MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 2368-2380

Sustainability Capability Internalization in Construction Supply Chain: An RBV–Stakeholder Perspective Using PLS-SEM

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Abstract: Grounded in the resource-based view (RBV) and informed by stakeholder theory, this study investigates how responsible sourcing capabilities translate into responsible production outcomes within the Indian construction supply chain. Specifically, the study examines the mediating role of responsible consumption as an internal capability deployment mechanism and the moderating role of sustainability targets aligned with Sustainable Development Goal 12 (SDG-12) as an external stakeholder-driven institutional pressure. Based on a critical synthesis of prior research, twenty-three critical success factors were identified and characterized across sourcing, consumption, and production stages of construction activities. Primary data were collected from 362 construction-sector professionals in India (out of 556 approached) between August and November 2025 using a structured questionnaire administered through online surveys and personal interviews. The proposed theoretical model was empirically tested using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS4. The results indicate that responsible sourcing positively affects responsible production directly and via responsible consumption, while SDG-12–aligned sustainability targets negatively moderate this relationship, constraining the translation of sourcing capabilities into production outcomes. By explicating the capability-based mechanisms and boundary conditions through which sustainability practices operate across the construction lifecycle, this study extends RBV by integrating stakeholder-driven constraints into sustainability capability deployment. The findings contribute to construction supply chain sustainability literature by moving beyond linear RS–RP linkages and offer actionable insights for policymakers and industry practitioners seeking to balance internal capability development with external sustainability mandates.
Keywords: Responsible sourcing; Responsible consumption; Responsible production; Resource-based view; Stakeholder theory; Construction supply chain; Indian construction sector.

Introduction

The United Nations (UN) endorsed Sustainable Development Goals (SDGs), which have accelerated the adoption of sustainability across all economic sectors, including manufacturing, construction, agriculture, and services (Fajfar, 2000; Narwaria, 2024; Wickramasinghe & De Zoyza, 2009). The construction sector in emerging countries is a primary focus of research. The global construction sector is crucial for sustainable development because it consumes significant resources, produces waste, and impacts the environment (Brammer & Hoejmose, 2012; Gualandris et al., 2015). As the world's second-largest emitter of greenhouse gases, the construction industry faces increasing pressure to adopt responsible practices that reduce environmental impact and promote social fairness (Seuring & Müller, 2008). Developing nations lead several of the UN's 17 SDGs, investing heavily in infrastructure development, building housing to accommodate rising urbanization, educational facilities, hospitals, and transportation infrastructure needed for urban growth (Zuo & Zhao, 2014). Responsible Sourcing (RS) has become vital to sustainable construction, emphasizing the selection of responsible materials and resource acquisition (Aguinis & Glavas, 2012). It aims to lessen environmental damage while supporting community development through sustainable procurement, policies, life cycle assessments, and efficient inventory management (Ambrosini et al., 2009). Although responsible sourcing is a key element of sustainable construction, its effects on production outcomes remain underexplored, especially in emerging economies like India (Wu & Pagell, 2011). The Indian construction sector faces vital challenges such as rapid urban population growth and infrastructure demands, that contributes to natural resource depletion, environmental degradation, and social inequality (Hart & Dowell, 2011; Lozano, 2015). These challenges encompass aspects of people, environment, economy, and society, aligning with sustainable development priorities (Ofori, 2015).The framing of 17 SDGs emphasizes addressing the needs of individuals and the environment. Researchers and industry practitioners are working on innovative strategies to embed sustainability practices in the post-pandemic construction sector (Laplume et al., 2008). Examining the relationship between responsible sourcing and Responsible Production (RP) is critical for informing both firm-level strategic decision-making and policy design at the pre-project planning stage, where sustainability commitments in construction are largely determined (González-Benito & González-Benito, 2006).

From a resource-based view (RBV) perspective, responsible sourcing constitutes an upstream sustainability capability that shapes the quality, traceability, and environmental performance of material inputs before project execution (Adams & Frost, 2008).However, the value of this capability is contingent on its effective deployment through subsequent planning, technological adoption, and material utilization processes within the construction supply chain (Harrison et al., 2010). Empirical evidence from recent large-scale infrastructure and green building projects in emerging economies indicates that digital procurement systems, Building Information Modelling (BIM), and prefabrication technologies play a mediating role by translating sourcing decisions into operational efficiencies and reduced material waste during production (Pagell & Wu, 2009).

Globally, construction accounts for around 40% of energy consumption, 40% of solid waste, 12% of water use, and nearly 37% of greenhouse gas emissions. Responsible production, in this context, extends beyond compliance-oriented practices and encompasses the integration of energy-efficient design principles, the use of recycled and low-carbon construction materials, and the adoption of renewable energy solutions at construction sites (Elkington, 1997). For instance, recent net-zero building initiatives have demonstrated that sourcing recycled aggregates and low-emission cement yields sustainability benefits only when supported by disciplined consumption practices, such as material optimization and waste segregation during construction (Love et al., 2010; Sarkis, 2003). This reinforces RBV's assertion that isolated resources do not generate value unless embedded within complementary capability bundles.

In parallel, stakeholder theory underscores the importance of economic and social considerations such as fiscal incentives, regulatory compliance mechanisms, and reputational rewards in shaping organizational sustainability behaviour (Helfat & Peteraf, 2009). While incentives for sustainable materials and technologies can encourage adoption, recent policy-driven construction programs also reveal that excessive compliance pressure may shift managerial focus toward symbolic adherence rather than effective capability internalization. Accordingly, it becomes essential to empirically assess how Responsible Consumption (RC) functions as an internal control mechanism that governs the responsible use of sourced materials within defined environmental and economic limits. Measuring the mediating influence of responsible consumption alongside responsible sourcing therefore provides a more nuanced understanding of how sustainable production outcomes are actually realized in construction supply chains (Barney et al., 2011; Darko & Chan, 2016; Henseler et al., 2016).

The connection between these factors varies depending on the approach taken. SDG 12's sustainability targets focus on sustainable consumption and production, leading to benefits like waste reduction, resource efficiency, environmental harmony, and improved livelihoods

(Carter & Rogers, 2008; Walker et al., 2008). Therefore, stakeholders should examine project targets and align them with responsible sourcing practices to enhance their impact; SDG 12's sustainability goal acts as a moderator, guiding organizations to adopt sustainable policies.

Although prior research has examined responsible sourcing, consumption, and production practices in construction supply chains, existing studies predominantly model these relationships as linear and uniformly positive, offering limited insight into the internal capability mechanisms through which sourcing practices are translated into production outcomes (Pagell & Shevchenko, 2014). From a resource-based view (RBV) perspective, there is insufficient empirical evidence explaining the role of responsible consumption as a deployment mechanism that enables sourcing capabilities to generate responsible production outcomes across the construction lifecycle (Ahi & Searcy, 2013; Sourani & Sohail, 2015).Moreover, sustainability research grounded in stakeholder theory has largely treated externally imposed sustainability targets as enabling conditions, implicitly assuming that regulatory and policy pressures strengthen sustainability performance. Recent construction-sector evidence, however, suggests that such targets may impose compliance-oriented constraints that weaken the effective internalization of firm-level sustainability capabilities (Beske et al., 2014). The conditional effects of SDG-12–aligned sustainability targets on capability–performance relationships therefore remain underexplored.

Addressing these gaps, this study adopts an integrated RBV–stakeholder framework to examine the direct, mediating, and moderating mechanisms linking responsible sourcing to responsible production in the Indian construction supply chain. Accordingly, the study is guided by the following research questions:

RQ1: How does responsible sourcing, conceptualized as a firm-level sustainability capability, influence responsible production outcomes in construction supply chains?

RQ2: To what extent does responsible consumption mediate the relationship between responsible sourcing and responsible production?

RQ3: How do SDG-12–aligned sustainability targets, as external stakeholder pressures, condition the relationship between responsible sourcing and responsible production?

The remainder of this paper is organized as follows. The next section reviews the relevant literature to identify critical success factors (CSFs) related to responsible sourcing, consumption, and production, and to develop the study hypotheses. Follow sections outline the research methodology and analytical approach, and present the empirical results, followed by a discussion of theoretical and practical implications. The last section concludes the study and suggests directions for future research.

