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HOW GREEN ENTREPRENEURIAL ORIENTATION INFLUENCES GREEN SUPPLY CHAIN PRACTICES: EVIDENCE FROM MSMES IN KARNATAKA

Mahendra H. R*, Ramananda Nayak V, B. D. Sumithra

Original Article

Alvas College, Moodbidri, 574227 Karnataka, India

**Corresponding Author's Email: rch.spt24@gmail.com*

Abstract

With the help of environmental dynamicism (ED) and green knowledge sharing (GKS), the study aims to determine whether green entrepreneurial orientation (GEO) has a moderating or mediating effect on MSMEs in Karnataka, India's adoption of GSM. The research employs a quantitative approach and a cross-sectional design. The theoretical frameworks are divided into three categories: knowledge-based, dynamic capability, and natural resource-based. 228 MSME owners and managers in five important Karnataka industrial areas provided data, which SmartPLS 4 collected and processed. ED has no moderating influence between GKS and GSCM, but GKS has a significant impact on GSCM and fully mediates the GEO-GSCM link, the results show. GEO positively impacts both GKS and GSCM. The model is also well-fitting, exhibiting strong predictive relevance and explanatory power (R = 0.589). This study will be beneficial for policymakers and MSME associations in promoting green leadership, a knowledge-sharing culture, and building the capacity of MSMEs for sustainable business development.

Keywords: Environmental Dynamics; Green Entrepreneurial Orientation; Green Knowledge Sharing; Green Supply Chain Management; MSMEs in Karnataka; SMARTPLS

Introduction

Indian MSMEs will need to develop environmentally responsible practices to successfully transition to more sustainable and equitable economic development in India. While the demand for environmentally friendly products and the increased demands placed on companies by customers and governments require MSMEs to find a balance between being competitive while also addressing their environmental responsibilities, research demonstrates that companies that implement green business strategies have higher levels of productivity and stakeholder trust [1]. As a result of increasing environmental pressures, many organisations have adopted Green Entrepreneurial Orientation (GEO), which describes the organisation's willingness to proactively innovate and take risks concerning the environmental opportunity. Studies have found that companies that have a high level of GEO, in part because they include environmental objectives within their entrepreneurial strategy, exhibit better sustainable performance [2]. The development of GEO utilised two theoretical stances: the Natural Resource-Based View (NRBV) and the Dynamic Capability View (DCV).

The Natural Resource-Based View (NRBV) posits that integrating environmental responsibility into strategic resources can result in a sustainable competitive advantage [3]. DCV asserts that companies must be able to continuously adapt and reconfigure their capabilities to pursue eco-innovation in dynamic environments [4, 5]. Together, these views support how the combination of entrepreneurial intent and environmental commitments provides agility and long-term

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sustainability. MSMEs in India view GEO as more than just a strategic orientation but as an essential requirement for survival in markets where green purchasing and environmentally aware consumers are prevalent. Proactive companies in developing green innovation and investing in eco-friendly processes are more likely to integrate sustainability into product design and operations and ultimately increase their competitiveness [6]. Though GEO establishes the strategic direction for a company, its realisation in exchanging tangible outcomes depends on the methods used by companies to acquire, share, and apply environmental knowledge. Green Knowledge Sharing (GKS) defines this process of exchanging eco-related information among firms and along the supply chain. GKS has been shown to be an effective way to turn strategies into real actions and helps connect leadership with better sustainable performance [7].

Other studies have demonstrated that knowledge capability enables innovation and enhances sustainable performance in the supply chain [8]. Green supply chain management integrates environmental considerations into production, transportation, sourcing, and reverse logistics and operationalises these ideas. Early studies determined that practices such as green purchasing, eco-design and customer participation improve both operational and environmental performance [9, 10]. Therefore, it is expected that companies with a strong GEO will encourage GKS, which will in turn allow them to establish a comprehensive GSCM system and enhance their sustainable competitiveness. However, the effect of these relationships is inconsistent in all contexts. Environmental dynamism (ED), resulting from rapid technological advancements, volatile markets, and changing environmental laws and regulations, will impact the degree to which knowledge sharing and green innovation affect performance [11, 12]. Due to the ever-evolving legal and technical landscape, micro, small, and medium enterprises (MSMEs) operating in countries undergoing economic transitions, such as India, need to understand how environmental dynamism (ED) affects the links between supply chain performance and knowledge. This study explores the relationship between green entrepreneurial orientation and the adoption of green supply chain management techniques in MSMEs in Karnataka through the moderating influence of environmental dynamicism and the mediating effects of green knowledge sharing. The study investigates how GEO prompts GKS, how GKS affects GSCM, if GKS functions as a mediator in the GEO-GSCM relationship and if ED modulates the strength of this relationship. Utilising SmartPLS-SEM, the study synthesises the Dynamic Capability View, the Knowledge-Based View and the Contingency Theory to generate theoretical and practical insights into how entrepreneurial orientation, knowledge processes and environmental context collectively produce sustainable supply chain behaviour in Indian MSMEs.

