Effect of lean-green practice and green human resource on supply chain performance: a resource-based view

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Abstract

Purpose – The study examined a wide range of proactive supply chain practices to demonstrate a cross-linkage among them and to understand their effects on both practitioners of previous decision-making models, frameworks, strategies and policies. Here, six supply chain practices are empirically evaluated based on 28 constructs to investigate a comprehensive model and confirm the connections for achieving performance and competence. The study presents a conceptual model and examines the influence of many crucial factors, i.e. supply chain collaboration, knowledge, information sharing, green human resources (GHR) management and lean-green (LG) practices on supply chain performance.

Design/methodology/approach – Structural equation modeling (SEM) examines the conceptual model and allied relationship. A sample of 175 respondents' data was collected to test the hypothesized relations. A resource based view (RBV) was adopted, and the questionnaires-based survey was conducted on the Indian supply chain professionals to explore the effect of LG and green human resource management (GHRM) practices on supply chain performance.

Findings – The study presented five constructs for supply chain capabilities (SCCA), five constructs for supply chain collaboration and integration (SCIN), four constructs for supply chain knowledge and information sharing (SCKI), five constructs for GHR, five constructs for LG practices (LGPR) and four constructs for lean-green SCM (LG-SCM) firm performance to be utilized for validation by the specific industry, company size and operational boundaries for attaining sustainability. The outcome emphasizes that SCCA positively influence GHRM, LG practices and LG supply chain firm performance. However, LG practices do not influence LG-SCM firm performance, particularly in India.

Originality/value – The study exploited multiple practices in a conceptual model to provide a widespread understanding of decision-making to assist in developing a holistic approach based on different practices for

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attaining organizational sustainability. The study stimulates the cross-pollination of ideas between many supply chain practices to better understand SCCA, SCIN, SCKI, GHRM and LG-SCM under a single roof for retaining organization performance.

Keywords Lean-green practices, Green human resource management (GHRM), Supply chain capabilities, Resource-based view (RBV)

Paper type Research paper

1. Introduction

The growing pressure from stakeholders to improve firms' social and environmental performance is forcing radical change to manage processes and operations more sustainably (Cherrafi *et al.*, 2017). Such dynamic necessities motivate applying and integrating a more comprehensive tool, practices, and measures for sustainable development of the supply chain (SC) for intelligent transformation (Kolberg *et al.*, 2017; Luthra and Mangla, 2018; Shah and Agrawal, 2021). It is evident in the academic literature that the integration of lean-green (LG) practices ensures enhanced performance throughout the value chain of the organization and consequently improves the organization's sustainability (Cherrafi *et al.*, 2017; Thanki and Thakkar, 2018; Jum'a *et al.*, 2022). Implementing LG strategies also helps reduce production costs in a company (Diaz-Elsayed *et al.*, 2013; Sahu *et al.*, 2022). Particularly in the SC context, the deployment of LG practices brings several benefits and influences the sustainable development of businesses (Essaber *et al.*, 2021). Earlier authors have explored the divergences and synergies relationship between LG management practices, resulting in better operations and environmental benefits (Thanki and Thakkar, 2016; Inman and Green, 2018; Kumar and Sanchez Rodrigues, 2020). The integration of LG strengthens the organization's production system's performance outcomes (Bhattacharya *et al.*, 2019). Further, the LG practices also stimulate process innovation and facilitate achieving sustainable performance in the SC (Cherrafi *et al.*, 2018; Huo *et al.*, 2019). Garza-Reyes *et al.* (2016) argue that deploying the LG is a practical approach in improving environmental performance and operational efficiency of transport operations. Teixeira *et al.* (2022) showcase that LG practices help organizations enhance competitive advantage and sustainable performance. In the digital era of the supply chain, the integration of LG facilitates viable and sustainable performance (Zekhnini *et al.*, 2021; Trubetskaya *et al.*, 2023; Holmemo and Korsen, 2023).

Organizations are now concentrating more on adopting LG practices to achieve sustainable development and improve organizational performance (Zhan *et al.*, 2018; Duarte and Cruz-Machado *et al.*, 2019; Abualfaraa *et al.*, 2020). The new approaches and focus on emerging dimensions are required to integrate LG practices to address sustainability issues in the SC (Cherrafi *et al.*, 2018; Sahu *et al.*, 2023a). The decision-makers responsible for integrating LG practices in SC generally lack organizational capabilities, making improving SC's overall performance difficult. Duarte and Machado (2017) and Duarte and Cruz-Machado (2019) pointed out that an effective and efficient green-lean SC requires strategic initiatives and organizational capabilities. Zhan *et al.* (2018) have explored that mindset and attitude, leadership and management, and employee involvement are critical constructs for LG practices. Despite available literature on LG practices and their importance in improving firm performance, there is a shortage of literature investigating the synergetic effect of SC factors on adopting green human resources (GHR) and LG-SCM practices. Bhatti *et al.* (2022) explore the relationship between GHRM and environmental performance of industries that lean towards the environment and found that GHRM practices are enablers for corporate environmental outcomes. Alavi and Aghakhani (2023) identified and measured GHRM activities affecting lean-agile dimension and showed the positive effect of GHRM activities on lean paradigms. Nonetheless, more empirical studies are required to verify the relationship between proactive factors supporting GHR and LG-SCM practices.

Organizations must integrate valuable assets and influential practices into new ventures to foster competitiveness and elevate the overall business landscape (Sony *et al.*, 2023;

Deshpande *et al.*, 2023). It is prominent in evaluating value-added assets, joint performance indicators, and sub-metrics to benchmark organizational performance and firm satisfaction (Shah *et al.*, 2023; Mishra *et al.*, 2023). It is recognized that identifying and integrating wide-ranging tools, practices, and measures under the edges of SC is significant for intelligent transformations and towards sustainable development of the SC. Still, it is not easy to understand realistic variables that contribute more towards driving the SC network. The same acted as a historic research gap for the present study. Accordingly, the study motivatedly tried to identify and evaluate a range of constructs for inducing capabilities in the supply chain.

Moreover, it is found that LG strategies can stimulate process innovation and help reduce production costs. Still, it is necessary to investigate the connections of LG practices with other proactive SC practices. The same is considered a second research gap. Due to the second research gap, the authors have been motivated to develop a conceptual model for the literature on SC boundaries to examine the influence of many crucial factors under the origins of SC. The significant evaluation of the developed conventional model and the need for implication of the proper decision-making techniques is found as the third research gap, where Structural equation modeling (SEM) and a Resource Based View (RBV) are found qualified in this extend and motivatedly implicated by the authors to investigate the synergetic effect of SC factors on adopting SC practices. Based on the crucial factors, the authors prepare decision-making constructs for collecting appropriate information related to proactive approaches.

The authors found the problem related to the identification of wide-ranging tools, practices, and integration of measures under the edges of SC. Additionally, problem-related with the understanding of realistic variables, problems with the investigation of the connections amongst practices, and problem related to the development of the conceptual model is found in the authors, where the authors consider the extended exploitation of literature as a tool to eradicate the issues described above and problems. The present study examines a broader range of proactive SC factors to demonstrate an effectual linkage for the evolution and succession of SC boundaries. The proposed study focuses on the following research questions to fill the existing literature gap and strengthen the understanding of the synergetic relationship between GHR and LG practices in fostering SCM performance.

RQ-1. Do supply chain (SC) capabilities, collaboration, knowledge, and information sharing impact the adoption of GHR and LG practices for improving LG-SCM firm performance?

RQ-2. How does GHR mediate the relationship between LG practices and LG-SCM firm performance?

