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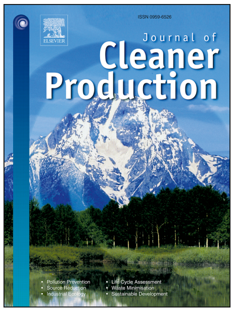

Why does “green” matter in supply chain management? Exploring institutional pressures, green practices, green innovation, and economic performance in the Chinese chemical sector

Xu Wen, Jun-Hwa Cheah, Xin-Jean Lim, Sridar Ramachandran

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1. **Xu Wen**: Conceptualization and Writing (i.e., original draft, review, and editing).

2. **Jun-Hwa Cheah**: Methodology, Formal analysis, Validation, and Writing (i.e., review and editing).

3. **Xin-Jean Lim**: Validation and Writing (i.e., review and editing).

4. **Sridar Ramachandran**: Validation and Writing (i.e., review and editing).

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Author Details:
Xu Wen
Associate Professor
School of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia;
Department of Economics and Management, Tianjin Bohai Vocational Technology College, Tianjin, CN
Email: akiatm@163.com
ORCID: 0000-0003-1682-6176

Jun-Hwa Cheah **(Corresponding Author)**
Associate Professor
Norwich Business School, University of East Anglia, Norwich, Norfolk, United Kingdom.
Email: jackycheahjh@gmail.com
ORCID: 0000-0001-8440-9564

Xin-Jean Lim
Centre of Value Creation and Human Well-being Studies, Faculty of Economics and Management, Universiti Kebangsaan Malaysia, Selangor, Malaysia
Email: lim.xinjean@yahoo.com
ORCID: 0000-0002-6794-3607

Sridar Ramachandran
Professor
School of Business and Economics, Universiti Putra Malaysia, Serdang, Malaysia;
Email: sridar@upm.edu.my

Why does "Green" matter in supply chain management? Exploring institutional pressures, green practices, green innovation, and economic performance in the Chinese chemical sector

ABSTRACT

There is a growing concern over the depletion of natural resources caused by rapid industrialization and its impact on the environment. As a response to these concerns, many companies are now focusing on implementing green supply chain management (GSCM) practices and green innovation (GI) as part of their environmental strategies to improve their economic performance (EP). Empirical evidence regarding the actual effects of these practices on the economic performance of Chinese chemical companies is still limited, warranting further investigation. To close the gap, this study utilizes the resource-based view and Institutional Theory to explore how three types of institutional pressures influence GSCM practices in Chinese chemical companies. Additionally, it examines the role of top management support (TMS) in shaping the relationship between GSCM practices and economic performance. The PLS-SEM approach was used to analyze the data gathered from 414 samples from listed Chinese chemical companies. The findings of the study revealed four key outcomes: First, institutional pressures have a positive influence on the adoption of GSCM practices by companies. Second, both GSCM practices and GI have a positive impact on economic performance, indicating that companies can enhance their economic performance by incorporating environmentally friendly practices. Third, GI acts as a mediator between GSCM practices and economic performance, indicating that the implementation of GI plays a crucial role in improving companies' economic outcomes through GSCM practices. Lastly, the relationship between GSCM practices and economic performance is strengthened when top management provides strong support for these initiatives. Overall, these findings not only have an academic impact on the supply chain domain but also provide effective environmental management practices to the top managers in Chinese chemical sector, allowing them to make decisions that benefit organizational efficiency, innovation, and performance. By identifying the factors that drive the adoption of GSCM practices and their influence on economic performance, the study offers valuable guidance for companies to integrate sustainable practices into their operations.

Keywords: green supply chain management; green innovation; Institutional Theory; Resource-based View; top management support; PLS-SEM

1.0 Introduction

Increased global awareness of environmental pollution has prompted organizations worldwide to prioritize ecological concerns (Shen et al., 2020). It can also be seen that discussions on environmental sustainability have gained international prominence. Embracing the principles of sustainable development, manufacturing enterprises around the world are transitioning from a profit-centric approach to one that integrates economic and environmental objectives to meet the growing demand for sustainable practices (Ahmed et al., 2019).

Developing countries like China, in particular, have faced numerous environmental challenges as their economies expand. According to the Ministry of Ecology and Environment (2022), China incurred ecological damage costs of 0.78 trillion yuan (approximately 109.497 billion USD) and pollution loss costs of 1.5 trillion yuan (approximately 210.5701 billion USD) in 2021. These figures represent the economic damage from unsustainable development practices, which can hinder China's long-term economic growth and development. Furthermore, environmental degradation significantly impacts human health and overall quality of life. Cheng and Nathanail (2018) highlighted that the rapid economic development in China's eastern region has recently coupled with substantial industrial pollution, in around 459 cancer villages in China.

The Chinese chemical industry, while integral to the country's industrialized economy, faces significant environmental challenges, such as pollution and greenhouse gas emissions. Consequently, Chinese chemical companies confront institutional pressures, driven by environmental sustainability requirements and the need to maintain organizational legitimacy (Peng et al., 2021). These pressures emphasize the importance of adopting green practices based on legitimacy and social responsibility, as highlighted by Qi et al. (2021). Scholars widely acknowledge that institutional pressures play a pivotal role in motivating companies to adopt environmentally-friendly practices. For instance, El-Garaihy et al. (2022) argue that institutional pressures influential pressure on companies to adopt green supply chain management (GSCM) practices. As consumer demands evolve and public awareness of environmental issues grows, companies face increasing pressures to implement GSCM practices (Huang and Chih-Hsuan, 2022). Despite this consensus, some studies present contrasting findings. Yang (2018) found that institutional pressures have a limited influence on GSCM practices in Taiwanese container shipping companies. Saeed et al. (2018) identified that mimetic pressure negatively affects GSCM practices in the Pakistani manufacturing industry. Similarly, Zhu et al. (2013) observed that coercive pressure does not significantly impact the adoption of GSCM practices in Chinese companies. These divergent results demonstrate the inconsistency in previous research concerning the positive impact of various types of institutional pressures on GSCM practices. To address this research gap, our study aims to provide fresh empirical evidence by specifically examining the relationship between institutional pressures (coercive, normative, and mimetic) and GSCM practices within Chinese chemical companies.

Moving forward, the Resource-Based View (RBV) introduced by Barney (1991) serves as a valuable framework for analyzing internal practices based on their attributes of being valuable, rare, inimitable, and non-substitutable (VRIN). In the context of this study, green supply chain management (GSCM) practices is broadly defined as the integration of environmental considerations into supply chain management, as proposed by Srivastava (2007). Similarly, green innovation (GI), based on Soewarno's (2019) definition, refers to innovative practices in products, processes, and management to minimize environmental impacts and achieve sustainable competitiveness. Both GSCM practices and GI are considered to possess VRIN attributes, enabling firms to adopt greener strategies, reconfigure resources for eco-friendliness, and reduce energy consumption and carbon emissions, as demonstrated in the literature (Aslam et al., 2019; Cheah et al., 2022).

