection, a pilot test involving 30 respondents was conducted to ensure clarity, reliability, and content validity of the instrument. Minor adjustments were made based on the feedback to enhance the accuracy and comprehensibility of the survey

items. The data collection process adhered to voluntary participation, and anonymity was guaranteed to reduce social desirability bias and encourage honest responses.

For data analysis, the study utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4.0 software. PLS-SEM was chosen because of its suitability for complex models involving multiple constructs, mediation effects, and predictive relationships in exploratory and confirmatory research contexts. The analysis proceeded in two main stages: the measurement model assessment and the structural model assessment. In the measurement model, reliability was evaluated through Cronbach's alpha and composite reliability, while convergent and discriminant validity were established through average variance extracted (AVE) and Fornell–Larcker criteria. In the structural model, path coefficients, t-values, and p-values were estimated using bootstrapping with 5,000 resamples to test the significance of hypothesized relationships. The mediating role of green supply chain management was also examined following the procedures recommended by Hair et al. (2021), which include assessing both direct and indirect effects. The model's predictive relevance and goodness-of-fit indices were also analyzed to ensure the robustness of the results.

Ethical considerations were given due attention throughout the research process. Participants were informed about the purpose and scope of the study before filling out the questionnaire, and their consent was obtained voluntarily. No personal identifiers such as names or company details were collected, ensuring complete confidentiality and data privacy. The data were stored securely and used solely for academic purposes. Additionally, the study adhered to the ethical guidelines of social science research by avoiding any form of coercion, deception, or manipulation during data collection. Approval for conducting the study was obtained from the relevant institutional review committee prior to data collection. By maintaining ethical integrity, methodological rigor, and analytical precision, this study ensured that its findings would provide credible and actionable insights into how intellectual capital, financial resources, and corporate social responsibility collectively contribute to organizational sustainability through the mediating influence of green supply chain management in the Pakistani manufacturing context.

Results

Reliability & Convergent Validity

Table 4.1Reliability & Convergent Validity

Construct	# Items	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Intellectual Capital (IC)	6	0.86	0.91	0.64
Financial Resources (FR)	5	0.82	0.88	0.58
Corporate Social Responsibility (CSR)	6	0.84	0.89	0.60
Green SCM (GSCM)	7	0.88	0.92	0.66
Organizational Sustainability Performance (OSP)	6	0.87	0.90	0.65

The results of the reliability and convergent validity analysis indicate that all constructs in the measurement model demonstrate strong internal consistency and satisfactory convergent validity. Cronbach's alpha values for all variables range from 0.82 to 0.88, exceeding the recommended threshold of 0.70, which confirms the internal reliability of the measurement items. Similarly, composite reliability (CR) values lie between 0.88 and 0.92, well above the acceptable limit of 0.70, indicating that the indicators consistently represent their respective latent constructs. The average variance extracted (AVE) values for all constructs also surpass the minimum criterion of 0.50, ranging from 0.58 to 0.66, suggesting that more than half of the variance in the indicators is explained by the underlying latent variable. These results collectively affirm that the measurement scales used for intellectual capital, financial resources, corporate social responsibility, green supply chain management, and organizational sustainability performance are both reliable and valid, providing a strong foundation for further structural model analysis.

Discriminant Validity — HTMT (heterotrait-monotrait ratio)

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Table 4.2 Discriminant Validity — HTMT

—	IC	FR	CSR	GSCM	OSP
IC	—	0.62	0.58	0.70	0.66
FR	0.62	—	0.61	0.68	0.64
CSR	0.58	0.61	—	0.72	0.69
GSCM	0.70	0.68	0.72	—	0.78
OSP	0.66	0.64	0.69	0.78	—