It is worth noting that internal resources are essential in influencing organization strategies and performance, reiterating the RBV (Dubey *et al.*, 2019a, b). In recent years, the RBV has gained remarkable attention in the SCM discipline (Brandon-Jones *et al.*, 2014; Gunasekaran *et al.*, 2017; Dubey *et al.*, 2019a, b). The RBV appropriately explains how a firm can gain a competitive advantage by focusing on strategic resource exploitation. The RBV mainly focuses on effectively and efficiently implementing valuable resources and strategies to drive competitive advantage (Kumar and Sanchez Rodrigues, 2020). The firm's internal resilience and frailty can be controlled, but it is far more challenging to respond and change following external threats and opportunities (Brandon-Jones *et al.*, 2014).

Furthermore, every country moves towards sustainable solutions to reduce risk and secure the future. In this line, sustainable SCM should also concentrate on RBV, which urges firms to gain a competitive advantage by focusing on sustainable operations in the SC (Shibin *et al.*, 2020). This study embraces innovativeness by supporting the expansion of sustainable

development, robust underlying relationships, and significant factors by suggesting technical marks for restructuring the SC (Carvalho *et al.*, 2017; Liu *et al.*, 2018; Srinivasan and Swink, 2018). The main success of the SCM segmental domain relies on extracting technical knowledge from the ocean of SCM, which depends on the question of categorizing, relating, and extracting fruitful information from the technical resources of SCM (Schiavone and Sprenger, 2017).

The study's first section describes the fundamental concept of the SC; the second section underlines the theoretical background of the present study and the third section discusses the research methodology to describe the procedure guideline adopted, followed by data analysis and results in section four and discussions and implications of the study in section five. Subsequently, the study is concluded in section six to disclose significant connections, facts, and records.

2. Theoretical background

The present study argues that SC can deliver operational excellence by encompassing continuous improvement (Kaizen) through a culture of innovations and advancements. The same majorly depends on the innovative drivers, acceptability, and influence, which requires testing network relationships amongst these drivers to declare their fit, impact, and spread in achieving performance outcomes. Companies can manage their SC effectually by understanding drivers as a strategic factor for driving their dependents gracefully and automatically. However, the success rate of the dependents depends on the question, "How can the critical success driving factors be deemed understood and identified?"

Consequently, the authors have endeavored to present a study to demonstrate a comprehensive SC model considering SC factors and tried to connect them for deemed understanding and identifying crucial drivers for twisting the performance index and advancing the foundation of SCM using a detailed literature review (Sharma and Sehrawat, 2021). It is found that a holistic understanding of complementary sources of SC factors will lead to contributing to evolving customer-oriented business requirements and innovating for a changing market.

2.1 Supply chain capabilities (SCCA)

The SC capabilities can be created, processed, and identified in the form of factors, sub-factors, strategies, and policies to generate automatic manufacturing lines, practical transformations, ease delivery of inventories, and high quality with desired quantity (Aslam *et al.*, 2018; Mikalef *et al.*, 2019; Hoque *et al.*, 2023). Logistics and production capabilities can influence core components of the production system, which are answerable for rapid manufacturing transformation and deliveries of inventories (Tolonen *et al.*, 2017; Aslam *et al.*, 2018). The same is evaluable from the insights of satisfying demand and supply requirements. Purchasing capabilities, dynamic capabilities, and partners' and suppliers' capabilities can aid in handling complex decisions, rationalized judgments, selections, and deployment of robust structures to work intensely with business structures and partners to ease fulfill new mandates imposed by the regulations and optimize procurement functions (Brusset and Teller, 2017; Ashrafi *et al.*, 2019). SC capabilities knot performance traits and can be in the form of authority, governing mediums, mechanisms, models, targets, indicators, tasks, roles, etc. (Tolonen *et al.*, 2017; Sahu *et al.*, 2023b).

2.2 Supply chain collaboration and integration (SCIN)

The collaboration and the degree of integration amongst SC partners, resources, etc., are significant for accounting for a set of activities more or less efficiently under a cost model (Liu

et al., 2018; Pérez-Mesa *et al.*, 2021). Identification of vulnerable aspects, integration of power sources, and flexibility in SCs are answerable for strategically influencing the responsiveness and collaboration interest of the corporates with the matching companies (Tiwari *et al.*, 2018). Moreover, the quality of product manufacturing in the SC, services offered and required from the collaborating partners, costs associated with the SC deeds, and competitive power of the companies under a market domain. The monopoly structures are found in a few significant maps, considering the corporation for collaborating and delivering their interest in integrating their strength with the trademarks (Dubey *et al.*, 2019a, b; Pérez-Mesa *et al.*, 2021). Indeed, the communication and cross-functional collaboration among various supply chain departments, service providers, and customers can facilitate the adoption of LG practices (Sanchez Rodrigues and Kumar, 2019; Kumar and Sanchez Rodrigues, 2020).

2.3 Supply chain knowledge and information sharing (SCKI)

Recent advancements in information technology have escorted insightful changes in the global manufacturing domain and have granted success in laying a vibrant network among assesses (Han *et al.*, 2017; Afshan *et al.*, 2018). The extensive implementation and acceptance of information sharing and knowledge transmission means are triggering profound reflection under a production system with a supported foundation for business competition (Srinivasan and Swink, 2018; He *et al.*, 2020). Today, knowledge about SC principles and the implementation of prevailing information technology under organizational structure is required to instantly share key aspects, facts, and figures (Tortorella *et al.*, 2019; He *et al.*, 2020). The same is a remarkable tool to deliver the precise solution at a working pace to affect national competitiveness (Wang *et al.*, 2019; Bag *et al.*, 2021). Communication means and mediums are nowadays crucial as it enable new ways to SC operations via accounting big-data analytics and assist in understanding market turbulency for revising the organizations' strategies (Schiavone and Sprenger, 2017; Han *et al.*, 2017). User-friendly information-sharing means and mediums unite the organization's boundaries and aid in exploiting the organization's resources technically and respectfully, and leading to diversification and evident expansion of organization SC (Kache and Seuring, 2017; Afshan *et al.*, 2018).

2.4 Green human resources management (GHRM)

The growing need for ecological sustainability inculcates competitive edges in organizations, motivating them to ponder the structure of human resource policy, referred to as green human resources management (GHRM), for prospering environmental practices (Ren *et al.*, 2018; Pham *et al.*, 2019). The GHRM is usually defined as Human Resource Management (HRM) practice, which focuses on mounting environmental sustainability by creating, training, identifying, and deploying green talents to the organization (Roscoe *et al.*, 2019; Yu *et al.*, 2020a). The GHRM responded to its deeds by investigating and scheduling a range of primary policies, practices, and strategies for stimulating the green nature in the habits of the organizational employees and fresh new talents (Obeidat *et al.*, 2020; Roscoe *et al.*, 2019). The organization's working culture, employee intra-interrelations, management commitment, and employer's enthusiasm are a few benchmarking factors that can lead to retaining the green human environment in the organization (Yusoff *et al.*, 2020; Obeidat *et al.*, 2020). The GHRM practices are vital and are required to be inducted into traditional organizations for contemporary development under the umbrella of green objectives, ecological discipline at work, and for significantly reducing the exhaustion of natural resources by focusing on decremented movements of the employees in the office based on green layouts, buildings, behaviors, and rewards (Kim *et al.*, 2019; Yu *et al.*, 2020a).

2.5 Lean-green practices (LGRP)

The LG practices can lead organizations to develop their strategic proposal by reducing waste activities and recovering from failed products to indent ecological marks to the system for sustainability (Carvalho *et al.*, 2017; Wang *et al.*, 2018). The LGRP should be practically included at the various stages in numerous activities of the SC, i.e. at the stage of manufacturing, deliveries, quality checks, warehousing, etc., for attaining sustainable eco-goals and economic lids (Lartey *et al.*, 2020; Raut *et al.*, 2021). The practical thinking of LG management is required for the manufacturing processes dynamic renovation, developing green warehousing, utilizing eco-packaging materials sources, and development of ecological standards (Wang *et al.*, 2018; Kumar and Sanchez Rodrigues, 2020). LG thinking, more importantly, delivers tactical knowledge towards eliminating losses and value creation at every stage of processes and services under the stocks of lean inventories, green procurement, green materials, green-lean marketing, lean processes, and green distribution channels, etc. (Kumar and Sanchez Rodrigues, 2020; Yu *et al.*, 2020b). The lean approach facilitates green practices and meets customers' requirements by producing quality and eco-oriented products (Afum *et al.*, 2021; Kaswan *et al.*, 2023).