However, innovation inherently carries uncertainties, and businesses face challenges in increasing the success rates of their innovations while controlling research and development (R&D) costs (Wong et al., 2020). Similarly, eco-friendly product design may lead to higher prices at various stages of the product lifecycle (Tariq et al., 2020). To strike a balance between environmental concerns and economic performance (EP), which represents the economic advantages achieved through business activities (Zhang and Ma, 2021), effective management of both GSCM practices and GI becomes crucial. To investigate this conflicting view, this study employs the RBV to examine how GSCM practices and GI individually influence EP in the Chinese chemical sector. Both GSCM practices and GI are perceived as potential internal resources capable of enhancing a company's performance and conferring competitive advantages in the marketplace (Seman et al., 2019). GSCM practices are recognized as critical green practices that benefit both the environment and EP. GI, on the other hand, is seen as supporting the greening of each stage within the supply chain (Viale et al., 2022). Notably, innovation is considered a key factor in the successful implementation of GSCM practices (Siddiqui, 2019). Nevertheless, the adoption of innovation does not always lead to improved cost control or enhanced EP for some companies, with cost concerns posing barriers to its adoption among many manufacturers. For instance, Wang et al. (2017) mentioned that most Chinese companies believe that investing in innovation comes with high costs and risks. Thus, exploring the relationship between GSCM practices, GI, and EP assumes significant importance, and this study aims to address this gap by emphasizing the potential mediating role of GI in explaining the indirect impact of GSCM practices on economic performance within the Chinese chemical sector.

Furthermore, top management support (TMS) assumes a critical role in guiding an organization's environmental initiatives and significantly influencing the firm's overall development trajectory due to its influential position within the company (Liu et al., 2020). TMS is considered the cornerstone factor impacting a firm's adoption of green practices (Huang and Chih-Hsuan, 2022), and its support is acknowledged as a key driver for motivating companies to adopt green practices (Liu et al., 2020). To foster sustainable economic development, top managers are more inclined to support the implementation of green practices (Burki and Ersoy, 2019), particularly when such practices can improve EP (Sturdivant and Ginter, 1977). Profitable businesses are also more motivated to adopt green practices. Consequently, it can be predicted that TMS may moderate the impact of green practices adoption on EP. Despite existing studies primarily focusing on the direct relationship between TMS and green practices (e.g., Ilyas et al., 2020; Liu et al., 2020), this study seeks to contribute to the body of knowledge by examining TMS as a potential moderator in the link between green practices (GSCM practices and GI) and EP.

In conclusion, this study makes three contributions by comprehensively evaluating the existing literature on GSCM practices while employing both RBV theory and institutional theory. First, we examine how institutional pressures affect GSCM practices in the context of the Chinese chemical sector using institutional theory. The results show that institutional pressures (i.e., coercive, normative, and mimetic) have an impact on GSCM practices, which yield interesting findings that supplement the existing body of GSCM knowledge. Second, drawing upon the RBV theory, we investigate the relationship between GSCM practices, GI, and EP. The result indicates that both GSCM practices and GI have a positive impact on organizations' EP. In addition, our study demonstrated that GI plays a crucial role in linking the relationship between GSCM practices and EP. Lastly, our findings also show that TMS plays a significant moderating role in influencing the relationship of GSCM practices on EP, which provides robust scientific evidence for an optimized supply chain structure.

The remainder of this paper is structured as follows. Section 2 provides existing literature reviews. Hypotheses are developed in Section 3, followed by the research methodology and data analysis in Section 4. Section 5 presents the results. Discussion and implications in Section 6, followed by conclusion in Section 7. Limitations and future research directions in Section 8.

2.0 Literature review

2.1 Theoretical reviews

2.1.1 Resource-based view theory

The RBV and Institutional Theory are used in this study to investigate the full pressures-practices-performance model of GSCM practices in the context of the Chinese chemical sector. The environmental management strategy literature study emphasizes the link between a firm's environmental management and organizational performance. From the RBV perspective, organizations should harness various resources (i.e., tangible, intangible, or capability) to increase their competitiveness (Hart, 1995). This theory asserts that resources, such as human capital, technology, equipment, and information, have traditionally been recognized by businesses as a means of gaining a competitive advantage and improving organizational performance (Sarkis et al., 2011). In addition, the RBV proposes that resources should have four important VRIN attitudes in order to create a long-term competitive advantage (Barney, 1991).

Based on the abovementioned, this study discusses GSCM practices and GI as VRIN assets in the context of the full pressures-practices-performance model. The fundamental goal of GSCM practices and GI is to mitigate social and environmental hazards (Le et al., 2022) and create new opportunities for engaging in green practices, thereby enhancing competitiveness and organizational performance (Kalyar et al., 2020). Hence, GSCM practices and GI fulfill the criteria set by the RBV for generating and promoting greater competitiveness and performance. This is because GSCM practices and GI are typically integrated into the company's multifaceted environmental management strategies, endowing environmental management with organization-specific characteristics that confer more significant advantages to the company compared to its competitors in the marketplace. Barney et al. (2021) further developed RBV theory, which is that institutional pressures are crucial in addressing imbalances between firms' resource demand and supply. Thus, integrating GSCM practices and GI into stakeholder-oriented management activities enhances the organizational capacity to address their sustainability goals effectively (Le, 2023). Additionally, this integration contributes to strengthening organizations' ability to manage their competitiveness to achieve EP effectively (Seman et al., 2019).

2.1.2 Institutional theory

On the other hand, the influence of institutional pressures on the adoption of GSCM practices can be analyzed through the lens of Institutional Theory. Huang and Chen (2022) argue that institutional recognition gives companies a sense of purpose and existence. From this perspective, Institutional Theory strongly shapes the adoption of green practices within organizations (e.g., Rahman et al., 2023 and Qi et al., 2021).

The Institutional Theory, first introduced by DiMaggio and Powell in 1983, plays a crucial role in understanding organizational management by identifying various institutional pressures that influence companies' behavior. These pressures include coercive pressure, normative pressure, and mimetic pressure. Coercive pressure refers to the influence exerted on organizations by external entities upon which they depend, such as regulatory agencies. Companies adopt pollution control technologies to comply with governmental regulations, exemplifying the impact of coercive pressure. Normative pressure, on the other hand, stems from values and standards of conduct promoted by professional networks, industry associations, and academic institutions. Managers align their work processes and environment to meet the requirements set by these entities, as observed in various studies (Rivera, 2004; Saeed et al., 2018). Mimetic pressure is motivated by the tendency of companies to imitate the practices of successful competitors in the industry. When faced with uncertainties regarding the best course of action, top managers often resort to imitating and learning from successful firms, particularly their competitors (Zhu and Geng, 2013; Liu et al., 2020).

2.2 Green supply chain management (GSCM) practices

GSCM has been found to contribute to the reduction of adverse environmental impacts throughout the supply chain without compromising operational quality, production costs, reliability, and overall performance (Roh et al., 2022). Arisen from the environmental requirements and concerns, GSCM offer competitive advantages and governmental benefits (Al-Ghwayeen and Abdallah, 2018). By adopting GSCM practices, organizations can effectively reduce the adverse environmental effects of their business activities while providing additional value to customers (Chavez et al., 2016).

In line with the latest Chinese environmental policy, Chinese companies are aiming for products with zero CO^2 emissions and carbon neutrality in their operational processes. However, many unanswered questions remain about GSCM practices, as the green supply chain field has only recently gained prominence, particularly in China. Theories and practices in this context are rapidly developing to facilitate the successful implementation of GSCM practices in Chinese companies (Qiao et al., 2022). Researchers in operations management have published numerous papers on GSCM practices, exploring the significance of different GSCM dimensions for practice development. Appendix 1 summarizes some main research in regard to GSCM practices and internal/external outcomes.