Research Objectives

1. Karnataka's micro, minor, and medium-sized enterprises (MSMEs) are sharing green knowledge to study green entrepreneurship.
2. The impact of green information sharing on environmentally friendly supply chain management.
3. The clear relationship between green entrepreneurship practices and green supply chain management strategies.
4. Minimise supply chain management and green entrepreneurship's adverse consequences from the dissemination of green knowledge.
5. Environmental dynamism moderates green supply chain management and green knowledge sharing.

Literature Review

A substantial amount of study has been conducted on the relationship between a company's strategy, competitiveness, and environmental consciousness, and this is reflected in sustainability-orientated entrepreneurship [13]. Even though more research is being done on the strategic role of GEO and how it affects knowledge flows and sustainable operations [2, 6], there are still a lot of disparate empirical studies on GEO and knowledge flows, especially for smaller businesses with fewer resources, which may hinder their ability to implement effective sustainability practices compared to larger firms.

Green Entrepreneurial Orientation and Green Knowledge Sharing

Green Entrepreneurial Orientation is an extension of the traditional EO construct, adding ecological values to proactivity, innovativeness and risk-taking behaviours. Firms that exhibit high levels of Green Entrepreneurial Orientation (GEO) will actively seek and exploit environmentally responsible business opportunities, utilise clean technologies to create new products and services, and identify as well as take advantage of emerging sustainability trends [2]. The Dynamic Capability View [4, 5] supports the perspective of the GEO construct and argues that firms that exhibit entrepreneurial behaviour will develop adaptive capabilities to sense, seize, and reconfigure resources in response to changes in the firm's environment. The theoretical links between GEO and Green Knowledge Sharing (GKS) exist; however, the empirical links are less well understood. Research has shown that entrepreneurial firms foster open communication and learning cultures that allow employees to share innovative ideas [14]. Within a green context, the sharing of environmental insight will facilitate the transformation of entrepreneurial intent into operational practice. Empirical studies have shown that firms with proactive environmental orientations will establish systems for collecting and disseminating eco-innovation knowledge throughout departments and supply chain partners [7, 8]. The manufacturing and technology sectors in developed nations have provided most of the empirical evidence supporting the existence of a link between GEO and GKS. Many studies of Indian MSMEs have not empirically examined the direct effects of GEO on environmental information exchange in smaller businesses without formalised learning systems.

H_1: Green Entrepreneurial Orientation is positively associated with Green Knowledge Sharing in MSMEs.

Green Knowledge Sharing and Green Supply Chain Management

Knowledge-based theory suggests that knowledge is the most valuable strategic asset for supporting sustained innovation and gaining a competitive advantage in business [15]. Green Knowledge Sharing (GKS) supports the dissemination of knowledge and skills regarding cleaner production, recycling, eco-design, and waste minimization. Research shows that knowledge-sharing culture and inter-organizational collaboration play significant roles in establishing green supply chain networks [7, 8]. Zhu & Sarkis [9] showed that early adopters of GSCM in manufacturing industries were able to achieve higher operational performance and lower resource waste primarily due to internal knowledge coordination. Nevertheless, most studies that have investigated GSCM remain cross-sectional and have neglected the behavioural factors that influence knowledge flow, such as organisational culture, employee motivation, and communication practices.

H_2: Green Knowledge Sharing is positively related to Green Supply Chain Management Practices.

Green Entrepreneurial Orientation and Green Supply Chain Management

In addition to knowledge transfer being an important mechanism, an entrepreneurial approach may directly influence the greening of supply chains. Companies with Green Entrepreneurial Orientation (GEO) could integrate sustainability principles into sourcing, production, and logistical decision-making [2]. The Natural Resource Based View [3] supports this perspective, indicating that companies with GEO perceive environmental responsibility as a strategic capability that improves both competitiveness and legitimacy. Mohanty & Prakash [1] identified that Indian companies that adopted green procurement and waste recovery practices increased both profit and reputation. However, some researchers have questioned whether GEO can independently drive GSCM results without organizational learning as an intermediate variable. Some researchers have indicated that orientation gives direction but does not provide the process required for implementation, thus requiring knowledge-sharing routines to implement GSCM [14], which are essential for translating strategic goals into effective practices that enhance sustainability in supply chain management.

H_3: Green supply chain management practices are positively impacted by green entrepreneurial orientation.

Mediation Role of Green Knowledge Sharing

According to Kusa et al. [14], knowledge management partially mediates the relationship between entrepreneurial orientation and organizational performance, stating that knowledge is the element that turns intention into an actual result. Similarly, Saleem et al. [7] found in the context of environmentally oriented business that the exchange of environmental knowledge positively affects the influence of green leadership on performance. Additionally, Singh et al. [8] also concluded that it is the information and knowledge capabilities that help create resilient supply chains. Therefore, based on these studies, the function of GKS as a mediator is evident; companies with greater levels of GEO tend to provide more opportunity for discussion regarding environmental issues, shared learning and cross-functional coordination, leading to enhanced GSCM implementation.

H_4: The association between green supply chain management practices and green entrepreneurial orientation is mediated by green knowledge sharing.

Moderation Role of Environmental Dynamism

The rate and predictability of technological, market, and regulatory change, referred to as environmental dynamism (ED), will influence the extent to which internal organisational relationships are strengthened. The contingency theory also suggests that the effectiveness of organizational abilities will be influenced by the degree to which they align with the characteristics of the environment in which they exist. Organisations that exist in dynamic environments can increase their rate of adaptation when compared to those existing in static environments when they have well-developed learning/knowledge-sharing systems. This ultimately results in better performance for these organisations. The researchers have stated that it is in environments with high levels of environmental uncertainty that the benefits of sharing knowledge and innovating become most pronounced. These findings demonstrate that environmental dynamism creates conditions in which GKS will be more effective due to increased reliance upon ongoing learning and collaboration by organisations. There is a need for further research regarding the moderation mechanism in this context for Indian MSMEs, where frequent regulatory changes and technological disruptions are common. Investigation into this interaction will offer clarity about the ways in which contextual dynamics influence the relationship between knowledge and performance within green supply chain contexts.

H_5: The relationship between green supply chain management practices and green knowledge sharing is moderated by environmental dynamicism, with a stronger correlation under high environmental dynamicism levels.

Methodology

The use of quantitative methodology was made because it enables the researcher to simultaneously investigate the latent constructs' direct influence, indirect effect (mediation), and moderation. GEO, GKS, GSCM, and ED relationships in MSMEs across Karnataka were investigated using a cross-sectional and explanatory approach.

Sample Selection and Data Collection

The MSMEs were randomly sampled from five districts located in Karnataka. The five districts, Bengaluru Urban, Mysuru, Hubballi-Dharwad, Mangaluru (Dakshina Kannada), and Belagavi, have been identified as having the greatest amount of industrial maturity and entrepreneurial activities. These districts provide a representative example of the diversity of MSMEs found within Karnataka. In addition, these districts include a combination of both technology-based and traditional MSME clusters that are representative of the overall industrial landscape found within the state. Purposive sampling was conducted due to the inability to accurately determine the total population of MSMEs in Karnataka. This allowed the researcher to obtain a sample of MSMEs that would be representative of the diversity of industries and locations of MSMEs found in Karnataka.

Instrument Development and Measurement

The survey questionnaire consisted of scales that were concise and adapted from previously validated instruments. GEO was defined as being environmentally proactive and innovative and taking risks. GEO was measured with 5 items [2, 16]. GKS was measured using 4 items [7, 17]. GSCM was measured with 5 items [9, 10]. ED was defined as being associated with technological, market and regulatory uncertainty. ED was measured with 3 items [11, 12]. A 5-point Likert scale was used to rate each of the previously specified items. The rating ranged from 1 (strongly disagree) to 5 (strongly agree).

To make sure the language used was understandable and the context was pertinent, three academic experts and two MSME practitioners evaluated the instrument created for this study.