2.6 Lean-green SCM (LGSM) firm performance

The inclusion of LG measures may induce performance strains to the system economically and ecologically. Demonstrating LG traits may pilot synchronized green design and manufacturing, leading to firm performance technically and ethically (Dey *et al.*, 2019; Sharma *et al.*, 2021). LG actions review resource inefficiencies and green drivers for process and product innovations in SCM. The injection of LG is dimensionally significant under the testimonial of logistics mechanism for assuring varieties of direct and indirect gains and in the form of assets under the cycle of product deliveries and utilities in both forward and backward directions (Wong *et al.*, 2018; Inman and Green, 2018). Moreover, the standardization of processes, accreditations, and the implication of R&D activities for accounting for LG premises are significant for leading LG thinking for renovating firm performance (Abdallah *et al.*, 2019; Dey *et al.*, 2019). LG and Sustainability plays a crucial role in meeting stakeholders' and shareholders' expectations for sustainable operations and products (Siegel *et al.*, 2022; Panayiotou and Stergiou, 2023; Sharma *et al.*, 2023d). The same may assist in eliminating ineffective practices in the form of waste to lower costs, increase efficacy, management of delivery times, fulfillment of employer's desires, revenue generation, ecological impacts, and customers' demand (Cherrafi *et al.*, 2017; Abdallah *et al.*, 2019).

2.7 Resource-based view (RBV)

It is evident from the literature that a firm utilizes this view to attain sustainable competitive advantage, i.e. strategic exploitation of the resources (Shibin *et al.*, 2020; Dubey *et al.*, 2019a, b; Sharma *et al.*, 2022). RBV adopts the theory of corporate formation, an inside-out approach, i.e. using business strategy to efficiently manage and organize resources for acquiring organizational resources (Agrawal and Jain, 2022). Furthermore, if resources are not exploited judiciously, then in the future, any firm may lose out to the competition, leading to reduced market share for the organization (Gunasekaran *et al.*, 2017). Hence, it is essential to understand that capabilities are requisite for a firm primarily dependent upon its operational environmental circumstances (Brandon-Jones *et al.*, 2014). Globally, a dire condition has forced firms to consider measures to accelerate awareness regarding environmental degradation and its harmful effects. Since resources are not equally available, responsibilities lie to those with access (Kumar *et al.*, 2022). Sustainable SCM and RBV endorse the view to extensively estimate the available resource pool and competencies and leverage them to the maximum potential (Gunasekaran *et al.*, 2017; Agrawal and Pingle, 2020). The work of Stadler

et al. (2013) analyze the role of capabilities in supporting activities toward accessing resources and further developing them. The utilization of the RBV can prove beneficial in enhancing both the theoretical and practical comprehension of how supply chain interactions influence performance (Rungtusanatham *et al.*, 2003). When examining operational management systems like lean and green through the lens of the RBV, it becomes evident that they may not inherently meet the criteria for establishing a sustainable competitive advantage. These systems can potentially be replicated and applied in various organizations and supply chains, making them less unique. To enhance an organization's operations and supply chain, it's crucial to integrate process innovation alongside these practices (Cherrafi *et al.*, 2018). This integration offers incredible value. Drawing from the RBV and existing literature, we contend that the impact of adopting green and lean practices, supply chain capabilities (SCCA), and collaboration on supply chain performance can be enhanced when coupled with process innovation. This combination results in a mutually reinforcing relationship that improves performance.

3. Conceptual framework and proposed hypothesis

The organizations must identify driving components feasible for implementation under their comprehensive procedures for experiencing organizational performance and environmental outcomes. The authors proposed a conceptual framework, six variables, and 28 items to investigate LG performance. The details of each are discussed in Table 1. The conceptual framework is shown in Figure 1, and the methodology followed is shown in Figure 2.

A few SC capabilities, i.e. logistics, production, and purchasing capabilities, are significant for inducing a higher degree of client promises (Tolonen *et al.*, 2017; Aslam *et al.*, 2018). Integrating GHRs into the organization may assist in curtailing environmental loads (Mikalef *et al.*, 2019; Pham *et al.*, 2019). Incorporating GHR practical guidelines, strategies, qualifications, and training can stimulate organizational employees to achieve green behavior. It can be deployed and integrated into various SC capabilities to serve environmentally sensitive, resource-efficient, and green workplaces all over the organization (Roscoe *et al.*, 2019; Yu *et al.*, 2020a). Thus, one can say that there can be a linkage between SC capabilities and GHRs for assuring green outcomes while exploiting SC capabilities. Hence, we hypothesize that SC capability positively affects the adoption of GHRs in SCM.

H1. SCCA has a positive relationship with GHRs in SCM.

It has been found that organizational boundaries should be well collaborated with customers, suppliers, outsourcing partners, other human resources, consultants, etc., to optimize a more comprehensive range of routine activities. The cross-integration amongst intra and inter-organizational hierarchy may lead to the succession and accomplishment of organizational policies (Afshan *et al.*, 2018; Dubey *et al.*, 2019a, b). The collaboration and the related degree of integration amongst SC partner sources are crucial to collectively control and prevail towards the deficiencies encountered in the roads of succession and growth of SC (Tiwari *et al.*, 2018; Bag *et al.*, 2021). Here, collaboration with green partners, employees, and suppliers can be significant in fostering an organization's green image (Obeidat *et al.*, 2020; Roscoe *et al.*, 2019). Thus, one can say that there can be a linkage between SC collaboration, integration and GHRs. Hence, we hypothesize that SC collaboration and integration positively affects the adoption GHRs in SCM.

H2. SCIN positively affects adopting GHRs in SCM.

It is always required to share and exchange technical knowledge among dependents, partners, peers, and clients in SC (Han *et al.*, 2017; Tortorella *et al.*, 2019). Including GHRM

Table 1.
Define the variables and items

S. N	Variables/factors	Symbol	Items	Authors and year
01	Supply chain capabilities (SCCA)	SCCA1	Logistics capabilities deliver organization strength to transport the correct quantity of commodities at the right time and place	Tolonen *et al.* (2017), Brusset and Teller (2017), Aslam *et al.* (2018), Wamba and Akter (2019), Ashrafi *et al.* (2019), Mikalef *et al.* (2019)
		SCCA2	Purchasing capabilities refer to the organization's buying power and replicate organization competency to arrange prescribed raw material assets to machines and services to satisfy ready clients' demands	
		SCCA3	Product design requires the availability and development of production capabilities to integrate refined product designs into existing types of machinery and attain the concept of continuous production	
		SCCA4	Dynamic capabilities refer to the abilities and strength of the organizations towards handling routines, turbulent activities, confused customers and varying demands	
		SCCA5	Partners and suppliers' capabilities point towards the potential collaborative abilities with personal elements of SC to lead in maintaining the right balance of competency, delivery ability and cost	
02	Supply chain collaboration and integration (SCIN)	SCIN1	SC integration power and vulnerability defines the degree up to which an organization collaborates with its SC elements and partners to manage collectively, control and avoid vulnerable Intra and inter-organization practices	Afshan *et al.* (2018), Tiwari *et al.* (2018), Liu *et al.* (2018), Dubey *et al.* (2019a, b), Kumar and Sanchez Rodrigues (2020), Pérez-Mesa *et al.* (2021)
		SCIN2	SC flexibility and responsiveness make the organizations competent to handle deviations and fluctuations within the value chain	
		SCIN3	The organization's quality plays a very prominent role in the collaboration and integration of the organizations with quality firms	

(*continued*)