To define GSCM practices, Zhu and Sarkis (2004, p.267) conducted a comprehensive review of sustainability literature and stated that "GSCM ranges from green purchasing to the integration of the supply chain, starting from suppliers, manufacturers, customers, and finally, reverse logistics, which involves 'closing the loop'." Empirical research has proposed that GSCM practices can be categorized into four dimensions: green purchasing, internal environmental management, cooperation with customers, and investment recovery (Zhu et al., 2007). In essence, GSCM practices encompass determinants and outcomes that account for environmental considerations in daily supply chain activities (Nkrumah et al., 2021).

Organizational managers adopt GSCM practices as a means to navigate the demanding environmental pressures imposed by governmental regulators and customers. These practices assist companies in enhancing their EP by investing other green practices like GI into their business operations. However, empirical evidence is limited in demonstrating the relationship between GSCM practices and GI in terms of enhancing EP. Therefore, the development of long-term innovation capabilities is necessary to effectively respond to external pressures.

2.3 Green innovation (GI)

GI refers to the development of new ideas, products, services, procedures, and environmental management systems that can effectively address environmental challenges (Zhang et al., 2020). The significance of institutional, social, and economic sustainability further strengthens the rationale for investing in this aspect (Saunila et al., 2018). Generally, it is defined as a process that contributes to the creation of new products and technologies with the aim of reducing environmental risks, such as pollution and the negative consequences of resource exploitation (Castellacci and Lie, 2017, p.1036). The main objectives of GI are to enhance the performance of green products and services for end users, and eventually exhibit a positive impact on corporate competitive advantage (Takalo et al., 2021).

As documented in the literature review, an organization that cultivates GI has been found to increase organizational flexibility and cost efficiency (Xie et al., 2019), which in turn helps to mitigate environmental challenges (Pan et al., 2020), improve resource efficiency (Fang et al., 2020), create opportunities for eco-friendly practices (Jahanshahi et al., 2019), reduce pollution rates, increase recycling, and save energy (Awan et al., 2019). GI serves as a significant tool for society, institutions, and firms to fulfill ecological responsibility and plays a crucial role in gaining competitiveness and enhancing EP in the face of environmental concerns (Saunila et al., 2018). Moreover, GI helps organizations protect their business models from imitation by competitors (Takalo et al., 2021) and is also essential for maintaining legitimacy (Shen et al., 2020). However, most past studies paid attention to the direct relationship between GI and GSCM practices on EP. Viale et al. (2022) state that GI is essential in offering eco-friendly innovation capabilities to support each supply chain step. On the other hand, Przychodzen et al. (2019) argue that GI negatively influences EP. Thus, exploring the GI as a potential mediation role to influence GSCM practices and EP is important. Therefore, this study aims to thoroughly examine the direct and indirect relationship between GSCM practices, GI, and EP in the Chinese chemical sector.

2.4 Top management support (TMS)

It is widely recognized that top management plays a crucial role in creating a supportive, trustworthy, and beneficial environment for organizational performance. According to Rodríguez et al., (2008), TMS can be defined as the provision of essential support to operational processes and the responsibility of providing clear instructions for the functioning of a firm. Additionally, Zahra et al. (2006) stated that TMS involves senior managers serving as executive sponsors for business procedures and maintaining commitment.

Wang et al. (2022) emphasized that top management holds the responsibility for resource allocation. Also, the support from top managers can be in the form of allocating sufficient resources and support to ensure the implementation of environmental practices (Chu et al., 2017). For example, top managers provide clear guidance and agreements that help organizations eliminate uncertainties. Therefore, it is crucial for top managers to be committed to utilizing all available green resources and capabilities to foster environmental development within the organization. Implementing green practices, such as GSCM practices and GI, necessitates access to extensive green resources and capabilities, which can only be made available through the active support of top managers. Therefore, the support of top managers in adopting green practices serves as a catalyst in motivating companies to effectively implement GI and GSCM practices.

3.0 Hypotheses development

3.1 Institutional pressures and GSCM

Institutional pressures highlight that companies which operate as social entities and profit-making entities, often face significant pressures to meet institutional expectations to gain social legitimacy and valuable resources (DiMaggio and Powell, 1983). Conversely, failing to meet these expectations can potentially harm organizational performance and long-term growth (Scott et al., 2004). DiMaggio and Powell (1983, p.7) emphasized three types of institutional pressures that contribute to "an organizational propensity to converge on a single practice in a given industry", namely coercive, normative, and mimetic pressures.

Firstly, Chinese governments at both the local and national levels have exerted coercive pressures on chemical companies due to concerns over limited resources and environmental degradation. This has been done through increased environmental supervision and tax policies (Sun and Razzaq, 2022). In line with DiMaggio and Powell's (1983, p.7) perspective, enterprises attach importance to political power and institutional legitimacy to safeguard their social reputation and economic rewards. Coercive power is thus considered to have the most significant influence on the adoption of GSCM practices (Cousins et al., 2019). Non-compliance with Chinese environmental regulations puts these companies at risk of facing legal consequences, and in severe cases, they may be forced to exit the business market altogether.

Additionally, there is normative pressure on companies to adopt GSCM practices driven by young customers and suppliers who have heightened environmental expectations. As emphasized by Ahmad and Zhang (2020), young Chinese customers are increasingly aware of environmental issues and prefer to consume "green" products. Similarly, Zhang et al. (2023) stated that diversifying suppliers from various regions and selecting those with strong environmental credentials may assist companies in reducing transportation-related carbon emissions and energy consumption, thereby increasing their resilience to risk and boosting economic growth. Moreover, both internal and external professionals, as well as environmentalists, exert pressure on the chemical sector to implement environmental management strategies in their daily operations. For example, Gawusu et al. (2022) highlight that international trade barriers serve as a stimulus for companies to adopt GSCM practices. Zhu et al. (2013) argue that pressures from export sales and international customers, as well as consumer demands, play a significant role in motivating companies to embrace green practices.

On the other hand, mimetic pressure occurs when a firm imitates the successful behaviors of its competitors. Companies may choose to imitate competitors simply because they have achieved success and it is perceived that they can achieve similar success by adopting the same behaviors. As highlighted by Zhu and Sarkis (2007), the process of globalization has provided Chinese chemical companies with opportunities to observe and mimic the successful practices of their international competitors, particularly foreign companies operating within China. In a broader context, as GSCM practices have demonstrated their effectiveness as green practices, Chinese companies are motivated to adopt GSCM practices with the expectation that they will bring economic benefits to their firms (Yang, 2018).

In the context of this study, it is expected that Chinese chemical companies encounter various degrees of institutional pressure, especially when they adopt GSCM practices to meet environmental requirements, customer demands, and government regulations (Kalyar et al., 2020). Thus, external pressures from regulators, customers, and competitors can significantly impact the adoption of GSCM practices by Chinese chemical companies. The hypotheses are formulated as follows:

H1a: Coercive pressure is positively related to GSCM practices.
H1b: Normative pressure is positively related to GSCM practices.
H1c: Mimetic pressure is positively related to GSCM practices.

3.2 GSCM practices and Green innovation

Green Innovation (GI) is recognized as a crucial strategic choice for environmental sustainability, as it enables firms to achieve higher levels of eco-friendliness (Cuerva, 2014). In the contemporary workplace, the integration of GSCM practices and GI is emerging as a common practice, where companies consider both green practices during their product development processes, either directly or indirectly (Khan et al., 2021).