Data Screening and Control of Common Method Bias

All of the data collected for this study was screened using SPSS version 26 before any analysis. There were no missing values or extreme outliers in the data. Furthermore, normality was not an issue because PLS-SEM does not depend on the presumption that data is normally distributed. Potential multivariate outliers were found using Mahalanobis distance. The critical value was not exceeded by any of the computed distances. The purpose of the questionnaire was to arrange the items in a random order. Respondent anonymity was maintained, and the predictor and criterion variables were separated. According to the findings of Harman's single-factor test, the first factor accounted for less than 40% of the variance.

Data Analysis

After initial screening in SPSS, SmartPLS version 4 was used to estimate the model parameters. Discriminant validity was confirmed using the HTMT ratio, while the outer VIF values were used to evaluate collinearity. The direct, mediating, and moderating impacts of the structural model were assessed using bootstrapping with 5000 resamples. The R2, f, and Q statistics were used to assess the predictive relevance and model fit.

Ethics

This study complied with institutional research ethics guidelines. The secrecy of their involvement was guaranteed to the respondents, and this study excluded no vulnerable groups (refer to Table 1 below).

Table 1: Constructs, Number of Items, and Sources

Construct	Key Dimensions	No. of Items	Source(s)
GEO	Proactiveness, innovativeness, risk-taking	5	Covin & Slevin [16]; Habib et al. [2]
GKS	Internal and external knowledge exchange	4	Huang et al. [17]; Saleem et al. [7]
GSCM	Green purchasing, eco-design, customer cooperation	5	Zhu & Sarkis [9]; Zhu et al. [10]
ED	Market, technological, and regulatory uncertainty	3	Chan et al. [11]; Sharma et al. [12]

Source: Collected by Author

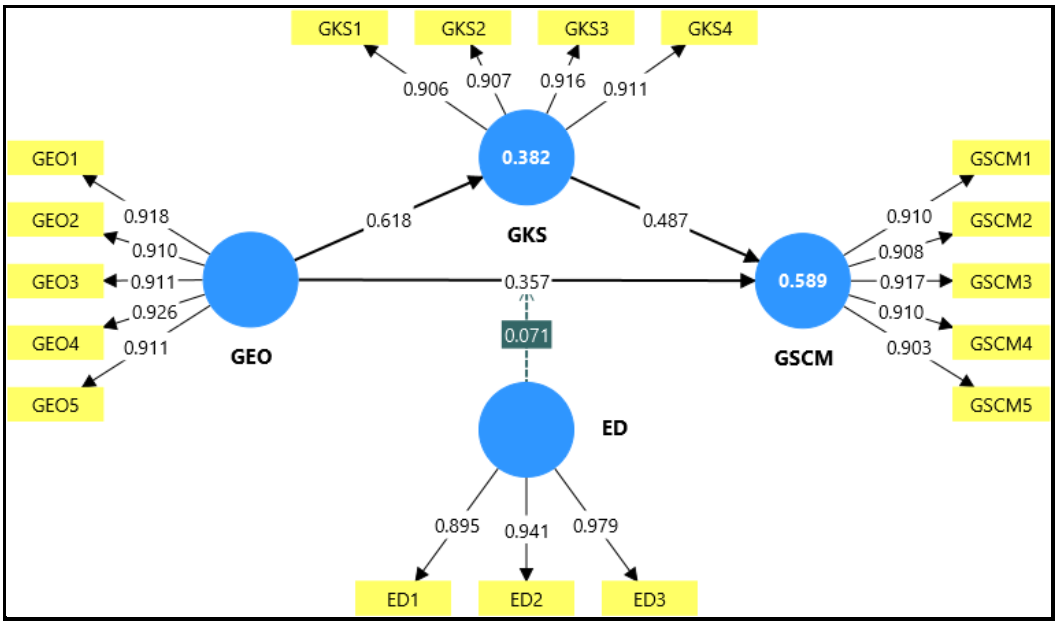
Result

This section presents the findings obtained from the Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis conducted using SmartPLS 4. The analytical procedure was carried out in two sequential stages in accordance with the recommended methodological guidelines. In the first stage, the measurement model was evaluated to ensure the reliability, validity, and overall adequacy of the constructs. The second stage focused on examining the structural paths among the constructs, the results of which are reported in this section.