S. N	Variables/factors	Symbol	Items	Authors and year
		SCIN4	The costs play a significant role in the succession of any system or trial. Reduced SC costs are the sustainable need for prospering SC collaboration and integration	
		SCIN5	Competitive power and monopoly are vital to restoring economic floods and survival	
03	Supply chain Knowledge and information sharing (SCKI)	SCKS1	Communication means and mediums refer to the adaptability and applicability of communication networks used to connect business elements involved at the various stages of SC, from procurement of raw materials to supply of finished goods	Han *et al.* (2017), Schiavone and Sprenger (2017), Kache and Seuring (2017), Srinivasan and Swink (2018), Afshan *et al.* (2018), Tortorella *et al.* (2019), He *et al.* (2020)
		SCKS2	The cultural difference amongst assesses (user-friendly system): A user-friendly system and encountering cultural differences amongst assesses is necessary to share SC knowledge and information on the network effectively	
		SCKS3	Components under an SC circle can be physical components, intelligent components and connecting components, strengthening the value and relying on acquiring knowledge and allied capabilities	
		SCKS4	Organizational boundaries refer to the organization's limits and related working environment, where the resources can be handled agilely and actively	
04	Green human resources (GHR)	GHR1	GHRH purposely works to generate environmentally friendly, sensitive, resource-competent and socially liable workers at the workplace for working all over the organization	Obeidat *et al.* (2020), Yusoff *et al.* (2020), Ren *et al.* (2018), Roscoe *et al.* (2019), Pham *et al.* (2019), Kim *et al.* (2019), Yu *et al.* (2020a)
		GHR2	Rewards policies and compensation packages are crucial to enroll GHRM and environmental consciousness, as the same stimulate employees to undertake eco-friendly activities, pledges and promotes environmental actions across organizations	

(*continued*)

Table 1.

Table 1.

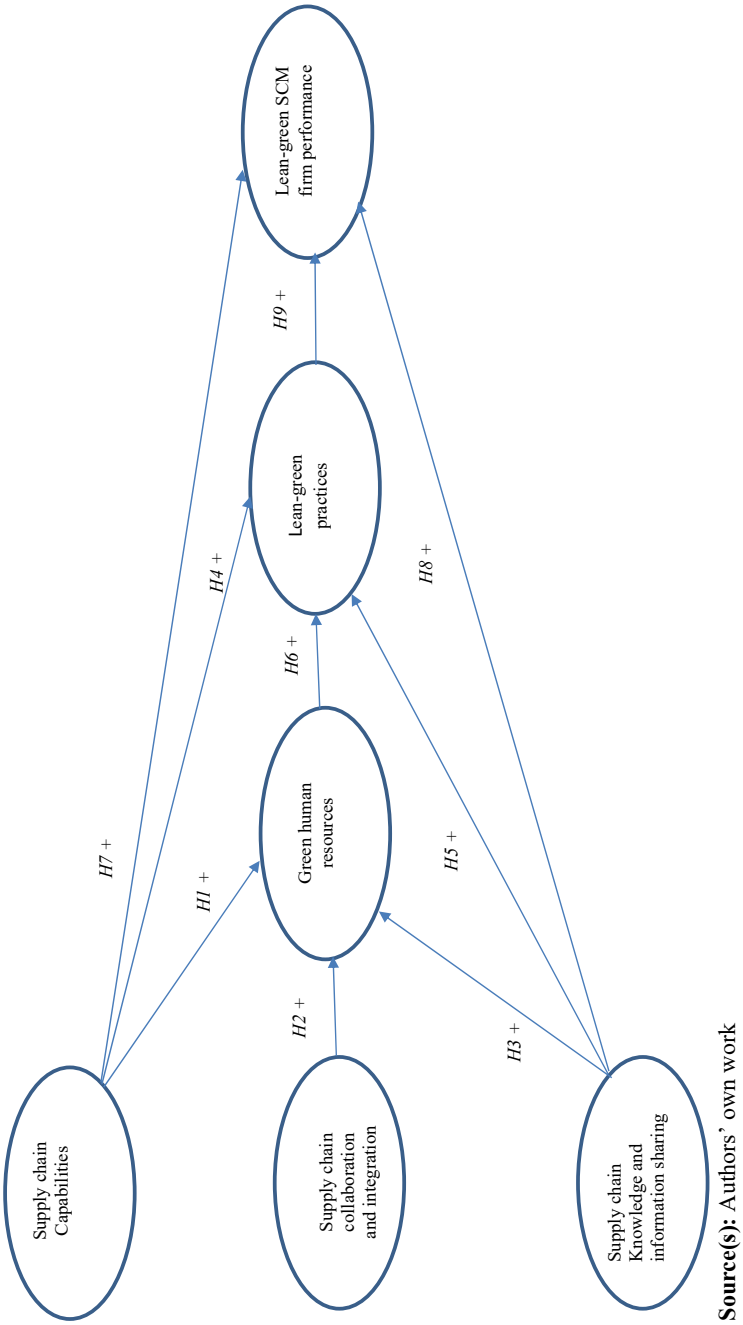
S. N	Variables/factors	Symbol	Items	Authors and year
		GHR3	Organizational culture, employee relations and management commitment allocates GHRM attitudes for sustainable development. Green organizational culture and employee relations stimulate the employees thinking towards environmental loads and are the foundation for embracing corrective environmental actions by the dependent employees	
		GHR4	The green T&D activities and employer's green enthusiasm refer to the quality of leadership to influence employees' activities, and orientation towards achieving green issues by the organization	
		GHR5	Today's scenario for advancing GHRM practices. Creating a green atmosphere by focusing on decremented employees' movements in the office, designing inter-Intra layouts, etc. are significant for sinking exploitation of natural resources	
05	Lean-green practices (LGPR)	LGPR1	The green warehousing and eco-packaging provision curtails environment loads, reduces useless efforts, and induces an approach towards managing work with the high endeavor to develop the company's performance	Carvalho *et al.* (2017), Wang *et al.* (2018), Lartey *et al.* (2020), Yu *et al.* (2020b), Ghobadian *et al.* (2020), Kumar and Sanchez Rodrigues (2020), Raut *et al.* (2021)
		LGPR2	The overstocking inventory may lead to higher working capital, which may be obsolete at any instant due to technological dirt. Excess inventory stocks amplify carrying costs	
		LGPR3	The green marketing, advertising and distribution are significant from traditional marketing and advertising, saving ecological deprivation	

(*continued*)

S. N	Variables/factors	Symbol	Items	Authors and year
		LGPR4	The definition of eco-standards for types of machinery and equipment may lead to escorting green-lean practices by way of reduction in energy resources, efficient utilization of materials, conforming sustainable design, less human responses, fewer failures and sustainable outcomes	
		LGPR5	The waste recovery and failure management systems from both internal and external sides are significant for practicing lean-green aspects	
06	Lean-green SCM firm performance (LG-SCM)	LG-SCM1	The devising green design to products is essential for curtailing undesirable operational steps for aiding green manufacturing based on settled operators' costs, variable costs and reduced energy exploitation	Cherrafi *et al.* (2017), Liu *et al.* (2018), Wong *et al.* (2018), Inman and Green (2018), Dey *et al.* (2019), Abdallah *et al.* (2019), Sharma *et al.* (2021)
		LG-SCM2	The forward and reverse logistics policies are essential for acquiring firm performance all over the SC	
		LG-SCM3	The documentation and process standardization systemizes working and leads to efficacy, understanding and utilization	
		LG-SCM4	The research and development activities and accreditations are essential pillars for gleaning lean-green practices all over the SCM for high firm performance	

Source(s): Authors' own work

Table 1.