Academically, there is a plethora of discussion about the relationship between GSCM practices and GI across different countries and industries. For example, Yusr et al. (2020) found that GSCM practices have a significantly positive impact on GI in Malaysian manufacturing firms. Likewise, the research conducted by Roh et al. (2022) emphasized the positive relationship between GSCM practices and GI in South Korean Carbon-neutral companies. Similarly, Khan et al. (2021) explored GI as a support system for companies adopting GSCM practices in Pakistan. However, China's distinctive economic environment and political system pose challenges for

Chinese company managers in directly applying the findings from existing studies. Therefore, this paper seeks to bridge this gap by conducting a focused investigation into the relationship between GSCM practices and GI specifically within the Chinese chemical industry. Drawing upon previous evidences, we develop the following hypothesis:

H2: GSCM is positively related to GI.

3.3 GSCM practices and Economic Performance (EP)

A company's EP is strongly influenced by its ability to reduce costs associated with energy usage, material acquisition, waste disposal, waste discharge, and environmental penalties (Ahmed et al., 2018). Numerous previous studies have consistently found a strong positive relationship between GSCM practices and EP. As Ahmed et al. (2020) noted, the adoption of GSCM practices can help industries achieve financial scale by reducing operational waste. Furthermore, GSCM practices lead to long-term gains in terms of revenue and profit performance for businesses (Siddiqui, 2019). However, Saeed et al. (2018) and Zhu et al. (2013) found that GSCM practices had a non-significant impact on EP in Pakistan's and Chinese manufacturing industries, respectively. Thus, based on these different study findings, the next hypothesis is proposed as follows:

H3: GSCM is positively related to EP.

3.4 Green Innovation and Economic Performance

GI plays a pivotal role in enhancing EP for chemical companies through various means, including cost reductions and satisfied customer "green" demand. By meeting customers' expectations, chemical companies can achieve economic success more readily by establishing strong brand images, creating barriers to entry into new markets, and attracting new customers (Chavez et al., 2016). However, it is essential to acknowledge that GI activities (such as the costs associated with obtaining green certifications, making green technical investments, and higher adjustment costs) may also potentially negatively impact a firm's EP (Przychodzen et al., 2019). While GI can lead to long-term benefits and competitive advantages, it may require initial investments and expenses that could impact short-term profitability (Holzner and Wagner, 2022). Extending from previous observations, this study suggests that GI is a critical factor that positively influences the EP of Chinese chemical companies. The hypothesis is formulated as follows:

H4: GI is positively related to EP.

3.5 The mediating role of green innovation

The mediating role of GI between GSCM practices and EP is established in the study by Seman et al. (2019). This relationship is formed as GI is viewed as the key factor that assists the organization in offsetting its negative environmental effects through collaboration with GSCM practices as well as attracting environmentally conscious consumers (Shafique et al., 2017). Another significant study by Silva et al. (2019) is evident that GSCM practices indirectly encourage companies to embrace GI as a means to reduce operational costs and improve financial benefits. In addressing environmental issues, GI is recognized as a key element that supports the greening of all stages within the supply chain (Viale et al., 2022). Based on these considerations, this study posits that the GI is a potential mediator in influencing the relationship between GSCM practices and EP in Chinese chemical companies. Thus, the hypothesis is put forth as follows:

H5: GI mediates the relationship between GSCM and EP.

3.6 The moderating role of Top Management Support (TMS)

TMS plays a crucial role in driving environmental strategies as these decisions involve allocating resources and implementing changes in business activities. For example, Liu et al. (2020) point out that top management is vital in determining whether organizations genuinely embrace green practices. While external pressures may drive firms to adopt green practices, Wijethilake and Lama (2019) argue that the commitment and philosophy of top management towards environmental management are key indicators of the successful implementation of green practices. Moreover, top management that prioritizes sustainability may advance sustainability agendas beyond organizational priorities (Burki and Ersoy, 2019). Traditionally, EP has been the primary goal of companies. However, the increasing importance of environmental issues is compelling companies to invest more in adopting sustainability activities, such as how GSCM practices and GI could maximize the potential return of the organization.

According to Chu et al. (2017) and Ilyas et al. (2020), top managers who are dedicated to environmental strategies are more likely to promote the adoption of green practices (i.e., GSCM practices and GI). For instance, as suggested by Liu et al. (2020), top managers may commit to addressing environmental issues in operations, assessing the impact of green practices on business operations, developing green practices for competitive advantage, understanding consumer demand for environmentally friendly products, and communicating information about environmental management with organizational stakeholders. This study explores the moderating role of TMS in strengthening the significant relationship between green practices (GSCM practices and GI) and EP. Thus, the hypotheses are postulated as follows:

H6a: The positive relationship between GSCM and EP is stronger, when TMS is high.
H6b: The positive relationship between GI and EP is stronger, when TMS is high.

Based on the abovementioned hypotheses, Figure 1 depicts the framework of this research.

- Insert Figure 1 here -

4.0 Methods

4.1 Data collection process

Purposive sampling was employed to select a sample of chemical companies in China, following the approach commonly used in related studies (Seman et al., 2019). The data was collected between March and April 2022 from the chemical companies in the southeast coastal region of China that had adopted GSCM practices for at least one year. We distributed 414 questionnaires, which were all answered and returned by the respondents. Each respondent who answered and completed the questionnaire was given a token of appreciation (i.e., a RMB 25 JingDong online shopping voucher). Specifically, this study used an online survey (Wenjuanxing platform that is also known as the Chinese Qualtrics like platform) link during the COVID-19 pandemic in response to lockdown measures, as it was challenging to access larger sample sizes via face-to-face interactions. Questionnaires were shared with the top and middle managers of chemical companies located on the southeast coast of China that were still operating during the post-pandemic, including Tianjin, Guangzhou Province, Shanghai, Zhejiang Province, and others. These regions have consistently demonstrated high economic efficiency and strong economic vitality within China (Shao et al., 2021). Furthermore, it is worth noting that 73% of the companies in this area have been recognized among China's top 500 chemical companies (Statista, 2023).

After excluding seven responses with excessive missing values, a total of 414 valid responses were retained for analysis. The collected sample size exceeds the minimum requirement of 153, considering an effect size of 0.15 and a power level of 0.95, as determined in a power analysis (Hair et al., 2019). The majority of respondents were primarily from Tianjin (24.39%) and Guangdong Province (24.39%). Also, the majority were affiliated with local firms (40.57%), held senior management positions (35.26%), with a bachelor's degree (58.18%). On average, all the companies had a history of six to 10 years (34.45%) (see Appendix 2).

4.2 Instruments of study

The variables were measured using well-established scales that have been used in previous studies. Coercive power, normative power, and mimetic power items were developed based on the work of Ahmed et al. (2019) and Zhu et al. (2013), respectively. GSCM practices were measured using four sub-dimensions (green purchasing, customer environmental cooperation, internal environmental management, and reverse logistics), were measured using the scale proposed by Zhu et al. (2013) and Seman et al. (2019). Items for TMS were adopted from studies by Liu et al. (2020) and Ilyase (2020). The items of GI were adopted from Chen et al. (2006) and Cheng et al. (2014). EP was evaluated using a scale applied by Seman et al. (2019) and Zhu et al. (2013). All items were measured using a seven-point Likert scale ranging from 1=Strongly Disagree to 7=Strongly Agree.