Measurement Model Evaluation

The Measurement Model was evaluated using the four most crucial assessment criteria: discriminant validity, convergent validity, internal consistency reliability, and outer loadings. All the constructs—that is, Environmental Dynamism (ED), Green Supply Chain Management (GSCM), Green Entrepreneurial Orientation (GEO), and Green Knowledge Sharing (GKS)—met the proper standards for these criteria, according to Hair et al. [18], Fornell & Larcker [19], and Henseler et al. [20]. The measuring model, standardised factor loadings, and construct interactions are shown in Figure 1.

Figure 1: Measurement Model



Source: Collected by Author

Construct Reliability and Outer Loadings

Each indicator was reliable enough to be used in the analysis because all the loadings were greater than 0.70 [18]. Additionally, the composite reliability (CR) and Cronbach's alpha for each indicator were higher than 0.70, demonstrating adequate dependability [19]. Since the average variance extracted (AVE) values were all more than 0.50, all measures demonstrated strong convergent validity, according to Fornell and Larcker [20]; refer to Table 2 for further details. All the constructs have Cronbach's alpha and CR values of at least 0.90 [19], indicating exceptional reliability. AVE values were higher for every construct. The value of 0.80 demonstrated strong convergent validity, consistent with previous SmartPLS-based validation methods used in research on digital adoption [20, 21].

Table 2: Construct Reliability and Outer Loadings

Construct	*Item*	*Outer Loading*	*Cronbach's α*	*Composite Reliability (CR)*	*AVE*
Environmental Dynamism (ED)	ED1	0.895	0.943	1.346	0.882
	ED2	0.941			
	ED3	0.979			
Green Entrepreneurial Orientation (GEO)	GEO1	0.918	0.952	0.952	0.838
	GEO2	0.910			
	GEO3	0.911			
	GEO4	0.926			
	GEO5	0.911			
Green Knowledge Sharing (GKS)	GKS1	0.906	0.931	0.932	0.828
	GKS2	0.907			

	GKS3	0.916			
	GKS4	0.911			
Green Supply Chain Management (GSCM)	GSCM1	0.910	0.948	0.948	0.827
	GSCM2	0.908			
	GSCM3	0.917			
	GSCM4	0.910			
	GSCM5	0.903			
Moderation Term	ED × GEO	1.000	–	–	–

Source: Collected by Author

Discriminant Validity (HTMT)

The constructs' discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) ratio. All the HTMT ratios were less than 0.85 which implies that all the constructs were unique and there was no overlap between them in terms of concepts [22]. These results support prior SmartPLS based behavioural studies that demonstrated HTMT ratios which represented a satisfactory level of distinctiveness among constructs [23, 24]. A summary of these results is found in Table 3.

Table 3: HTMT Ratios

Construct	ED	GEO	GKS	GSCM	ED × GEO
ED	–				
GEO	0.064	–			
GKS	0.125	0.656	–		
GSCM	0.053	0.698	0.753	–	
ED × GEO	0.021	0.084	0.024	0.098	–
Note: HTMT values < 0.85 = acceptable discriminant validity [22].					

Source: Collected by Author

All constructs satisfied the HTMT criterion, confirming adequate discriminant validity across the measurement model.

Fit to the Model

Additional evidence for the measuring model's quality was provided by model-fit statistics. Both the saturated model (SRMR = 0.036) and the estimated model (SRMR = 0.052) met Hu & Bentler's [25] cutoff value of < 0.08. Additionally, both models' NFI values (0.926 and 0.923, respectively) were greater than 0.90 [26], which confirmed a good fit to the data. These outcomes demonstrated that the measuring model was valid, dependable, and a sufficient representation of the gathered data.

Evaluation of Structural Model

Following the guidelines of Hair et al. [18], there were two stages to the evaluation of the structural model. The variance inflation factor (VIF) values for each construct were examined in the first phase to evaluate multicollinearity. Multicollinearity was not an issue, as indicated by the VIF values, which varied from 1.34 to 1.54. The statistical significance of the proposed structural routes inside the model was tested in the second phase using a bootstrapping process with 5,000 resamples.