Source(s): Authors' own work

Figure 1.
Proposed conceptual framework

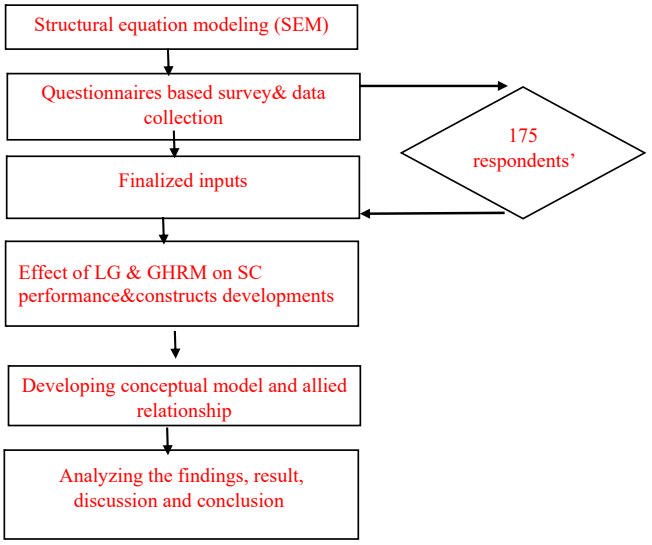


Figure 2.
Methodolgy followed

practices may entail transposing quality information ethically by human resources under deprived environmental goals (Ren *et al.*, 2018; Pham *et al.*, 2019). GHRM can stimulate organizations to handle deviations and fluctuation within the value chain by transposing information to the dependent considering eco-aspects. The implication of green HR in information technology will lead to exchanging knowledge and sharing information with specific targets ecologically and adopting more realistic practices for measuring SC performance (Kache and Seuring, 2017; Kim *et al.*, 2019). Thus, there can be a linkage between SC knowledge, information sharing, and GHRs. Hence, we hypothesize that SC knowledge and information sharing effect positively by adopting GHRs in SCM.

H3. SC knowledge and information sharing positively correlate with GHRs in SCM.

Furthermore, organizational SC capabilities are stimulating the organizations towards accepting the novel design, manufacturing needs, tasks, and practices, which are related to the development, manufacturing, launching of new products, etc., and can support benchmarking ecology and economics (Ashrafi *et al.*, 2019; Wamba and Akter, 2019). SC capabilities can be significant in inculcating and implementing LGRP over to the SC structure of the organizations (Brusset and Teller, 2017; Ghobadian *et al.*, 2020). These capabilities cover a broader range of activities under the aegis of logistics, deliveries, purchasing, processes, etc., where the inclusion of LGRP may escort green SC, sustainable development, and gratified management of product life cycle components (Carvalho *et al.*, 2017; Aslam *et al.*, 2018). Thus, there can be a linkage between SC capabilities and LGRP; hence, we hypothesize that SCCA positively affects the practices in SCM.

H4. SCCA has a positive relationship with LGRP in SCM.

The procurement of raw materials to supply finished goods in SC is prominent and can decide the utilization and adaptability of LG thinking (Han *et al.*, 2017; Tortorella *et al.*, 2019). Interactions among technical staff, participants, and customers can be best streamlined by adopting information technology. The same may assist in twisting big data as a resource factor for inducing LGRP over SC's operational and marginal elements (Srinivasan and Swink, 2018; Kumar and Sanchez Rodrigues, 2020), and hence SC knowledge and

information-sharing technology may engross LGRP. Thus, there can be a linkage between SC knowledge, information sharing, and LGRP. Therefore, we hypothesize that SC knowledge and information sharing positively correlate with LGRP in SCM.

H5. SCKI sharing has a positive relationship with LGRP in SCM.

Nowadays, the organization exposes the concept of GHR management to adopt integrative practices for competitiveness and sustainability significantly (Yusoff *et al.*, 2020; Obeidat *et al.*, 2020). The identification of eco-management skills, qualifications, and behavior of the HR working in the system are considered under GHRM principles for embracing pro-environmental issues under routine work by the organizations (Kim *et al.*, 2019; Yu *et al.*, 2020a). The same may influence the adoption of eco-standards for machinery, types of equipment, consumption of natural products, green procurements, and adoption of regulatory guidelines and may lead in escorting green-lean practices by way of reduction in energy resources, efficient utilization of materials, conforming sustainable design, less human responses, fewer failures and sustainable outcomes (Obeidat *et al.*, 2020; Raut *et al.*, 2021). Thus, there can be a linkage between GHRs and the implication of LGRP. Hence, we hypothesize that GHRs positively affect LGRP in SCM.

H6. GRHR has a positive relationship with LGRP in SCM.

It is examined that SC capabilities stimulate the organization to sense quality demand and confidently commit the organization to promise that end customers' requirements can be fruitfully managed by the organizations (Wamba and Akter, 2019; Mikalef *et al.*, 2019). Additionally, LG-SCM firm performance can be reached if the organizations incorporate the extent of SC capabilities in the form of internal manufacturing capacity, outsourcing capability, logistics capabilities, inventory capabilities, scheduling abilities, order management, and shop floor execution capabilities (Ashrafi *et al.*, 2019; Sharma *et al.*, 2021). Thus, one can say that there can be a linkage between SC capabilities and LG-SCM firm performance. Hence, we hypothesize a positive relationship between SC capabilities and LG-SCM firm performance.

H7. SC capabilities positively correlate with LG-SCM firm performance in SCM.

Furthermore, cognitive abilities are significant for ease in attaining laid organizational policies, strategies, etc. The same embraces knowledge, attention of markets, and business memories for connecting the information gaps among assesses (Srinivasan and Swink, 2018; He *et al.*, 2020). Moreover, cognitive capacities are required under an interconnected information network for configuring a worthy SC circle for value creation and attainment of firm performance (Schiavone and Sprenger, 2017; Han *et al.*, 2017). Information sources and their connecting means are significant for stimulating functions of SC components and also assist in the ease of integrating numerous allied practices to unite a value chain from SC, where the practical inclusion of LG-SC practices may deploy the aegis of green-lean design and develop green-lean manufacturing provisions for accounting elevated SC performance by the firms via invading production and labor costs with greater environmental efficiency for sustainable presentation (Afshan *et al.*, 2018; Inman and Green, 2018). Knowledge sharing and information technology may be excellent sources for attaining autocratic LG-SCM firm performance. They may escort efficient waste management deals and green blueprints to handle adverse effects on the ecology at a reduced cost for the survival of society (Dey *et al.*, 2019; Tortorella *et al.*, 2019). Thus, there can be a linkage between SC knowledge, information sharing, and LG-SCM firm performance.

H8. SC knowledge and information sharing positively correlate with LG-SCM firm performance in SCM.

The adaptability of LGRP aids in curtailing undesirable operational steps and escorts the system towards the development of green designs and manufacturing provisions, which maintains green manufacturing and firm SCM performance in long runs based on settled operators' costs, variable costs, and reduced energy exploitation (Ghobadian *et al.*, 2020; Yu *et al.*, 2020b). The concurrent realization of green-lean practices is needed for addressing competitiveness, regulatory requirements, and intersections with global SCs and for retaining firm performance, where the green SC practices extend their edges in greening the supply process, greening supplier entities, and related management activities (Wang *et al.*, 2018; Kumar and Sanchez Rodrigues, 2020), including an alliance with suppliers and corporate partners to eradicate packaging materials sources and recycling activities for respecting ecological loads along with organization dreams (Liu *et al.*, 2018; Wong *et al.*, 2018).

H9. LGPR positively correlates with LG-SCM firm performance in SCM.

The works of literature assist authors in understanding that improved SC capabilities, coordination, green products, lean services, reduced SC costs, and human resources are significant for achieving competitive advantage under practical information-sharing sources. Accordingly, the authors conducted the study under exploratory factor analysis considering network relationships amongst hypotheses mentioned earlier.

4. Method, data analysis, and results

We used a questionnaire to survey the Indian SC professionals (Table 2). The present work explores SCCA, SCIN, and SCKI's influence on lean-green SCM using an RBV. Therefore, we used a survey to measure SCM experts' views and opinions. The questionnaire was adapted following earlier scales validated by the extant literature.