Literature Review

Identification of Critical Success Factors (CSFs) in Sustainable Construction Supply Chain

The identification of Critical Success Factors (CSFs) has become a dominant analytical approach in construction sustainability research, as it enables stakeholders to distil complex, multi-dimensional sustainability practices into empirically testable capability domains (Briscoe & Dainty, 2005; Zhu et al., 2008) Prior studies on sustainable construction supply chains primarily emphasized environmental compliance and green procurement, focusing on material selection, supplier certification, and regulatory adherence (Agyekum, 2019; Hair et al., 2017). Figure 1 presents a lifecycle-oriented sustainability framework showing how responsible sourcing at the design stage and responsible production during construction are internalized within the supply chain through key operational parameters, ultimately leading to sustainable operational outcomes (Carter & Rogers, 2008; Seuring & Müller, 2008). It aligns with the study's RBV-based perspective by illustrating how upstream sourcing and midstream production practices are translated into downstream sustainability outcomes, such as low emissions, user satisfaction, and environmental comfort, through effective capability internalization.

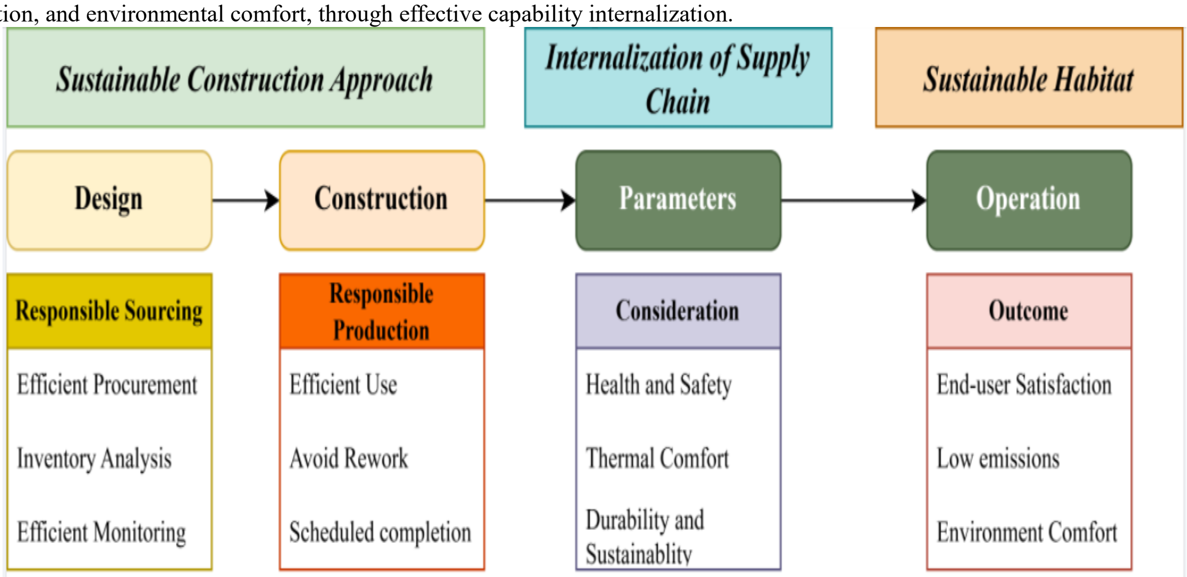

Figure 1 Sustainability framework in Construction Supply Chain

Within the construction context, several studies have identified upstream procurement-related CSFs, including supplier environmental assessment, material traceability, procurement transparency, and adoption of eco-labelled materials (Hofmann et al., 2014; Varnas et al., 2009).These factors are consistently linked to improved environmental performance but are often examined independently of downstream construction processes. Parallel streams of research grounded in lean construction and circular economy principles emphasize consumption-stage CSFs such as material efficiency, waste minimization, reuse practices, and on-site resource monitoring (Shen et al., 2010). These studies highlight that sustainability benefits embedded in procurement decisions are frequently undermined by inefficient material usage during project execution.

Downstream, sustainable production-oriented studies focus on CSFs associated with energy-efficient construction techniques, low-carbon technologies, waste treatment systems, and lifecycle performance monitoring (Pagell & Wu, 2009). However, these production-oriented CSFs are often treated as outcomes rather than as capability-dependent processes shaped by sourcing and consumption decisions. As a result, the interdependencies among sourcing, consumption, and production CSFs remain insufficiently theorized.

In addition, an emerging body of literature highlights the role of institutional and stakeholder-related CSFs, such as regulatory incentives, sustainability reporting requirements, client pressure, and policy-driven sustainability targets (Chen, 2008; Hair et al., 2017; Klassen & Whybark, 1999). While these factors are commonly framed as enablers of sustainability adoption, recent empirical findings suggest that

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Vol. 36 Issue 1, 2026, Pages: 2368-2380

externally imposed sustainability mandates may generate compliance-oriented behaviour, particularly in cost-sensitive construction environments, thereby constraining firms' ability to internalize sustainability capabilities (Ahi & Searcy, 2013; Beske et al., 2014).

Synthesizing these diverse strands of literature, the present study adopts a capability-based perspective to systematically identify and organize CSFs across three interrelated domains: responsible sourcing, responsible consumption, and responsible production (Gualandris et al., 2015; Zhu & Sarkis, 2007). Through an extensive review of peer-reviewed journal articles published between 2010 and 2025 in leading construction management, sustainability, and supply chain journals, an initial pool of CSFs was identified. These factors were screened for conceptual relevance, empirical recurrence, and alignment with RBV and stakeholder theory (Zhu et al., 2008). This process resulted in the identification of 23 CSFs as shown in Table 1, which collectively represent the core sustainability capability structure of construction supply chains and form the empirical foundation for hypothesis development and model testing.

Table 1 Identification of CSFs

CSFs ID	Derived CSFs	Construction Phase	Reference
RS1	establishing transparent Communication channels	Responsible Sourcing	(Bansal & Roth, 2005; Harrison et al., 2010)
RS2	industrial peers to incorporate sustainable development	Responsible Sourcing	(Ambrosini et al., 2009; Teece, 2007)
RC1	technology capabilities	Responsible Consumption	(Aguinis & Glavas, 2012; Bansal & Roth, 2005)
RS3	sustainable procurement	Responsible Sourcing	(Beske et al., 2014; Pagell & Wu, 2009)
RC2	use of renewable resources	Responsible Consumption	(Gualandris et al., 2015; Zhu & Sarkis, 2007)
RC3	use of locally available materials	Responsible Consumption	(González-Benito & González-Benito, 2006; Reuter et al., 2010)
RS4	Sustainable policies and standards fulfilment while sourcing	Responsible Sourcing	(Hart & Dowell, 2011; Teece, 2007)
RP1	Contractor and client profit	Responsible Production	(Liang et al., 2023; Narwaria, 2024)
RS5	tax reduction on sustainable products	Responsible Sourcing	(Harrison et al., 2010; Helfat & Peteraf, 2009)
RP2	minimizing carbon footprints	Responsible Production	(Pagell & Shevchenko, 2014; Vachon & Klassen, 2008)
RP3	construction and demolition waste management	Responsible Production	(Elkington, 1997; Sarstedt et al., 2020b)
RC4	efficient use of natural resource	Responsible Consumption	(Bowen et al., 2001; Klassen & Whybark, 1999)
RC5	waste reduction	Responsible Consumption	(Elkington, 1997; Vachon & Klassen, 2008)
RP4	reduce harmful substance	Responsible Production	(Adams & Frost, 2008; Chen, 2008)
RS6	construction scheduling	Responsible Sourcing	(Pagell & Shevchenko, 2014; Vachon & Klassen, 2008)
RS7	efficient inventory process	Responsible Sourcing	(Brammer & Hoejmose, 2012; Walker et al., 2008)
RP5	Policies on waste utilization	Responsible Production	(Hair et al., 2019b; Wickramasinghe & De Zoyza, 2009)
RC6	use of recycled materials	Responsible Consumption	(Fornell & Larcker, 1981; Henseler et al., 2015)
RS8	lifecycle assessment of buildings	Responsible Sourcing	(Liang et al., 2023; Ringle et al., 2012)
RP6	use of digital innovative tools in waste quantification	Responsible Production	(Bass & Riggio, 2006; Narwaria, 2024)
RS9	corporate sustainable responsibility	Responsible Sourcing	(Agyekum, 2019; Hair et al., 2019a)
RC7	efficient use of energy and water	Responsible Consumption	(Love et al., 2010; Shen et al., 2010)
RC8	efficient use of human resource	Responsible Consumption	(Ahi & Searcy, 2013; Pagell & Wu, 2009)

Responsible Sourcing CSFs as Firm-Level Sustainability Capabilities

From a resource-based view (RBV), responsible sourcing CSFs represent firm-level sustainability capabilities that shape the quality, compliance, and environmental performance of material inputs prior to project execution. These CSFs include supplier environmental evaluation, sustainable material selection, procurement transparency, and long-term supplier collaboration (Agyekum, 2019; Zhu & Sarkis, 2007). When embedded within procurement routines and decision-making processes, such CSFs constitute valuable and difficult-to-imitate capabilities that can enhance downstream operational performance.