The results of the discriminant validity assessment using the Heterotrait-Monotrait (HTMT) ratio demonstrate that all constructs in the model are empirically distinct from one another. As shown in the matrix, all HTMT values range between 0.58 and 0.78, which are well below the conservative threshold of 0.85, indicating that each construct measures a unique conceptual dimension without excessive overlap. The strongest relationships are observed between green supply chain management (GSCM) and organizational sustainability performance (OSP) with an HTMT value of 0.78, and between corporate social responsibility (CSR) and GSCM with 0.72, suggesting that while these constructs are related, they remain discriminately valid. Similarly, moderate HTMT values between intellectual capital (IC), financial resources (FR), and CSR (ranging from 0.58 to 0.70) further confirm that these resource-based constructs are related yet distinct. Overall, these results provide strong evidence of discriminant validity, ensuring that the constructs used in this study are conceptually independent and suitable for subsequent structural equation modeling.

Collinearity — Inner VIFs

Table 4.3 Collinearity

Predictors of GSCM

Predictor	**VIF**
IC	1.86
FR	1.74
CSR	1.80

The collinearity assessment results based on the Variance Inflation Factor (VIF) reveal that all predictor variablesintellectual capital (IC), financial resources (FR), and corporate social responsibility (CSR)—exhibit VIF values well below the critical threshold of 5, with scores of 1.86, 1.74, and 1.80 respectively. These results indicate the absence of multicollinearity issues among the independent variables, meaning that each predictor contributes unique and non-redundant information to the model. Low VIF values suggest that the relationships among IC, FR, and CSR are not excessively correlated, allowing for more accurate estimation of their individual effects on green supply chain management. Consequently, the data meet the statistical assumption of collinearity, ensuring the reliability and validity of subsequent structural model estimations in the PLS-SEM analysis.

Model Fit & Predictive Power

Table 4.4 Model Fit

Indicator	Result	Threshold / Interpretation
SRMR (standardized root mean square residual)	0.048	Good fit (≤ 0.08)
RMS_theta	0.075	Acceptable (≤ 0.12)
NFI (Normed Fit Index)	0.912	Acceptable (closer to 1 is better)
R^2 (GSCM)	0.58	Substantial: predictors explain 58% of variance in GSCM
R^2 (OSP)	0.62	Substantial: predictors explain 62% of variance in OSP
Q^2 (GSCM)	0.42	Good predictive relevance ($Q^2 > 0$)
Q^2 (OSP)	0.45	Good predictive relevance ($Q^2 > 0$)

The model fit and predictive power results indicate that the proposed PLS-SEM model demonstrates an excellent overall fit and strong explanatory capability. The standardized root mean square residual (SRMR) value of 0.048 is well below the accepted threshold of 0.08, confirming a good model fit, while the RMS_theta value of 0.075 is also within the acceptable range (≤ 0.12), indicating consistency in the outer model loadings. The Normed Fit Index (NFI) value of 0.912 further supports the adequacy of the model, showing that it closely fits the observed data. Additionally, the coefficient of determination (R^2) values reveal that the model explains 58% of the variance in green supply chain management (GSCM) and 62% of the variance in organizational sustainability performance (OSP), both of which are considered substantial in social science research. The predictive relevance (Q^2) values of 0.42 for GSCM and 0.45 for OSP are positive and exceed zero, indicating that the model has strong predictive accuracy and robustness.

4.2 Structural Equational Model

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Table 4.5Structural Equational Model

Hypothesis	Path	β (Beta)	t-value	p-value	f^2	Decision
H1	Intellectual Capital → Organizational Sustainability	0.218	4.102	< 0.001	0.054	Supported
H2	Financial Resources → Organizational Sustainability	0.261	5.014	< 0.001	0.073	Supported
H3	Corporate Social Responsibility → Organizational Sustainability	0.294	5.833	< 0.001	0.085	Supported
H4	Intellectual Capital → Green Supply Chain Management	0.311	6.028	< 0.001	0.102	Supported
H5	Financial Resources → Green Supply Chain Management	0.246	4.551	< 0.001	0.061	Supported
H6	Corporate Social Responsibility → Green Supply Chain Management	0.327	6.442	< 0.001	0.110	Supported
H7	Green Supply Chain Management → Organizational Sustainability	0.366	7.115	< 0.001	0.138	Supported
H8 (Mediation)	Intellectual Capital → GSCM → Organizational Sustainability	0.114	3.982	< 0.001	—	Supported
H9 (Mediation)	Financial Resources → GSCM → Organizational Sustainability	0.090	3.412	< 0.001	—	Supported
H10 (Mediation)	CSR → GSCM → Organizational Sustainability	0.120	4.221	< 0.001	—	Supported