Data was collected using alum networks and social networking sites (Sharma *et al.*, 2023c). It is important to note that the author filtered profiles and selected only those respondents who had experience with LGRP. The questionnaire was first tested with twenty experienced SC professionals before sending it to the respondents. A seven-point Likert scale (i.e. "1 = strongly disagree" to "7 = strongly agree") was used to measure the constructs (Raut *et al.*, 2021). Three hundred ninety-five respondents were selected for the survey, while 175 helpful responses were obtained, with a 44.30% response rate. Table 2 represents the

Items		*N* (175)	%age
Age	26–33	79	45.14
	34–41	40	22.86
	42–49	55	31.43
	Total	175	100.00
Gender	Male	129	73.71
	Female	46	26.29
	Total	175	100.00
Educational qualification	Undergraduate (UG)	57	32.57
	Postgraduate (PG)	77	44.00
	PhD	43	24.57
	Total	175	100.00
Years of experience	Less than 1	39	22.29
	2–5	59	33.71
	More than 5	77	44.00
	Total	175	100.00

Source(s): Authors' own work

Table 2. Demographic profile of respondents from manufacturing industry

respondents' detailed demographic profile. Concerning the age distribution, most participants fell in the age brackets 26–33 (45.14%). 73.71% of the population was male-represented. Ph.D. is the highest level of education, and 43 Ph.D. representatives (24.57%) were part of the total responses. While classifying based on years of professional experience, the total sample has 44% of respondents with over five years of experience, followed by respondents with 2–5 years of experience (33.71%).

The two essential methods of SEM are variance-based (VB-SEM) and covariance-based (CB-SEM) (Hair *et al.*, 2017, 2019). When the study aims to confirm existing theories, the authors can use these methods (Hair *et al.*, 2019) using the sample's covariance matrix. CB-SEM with the AMOS v.21 software package was used. Process macro-based SPSS 21 has been used to perform the moderation analysis.

4.1 Measurement model

The scale's reliability is measured using composite reliability, Cronbach's alpha, and average variance extracted. The author sequentially computed exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), respectively, in order to assess constructs and items' reliability and validity (Table 3). The values for Cronbach's alpha (>0.7), composite reliability (>0.7), average variance extracted (>0.5), and AVE square root (>0.8) were in line with the recommendations from the literature (Hair *et al.*, 2017) (Table 3). Further, all the item loadings were greater than 0.70, ensuring convergent validity (Fornell and Larcker, 1981). Convergent validity was additionally used to evaluate discriminant validity by comparing the correlation loadings between indicators of the same construct and of different constructs. The weak discriminant validity and the subsequent strong convergent validity depict the model's

Table 3. Constructs, measurement items, loading factors, Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE)

Construct	Measurement items	Loading	α	CR	AVE
Supply chain capabilities (SSCA)	SSCA1	0.959	0.926	0.947	0.819
	SSCA2	0.959			
	SSCA3	0.940			
	SSCA4	0.940			
Supply chain collaboration and integration (SCIN)	SCIN1	0.929	0.918	0.942	0.804
	SCIN2	0.906			
	SCIN3	0.899			
	SCIN4	0.838			
Supply chain knowledge and information sharing (SCKI)	SCKI1	0.932	0.872	0.943	0.843
	SCKI2	0.906			
	SCKI3	0.872			
	SCKI4	0.830			
Green human resources (GHRE)	GHRE1	0.890	0.940	0.955	0.842
	GHRE2	0.863			
	GHRE3	0.870			
	GHRE4	0.865			
Lean-green practices (LGPR)	LGPR1	0.914	0.935	0.953	0.836
	LGPR2	0.871			
	LGPR3	0.822			
	LGPR4	0.830			
Lean-green SCM firm performance (LGSFP)	LGSFP1	0.820	0.973	0.980	0.926
	LGSFP2	0.810			
	LGSFP3	0.770			
	LGSFP4	0.776			

Source(s): Authors' own work

accuracy. The results highlighted a discriminant of constructs, i.e. the diagonal values outperformed the correlations with all the values greater than 0.896 (Fornell and Larcker, 1981) (Table 4).

4.2 Common method bias

Authors have carefully paid attention to avoid Methodological biases by opting for only respondents who had experience and understanding of the research idea (MacKenzie and Podsakoff, 2012). Further, results from Herman's single factor test (equals to 20.681) were lower than the permissible value, i.e. 50%, thereby ensuring the research as well as the proposed model is free from method bias (Table 5).

4.3 Structural model assessment

The values for the structural model ensured a great model fit ($\chi 2/df = 1.493$, CFI = 0.968, IFI = 0.968, TLI = 0.964, RMSEA = 0.05) (Hu and Bentler, 1999; Anderson and Gerbing, 1988). The data analysis highlights that the seven hypotheses out of nine are significant and supported (Table 6 and Figure 1).

4.4 Hypotheses model assessment

Our SEM model has helped to clearly evaluate the hypothesis likelihood (Table 6). H1 proposed that SC capabilities negatively affect GHRs; however, the current data does not support the proposed hypothesis. The results suggest that SC capabilities have no significant influence on GHRs. This finding contradicts previous research in the same domain (Zaid *et al.*, 2018; Nkrumah *et al.*, 2021). In H2, we testified that SC collaboration and integration positively affect GHRs. It is supported, and the results showed a significant positive effect (SC collaboration and integration on GHR). This is a significant result supported by the recent research in GHR management (Sharma *et al.*, 2023a, b). In H3, we hypothesized that SC knowledge, information sharing, and integration positively affect GHRs. This hypothesis was supported. This finding is in line with recent literature Agyabeng-Mensah *et al.* (2020). The data has been collected from 139 manufacturing firms in Ghana, mainly focusing on human resource and SC managers (food, beverage and alcohol, textiles, agrochemical, and plastics). The findings are aligned in both developing economies. The effect of SC capabilities on LGRP has been tested in H4. The results indicate a positive impact that supports this hypothesis. The present research proposes that SC capabilities positively influence LGRP, which may escort long-term sustainability in the organization. However, this aspect is sparsely studied in the existing SCM literature and LG-SC practices (Sharma *et al.*, 2021). About the effect of SC knowledge and information sharing, H5 postulated a negative impact

	SSCA	SCIN	SCKI	GHRE	LGPR	LGSFP
SSCA	0.9053					
SCIN	0.101	0.8967				
SCKI	0.127	0.134	0.9182			
GHRE	0.076	0.402**	0.266**	0.9179		
LGPR	0.03	0.03	0.291**	0.029	0.9144	
LGSFP	0.016	0.004	0.089	−0.004	0.072	0.9623

Note(s): *Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)
Source(s): Authors' own work

Table 4.
Discriminant validity

Total variance explained

Factor	Initial eigen values			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.680	23.668	23.668	4.963	20.681	20.681
2	3.909	16.289	39.957			
3	3.300	13.751	53.708			
4	2.875	11.978	65.686			
5	2.544	10.600	76.286			
6	1.756	7.318	83.605			
7	0.477	1.989	85.594			
8	0.379	1.578	87.171			
9	0.321	1.338	88.509			
10	0.297	1.236	89.746			
11	0.292	1.218	90.964			
12	0.264	1.100	92.065			
13	0.260	1.085	93.149			
14	0.239	0.994	94.143			
15	0.231	0.961	95.104			
16	0.221	0.920	96.024			
17	0.201	0.839	96.862			
18	0.180	0.749	97.612			
19	0.138	0.574	98.186			
20	0.111	0.464	98.650			
21	0.103	0.427	99.077			
22	0.080	0.333	99.410			
23	0.078	0.325	99.735			
24	0.064	0.265	100.000			

Note(s): Extraction method: principal axis factoring
Percentage of variance is 20.681 which is below 50% and satisfies that there is no common method bias in the data after extracting a single factor in principal axis factoring
Source(s): Authors' own work

Table 5.
Herman's single factor test

Hypotheses	Coefficient	Standard deviation	*P*-values	Decision
H1	−0.041	0.058	0.047	NO
H2	0.049	0.067	0.046	YES
H3	0.246	0.065	***	YES
H4	0.080	0.060	0.018	YES
H5	−0.004	0.071	0.0960	NO
H6	0.474	0.089	***	YES
H7	0.037	0.074	0.061	YES
H8	0.079	0.084	0.034	YES
H9	−0.014	0.093	0.088	NO

Note(s): Significant at *P*-value <0 0.05
Source(s): Authors' own work

Table 6.
Path coefficients, standard deviation and *p*-values

on LGRP. The previous extant literature has not explored this relation (Sharma *et al.*, 2021). However, the results do not support this hypothesis.