Empirical research consistently reports positive associations between green procurement practices and improved environmental and project outcomes in construction (Briscoe & Dainty, 2005; Zhu & Sarkis, 2007). However, RBV cautions that the presence of sourcing capabilities alone does not guarantee performance benefits unless they are effectively internalized and deployed through complementary processes (Bansal & Roth, 2005). This theoretical insight provides the basis for modeling responsible sourcing as a direct antecedent of responsible production while recognizing that its effects may be partially contingent on internal deployment mechanisms.

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Accordingly, this posit hypothesizes as:

H1: Responsible sourcing CSFs exert a positive direct influence on responsible production outcomes.

Responsible Consumption CSFs as Capability Deployment Mechanisms

Despite their operational significance, responsible consumption CSFs remain under-theorized in construction sustainability literature. Responsible consumption CSFs encompass material usage efficiency, waste reduction practices, reuse and recycling routines, and monitoring of on-site resource consumption (Sarstedt et al., 2020a). These factors determine how sourced materials are utilized during construction and whether the potential sustainability benefits embedded in sourcing decisions are realized or dissipated during project execution (Yang et al., 2011).

Within an RBV framework, responsible consumption functions as an internal deployment mechanism that enables sourcing capabilities to generate value. Construction projects frequently experience material losses, overconsumption, and inefficiencies even when sustainable materials are procured, highlighting the critical role of consumption-stage CSFs (Reuter et al., 2010; Sarstedt et al., 2020b). Studies grounded in lean construction and circular economy perspectives demonstrate that disciplined material consumption practices significantly strengthen the effectiveness of sustainable procurement strategies. Consequently, and In-turn, the hypothesis are posited as:

H2: Responsible sourcing CSFs are expected to positively influence responsible consumption CSFs by shaping procurement quality, material availability, and usage norms.

H3: Responsible consumption CSFs are posited to enhance responsible production outcomes by aligning material use with sustainability-oriented production objectives.

Mediation of Responsible Consumption: Internalization of Sustainability Capabilities

RBV emphasizes that organizational capabilities create performance advantages through internalization rather than mere adoption. Applying this logic, responsible sourcing CSFs influence responsible production not only through direct effects, but also indirectly through responsible consumption CSFs that embed sourcing decisions into operational routines (Henseler et al., 2015; Wheatley, 2017).

While prior sustainability studies frequently model sourcing and production as directly linked, there is limited empirical work that explicitly tests the mediating role of consumption-stage practices in construction supply chains (Bansal & Roth, 2005; Hair et al., 2019a). This omission obscures the mechanisms through which sustainability capabilities are transformed into production-level outcomes.

Addressing this gap, the present study frame hypotheisis as:

H4: Responsible consumption CSFs acts as a partial mediator between responsible sourcing and responsible production, reflecting the internalization of sourcing capabilities within construction operations.

SDG-12–Aligned Sustainability Targets as Stakeholder-Imposed Boundary Conditions

In addition to internal capability dynamics, sustainability implementation in construction is shaped by external institutional pressures. Stakeholder theory provides a useful lens for understanding how sustainability targets aligned with Sustainable Development Goal 12 (SDG-12) function as exogenous constraints imposed by regulators, clients, and certification bodies (Brammer & Hoejmose, 2012; Seuring & Müller, 2008).

Although sustainability targets are commonly assumed to reinforce sustainable practices, emerging empirical evidence suggests that in highly regulated and cost-sensitive sectors such as construction, externally imposed targets may induce compliance-oriented behaviour (Gualandris et al., 2015; Zuo & Zhao, 2014). Firms may prioritize formal adherence and documentation over substantive capability development, thereby constraining managerial discretion and weakening the effective deployment of internal sustainability capabilities (Fornell & Larcker, 1981; Kim, 2013).

Accordingly, SDG-12–aligned sustainability targets are conceptualized as boundary conditions that condition the relationship between responsible sourcing and responsible production. This theoretical logic underpins the proposed negative moderation effect and framing of hypothesis as:

H5: Higher levels of external sustainability pressure are expected to weaken the positive effect of responsible sourcing on production outcomes by limiting its internalization into operational practices.

Literature Synthesis and Empirical Model Specification

The literature review identifies and synthesizes twenty-three Critical Success Factors (CSFs) underpinning responsible sourcing, responsible consumption, and responsible production in construction supply chains. Grounded in the resource-based view, these CSFs are conceptualized as interdependent sustainability capabilities whose performance effects depend on effective internalization across construction activities. Stakeholder theory further frames sustainability targets aligned with SDG-12 as external institutional pressures that condition capability deployment (González-Benito & González-Benito, 2006; Laplume et al., 2008). Table 2 presents the alignment between the proposed conceptual model, underlying theoretical foundations, and the study hypotheses. It demonstrates how each structural relationship in the model is explicitly grounded in the resource-based view or stakeholder theory and corresponds to a specific hypothesis. This alignment ensures theoretical coherence, avoids post-hoc model specification, and clarifies the role of each construct within the sustainability capability internalization framework.

Table 2 Theoretical foundation and research hypothesis

Model Component	Theory	Hypothesis
Responsible sourcing → Responsible production	RBV (capability effect)	H1
Responsible sourcing → Responsible consumption	RBV (deployment)	H2
Responsible consumption → Responsible production	RBV (integration)	H3
Mediation via responsible consumption	RBV (internalization)	H4
SDG-12 moderation	Stakeholder theory (boundary condition)	H5

Based on this theoretical synthesis, an integrated conceptual model as shown in Figure 2 is specified to examine the direct, mediating, and moderating relationships among the CSF-based capability domains. The conceptual model illustrates responsible sourcing as a firm-level sustainability capability that influences responsible production directly and indirectly through responsible consumption as an internal deployment mechanism. Sustainability targets aligned with SDG-12 are modelled as an external stakeholder pressure that moderates the responsible sourcing–responsible production relationship, defining the boundary conditions under which sustainability capabilities are internalized in construction supply chains.

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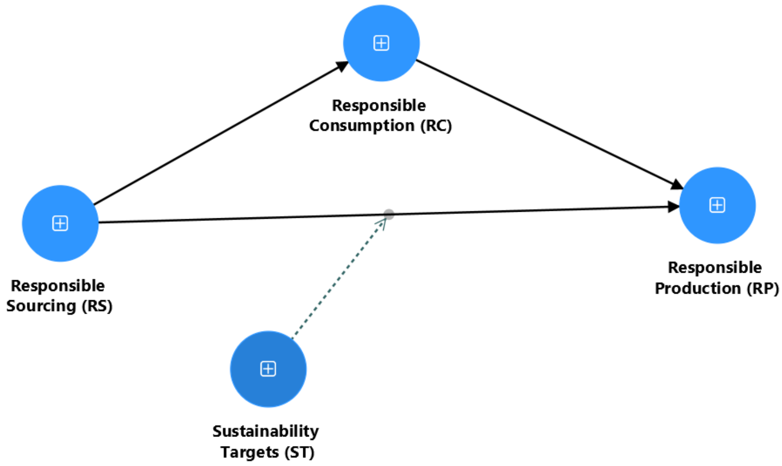

Figure 2 Conceptual model of sustainability capability internalization in Construction Supply Chain

To empirically validate the proposed model and test the associated hypotheses, the study employs Partial Least Squares Structural Equation Modelling (PLS-SEM). The following section details the research design, measurement development, data collection procedures, and analytical strategy adopted for model estimation and hypothesis testing.