The structural equation modeling results demonstrate that all direct and indirect relationships proposed in the study are statistically significant and positively contribute to organizational sustainability. Intellectual capital, financial resources, and corporate social responsibility each show meaningful direct effects on sustainability, indicating that knowledgeable human capital, adequate financial strength, and socially responsible practices independently enhance an organization's long-term performance. These three strategic resources also significantly influence green supply chain management, suggesting that firms with stronger intellectual, financial, and CSR foundations are more capable of adopting environmentally responsible supply chain practices. In turn, green supply chain management exerts a strong positive impact on organizational sustainability, confirming its role as a critical mechanism through which resources translate into sustainable outcomes. The significant indirect effects further validate that GSCM partially mediates the relationships of intellectual capital, financial resources, and CSR with sustainability, proving that organizations achieve higher sustainability when these capabilities are channeled through environmentally responsible supply chain processes. Overall, the findings highlight that both resource strength and strategic environmental practices jointly drive sustainability in organizations.

Discussion

The findings of this study reinforce the importance of organizational resources and socially responsible practices in achieving sustainability outcomes. Intellectual capital demonstrated a significant positive impact on organizational sustainability, supporting the argument that knowledgeable employees, innovative capabilities, and accumulated expertise enable firms to respond effectively to environmental challenges. This aligns with the Knowledge-Based View, which emphasizes that intangible resources drive competitive and sustainable advantages. Similarly, financial resources were found to be a strong predictor of sustainability, indicating that firms with adequate financial capacity are better positioned to invest in green technologies, compliance systems, and environmentally responsible initiatives. Corporate social responsibility also emerged as a crucial driver of sustainability, confirming that organizations committed to ethical and socially responsible behavior naturally progress toward sustainability-oriented strategies and practices.

A notable contribution of this study is the strong empirical evidence regarding the mediating role of green supply chain management. Intellectual capital, financial resources, and CSR all significantly influenced GSCM adoption, highlighting that resource-rich and socially responsible firms are more able—and more willing—to embed environmental considerations across their supply chain operations. This aligns with previous research suggesting that environmental sustainability becomes more achievable when organizations integrate green procurement, eco-friendly production, waste reduction, and responsible distribution practices. Moreover, GSCM showed a strong direct effect on organizational sustainability, indicating that green operational processes serve as an essential pathway through which resources are translated into sustainable outcomes. The significant indirect effects further indicate partial mediation, meaning that while resources directly contribute to sustainability, their impact becomes stronger and more systematic when routed through green supply chain practices.

Conclusion

Overall, this study establishes that intellectual capital, financial resources, and corporate social responsibility are key enablers of organizational sustainability, both directly and indirectly through green supply chain management. The results suggest that organizations aiming to strengthen their sustainability performance must not only build strong internal capabilities but must also institutionalize environmentally responsible practices across their supply chains. Green supply chain management emerges as a strategic mechanism that connects organizational resources to long-term environmental, social, and economic outcomes. The study highlights that sustainability is not achieved solely through resource availability; rather, it requires a holistic alignment of organizational capabilities, ethical commitments, and operational-level environmental integration. These findings offer valuable insights for managers and policymakers by emphasizing that investment in human knowledge, financial strength, and socially responsible initiatives—combined with focused green supply chain practices—can significantly improve an organization’s sustainability trajectory. Future research may extend this model by examining industry-specific moderating factors or exploring longitudinal effects to further deepen the understanding of resource-driven sustainability p

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