Testing of Hypotheses

Green Knowledge Sharing (GKS) was significantly and favourably impacted by Green Entrepreneurial Orientation (GEO), and Green Supply Chain Management (GSCM) was also positively impacted by both GEO and GKS (refer to Table 4 below). Furthermore, the indirect path from GEO to GSCM through GKS was also statistically significant, therefore providing evidence of a mediating process. Environmental Dynamism's (ED) moderating influence on the association between GKS and GSCM, however, was determined to be statistically insignificant. Collectively, these results demonstrate that the main factors influencing MSMEs' adoption of sustainable supply chain management methods are their desire to be entrepreneurial and their knowledge-sharing procedures [2, 7].

Table 4: Results of Hypotheses Testing

Hypothesis	Path	*β*	*t*	*p*	Result
H_1	GEO → GKS	0.618	16.157	0.000	Supported
H_2	GEO → GSCM	0.357	6.724	0.000	Supported
H_3	GKS → GSCM	0.487	9.540	0.000	Supported
H_4	GEO → GKS → GSCM	0.301	8.035	0.000	Supported
H_5	ED × GEO → GSCM	0.071	1.314	0.189	Not Supported
Note. Significance assessed at $p < 0.05$ (two-tailed)					

Source: Collected by Author

Variance Explained, Effect Size, and Predictive Relevance

The authors analysed how well the model can explain and predict variables using R^2 as the coefficient of determination [20, 27, 28, 29], f^2 as an effect size [28], and excellent predictive relevance (Q^2), which was proposed by Shmueli et al. [30]. In Table 5 authors can see that GEO explains 38.2% of the variation in GKS, while GEO + GKS + GEO × GKS together explain 58.9% of the variation in GSCM, indicating moderate to high levels of explanatory capacity. Their effect size statistics also indicate that GEO → GKS has a very strong effect size, and so does GKS → GSCM, while GEO → GSCM has a moderate effect size. Finally, the effect size for the moderating path (ED × GEO → GSCM) is very weak. Therefore, both positive Q^2 values for GKS and GSCM show authors that the model provides excellent predictive capacity [30].

Table 5: Model Explanatory Power, Effect Size, and Predictive Relevance

Endogenous Construct	Predictor	R^2	f^2	Q^2	Effect Size
GKS	GEO	0.382	0.618	0.382	Large
GSCM	GEO	0.589	0.186	0.589	Medium
	GKS		0.340		Large
	ED × GEO		0.011		Small

Source: Collected by Author

These indicators together show that the structural model is very good at explaining and predicting outcomes, highlighting the important roles of entrepreneurial orientation and knowledge exchange in reaching environmentally sustainable supply-chain performance among MSMEs in Karnataka [14].

Discussion

The degree to which MSMEs in Karnataka participate in green activities daily is correlated with green entrepreneurial attitude, according to the study's findings. Research indicates that the frequency of sharing environmental knowledge both inside and between departments is substantially positively correlated with green entrepreneurial attitude. This type of knowledge exchange is thought to foster learning within the organization, promote collaborative behaviour among employees and facilitate the use of new knowledge to address issues and create new opportunities. Consistent with the dynamic capability view of entrepreneurial firms [4, 5], the study also supports prior empirical studies demonstrating that green entrepreneurial leadership creates communication systems within organisations that allow the exchange of employee-generated ideas related to environmental issues [2, 7]. The study demonstrates that knowledge exchange is an essential part of green supply chain management, in line with the previously described studies. Prior research supports the idea that when environmental information is communicated freely between departments and with partners, organisations can adopt eco-design, green purchasing, and customer cooperation [8]. The study offers more proof that knowledge capabilities are critical for sustainability and green innovation, which is in line with the firm's knowledge-based orientation [15]. Small and medium-sized businesses (MSMEs) can use learning culture to improve their environmental performance and make up for the lack of access to formal education or science and technology training. There is a good direct correlation between green supply chain management and green entrepreneurial orientation,

suggesting that entrepreneurship with a sustainability focus might improve organisational performance. Adoption of proactive and innovative environmentally friendly business processes by MSMEs enhances their reputation and establishes trust among stakeholders supporting the natural resource-based view of the firm [3]. Previous research supports the idea that proactive green entrepreneurs invest in cleaner technologies and will improve their sustainability performance [2, 6]. Finally, the mediating role of green knowledge sharing suggests that the cognitive mechanisms utilised by green entrepreneurial orientation to convert strategic intentions into operational actions occur through the exchange of knowledge that promotes cross-functional collaboration and problem-solving. Studies show that the relationship between entrepreneurial orientation and business performance is mediated by knowledge management.

Informal discussions and informal partnerships or networks provide a viable substitute for formally established learning systems for MSMEs [7, 14], particularly in environments where formal structures may be lacking or ineffective in fostering knowledge sharing and collaboration. While environmental dynamism did not significantly moderate the relationships between supply chain management and knowledge sharing, it does suggest that knowledge processes continue to have a positive impact on supply chain management regardless of the degree of dynamism, even though general environmental dynamism affects firms. Additionally, the findings may suggest that contextual factors such as policy incentives or digital capabilities may be responsible for explaining additional variability in future studies, particularly in how these factors influence the effectiveness of supply chain management and knowledge sharing in MSMEs. Overall, the findings demonstrate strong explanatory and predictive capability, confirming that the combined effects of entrepreneurial and knowledge-based capabilities together explain a large percentage of sustainable supply chain behaviours exhibited by MSMEs. The high predictive power and substantial effect sizes observed here reinforce that the combined theoretical frameworks of the Dynamic Capability View, Knowledge-Based View, and Natural Resource-Based View provide a valid means to describe how entrepreneurial vision and learning lead to sustainability in resource-constrained MSMEs.

Practical Implications

The results of this research will offer practical application for both MSME (micro, small, and medium enterprises) policymakers in Karnataka and government policymakers who are looking to "green" their businesses. The high correlation between green supply chain management (GSCM) and green knowledge sharing (GKS) and green entrepreneurial orientation (GEO) shows that MSMEs can develop an environmentally friendly mindset or way of thinking about running a firm. Entrepreneurship development programs offered in various industrial zones, including Bengaluru, Mysuru, Hubballi-Dharwad, Mangalore, and Belagavi, could be designed to support green innovation and leadership through initiatives like Beyond Bengaluru and the ZED scheme. The evidence demonstrated that Green Knowledge Sharing (GKS) was one of the most critical enablers, and thus, MSME clusters should facilitate digital and local platforms for sharing eco-innovative ideas, supplier experience, and low-cost green technologies. Additionally, the data shows that GEO and GKS work together to improve green supply chain management (GSCM) practices, which can lead to enhanced sustainability and efficiency in resource use across various industries. Therefore, it is obvious that all organisations must take environmental factors into account when making decisions about sourcing, product design, and logistics. Organisations offering support, such as KASSIA and the District Industry Centre, may provide toolkits, mentoring, and incentives to support the adoption of green procurement and waste management practices. Additionally, since the internal knowledge culture of organisations and universities has been shown to be more influential than external volatility, the state should prioritise capacity-building programmes under RAMP and Skill India to foster partnerships with local university programmes and KREDL for the development of solar energy and circular economy opportunities. Overall, collectively, these actions would enable Karnataka's MSMEs to convert their green intent and shared knowledge into tangible environmental and competitive benefits.

Conclusion

The findings demonstrate that Green Knowledge Sharing (GKS) and Green Supply Chain Management (GSCM) are positively impacted by Green Entrepreneurial Orientation (GEO). It has been demonstrated that GKS mediates the

relationship between GEO and GSCM, indicating that knowledge sharing is the primary mechanism linking environmentally friendly supply chain practices with entrepreneurial attitude. In addition, Green Knowledge Sharing (GKS) was moderated by Environmental Dynamism (ED); therefore, the effects of GEO on GKS and GKS on GSCM were greater when the external environment was more dynamic. The integrated approach that incorporates dynamic capability, knowledge-based, and natural resource-based views clearly shows how MSMEs in Karnataka can establish green supply chain management. This research indicates that MSME policymakers can attain environmental competitiveness through increasing entrepreneurial vision (vision), encouraging knowledge sharing (knowledge) and integrating environmental considerations into the company's operations (values). Policymakers can assist in developing a "green leadership" programme and by encouraging inter-firm cooperation to promote green innovation as well as create incentives for companies to innovate sustainable products and services. The cross-sectional design of the study and the self-reporting nature of the data are its limitations. It is advised that future research evaluate the theoretical model or models at various points and in various geographical areas and industries using mixed-method approaches or longitudinal methodologies.

Conflict of Interest

The authors confirm that they have no personal, professional, or institutional affiliations, and no financial or non-financial relationships, that could be perceived as influencing the content or findings presented in this manuscript.

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