Subsequently, the content validity of the survey items was assessed through a pre-test. Four experienced academicians reviewed seven survey items to evaluate their appropriateness and clarity. Based on their feedback, revisions were made to improve the measurement items. Subsequently, the revised questionnaire was shared with three GSCM practitioners to ensure its suitability for their specific business context. This pre-test process confirmed the high content validity of the questionnaire. In addition, the English version of the survey was translated into Chinese. Both versions were carefully reviewed by bilingual professors, who provided feedback on any ambiguities in the translation. Adjustments were made accordingly to address the comments.

Finally, a pilot test was conducted with 40 top managers who had experience with Chinese chemical companies. This pilot test helped to further refine and validate the survey instrument with the purpose of optimizing its overall quality, for instance, ensuring the logical sequence and the clarity of instructions and wording, etc.

4.3 Data analysis technique

The partial least squares structural equation modeling (PLS-SEM) technique was employed in this study (Hair et al., 2019) to examine and predict the environmental management strategies in chemical companies. PLS-SEM was chosen because it allows for the investigation of complex structural frameworks, higher-order constructs, mediations, and moderator effects while focusing on causal-prediction goals (Becker et al., 2023; Hair et al., 2019). Based on the proposed research model in Figure 1, PLS-SEM offers the benefit of assessing the complicated relationship between variables. In this study, SmartPLS 4 was used to analyze the model parameters.

5.0 Results

5.1 Evaluation of common method bias (CMB)

The result of Harman's single factor indicated that the variance explained by the first factor was 35.363%, which was below the maximum threshold of 40% (Podsakoff et al., 2012). In addition, the full collinearity test revealed that the variance inflation factor (VIF) values varied from 1.009 to 1.318 (see Table 1), falling below the 3.3 criteria (Kock and Lynn, 2012). These results conclude that the CMB issue was not a problem in the study.

5.2 Evaluation of measurement model

Hair et al.'s (2019) guidelines were followed to assess internal consistency reliability and convergent validity in this study. Various measures, including factor loadings, composite reliability (CR), and average variance extracted (AVE), were employed. Table 2 displays the results, indicating that all items had loadings above the recommended threshold of 0.708, as suggested by Hair et al. (2010). Additionally, the study found that all constructs surpassed the recommended values of 0.70 for CR and 0.50 for AVE. Consequently, the study successfully established the constructs' internal consistency and convergent validity (see Table 1).

- Insert Table 1 here -

In addition, the study employed the Heterotrait-Monotrait (HTMT) ratio technique to evaluate discriminant validity. All HTMT values were below the recommended threshold of 0.90 (see Table 2) (Hair et al., 2019). This finding provides evidence of satisfactory discriminant validity results.

- Insert Table 2 here –

5.3 Evaluation of higher-order construct

The procedures outlined by Becker et al. (2023) were used in this study to assess the higher-order construct (Type II: reflective-formative) of GCSM practices. Initially, the redundancy analysis demonstrated satisfactory results of convergent validity under the employment of a global single item for GSCM practices (i.e., *Overall, do you think this company has performed well in terms of the green supply chain management practices?*), which generated a path coefficient of 0.955, surpassing the threshold value of 0.70 (Becker et al., 2023). Consequently, this demonstrated the construct validity of the GSCM practices was established from the sub-dimensions (i.e., Green Purchasing, Customer Environmental Cooperation, Internal Environmental Management, and Reverse Logistics). Following that, all the sub-dimensions were tested for collinearity concerns, and the VIF values were determined to be less than 3.3, suggesting that the dimensions are distinct. Finally, the significance of the sub-dimensions was evaluated, and all dimensions showed statistical significance (p-value 0.05).

- Insert Table 3 here –

5.4 Evaluation of structural model

In the initial stage, the problem of collinearity must be evaluated since the PLS-SEM evaluation of path coefficients depends on regression analyses. Table 4 showed that the VIF values of all constructs were less than 5 (Hair et al., 2019), indicating that the collinearity issue was not a concern in the present structural model.

Following the recommendation outlined by Becker et al. (2023), the bootstrapping technique with 10,000 subsamples was utilized to evaluate the structural framework and test the six hypotheses. The results in Table 4 demonstrate the significance of the relationship between CP and GSCM practices (β=0.107; p-value<0.01), NP and GSCM practices (β=0.330; p-value=0.000), and MP and GSCM practices (β=0.481; p-value=0.000). Additionally, the relationship between GSCM practices and GI (β=0.646; p-value=0.000), and the relationship between GSCM practices and EP (β=0.283; p-value=0.000) were significant. Furthermore, a positive influence of GI on EP (β=0.299; p-value=0.000) was observed, confirming all the direct relationships hypothesized in H1 to H4.

Moving forward, a significant path was found on the mediating role of GI in linking the relationship between GSCM practices and EP was discovered (β=0.193; p-value=0.000). Therefore, H5 was supported (see Table 4). The moderation effect was tested using a two-step approach suggested by Becker et al. (2023). The result indicates a significant moderated effect of TMS*GSCM practices on EP (β=0.152; p-value<0.01). However, the interaction between TMS*GI and EP was not found to be significant (β=-0.085; p-value>0.05). Therefore, H6a was supported while H6b was not. To further illustrate the significant result of H6a, interaction plots were examined. These plots demonstrated that the line labelled "high TMS" exhibits a steeper gradient compared to the line labelled "low TMS" (see Figure 2). Thus, the relationship between GSCM practices and EP results appears to be stronger when TMS is high. This provides additional support for H6a.

Based on Table 4, the framework demonstrated a strong explanatory capacity in terms of coefficient of determination (R^2) values, with coercive pressure, normative pressure, and mimetic pressure collectively explaining 47.54% of the variance in GSCM practices. Furthermore, GSCM practices accounted for 41.8% of the variance in GI and 39.6% of the variance in EP.

Meanwhile, the effect size (f^2) of GSCM practices (f^2=0.717) exhibited the largest effect size on GI. In explaining GSCM practices, a large effect was found on mimetic pressure (f^2=0.383), while a medium effect was found on normative pressure (f^2=0.151) and a small effect was found on coercive pressure (f^2=0.020). On top of that, all three paths between GSCM practices (f^2=0.059), GI (f^2=0.070), and the interaction term of TMS*GSCM practices (f^2=0.023) on EP resulted in a small effect size.

Finally, the predictive relevance of the framework was evaluated using PLSpredict (Shmueli et al., 2019). By employing the Q^2_predict, the values obtained for GSCM practices (0.173), GI (0.231), and EP (0.190) were all greater than zero (see Table 4), suggesting that the model possesses predictive relevance.

- Insert Table 4 here –

- Insert Figure 2 here –

6.0 Discussion and implications

6.1 Theoretical implications

This study makes four substantial contributions to the theoretical implications. The discussions were broken into four sections (see sections 6.1.1 to 6.1.4)

6.1.1 Institutional pressures and GSCM practices

The primary objective of this study was to investigate the influence of institutional pressures on GSCM practices. Building upon the RBV theory (DiMaggio and Powell, 1983), this research hypothesized that CP, NP, and MP act as motivation and hygiene factors, respectively, driving GSCM practices. Interestingly, consistent with earlier research (Ahmed et al., 2019; Shahzad et al., 2022), our results found that all three institutional pressures (coercive, mimetic, and normative) have a direct impact on GSCM practices. Therefore, H1a-H1c was supported.