Methodology

Research Design

This study employs a quantitative, cross-sectional research design to empirically test the proposed sustainability capability internalization framework. Consistent with the resource-based view, responsible sourcing, responsible consumption, and responsible production are operationalized as latent sustainability capability constructs represented by multiple Critical Success Factors (CSFs). The design facilitates examination of direct capability effects, internal deployment mechanisms, and external stakeholder-imposed boundary conditions.

Primary data were collected using a structured questionnaire (Appendix 1) to capture CSFs implementation across construction supply chains at different phsases of project along with eight SDG-12 targets. Partial Least Squares Structural Equation Modelling (PLS-SEM) was adopted as the analytical approach due to its suitability for capability-based models, complex mediation and moderation testing, and variance-oriented theory development (Hair et al., 2019). PLS-SEM also accommodates latent constructs measured through multiple indicators and supports empirical validation under non-normal data conditions. The following sections describe the measurement development, sampling strategy, data collection, and analytical procedures in detail.

Measurement Development and Item Generation

The construct operationalization in the present study followed a systematic, theory-driven, and multi-stage development process anchored in the resource-based view (RBV) and stakeholder theory (Wu & Pagell, 2011). A comprehensive review of peer-reviewed literature in sustainable construction management, supply chain sustainability, circular economy, and sustainability governance was undertaken to identify Critical Success Factors (CSFs) that have been consistently associated with sustainability performance across construction supply chains (Gualandris et al., 2015; Porter & van der Linde, 1995; Wu & Pagell, 2011; Zuo & Zhao, 2014). This process emphasized empirical recurrence and theoretical relevance rather than ad hoc factor selection.

Identification and Theoretical Structuring of CSFs

Consistent with RBV's distinction between capability endowment, internal deployment, and outcome realization, the identified CSFs were analytically structured into three latent sustainability capability domains responsible sourcing (RS), responsible consumption (RC), and responsible production (RP). Responsible sourcing CSFs represent upstream procurement and supplier governance capabilities; responsible consumption CSFs capture internal deployment mechanisms through which sourcing capabilities are operationalized within construction activities; and responsible production CSFs reflect downstream sustainability outcomes achieved during the production phase. This theoretically grounded structuring ensured conceptual clarity and mitigated risks of post-hoc construct formation. Measurement items were subsequently developed by adapting validated indicators from prior empirical studies, with contextual refinement to reflect construction-sector practices in India. Content validity was further strengthened through expert assessment involving academic researchers and construction industry professionals, who evaluated each item for clarity, relevance, and alignment with its corresponding CSF and construct definition (Liang et al., 2023). Ambiguous, leading, or double-barrelled items were systematically revised or eliminated prior to pilot testing, ensuring that the final measurement instruments accurately capture sustainability capability formation, deployment, and outcomes as conceptualized in the present study.

Pilot Study and Scale Development

A pilot study was conducted to preliminarily evaluate the psychometric adequacy of the proposed measurement scales. The pilot survey yielded 124 usable responses, which is consistent with methodological guidelines recommending sample sizes of 100–150 for exploratory scale validation when constructs are theoretically grounded and indicator communalities are adequate (Sarstedt et al., 2020).

Exploratory Factor Analysis (EFA) was employed to examine construct dimensionality and refine the item pool based on factor loadings, communalities, and cross-loading behaviour. Items failing to meet established thresholds were removed to achieve a parsimonious and theoretically coherent factor structure. Confirmatory Factor Analysis (CFA) was subsequently conducted to validate the refined measurement model and assess internal consistency, convergent validity, and discriminant validity using standard fit and reliability criteria. Both EFA and CFA were applied solely for scale purification and validation, not for hypothesis testing. The validated measurement instruments were then retained for use in the main study, where they were incorporated into the PLS-SEM analysis to test the proposed theoretical model.

Data Collection and Sample Characteristics

Following pilot-based scale purification and validation, primary data were collected for the main empirical analysis using the finalized measurement instrument. A structured questionnaire was administered to construction-sector professionals in India through a combination of online surveys and personal interviews to enhance response coverage and data quality. The sampling frame included respondents from government, semi-government, private, and academic organizations to reflect institutional diversity within construction supply chains and capture variation in sustainability capability implementation (Adams & Frost, 2008; Elkington, 1997; Pagell & Wu, 2009).

A total of 556 potential respondents were contacted, yielding 362 valid responses after data screening. This sample size satisfies established PLS-SEM sample adequacy criteria, exceeding both the ten-times rule and more rigorous minimum sample size requirements based on model complexity and the largest number of structural paths directed at any endogenous construct (Lozano, 2015). Given the presence of mediation and moderation effects in the proposed model, the achieved sample size provides sufficient statistical power for stable parameter estimation and reliable bootstrapping results in SmartPLS 4. Although convenience sampling was employed due to access constraints, respondent heterogeneity was deliberately retained to enhance the analytical relevance of the findings (González-Benito & González-Benito, 2006; Laplume et al., 2008). Potential limitations related to sampling approach and heterogeneity are acknowledged and addressed in the discussion.

PLS-SEM Measurement and Structural Model Evaluation

The proposed theoretical model was empirically examined using Partial Least Squares Structural Equation Modelling (PLS-SEM) implemented in SmartPLS 4, following a systematic two-stage evaluation procedure comprising assessment of the measurement model and the structural model. PLS-SEM was selected due to its suitability for variance-oriented analysis, complex model structures involving mediation and moderation, and constructs operationalized through multiple indicators (Hair et al., 2019).

Measurement Model Assessment

All latent constructs were modelled reflectively and evaluated for indicator reliability, internal consistency reliability, and construct validity. Indicator reliability was assessed through standardized outer loadings, with values exceeding recommended thresholds indicating adequate item performance (Gajendran & Harrison, 2007; González-Benito & González-Benito, 2006; Laplume et al., 2008; Sarstedt & Hair, 2021). Internal consistency reliability was evaluated using Cronbach's alpha and composite reliability coefficients. Convergent validity was established through the Average Variance Extracted (AVE), ensuring that each construct captured a sufficient proportion of variance from its indicators.Discriminant validity was assessed using both the Fornell–Larcker criterion and the heterotrait–monotrait (HTMT) ratio of correlations (Reuter et al., 2010; Yang et al., 2011). Given the conceptual proximity between responsible consumption and responsible production, HTMT values were interpreted conservatively and evaluated alongside theoretical justification distinguishing capability deployment from outcome realization. Indicator cross-loadings were additionally examined to confirm that each item loaded highest on its intended construct, mitigating concerns related to multicollinearity and construct overlap (Liang et al., 2023).

Structural Model Assessment

The structural model was evaluated using a bootstrapping procedure with 5,000 resamples to estimate path coefficients, t-values, p-values, and bias-corrected confidence intervals. Explanatory power was assessed using coefficients of determination (R^2), while effect sizes (f^2) were calculated to evaluate the relative contribution of each exogenous construct to endogenous variables (Wheatley, 2017). Predictive relevance was examined using the blindfolding procedure to compute Stone–Geisser's Q^2 values.

Mediation was assessed by examining the significance and confidence intervals of the indirect effect of responsible sourcing on responsible production through responsible consumption. Partial mediation was established where both direct and indirect effects were statistically significant. Moderation was tested using a two-stage interaction approach, with the interaction term between responsible sourcing and SDG-12–aligned sustainability targets included as a predictor of responsible production (Bass & Riggio, 2006). The resulting negative interaction effect was interpreted as a constraining boundary condition consistent with stakeholder theory, rather than as an amplification effect.

Model Fit and Quality Evaluation

Overall model fit and quality were assessed using PLS-SEM–appropriate indices, including standardized root mean square residual (SRMR). These indices were reported to demonstrate the adequacy of both the measurement and structural components of the model in accordance with SmartPLS 4 reporting guidelines (Hsu & Liou, 2013; Ringle et al., 2012).

Taken together, this comprehensive evaluation procedure ensures the robustness, validity, and interpretability of the empirical findings by aligning measurement development, structural testing, and theoretical interpretation within a unified PLS-SEM framework.