H6 assumed that GHRs positively affect LGRP. The results exhibited a considerable positive impact, leading to the hypothesis's acceptance. This relationship is critical but sparsely studied in the literature (Gaikwad and Sunnapwar, 2020; Gandhi *et al.*, 2021). In H7,

we argued that SC capabilities positively affect LG-SCM firm performance. It is supported, and the results showed a significant positive effect (SC capabilities on LG-SCM firm performance). This significant result needs exploration, as suggested in previous literature (Bag *et al.*, 2022; Sharma *et al.*, 2021). In H8, we argued that SC collaboration and integration positively affect LG-SCM firm performance. It is supported, and the results showed a significant positive effect (SC capabilities on LG-SCM firm performance).

Finally, H9 assumed that LGRP negatively affects LG-SCM firm performance. This relationship is critical but sparsely studied in the literature (Sharma *et al.*, 2021). However, the results showed no significant impact, which led to the hypothesis rejection. The total effect characterizes the real influence of an exogenous construct on the target constructs, thereby including the influence via mediating construct GHRs and lean-green practices. The results indicate a partial mediation among SC knowledge and information sharing, GHRs, and lean-green practices (Table 7).

4.5 Structural model's results

The authors assessed the structural model using regression analysis (Hair *et al.*, 2017). The proposed model accomplished a satisfactory explanation (58.1%) of variation in achieving LG-SCM firm performance for Indian SCs. In this regard, the computed value was in line with previous works in similar domains (Raut *et al.*, 2021; Bag *et al.*, 2021). Constructs, measurement items, loading factors, and Cronbach's alpha are mentioned in Table 3. Discriminant validity and Path coefficients is mentioned in Table 4 and Table 6 respectively.

5. Discussion and implications

The research has adopted RBV, which elucidates that an organization can enhance its performance by creating strategic resources or capabilities (Brandon-Jones *et al.*, 2014). The non-substitutable, rare, beneficial, and inimitable capabilities help SCM perform better (Dubey *et al.*, 2020). It is evident from past literature that RBV has drawn substantial interest from the SC community (Dubey *et al.*, 2020) since it emphasizes that firm capabilities, collaboration, and knowledge sharing help increase firm performance. RBV also endorses the view that resources are used to build capabilities (Dubey *et al.*, 2020). It is worth noting that only a handful of studies in the SC discipline explore the bundling of resources and capabilities. Hence, the author has adopted RBV to explore and better understand the rationale behind the phenomenon in question. Empirical results in the previous section justify the proposed model and emphasize the model's value.

The author proposes that SC capabilities positively influence GHRs (H1), LGRP (H4), and LG-SCM firm performance (H7), which needs immediate attention and empirical investigation (Sharma *et al.*, 2021; Raut *et al.*, 2021). The literature on SC capabilities suggested that it

Relationship	Direct effect	Indirect effect	Result
SSCA → GHRE → LGPR	0.092(0.145)	−0.021(0.408)	No effect
SCKI → GHRE → LGPR	*0.000(—)	*0.109(0.002)	Partial mediation
SCIN → GHRE → LGPR	0.068(0.276)	0.017(0.489)	No effect
SSCA → GHRE → LGPR → LGSFP	0.072(0.321)	0.000(0.829)	No effect
SCKI → GHRE → LGPR → LGSFP	*0.000(—)	−0.001(0.992)	No effect
SCIN → GHRE → LGPR → LGSFP	0.015(0.860)	0.000(0.857)	No effect

Note(s): Significant at *P*-value <0 0.1; parenthesis values (*P*-values)
Source(s): Authors' own work

Table 7.
Results of mediation effect

amalgamates various capabilities, namely logistics, purchasing, production, dynamics, partners and suppliers (Wamba and Akter, 2019; Ashrafi *et al.*, 2019; Mikalef *et al.*, 2019). The results have supported both H4 and H7; however, H1 has not been supported in the context of the present study. The SC capabilities have been studied in the context of SC performance (Han *et al.*, 2020); however, no literature has explored this construct concerning GHRs, which needs further exploration.

The author testifies that SC collaboration and integration positively influence GHRs (H2). The author justifies that SC collaboration and integration includes integration power and vulnerability, SC flexibility and responsiveness, quality of products and services, reduced SC costs, and competitive power and monopoly (Liu *et al.*, 2018; Dubey *et al.*, 2019a, b; Pérez-Mesa *et al.*, 2021). The author aims to testify that SC knowledge and information sharing positively influence GHRs (H3), LGRP (H5), and LG-SCM firm performance (H8), which is sparsely studied in the present literature. The literature on SC Knowledge and information sharing suggests that SC knowledge and information sharing depends upon communication means of information technology, user-friendliness of systems, cognitive capacities and organization boundaries, and resource and diversification (Afshan *et al.*, 2018; Tortorella *et al.*, 2019; He *et al.*, 2020). The results have supported both H3 and H5; however, H8 has not been supported in the context of the present study. However, scarce research in the literature has explored this construct concerning LG-SCM firm performance. Hence, more such studies are needed to generalize the findings of the present work.

The author testifies that GHRs positively influence LGRP (H6). The author justifies that SC collaboration and integration includes eco-management skills, Rewards policies, and compensation towards environmental consciousness, organizational culture, employee relations and management commitment, green T&D activities and employer's enthusiasm, the green movement, buildings and related inter-Intra layouts (Pham *et al.*, 2019; Kim *et al.*, 2019; Yu *et al.*, 2020a)

The author proposes that LGRP positively influences LG-SCM firm performance (H9); however, they have not been empirically proven in this context. This relation is critical (Sharma *et al.*, 2021), and previous literature proposes that it can significantly influence LG-SCM firm performance. Further, the research implications in terms of theory and practice of the constructs affecting LGRP and LG-SCM firm performance are discussed in the next section.

Based on the conventional model, the hypothesis is tested, where the authors evaluate a total of nine hypotheses. The findings of the study have supported hypotheses H3 and H5; however, H8 has not been supported in the context of the present study. The authors identified that there has been a scarce study in the literature that has explored multiple constructs related to building conventional models concerning LG-SCM firm performance. Hence, more studies are needed to generalize the findings of the present work. Further, the authors identified the surplus range of theories and practices related to the conventional model. Still, the allied constructs and their implications under the specific context of any industry are deficiently found to assist in designing a more robust decision-making platform for affecting firm performance. Indeed, research under the dimensions of identifying a greater number of constructs is required for building the correct ladders to performance and success.

The present study considers SC capabilities a resource to assist business enterprises or companies in enduring control over processes, operations, failures, etc. SC resources can be tangible or intangible in nature like human resources, inventory resources, intellectual resources, logistics resources, decision-making resources (in the form of software, tools, consultants), warehouse management resources, order capturing resources, supply chain visibility resources, risk management resources, technology integration, resources for continuous improvement. Accordingly, in the present study, various SC proactive practices are evaluated to validate them as resources for uplifting the supply chains' capabilities to assist in retaining excellence, controlling possessions, and improving efficiency, effectiveness, and competitive advantages or controls.