These positive relationships were also found to be identical to previous empirical evidence. As reported in both studies by Zeng et al. (2017) and Qi et al. (2021), China's environmental laws and regulations and policy guidance, have been strengthened in recent years. These changes have pushed Chinese chemical companies to present their operations as "green" to attain legitimacy while potentially reducing their actual environmental efforts in daily operational management. Furthermore, Ahmed et al. (2019) and Zhu et al. (2013) discovered that both normative and mimetic pressure positively influence companies' adoption of environmental strategies. Notably, mimetic pressure (β=0.481) has emerged as the most influential factor, followed by normative pressure (β=0.330). One possible explanation is that Chinese chemical enterprises primarily adopt environmental development strategies because other chemical companies adopt environmental practices and gain EP. As consumers display a growing willingness to pay for environmentally friendly products, these companies adopt environmental management as a corporate strategy to drive profitability.

6.1.2 The consequences of GSCM practices

This study provides solid evidence that GSCM practices have a significant influence on the development and enhancement of GI within Chinese chemical industries (H3). This finding is consistent with Seman et al. (2019), in which enterprises are motivated to engage in sustainable environmental protection through the adoption of GI.

In addition, this study provides empirical support for the positive impact of GSCM practices on a firm's economic success, as indicated by similar effect sizes (H2). When both GSCM practices and GI are applied effectively, Chinese chemical businesses may realize greater financial benefits, resulting in increased involvement with green management techniques. These findings are consistent with earlier research that has indicated that GSCM practices and GI contribute to creating more lucrative and comprehensive environmental management strategies (Seman et al., 2019). In fact, implementing GSCM practices (i.e., procuring more green sources from their suppliers) could serve as a valuable tool for companies to yield their EP targets, such as cost savings, increased productivity, production of high-quality products, and attracting potential suppliers and consumers (Chavez et al., 2016). Thus, it is possible to conclude that GSCM practices are critical in driving the environmental sustainability growth of Chinese chemical companies.

Finally, this research provides statistical evidence highlighting the significant role of GI in shaping and enhancing EP (H4). The integration of "green" practices continually drives Chinese chemical companies to develop new eco-design products, explore potential market segments, and meet the growing consumer demand for environment-friendly solutions (Liu et al., 2020). Customers worldwide are increasingly prioritizing the purchase of environmentally responsible chemical products and services (Chavez et al., 2016). Hence GI should be recognized not only as a means to improve EP of Chinese chemical companies.

6.1.3 Mediating effect of GI

The second objective of this study was to examine the mediating role of GI. The findings of this research clearly demonstrate that GI plays a significant mediating role, linking GSCM practices and EP in Chinese chemical companies. It aligns with the studies conducted by Seman et al. (2019) and Siddiqui (2019), which emphasize the importance of GI in mediating the relationship between GSCM practices and EP. The significant finding provides further support for the RBV (Barney, 1991), which implies that GSCM practices serve as key strategic resources for firms in facilitating the adoption and implementation of VRIN resources, like GI, thereby leading to desired organizational outcomes.

6.1.4 Moderating effect of TMS

The analysis findings reveal that TMS plays a moderating role between GSCM practices and EP in Chinese chemical companies, supporting H6a. Our result demonstrated that Chinese chemical companies with high TMS strengthen the relationship between GSCM practices and EP. In contrast, TMS does not moderate the relationship between GI and EP in the Chinese chemical sector. Hence H6b was rejected.

Despite the Chinese chemical industry being foreseen as a significant energy industry in China, yet, many organizations are still facing serious challenges arising from market fragmentation, local protectionism, and the underdevelopment of labor, capital, land, and resource markets. For example, Mao and Wang (2019) highlighted that local protectionism often exerts influence on Chinese chemical companies when they adopt new green practices, such as GI. Consequently, the basic role of Chinese chemical companies in resource allocation is still constrained by numerous external uncertain factors. Furthermore, for the long-term development of the company, top management must adhere to and adapt to local culture and policies. Therefore, they exercise extreme caution when selecting GI practices. Consequently, the moderating role of TMS is significantly limited in terms of GI and its impact on EP.

6.2 Practical implications

Aside from theoretical contributions that advance the literature, this research also makes substantial contributions to the managerial aspect, particularly for policymakers and the management of Chinese chemical sectors.

6.2.1 Policymakers

The statement highlights the importance of GSCM practices and GI in mitigating the adverse effects of environmental pollution on enterprises, particularly in the Chinese chemical industry. The adoption of green practices in this sector can gain several advantages, such as promoting resource utilization, reducing CO^2 emissions, and protecting organizations from uncertainties related to pollution (Le et al., 2022). It is noteworthy that several key factors contribute to the successful implementation of GSCM practices, including internal environmental management, green purchasing, customer environmental cooperation, and reverse logistics (Zhu et al., 2013). The development and integration of these environmentally friendly activities can significantly enhance the EP of chemical companies. Therefore, decision-makers within Chinese chemical companies who formulate internal environmental policies pertaining to green practices play a crucial role in shaping the company's environmental strategies. By implementing appropriate environmental activities, policymakers can contribute to the long-term profitability of the company, enabling it to overcome the uncertainties arising from external factors.

6.2.2 The management of the Chinese Chemical Sector

This research provides a comprehensive analysis of recommendations to improve performance outcomes in the Chinese chemical sector. By identifying seven internal and external factors, the study highlights the drivers that stimulate growth in performance outcomes in Chinese chemical companies. Institutional pressures and green practices are examined as antecedents that influence performance outcomes. The research also identifies specific green practices that can generate favorable EP within the Chinese chemical industry. Firm resources in the chemical industry primarily come from internal sources, industry collaborations, and customer partnerships aimed at environmental improvement. Institutional pressures, driven by favorable opinions and practices advocated by professional groups, play a crucial role in shaping the adoption and implementation of GSCM practices and GI for environmental protection.

TMS, GSCM practices, and GI have emerged as significant predictors of greening practices and environmental strategies in the Chinese chemical sector. The coordination of Chinese chemical companies in adopting environmental enhancement goals is pivotal, and industry associations and professional groups play a crucial role in fostering competitiveness and gaining legitimacy through environmental management practices. It is essential for these associations and groups to strategically support the modernization efforts of Chinese chemical companies, not only for China's transformation into an Industry Revolution 4.0 country but also to achieve the country's development milestones.

7.0 Conclusion

The study sheds light on the importance of incorporating green practices in supply chain management in Chinese chemical companies by utilizing both RBV theory and Institutional theory. Firstly, the study found that institutional pressures, such as coercive, normative, and mimetic pressures, are important in driving the adoption of GSCM practices. Among these pressures, mimetic pressure arising from competitors has the most substantial influence. This implies that the implementation of GSCM practices as a result of institutional pressures is critical because it assists Chinese chemical firms in achieving optimal supply chain structure. This structure is predicted to facilitate the chemical firms to prioritize environmentally friendly practices, such as reducing carbon emissions, minimizing waste, and sourcing materials from sustainable suppliers.

Secondly, findings also show that GSCM practices and GI significantly impact EP. Hence, implementing green practices could serve as a valuable tool for companies to explore potential market segments and meet the growing consumer demand for green consumption (Liu et al., 2020). Thus, it is possible to conclude that integrating "green" practices is critical in driving the environmental sustainability growth of Chinese chemical companies.