Results and Findings

Descriptive Statistics

The descriptive statistics analysis outcome confirms the study factor's results, as shown in Table 3. First, the mean scores range between 3.75 and 4.1, which highlights the positive tendency of the responses, and then the values of standard deviation lie between 0.81 and 0.97, showing that the maximum scores have moderate variability. Values of skewness scattering leftward with a range between -0.56 and -0.28 are considered acceptable limits (Mallery, Paul and George, 2000). Further, the kurtosis values lie between -0.58 and 0.13, demonstrating comparatively flat distributions that meet the normality criteria expectations (Kim, 2013). Variable loadings are determined to establish the appropriate relationship between factors and convergent validity, ranging from 0.69 to 0.81, signifying a proper relationship (Sarstedt et al., 2020a). Also, the variance inflation factor (VIF) is between 1.17 and 1.26, describing minimal multicollinearity between the variables (Sharma, 2020). These statistical results proclaim the variability and reliability of the study factors for the given analysis.

Table 3 Descriptive Statistics Results

Item	Mean	Standard Deviation	Skewness	Kurtosis	Factor Loading	VIF
RC1	3.85	0.91	-0.28	-0.47	0.73	1.23
RC2	4.1	0.81	-0.56	0.13	0.79	1.17
RC3	3.75	0.97	-0.32	-0.58	0.69	1.26
RC4	3.9	0.85	-0.42	-0.25	0.76	1.21
RC5	4.05	0.83	-0.51	-0.03	0.81	1.19
RC6	3.95	0.87	-0.39	-0.32	0.77	1.22
RC7	4	0.88	-0.45	-0.18	0.78	1.21
RC8	3.85	0.89	-0.3	-0.45	0.74	1.24
RP1	3.8	0.92	-0.28	-0.49	0.72	1.23
RP2	3.9	0.88	-0.36	-0.29	0.75	1.22
RP3	3.85	0.91	-0.34	-0.37	0.73	1.23
RP4	3.95	0.87	-0.4	-0.28	0.77	1.21
RP5	4	0.86	-0.42	-0.19	0.78	1.2
RP6	4.05	0.85	-0.48	-0.1	0.8	1.19

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RS1	3.95	0.87	-0.4	-0.28	0.77	1.21
RS2	4	0.88	-0.45	-0.18	0.78	1.21
RS3	3.85	0.91	-0.34	-0.37	0.74	1.23
RS4	3.9	0.88	-0.36	-0.29	0.75	1.22
RS5	3.95	0.87	-0.4	-0.28	0.77	1.21
RS6	4.05	0.83	-0.51	-0.03	0.81	1.19
RS7	3.8	0.92	-0.28	-0.49	0.72	1.23
RS8	3.95	0.87	-0.4	-0.28	0.77	1.21
RS9	4	0.88	-0.45	-0.18	0.78	1.21
ST1	4.05	0.85	-0.48	-0.1	0.8	1.19
ST2	3.95	0.87	-0.4	-0.28	0.77	1.21
ST3	4	0.88	-0.45	-0.18	0.78	1.21
ST4	3.9	0.89	-0.35	-0.35	0.76	1.22
ST5	4	0.86	-0.42	-0.19	0.78	1.2
ST6	3.9	0.88	-0.36	-0.29	0.75	1.22
ST7	4.05	0.83	-0.51	-0.03	0.81	1.19
ST8	3.95	0.87	-0.4	-0.28	0.77	1.21

Overall, descriptive statistics results for primary variables adopted for the study, RS, RC, RP, and ST, are shown in Table 4. The construct values are rated positively by the respondents, revealed by the mean values that range from 3.85 to 4.00, which is close to the scale midpoint of 4. The standard deviations, ranging from 0.87 to 0.91, suggest moderate response variability, indicating a relatively consistent perception among respondents. The skewness values for all variables are negative, ranging from -0.28 to -0.45, indicating that the response distribution is skewed slightly to the left. This suggests that respondents tended to rate the variables higher rather than lower. Kurtosis values range from -0.47 to -0.18, indicating that the data distributions are relatively flat compared to a normal distribution (platykurtic). These values fall within acceptable limits for skewness and kurtosis, as suggested by (Mallery, Paul, and George, 2000), implying that the data do not deviate significantly from normality and are appropriate for further statistical analysis.

Table 4 Descriptive Statistics of Variables

Variables	Mean	Standard Deviation	Skewness	Kurtosis
Responsible Consumption	3.85	0.91	-0.28	-0.47
Responsible Production	3.9	0.88	-0.36	-0.29
Responsible Sourcing	3.95	0.87	-0.4	-0.28
Sustainability Targets	4	0.88	-0.45	-0.18

Assessment of Measurement Model

Table 5 presents the internal consistency, reliability, and convergent validity of the constructs Responsible Consumption, Responsible Production, Responsible Sourcing, and Sustainability Targets. The Cronbach's alpha values, ranging from 0.818 to 0.891, indicate good internal consistency for all constructs, surpassing the 0.70 threshold recommended by (Nunnally, J and Bernstein, 1994). The values of Composite reliability (rho_a and rho_c) exceed the benchmark of 0.70, where rho_a lies from 0.851 to 0.913, and the rho_c ranges from 0.851 to 0.913 shows the construct's reliability test is confirmed (Hair et al., 2019b). Further, average variance extracted (AVE) values, which describe the convergent validity, are found adequate by falling within the values in range of 0.521 and 0.583. It met the criteria of AVE with 0.50 or more, indicating that constructs demonstrate a significant variance in their indicators (Fornell & Larcker, 1981).

The robustness of the constructs is governed by these combined tests performed for later analyses in the study.

Table 5 Internal Consistency, Reliability, and Convergent Validity of Constructs

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Responsible Consumption	0.891	0.909	0.913	0.571
Responsible Production	0.818	0.920	0.864	0.538
Responsible Sourcing	0.878	0.889	0.902	0.583
Sustainability Targets	0.822	0.836	0.851	0.521

The measurements of constructs were further validated using the Heterotrait-Monotrait (HTMT) ratio, which denotes the discriminant validity signifying the distinctness of the construct from other constructs, utilizing the correlation between constructs. The HTMT ratios for RC, RP, RS, and ST lie between 0.129 and 0.762, less than the threshold limit of 0.85, as shown in Table 6. Therefore, the test confirms discriminant validity, highlighting that constructs are distinct (Henseler et al., 2015).

Table 6 Results of HTMT ratios (Discriminant Validity)

	Responsible Consumption	Responsible Production	Responsible Sourcing	Sustainabilit y Targets	Sustainability Targets x Responsible Sourcing
Responsible Consumption					
Responsible Production	0.762				
Responsible Sourcing	0.712	0.752			
Sustainability Targets	0.393	0.129	0.397		
Sustainability Targets x Responsible Sourcing	0.226	0.350	0.323	0.166	

Additionally, the discriminant validity of constructs by the Fornell-Larcker (F-L) criterion is assessed by comparing the AVE values square root of every construct with the correlations among the constructs. The values of F-L for variables are 0.856, 0.834, 0.695, and 0.649 for RC, RP, RS, and ST, respectively, as shown in Table 7. The inter-construct correlations should have a range of (ranging from 0.072 to 0.819). Therefore, it signifies better discriminant validity because each construct shares variance with its indicators rather than other constructs (Fornell & Larcker, 1981).

Table 7 Discriminant Validity - Fornell-Larcker (F-L) criterion

	Responsible Consumption	Responsible Production	Responsible Sourcing	Sustainability Targets
Responsible Consumption	0.856			
Responsible Production	0.819	0.834		
Responsible Sourcing	0.813	0.769	0.695	
Sustainability Targets	0.086	0.131	0.072	0.649

Hypothesis Testing using PLS-SEM

To empirically validate the proposed theoretical framework (Figure 3), hypothesis testing was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 4, employing a bootstrapping procedure with 5,000 subsamples. The results of the structural model assessment, including path coefficients (β), t-values, and p-values, are presented in Table 8.

As hypothesized, responsible sourcing (RS) was found to exert a statistically significant direct influence on responsible production (RP) (H1: $\beta = 0.249$, $t = 2.45$, $p = 0.015$), confirming its role as a firm-level sustainability capability consistent with the Resource-Based View (RBV) (Barney, 1991; Bharadwaj, Patwardhan, & Sharma, 2025).

In support of H2, responsible sourcing positively influenced responsible consumption (RC) ($\beta = 0.237$, $t = 4.36$, $p < 0.001$), suggesting that sourcing practices shape the internal deployment of sustainability capabilities within construction operations. Furthermore, H3 was also supported, indicating that responsible consumption significantly enhanced responsible production ($\beta = 0.125$, $t = 3.97$, $p < 0.001$). These two individual relationships constitute the indirect pathway tested in H4.

The mediation hypothesis (H4) was confirmed with a statistically significant indirect effect of RS on RP via RC ($\beta = 0.029$, $t = 1.98$, $p = 0.048$), demonstrating partial mediation. This finding aligns with RBV's assertion that internal deployment mechanisms (RC) are necessary to realize the full value of upstream capabilities (RS) in downstream outcomes (RP) (Trivedi et al., 2023; Kiani Mavi & Standing, 2018).

Importantly, the moderation hypothesis (H5) was also supported. The interaction effect between responsible sourcing and SDG-12–aligned sustainability targets (ST) was negative and statistically significant ($\beta = -0.154$, $t = 2.34$, $p = 0.019$). This result supports the theoretical assumption from Stakeholder Theory that excessive external institutional pressure (e.g., regulatory mandates or client compliance requirements) may constrain managerial discretion and reduce the efficacy of internal sustainability capabilities (Freeman & McVea, 2005; Opoku, 2019). The moderation result reinforces the need to balance internal capability development with stakeholder-imposed expectations to avoid symbolic compliance (Gledson et al., 2024).

The full hypothesis testing results are summarized in Table 8, and the final validated structural model is depicted in Figure 3.

Table 8 Hypotheses results of the study

Hypothesis	Structural Path	Path Coefficient (β)	t-value	p-value	Result
H1	Responsible Sourcing → Responsible Production	0.249	2.45	0.015	**Supported**
H2	Responsible Sourcing → Responsible Consumption	0.237	4.36	0.000	**Supported**
H3	Responsible Consumption → Responsible Production	0.125	3.97	0.000	**Supported**
H4	Responsible Sourcing → Responsible Consumption → Responsible Production (Mediation)	0.029	1.98	0.048	**Supported**
H5	Responsible Sourcing × Sustainability Targets → Responsible Production (Moderation)	−0.154	2.34	0.019	**Supported**

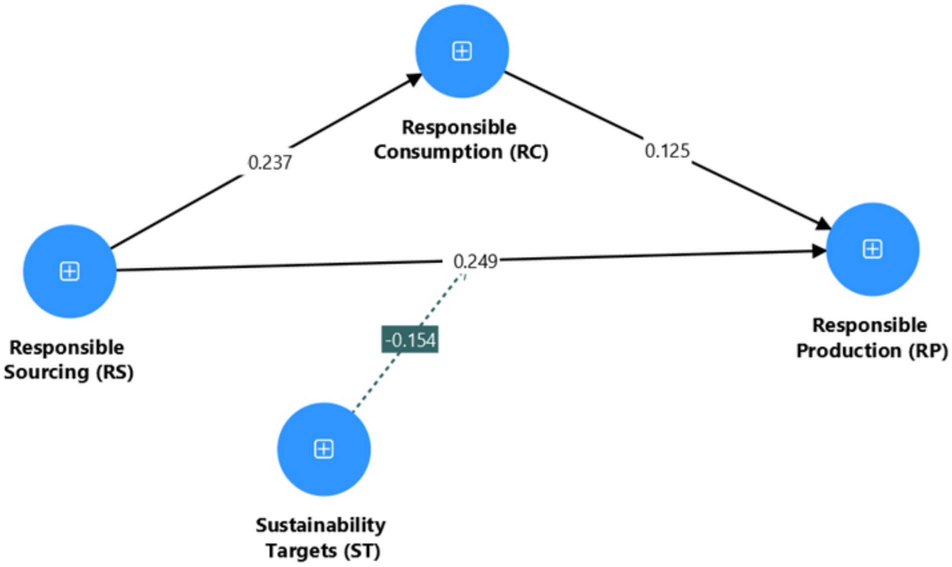

Figure 3. Proposed Structural Model

Discussion

The findings of this study offer novel empirical insights into how sustainability capabilities are internalized within construction supply chains, particularly in the context of emerging economies such as India. Grounded in the Resource-Based View (RBV) and informed by Stakeholder Theory, (Gajendran & Harrison, 2007) the results reinforce the multidimensional nature of sustainability implementation by validating both internal deployment mechanisms and external moderating conditions.

The first key finding (H1) confirms that responsible sourcing (RS) positively influences responsible production (RP) outcomes in construction projects. This supports the RBV assertion that upstream capabilities—such as procurement transparency, lifecycle assessments, and supplier collaboration—constitute valuable, rare, and hard-to-imitate resources that enhance environmental and operational outcomes (Fornell & Larcker, 1981; Wickramasinghe & De Zoyza, 2009). This result is consistent with prior empirical research demonstrating that sustainable procurement enhances downstream performance metrics like emissions reduction, waste handling, and cost control (Hsu & Liou, 2013; Kim, 2013; Nunnally, J).

However, the study goes beyond this direct linkage by validating the mediating role of responsible consumption (RC) (H4). The significant indirect path from RS to RP through RC (H2 and H3) empirically illustrates that upstream capabilities must be operationalized through disciplined internal routines such as material optimization, waste minimization, and energy–resource efficiency. This internalization of capabilities is central to RBV logic, which holds that performance advantages arise not merely from capability possession but from their effective deployment (Sharma, 2020; Wheatley, 2017). As evidenced in sustainable construction contexts, even when green-certified materials are procured, downstream sustainability gains are often lost if inefficient consumption practices persist (Liang et al., 2023; Sarstedt & Hair, 2021). The partial mediation confirmed in this study aligns with findings from circular economy and lean construction literature that underscore the enabling role of operational discipline in realizing strategic sustainability outcomes (Laplume et al., 2008; Pagell & Wu, 2009).

The most critical theoretical contribution arises from the support of Hypothesis H5, which reveals a negative moderating effect of SDG-12–aligned sustainability targets on the RS → RP relationship (Beske et al., 2014; Seuring & Müller, 2008). Contrary to the normative assumption that regulatory or institutional sustainability pressures universally strengthen sustainability performance (Aguinis & Glavas, 2012), the results of this study suggest that excessive external mandates may, in fact, constrain the internalization of sustainability capabilities. This finding is aligned with emerging critiques within stakeholder theory that question the effectiveness of compliance-oriented sustainability regimes in high-pressure environments such as construction (Ahi & Searcy, 2013; Pagell & Wu, 2009). In particular, when firms are compelled to meet externally imposed sustainability reporting or certification obligations, managerial focus may shift toward symbolic compliance rather than genuine operational integration—resulting in weaker performance translation from sourcing to production (Carter & Rogers, 2008).

This paradox—wherein external stakeholder demands may diminish internal capability effectiveness—has important implications. While previous studies have praised SDG-aligned frameworks as enabling tools for sustainability adoption (Aguinis & Glavas, 2012; Barney et al., 2011), this study adds nuance by suggesting that institutional pressures must be aligned with firm-level absorptive capacity. Overly rigid sustainability targets, especially those imposed without adequate resourcing or support mechanisms, may disrupt rather than reinforce firm-level strategies for sustainability capability development. This insight extends stakeholder theory by emphasizing the conditional effectiveness of institutional sustainability mandates, particularly in emerging market contexts where operational and cost constraints are significant (Beske et al., 2014; Pagell & Wu, 2009).

From a policy and managerial perspective, these findings suggest that responsible sourcing should not be viewed in isolation. Its success depends on an intermediate layer of consumption practices, which bridge the strategic intent of procurement with the on-ground realities of construction execution(Aguinis & Glavas, 2012). Additionally, sustainability mandates under SDG-12 must be designed with flexibility and support mechanisms to avoid unintended trade-offs. For example, rather than imposing prescriptive compliance requirements, regulatory bodies might instead provide technical assistance, training, and incentive-based schemes to enable effective internalization of sustainability practices (Aguinis & Glavas, 2012; Ambrosini et al., 2009).

In sum, this study contributes a capability-chain perspective to the sustainability literature in construction supply chains. By modeling responsible consumption as a deployment mechanism and SDG targets as boundary conditions, the study articulates how sustainability capabilities interact across multiple stages of the construction lifecycle. These findings move beyond linear RS–RP models and offer a more integrated, dynamic, and conditional view of sustainability capability internalization (Pagell & Wu, 2009).

Conclusion

This study set out to investigate how sustainability capabilities—specifically *responsible sourcing*, *responsible consumption*, and *responsible production*—are internalized and operationalized within the Indian construction supply chain, using an integrated theoretical lens of the Resource-Based View (RBV) and Stakeholder Theory. The empirical findings derived from PLS-SEM-based structural modeling and hypothesis testing provide compelling evidence that internal sustainability practices are interdependent and their impact is influenced by both internal capability flow and external institutional pressures.

The significant direct effect of responsible sourcing on responsible production (H1) reinforces the strategic value of upstream decisions in determining downstream sustainability outcomes. Moreover, the mediation path through responsible consumption (H2–H4) indicates that the deployment of internal routines matters as much as their existence—underscoring the RBV argument that resources and capabilities must be *effectively utilized* to create value (Zhu et al., 2008). The confirmation of partial mediation suggests that sustainable sourcing alone is insufficient unless supported by efficient and responsible utilization practices during execution.

Interestingly, the moderating effect of SDG-aligned sustainability targets (H5) revealed a negative influence, suggesting that over-regulation or misaligned stakeholder expectations may sometimes hinder rather than enhance internal sustainability performance. This result challenges the one-size-fits-all view of sustainability enforcement and emphasizes the need for context-aware, capacity-sensitive frameworks. The study provides three novel contributions to theory and practice; a) It extends the capability-based view of sustainability by illustrating a sequential chain from sourcing to consumption to production; b) It introduces the idea that external sustainability pressures may not always have linear or positive effects, depending on internal maturity and organizational readiness; and c) It offers an empirically tested PLS-SEM framework for analyzing sustainability integration across construction supply chain functions.

From a managerial perspective, the findings underscore the need for cross-functional integration of sustainable practices across sourcing, consumption, and execution layers. Managers must align internal processes and stakeholder mandates through responsive governance mechanisms. For policymakers, the findings advocate for flexible and incentive-driven compliance strategies that empower firms instead of burdening them with rigid standards.

This study is limited by its cross-sectional design and geographic focus on Indian construction firms, which may affect the generalizability of findings. Future research can explore longitudinal models, cross-country comparisons, and integration of advanced analytics (e.g., hybrid PLS–ANN or Fuzzy-DEMATEL) to deepen understanding of dynamic sustainability capability interaction.

Data Availability Statement
The data supporting the findings of this study are available upon reasonable request from the corresponding author.

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declaration
The authors declare that there is no conflict of interest regarding the publication of this paper.

References
Adams, C. A., & Frost, G. R. (2008). Integrating sustainability reporting into management practices. *Accounting Forum*. https://doi.org/10.1016/j.accfor.2008.05.002
Aguinis, H., & Glavas, A. (2012). What we know and don't know about corporate social responsibility. *Journal of Management*. https://doi.org/10.1177/0149206311436079
Agyekum, K. (2019). Sustainable construction practices. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2019.118970
Ahi, P., & Searcy, C. (2013). A comparative literature analysis of green and sustainable supply chain management. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2013.02.015
Ambrosini, V., Bowman, C., & Collier, N. (2009). Dynamic capabilities: An exploration. *British Journal of Management*. https://doi.org/10.1111/j.1467-8551.2008.00613.x
Bansal, P., & Roth, K. (2005). Why companies go green revisited. *Organization Studies*. https://doi.org/10.1177/0170840605054619
Barney, J. B., Ketchen, D. J., & Wright, M. (2011). The future of resource-based theory. *Journal of Management*. https://doi.org/10.1177/0149206310391805
Bass, B. M., & Riggio, R. E. (2006). *Transformational Leadership*. Psychology Press. https://doi.org/10.4324/9781410617095
Beske, P., Land, A., & Seuring, S. (2014). Dynamic capabilities and sustainable supply chain management. *International Journal of Operations & Production Management*. https://doi.org/10.1108/IJOPM-12-2012-0542
Bowen, F. E., Cousins, P. D., Lamming, R. C., & Faruk, A. C. (2001). The role of supply management capabilities in green supply. *Production and Operations Management*. https://doi.org/10.1111/j.1937-5956.2001.tb00077.x
Brammer, S., & Hoejmose, S. (2012). Ethical trade in the supply chain. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-011-1139-4
Briscoe, G., & Dainty, A. (2005). Construction supply chain integration. *Construction Management and Economics*. https://doi.org/10.1080/01446190500084479
Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management. *International Journal of Physical Distribution & Logistics Management*. https://doi.org/10.1108/09600030810913773
Chen, Y. S. (2008). The driver of green innovation and green image. *Journal of Business Ethics*. https://doi.org/10.1007/s10551-007-9383-1
Darko, A., & Chan, A. P. C. (2016). Barriers to green building adoption. *Sustainable Cities and Society*. https://doi.org/10.1016/j.scs.2016.02.010
Elkington, J. (1997). Cannibals with forks: The triple bottom line of 21st century business. *Environmental Quality Management*.
Fajfar, P. (2000). A capacity spectrum method based on inelastic demand spectra. *Earthquake Engineering and Structural Dynamics (Wiley/ASCE Cited)*, *29*, 587.
Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39. https://doi.org/10.2307/3151312
Gajendran, R. S., & Harrison, D. A. (2007). The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *Journal of Applied Psychology*, *92*(6), 1524. https://doi.org/10.1037/0021-9010.92.6.1524
González-Benito, J., & González-Benito, Ó. (2006). Environmental proactivity and business performance. *International Journal of Production Research*. https://doi.org/10.1080/00207540500161784
Gualandris, J., Klassen, R. D., Vachon, S., & Kalchschmidt, M. (2015). Sustainable evaluation and verification in supply chains. *Journal of Operations Management*. https://doi.org/10.1016/j.jom.2015.06.001
Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling. *Journal of Marketing Theory and Practice*. https://doi.org/10.1080/10696679.2017.1391732
Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019a). When to use and how to report PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203
Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019b). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203
Harrison, J. S., Bosse, D. A., & Phillips, R. A. (2010). Managing for stakeholders. *Academy of Management Executive*. https://doi.org/10.5465/ame.2010.54407948
Hart, S. L., & Dowell, G. (2011). A natural-resource-based view of the firm: Fifteen years after. *Academy of Management Review*. https://doi.org/10.5465/amr.2011.0123
Helfat, C. E., & Peteraf, M. A. (2009). Understanding dynamic capabilities. *Strategic Management Journal*. https://doi.org/10.1002/smj.753
Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research. *MIS Quarterly*. https://doi.org/10.25300/MISQ/2016/40.2.02
Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8
Hofmann, H., Busse, C., Bode, C., & Henke, M. (2014). Sustainability-related supply chain risks. *Business Strategy and the Environment*. https://doi.org/10.1002/bse.1776
Hsu, C. W., & Liou, J. J. (2013). An integrated DEMATEL and ANP approach for evaluating Green Supplier Development Program in the electronics industry. *Journal of Environmental Management*, *125*, 83–95. https://doi.org/10.1016/j.jenvman.2013.03.027
Kim, H.-Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative*

Dentistry & Endodontics, *38*(1), 52. https://doi.org/10.5395/rde.2013.38.1.52
Klassen, R. D., & Whybark, D. C. (1999). The impact of environmental technologies on manufacturing performance. *Academy of Management Journal*. https://doi.org/10.2307/256982
Laplume, A. O., Sonpar, K., & Litz, R. A. (2008). Stakeholder theory review. *Journal of Management*. https://doi.org/10.1177/0149206308324322
Liang, S., Cai, Y., & Fei, Z. (2023). Multi-Objective Optimization Design of FRP Reinforced Flat Slabs under Punching Shear by Using NGBoost-Based Surrogate Model. *Buildings*, *13*(11). https://doi.org/10.3390/buildings13112727
Love, P. E. D., Edwards, D. J., & Irani, Z. (2010). Rework in construction projects. *Automation in Construction*. https://doi.org/10.1016/j.autcon.2009.10.003
Lozano, R. (2015). A holistic perspective on corporate sustainability drivers. *Corporate Social Responsibility and Environmental Management*. https://doi.org/10.1002/csr.1342
Mallery, Paul and George, D. (2000). *SPSS for windows step by step*. Allyn \& Bacon, Inc.
Narwaria, T. (2024). A bibliometric analysis of employee turnover intention among IT sector employees. *International Review of Management and Marketing*, *14*, 355–363. https://doi.org/10.32479/irmm.16016
Nunnally, J and Bernstein, I. (1994). *Psychometric Theory 3rd edition (MacGraw-Hill, New York)*.
Ofori, G. (2015). Nature of the construction industry. *Construction Management and Economics*.
Pagell, M., & Shevchenko, A. (2014). Why research in sustainable supply chain management should have no future. *Journal of Supply Chain Management*. https://doi.org/10.1111/jscm.12037
Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management. *Journal of Supply Chain Management*. https://doi.org/10.1111/j.1745-493X.2009.03167.x
Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*. https://doi.org/10.1257/jep.9.4.97
Reuter, C., Foerstl, K., Hartmann, E., & Blome, C. (2010). Sustainable global supplier management. *Journal of Operations Management*. https://doi.org/10.1016/j.jom.2009.12.002
Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). A critical look at the use of PLS-SEM in MIS quarterly. *MIS Quarterly*, *36*(1), iii–xiv.
Sarkis, J. (2003). A strategic decision framework for green supply chain management. *Journal of Cleaner Production*. https://doi.org/10.1016/S0959-6526(02)00062-8
Sarstedt, M., & Hair, J. F. (2021). *PLS-SEM: Handbook of Research Methods in Financial Markets BT - Handbook of Research Methods in Financial Markets* (Vol. 2). Springer. https://doi.org/10.1007/978-3-030-79883-9
Sarstedt, M., Ringle, C. M., & Hair, J. F. (2020a). Handbook of Market Research. In *Handbook of Market Research* (Issue July). https://doi.org/10.1007/978-3-319-05542-8
Sarstedt, M., Ringle, C. M., & Hair, J. F. (2020b). Partial least squares structural equation modeling. *Handbook of Market Research*. https://doi.org/10.1007/978-3-319-05542-8_15-1
Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2008.04.020
Sharma, B. M. (2020). Assessment of antibiotics in the surface water of Yamuna River. *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-019-06396-w
Shen, L. Y., Tam, V. W. Y., Tam, L., & Ji, Y. B. (2010). Project feasibility and sustainability. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2009.11.017
Sourani, A., & Sohail, M. (2015). Barriers to sustainable construction procurement. *Engineering, Construction and Architectural Management*. https://doi.org/10.1108/ECAM-08-2013-0074
Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of enterprise performance. *Strategic Management Journal*. https://doi.org/10.1002/smj.640
Vachon, S., & Klassen, R. D. (2008). Environmental management and manufacturing performance. *Journal of Operations Management*. https://doi.org/10.1016/j.jom.2007.06.001
Varnas, A., Balfors, B., & Faith-Ell, C. (2009). Environmental consideration in construction procurement. *Journal of Environmental Management*. https://doi.org/10.1016/j.jenvman.2009.02.004
Walker, H., Di Sisto, L., & McBain, D. (2008). Drivers and barriers to environmental supply chain management. *Journal of Purchasing and Supply Management*. https://doi.org/10.1016/j.pursup.2008.01.002
Wheatley, D. (2017). Autonomy in paid work and employee subjective well-being. *Work and Occupations*. https://doi.org/10.1177/0730888417697232
Wickramasinghe, V., & De Zoyza, N. (2009). A comparative analysis of managerial competency needs across areas of functional specialization. *Journal of Management Development*, *28*(4), 344–360. https://doi.org/10.1108/02621710910947362
Wu, Z., & Pagell, M. (2011). Balancing priorities: Decision-making in sustainable supply chain management. *Journal of Operations Management*. https://doi.org/10.1016/j.jom.2010.11.001
Yang, M. G., Hong, P., & Modi, S. B. (2011). Impact of lean manufacturing and environmental management. *International Journal of Production Economics*. https://doi.org/10.1016/j.ijpe.2011.01.017
Zhu, Q., & Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices. *International Journal of Production Research*. https://doi.org/10.1080/00207540600790875
Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices. *International Journal of Production Economics*. https://doi.org/10.1016/j.ijpe.2007.11.010
Zuo, J., & Zhao, Z. Y. (2014). Green building research review. *Renewable and Sustainable Energy Reviews*. https://doi.org/10.1016/j.rser.2014.01.033

Appendix 1

- Structured Questionnaire for Data collection.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 2368-2380

A Study on Impact of Responsible Sourcing, Responsible Consumption AND Responsible Production on UN-Framed SDG-12 Sustainability Targets: Evidence from Indian Construction Sector

Questionnaire Survey Form **Thank You For your Valuable Time, Knowledge, and Efforts.**

Section A) Respondent Information: Please Provide the following information

Name (Optional).............**Organization Name (Optional)**…......... **Experience** (Years)… **Education**: Diploma/UG/PG/Ph.D.

Section B) Research Questions: According to the Scale below, Kindly tick on your opinion.

1- Strongly Disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly Agree

Phase	CSF-ID	Statement	Response				
			1	2	3	4	5
Responsible Sourcing (Sustainability capability)	RS1	The project's communication channel is somewhat transparent to all stakeholders involved.					
	RS2	The Project team communicates with industrial peers to incorporate sustainable development.					
	RS3	The organization aims to ensure the sustainable procurement of all resources.					
	RS4	The organization adopt sustainable policies and standards while sourcing.					
	RS5	The organization avails tax reduction benefits while utilizing sustainable products.					
	RS6	The project scheduling meets all the expectations of a project team.					
	RS7	The organization has a better inventory process for procurement and storage.					
	RS8	The project manager has evaluated the Life Cycle Assessment of work to reduce waste and consume efficiently.					
	RS9	The organization is actively involved in Corporate Social Responsibility activities.					
	Any Comments on Responsible Sourcing:						
Responsible Consumption (Capability Deployment)	RC1	The organization's technological capabilities met the standard requirements.					
	RC2	The organization efficiently utilizes renewable energy sources (solar energy, wind energy, etc.)					
	RC3	The organization efficiently utilizes locally available materials.					
	RC4	The project in charge has adopted tools & techniques to preserve natural resources.					
	RC5	The project in charge has adopted tools & techniques to minimize waste generation.					
	RC6	The latest tools and technologies are deployed on-site to use recycled products.					

	RC7	The resources are allocated efficiently by the project in charge of enhancing efficient energy and water use.					
	RC8	The resource allocation is done accordingly to utilize human resources efficiently.					
	Any Comments on Responsible Consumption:						
Responsible Production (Sustainability Outcomes)	RP1	The project's primary aim is the contractor's and client's profit.					
	RP2	The project team places primary emphasis on minimizing carbon footprint.					
	RP3	The management team have better plans to combat construction and demolition waste.					
	RP4	The organization deploys tools to reduce harmful substances and their demolition.					
	RP5	The organization has framed policies for waste utilization.					
	RP6	Waste quantification is done using digital tools and techniques.					
	Any Comments on Responsible Production:						
(SDG-12 Targets) External Stakeholder Pressure	**ST**	**Statement (Adopted from UN-2015 SDGs)**	**Response**				
	ST1	Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns.					
	ST2	Achieve the sustainable management and efficient use of natural resources.					
	ST3	Achieve the environmentally sound management of chemicals and all wastes throughout their life cycle.					
	ST4	Substantially reduce waste generation through prevention, reduction, recycling and reuse.					
	ST5	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.					
	ST6	Promote public procurement practices that are sustainable, following national policies and priorities.					
	ST7	Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.					
	ST8	Support developing countries in strengthening their scientific and technological capacity to move towards more sustainable consumption and production patterns.					
Any Comments on SDG-12 Targets:							