5.1 Theoretical implications

The theoretical foundation of the study will help the managers and professionals towards having a deep understanding of proactive supply chain practices. This research presents theoretical implications and contributions related to SCM and RBV in the context of LGRP. By doing so, the research contributes towards growing the application of RBV to novel areas, thereby enhancing its theoretical usefulness and validity in various settings to elucidate GHR and LGRP rising prominence in the Indian SC context. LGRP is an emerging research avenue; however, very few empirical studies have explored the same (Sharma *et al.*, 2021). Therefore, present study investigated the influence of constructs and identified the prominent constructs that can influence LGRP and SCM firm performance with convincing results. The success of any firms remains ambiguous until critical dividends, margins and segments related to different SC practices, partners, collaborators, constructs and so on will be implemented. The same demands the efforts to truly understand the role of all applied segments, where the theoretical pace presented in the study will help is defining the critical dividends and marginal practices that are crucial for attaining success. The study could assist managers to develop a set of best strategies, which are based on crucial practices that are oriented towards social, environmental, economic, and performance objectives. The study has theoretically presented and validated an extended RBV (Dubey *et al.*, 2020) model in the Indian context. Most of the results are consistent with recent studies and have presented the theoretical base as sought by a group of researchers for sustainability (Abualfaraa *et al.*, 2020; Gaikwad and Sunnapwar, 2020; Lartey *et al.*, 2020; Sharma *et al.*, 2021; Gholami *et al.*, 2021; Raut *et al.*, 2021). The theoretical utility of the study is re-emphasizing on the critical motivators for adopting or migrating towards LGRP. This work presented is among the first empirical studies investigating this intriguing behavior on LGRP and SCM firm performance. This work facilitates future researchers by better understanding the gap and acknowledging the possibility of examining constructs that can help them to formulate call-to-action strategies for firms keen on adopting LGRP. The finding suggests that in India, SC stakeholders adopt GHRs and lean-green practices to improve LG-SCM firm performance.

5.2 Practical implications: supply chain manager perceptive

The main intension of the study is to examine the relationship amongst various existing proactive SC practices to understand their impacts and preferences under supply chain. In present study, the authors have presented six crucial supply chain practices with their empirical investigations based on 28 constructs. The study will assist supply chain managers understand a cross-linkage amongst proactive SC practices and their effects on building elevated decision-making models, frameworks, strategies and policies. The study have presented key elements related to the practices falling under the boundaries of the supply chain, where the understanding related to elements will help identify key drivers and influencers that could significantly impact the organizations' overall functioning, performance and success. The study presented a crucial understanding of SC practices based on conventional model, which will assist the supply chain managers in addressing critical practices to their decision-making framework to respond towards better decision-making, efficient allocation of resources, risk curtailments, decision innovations, strategic planning and improved outcomes. The study will help supply chain managers incorporate critical constructs related with LG-SCM and GHRM into their strategic planning, which will promise in ensuring alignments of their resources towards attaining organizational long-term goals with efficiency and effectiveness. It is prominent to analyze uncertainty associated element based on data analytics and cross examination of relationships to minimize dispersion, achieve goals, mitigate disruptions and ensure sustainability (Shakeb *et al.*, 2022; Bindra *et al.*, 2023). It is found significant to integrate different varieties of decision methods

into a unified platform for attaining performance, predicting risks, and automating sustainable solutions (Ghosh *et al.*, 2023; Bhuvaneskumar *et al.*, 2023). Thus, one can assume that identifying key conditions, factors, and relationships assists in automated business practices, which needs the support of requirements, criteria, theories, and strategies (Jarboui *et al.*, 2023; Park and Singh, 2023). Accordingly, in present study a range of proactive practices are evaluated based on contractual variables for understanding the capabilities of the supply chains to assist managers in retaining excellency, efficiency, effectiveness, and competitiveness. The study will help supply chain managers set realistic objectives and chart a course of action considering the most important variables.

The results accentuate the importance of GHRM since rewards policies and compensation towards environmental consciousness and employers' and employee enthusiasm are key motivators for any firm to move towards LGRP. The findings suggest that LGRP are not a significant construct that affects the LG-SCM firm performance in Indian SC firms. One way to interpret this outcome is that Indian firms may feel under-confident or uncertain in their efficiency in utilizing resources to achieve pro-ecological capabilities. In the long-term perspective, this attitude may cause concern because it indicates that the firms are not motivating their individuals towards environmental protection. To overcome this, the author proposes that the government take the necessary initiatives to ensure citizens have a sense of environmental responsibility. Policies targeting awareness among young generations are very critical so that they own responsibility towards the environment. Webinars, seminars, and school curriculum updates are the hours needed. Simultaneously, social media campaigns, advertisements, and social messages can involve adult residents.

6. Conclusions

This research examines the constructs (SC capabilities, supply chain collaboration and integration, SC Knowledge, and information sharing) that impact GHRMs, LGRP, and LG-SCM firm performance in Indian SCs. The authors developed and validated an RBV Model to accomplish this research objective. The proposed model can predict that the hypothesized constructs significantly influence LG-SCM firm performance in the Indian SCs. The authors further found that GHRs positively influence LGRP; however, LGRP do not influence LG-SCM firm performance in the Indian SC context. The study has originally presented five constructs for SCCA, five constructs for supply chain collaboration and integration (SCIN), four constructs for supply chain knowledge and information sharing (SCKI), five constructs for GHR, five constructs for lean-green practices (LGPR) and four constructs for LG-SCM firm performance (LG-SCM), which the supply chain mangers can utilize for validating their existing SC capabilities under their specific industry, company size and operational boundaries for attaining sustainability. The second originality of the study lies in presenting a crucial understanding about multiple practices in a conceptual model to embrace an extensive indulgence of many practices in decision making to assist in developing hybrid-holistic models considering said practices for attaining organizational competency. The cross-pollination of ideas between many supply chain practices has been stimulated in present study to provide a good understanding of SCCA, SCIN, SCKI, GHRM, LG-SCM in single roof for retaining organization performance, representing its third originality. The study crucially advocated that it is always significant to focus on the dignified elements of the firms in the form of practices, tools, models, drivers and so on; that have the most substantial influence on the outcomes. This in turn will lead in receiving more informed and effective decision-making, help in allocating resources strategically, help in optimizing performance and minimizes the impact of risks and uncertainties.

The present research findings also suggest partial mediation among SC Knowledge and information sharing and GHR concerning LG-SCM firm performance in developing

economies. The contribution of this study is multifold, including the following: (1) the possibility to explore RBV in the context of LG-SCM firm performance, with appropriate measures for explanation (58.1%); (2) the classification of constructs that affect GHRM, LGRP, and LG-SCM firm performance positively, and (3) our results demonstrate the dominant status of GHRs as an antecedent LGRP.

6.1 Limitations and future scope of the study

The major limitation of presented research lies in the unavailability of existing literature, where mainly empirical studies are deficiently found that can help in comparative analysis amongst many SC practices and their influences (Sharma *et al.*, 2021; Raut *et al.*, 2021). Another critical limitation was the generalization of the research methodology and findings, as this research has respondents from a single country. However, the present study offered crucial constructs to research community that may assist in extending their research based on the validation of our model to other countries. Also, the researchers suggest future works to compare these results with other emerging or developed economies. We also suggest longitudinal studies that can compare the results over some time in the same economy.

The study have limitedly considered 28 constructs with five constructs of SCCA, five constructs of SCIN, four constructs of SCKI, five constructs of GHR, five constructs of LGPR and four constructs of LG-SCM for testing the hypothetical relationship between proactive practices. The numbers of constructs under each dimensional strain of SC practices are needed to be increase in future studies to attain robust solutions and elevated outcomes. Additionally, the presented conventional models is also need to be validate under a specific industry, company size and operational boundaries for attaining sustainability. Moreover, the range of MCDM techniques named as TOPSIS, MOORA, GRA, AHP, DEA and so on are also need to be implicated in future studies for the selection of critical factors for testing hypothesis. Additionally, non-linear and constrained optimization models are also needed to be integrated in future studies in the present model to generalize the findings of the present study.

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