Thirdly, the study shows that GI has an important mediating function between GSCM practices and EP improvement. GSCM practices create valuable opportunities for GI by supporting zero negative environmental impacts within the product life cycle (Khan et al., 2021). GI proves its value as a support system for GSCM practices adoption. It offers a "green" way to innovate at each practice of GSCM to minimize potential hazards and achieve EP (Seman et al., 2019).

Finally, the study emphasizes the role of TMS in regulating the association between GSCM practices and EP. A higher level of TMS strengthens the positive impact of GSCM practices on environmental management capabilities, leading to improved EP. In contrast, the finding also indicates that TMS does not moderate the relationship between GI and EP in Chinese chemical companies. Based on the result, it can be regarded that many uncertain factors still restrict Chinese chemical companies' environmental management in resource allocation.

8.0 Limitations and future research directions

This investigation has several limitations. Firstly, the data collected in this study was limited to the southeast coast of China. Future research should explore whether the findings hold true in other regions of China with diverse institutional structures. This will help provide a more comprehensive understanding of the relationship between institutional pressures and the adoption of GSCM practices and GI. Secondly, the cross-sectional nature of the data prevented the examination of dynamic changes in the outcome variables across time. To address this limitation, longitudinal data could be employed to validate the proposed framework and investigate how institutional pressures influence the adoption of GSCM practices and GI, ultimately impacting EP. This study by Maaz et al. (2022) argues that green dynamic capabilities can serve as a potential intangible asset that encourages companies to adopt GSCM practices and GI, particularly in response to environmental and sustainability challenges. This concept can directly or indirectly contribute to improving EP. For instance, dynamic capability can encourage organizations to continually explore new technologies, materials, and processes in the supply chain management that reduce environmental footprints and create opportunities for produce and process innovation that meet demands in their business market.

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Table 1: Reliability, Convergent Validity, and Full Collinearity

Variable	Item	Loading
Coercive Pressure CR=0.916, AVE=0.646, & FC=1.171	CP1: The green environmental management of our firm is influenced by national environmental regulations.	0.842
	CP2: The green environmental management of our firm will be influenced by national resource-saving regulations.	0.803
	CP3: The green environmental management of our firm will be influenced by regional environmental regulations.	0.851
	CP4: The green environmental management of our firm will be influenced by regional resource-saving regulations.	0.710
	CP5: The green environmental management of our firm is influenced by export countries' environmental regulations.	0.870
	CP6: The green environmental management of our firm will be influenced by products that potentially conflict with laws.	0.732
Normative Pressure CR=0.900, AVE=0.564, & FC=1.119	NP1: Our firm is considering the pressure brought by export.	0.724
	NP2: Our firm is considering the pressure brought by foreign customers on environmental requirements.	0.715
	NP3: Our firm will consider the pressure brought by domestic customers on environmental requirements.	0.736
	NP4: Our firm will consider the pressure brought by Chinese consumers' environmental awareness.	0.792
	NP5: Our firm will consider the pressure brought by public environmental awareness.	0.729
	NP6: Our industry is followed by the news media closely.	0.788
	NP7: Establishing the company's green image is extremely important to our firm.	0.767
Mimetic Pressure CR=0.799, AVE=0.571, & FC=1.104	MP1: The green environmental management of our firm will be affected by competitors' green environmental management protection strategy.	0.709
	MP2: The green environmental management of our firm will be affected by substitution product green environmental strategy.	0.765
	MP3: The green environmental management of our firm will be affected by professional environmental protection groups.	0.801
Top Management Support CR=0.906, AVE=0.617, & FC=1.141	TMS1: Top managers in our firm recognize the importance of green supply chain management practices.	0.799
	TMS2: Top managers in our firm proactively support implementing green supply chain management practices.	0.782
	TMS3: Top managers in our firm show a positive attitude towards green supply chain management practices.	0.796
	TMS4: Top managers in our firm are willing to invest the resources needed to implement green supply chain management practices.	0.770

	TMS5: Top managers in our firm are likely to approve special funds for investment green supply chain management practices.	0.771
	TMS6: Top managers in our firm have a well-defined environmental policy.	0.795
Green Purchasing CR=0.920, AVE=0.842, & FC=1.081	GP1: Our firm cooperates with suppliers for environmental objectives.	0.793
	GP2: Our firm selects suppliers using environmental criteria.	0.725
	GP3: Our firm checks supplier's ISO 14000 certification.	0.749
	GP4: Our firm adopts a just-in-time logistics system.	0.732
	GP5: Our firm provides design specifications to suppliers that include environmental requirements for purchased items.	0.745
	GP6: Our firm takes an environmental audit for suppliers' inner management.	0.761
	GP7: Our firm evaluates second-tier supplier-friendly environmental practices.	0.758
	GP8: Our firm cooperates with the suppliers to reduce packaging.	0.729
	GP9: Our firm requires suppliers to use environmentally degradable packaging.	0.747
Customer Environmental Cooperation CR=0.911, AVE=0.594, & FC=1.074	CC1: Our firm cooperates with customers for products with eco-design.	0.747
	CC2: Our firm cooperates with customers for cleaner production.	0.769
	CC3: Our firm cooperates with customers for using less energy during product transportation.	0.777
	CC4: Our firm adopts third-party logistics.	0.798
	CC5: Our firm cooperates with customers for product take back.	0.789
	CC6: Our firm cooperates with customers for reverse logistics relationships.	0.759
	CC7: Our firm cooperates with customers for green packaging.	0.754
Internal Environmental Management CR=0.916, AVE=0.823, & FC=1.009	IEM1: Our firm's senior managers commit to adopting green supply chain management practices.	0.709
	IEM2: Our firms' mid-level managers support green supply chain management practices.	0.718
	IEM3: Our firm supports cross-functional cooperation for environmental improvements.	0.756
	IEM4: Our firm supports special training for workers on environmental issues.	0.761
	IEM5: Our firm acquires ISO 14000 certification.	0.750
	IEM6: Our firm's products have eco-labeling.	0.748
	IEM7: Our firm has pollution prevention programs.	0.742
	IEM8: Our firm's internal performance evaluation system incorporates environmental factors.	0.736
	IEM9: Our firm's internal evaluation generates environment reports.	0.744
Reverse Logistics	RL1: Our firm collects used products from customers for recycling.	0.856

CR=0.927, AVE=0.718, & FC=1.318	RL2: Our firm collects used packaging from customers for recycling.	0.853
	RL3: Our firm requires suppliers to collect their packaging materials.	0.850
	RL4: Our firm returns products to suppliers for recycling.	0.857
	RL5: Our firm returns its packaging to suppliers for recycling.	0.821
Green Innovation CR=0.947, AVE=0.749, & FC=1.155	GI1: Our firm chooses product materials that have the least amount of pollution for conducting the product design.	0.870
	GI2: Our firm uses the fewest amount of materials to comprise the product for conducting the product design.	0.871
	GI3: Our firm would carefully consider whether the product is easy to recycle for product design.	0.881
	GI4: Our firm's manufacturing process effectively reduces the emission of hazardous substances.	0.842
	GI5: Our firm's manufacturing process reduces the consumption of nature resources.	0.851
	GI6: Our firm's manufacturing process reduces the use of raw materials.	0.878
Economic performance CR=0.851, AVE=0.533, & FC=1. 271	FP1: Our firm has implemented green supply chain management practices to reduce materials purchasing costs.	0.715
	FP2: Our firm has implemented green supply chain management practices to reduce energy consumption costs.	0.742
	FP3: Our firm has implemented green supply chain management practices to reduce waste treatment fees.	0.717
	FP4: Our firm has implemented green supply chain management practices to reduce waste discharge fees.	0.763
	FP5: Our firm has implemented green supply chain management practices to avoid environmental accidents fine.	0.712

Note: α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; FC=Full Collinearity

Table 2: Assessment of Discriminant Validity using HTMT

Construct	CP	EP	GI	GSCM	MP	NP	TMS
CP							
EP	0.047						
GI	0.162	0.504					
GSCM	0.513	0.135	0.117				
MP	0.137	0.554	0.628	0.129			
NP	0.133	0.520	0.599	0.170	0.300		
TMS	0.636	0.152	0.085	0.808	0.113	0.208	

Note: CP = Coercive Pressure; EP = Economic Performance; GI = Green Innovation; GSCM=Green Supply Chain Management; MP = Mimetic Pressure; NP = Normative Pressure; TMS = Top Management Support

Table 3: Assessment of Higher-Order Construct

Higher-Order Construct	Sub-dimension	Convergent Validity	Outer Weights	Outer VIF	t-value	p-value
GSCM Practices	(i) Green Purchasing	0.955	0.328	2.037	11.598	0.000
	(ii) Customer Environmental Cooperation		0.295	2.076	10.032	0.000
	(iii) Internal Environmental Management		0.234	1.740	8.223	0.000
	(iv) Reverse Logistics		0.363	1.764	13.132	0.000

Table 4: Assessment of Structural Model

Path Relationship	Std Beta	Std Error	t-value	p-value	BCa CI		VIF	F^2	R^2	Q^2_predict	Remarks
					LB	UB					
H1a) CP → GSCM	0.107	0.052	2.070	0.038	0.003	0.204	1.257	0.020	0.475	0.173	Supported
H1b) NP → GSCM	0.330	0.044	7.475	0.000	0.214	0.381	1.135	0.151			Supported
H1c) MP → GSCM	0.481	0.044	10.940	0.000	0.416	0.563	1.199	0.383			Supported
H2) GSCM → GI	0.646	0.038	17.220	0.000	0.561	0.712	1.000	0.717	0.418	0.231	Supported
H3) GSCM → EP	0.283	0.068	4.183	0.000	0.143	0.404	2.246	0.059	0.396	0.190	Supported
H4) GI → EP	0.299	0.063	4.771	0.000	0.171	0.420	2.116				Supported
H5) GSCM → GI → EP	0.193	0.045	4.308	0.000	0.110	0.284					Supported
H6a) GSCM * TMS → EP	0.152	0.065	2.358	0.018				0.023			Supported
H6b) GI*TMS → EP	-0.085	0.053	1.612	0.107				0.011			Rejected

Note: CP = Coercive Pressure; EP = Economic Performance; GI = Green Innovation; GSCM=Green Supply Chain Management; MP = Mimetic Pressure; NP = Normative Pressure; TMS = Top Management Support

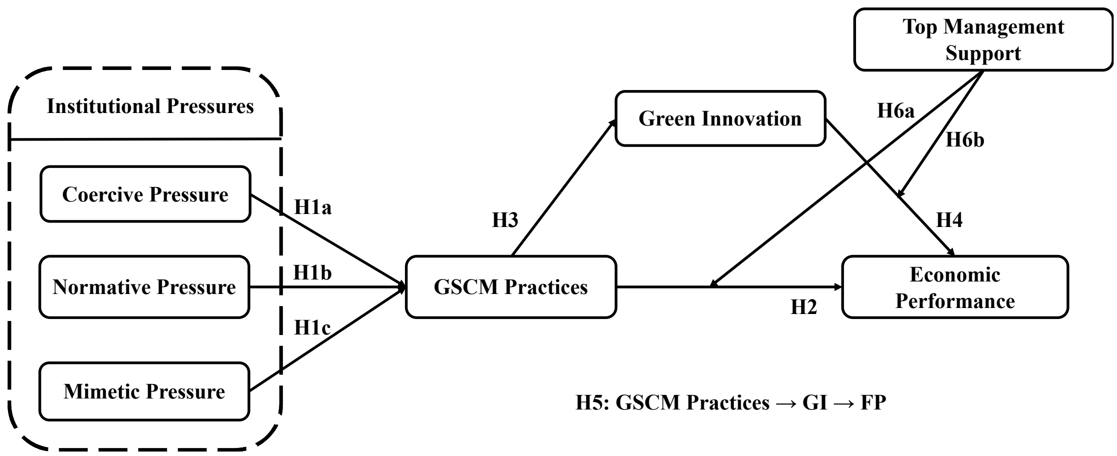

Figure 1: Research Framework

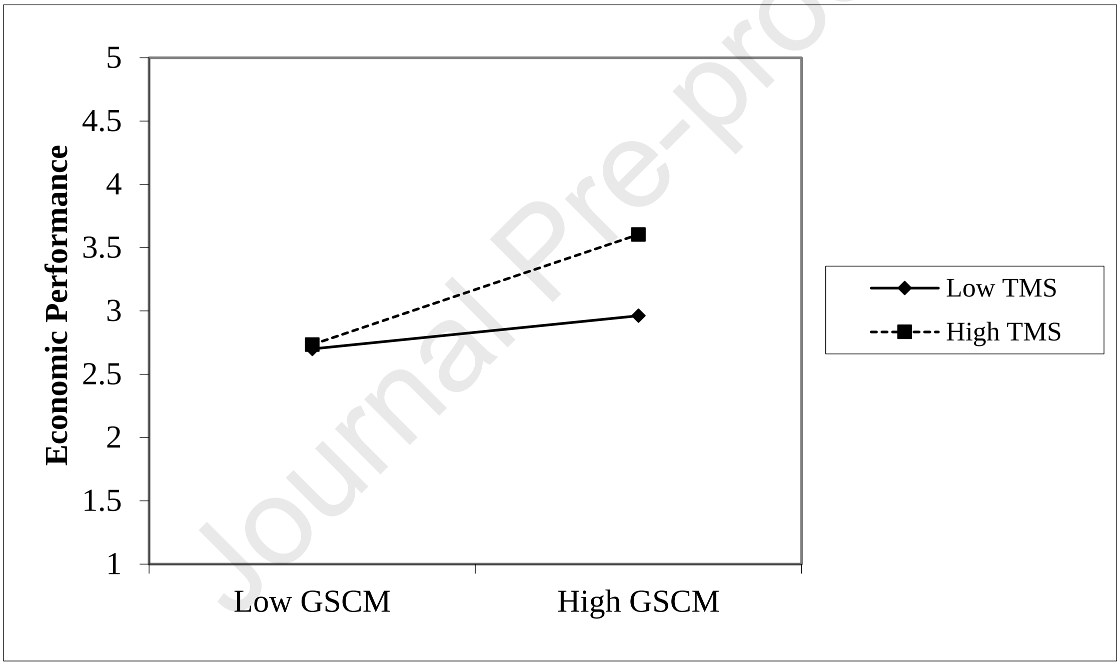

Figure 2: Interaction plot of GSCM*TMS on Economic Performance

Highlights

- This study examined the influences of institutional pressures on GSCM practices.
- The research model is drawing from RBV and Institutional Theory
- Data was collected from 414 listed chemical companies in China.
- The mediating role of green innovation is established.
- Economic performance was found to rely on top management supports.

Data availability statement
Data will be made available upon reasonable request.

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Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: