EFFECTS OF INSTITUTIONAL PRESSURES AND GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON GREEN INNOVATION AND PERFORMANCE OF CHINESE CHEMICAL MANUFACTURERS IN CHINA

By

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Chairman : Jacky Cheah Jun Hwa, PhD
School : Business and Economics

The increasing depletion of natural resources due to rapid industrialization has led to a heightened scholarly focus on the environmental impact of companies. In response to these growing environmental concerns, numerous Chinese chemical companies have started incorporating green supply chain management (GSCM) practices and green innovation (GI) into their environmental strategies, aiming to improve performance outcomes. Since environmental strategy is a valuable strategic resource in Chinese chemical companies, GSCM practices and GI adoption have been effective environmental tools affecting organizational performance outcomes.

To address this issue, this thesis aims to bridge the gap in the existing literature by investigating the GSCM practices and GI that impact performance outcomes in the context of Chinese chemical companies. First, underpinned by Institutional Theory, institutional pressures were suggested as the hygiene and motivation factors that drive Chinese chemical companies to implement GSCM practices and GI. Second, the Resource-Based View explains the GSCM practices and GI as a valuable, rare, inimitable, and non-substitutable resource to influence Chinese chemical companies' performance outcomes. Upper Echelon Theory also explains the moderating role of top management support in influencing the relationship between institutional pressures and the adoption of GSCM practices. Last, the Dynamic Capabilities Theory was applied to explain the moderation role of green dynamic capabilities.

Due to COVID-19, online questionnaires were used to collect data in this research. Data collection was conducted online between January and April 2022, utilizing the Wenjuanxing platform, a respected Chinese version of

Qualtrics. The participant pool was restricted to those with IP addresses coming from the southeastern region of China, which encompasses nine provinces and cities, including Beijing, Tianjin, Hebei province, Shanghai, Jiangsu province, Zhejiang province, Fujiang province, Shandong province, and Guangdong province. A total of 414 online questionnaires were distributed to the respondents using the purposive sampling method, with the respondents being Chinese chemical company employees who had at least one year of work experience. Subsequently, partial least squares structural equation modeling was adopted to analyze the data.

The study revealed three key findings: 1) normative pressure and mimetic pressure play important roles in motivating GSCM practices; 2) GSCM practices and GI are significant factors that should not be overlooked as they are essential to organizational performance outcomes; and 3) green dynamic capabilities moderate the influence of GSCM practices on performance outcomes in Chinese chemical companies. Theoretically, this study adds to the existing literature by: broadening the theoretical scope of the full pressures-practices-performance model of GSCM in the Chinese chemical sector; uncovering the direct and mediating roles of GI in GSCM practices and organizational performance; and exploring the moderating roles of top management support and green dynamic capabilities in the full pressures-practices-performance model of GSCM in the Chinese chemical sector.

Keywords: Institutional Pressures, Green Innovation, Green Supply Chain Management (GSCM), Firm Performance, Chinese Chemical Manufacturers

SDG: GOAL 9: Industry, Innovation and Infrastructure

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN TEKANAN INSTITUSI DAN AMALAN PENGURUSAN RANTAIAN BEKALAN HIJAU TERHADAP INOVASI HIJAU DAN PRESTASI PENGELUAR KIMIA CINA DI CHINA

Oleh

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Kehabisan sumber asli yang semakin meningkat akibat perindustrian yang pesat telah membawa kepada tumpuan ilmiah yang lebih tinggi terhadap kesan alam sekitar syarikat. Sebagai tindak balas kepada kebimbangan alam sekitar yang semakin membesar ini, banyak syarikat kimia Cina telah mula menggabungkan amalan pengurusan rantaian bekalan hijau (GSCM) dan inovasi hijau (GI) ke dalam strategi alam sekitar mereka, bertujuan untuk meningkatkan hasil prestasi. Memandangkan strategi alam sekitar adalah sumber strategik yang berharga dalam syarikat kimia Cina, amalan GSCM dan penggunaan GI telah menjadi alat alam sekitar yang berkesan yang mempengaruhi hasil prestasi organisasi.

Untuk menangani isu ini, tesis ini bertujuan untuk merapatkan jurang dalam literatur sedia ada dengan menyiasat amalan GSCM dan GI yang memberi impak kepada hasil prestasi dalam konteks syarikat kimia Cina. Pertama, disokong oleh Teori Institusi, tekanan institusi dicadangkan sebagai faktor kebersihan dan motivasi yang mendorong syarikat kimia Cina untuk melaksanakan amalan GSCM dan GI. Kedua, Teori Berasaskan Sumber menerangkan amalan GSCM dan GI sebagai sumber yang bernilai, jarang, tidak dapat ditiru, dan tidak boleh diganti untuk mempengaruhi hasil prestasi syarikat kimia Cina. Teori Eselon Atas juga menjelaskan peranan penyederhana sokongan pengurusan atasan dalam mempengaruhi hubungan antara tekanan institusi dan penggunaan amalan GSCM. Terakhir, Teori Keupayaan Dinamik digunakan untuk menerangkan peranan penyederhana keupayaan dinamik hijau.

Disebabkan COVID-19, soal selidik dalam talian digunakan untuk mengumpul data dalam penyelidikan ini. Pengumpulan data dijalankan dalam talian antara Januari dan April 2022, menggunakan platform Wenjuanxing, versi Qualtrics Cina yang dihormati. Kumpulan peserta dihadkan kepada mereka yang mempunyai alamat IP yang datang dari wilayah tenggara China, yang merangkumi sembilan wilayah dan bandar, termasuk Beijing, Tianjin, wilayah Hebei, Shanghai, wilayah Jiangsu, wilayah Zhejiang, wilayah Fujiang, wilayah Shandong dan wilayah Guangdong. Sebanyak 414 soal selidik dalam talian telah diedarkan kepada responden menggunakan kaedah persampelan bertujuan, di mana responden merupakan pekerja syarikat kimia Cina yang mempunyai pengalaman kerja sekurang-kurangnya satu tahun. Seterusnya, pemodelan persamaan struktur kuasa dua terkecil separa telah diguna pakai untuk menganalisis data.

Kajian mendedahkan tiga penemuan utama: 1) tekanan normatif dan tekanan mimetik memainkan peranan penting dalam memotivasikan amalan GSCM; 2) Amalan GSCM dan GI adalah faktor penting yang tidak boleh diabaikan kerana ia penting untuk hasil prestasi organisasi; dan 3) keupayaan dinamik hijau menyederhanakan pengaruh amalan GSCM ke atas hasil prestasi dalam syarikat kimia Cina. Secara teorinya, kajian ini menambah ke literatur sedia ada dengan: meluaskan skop teori model tekanan-amalan-prestasi penuh GSCM dalam sektor kimia Cina; mendedahkan peranan langsung dan pengantara GI dalam amalan GSCM dan prestasi organisasi; dan meneroka peranan penyederhana sokongan pengurusan atasan dan keupayaan dinamik hijau dalam model tekanan-amalan-prestasi penuh GSCM dalam sektor kimia Cina.

Kata kunci: Tekanan Institusi, Pengurusan Rantai Bekalan Hijau, Inovasi Hijau, Prestasi Firma, Pengeluar Kimia Cina

SDG: MATLAMAT 9: Industri, Inovasi dan Infrastruktur

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LIST OF ABBREVIATIONS

RBV	Resource-based view
IT	Institutional theory
CP	Coercive pressure
NP	Normative pressure
MP	Mimetic pressure
ST	Stakeholder theory
DCT	Dynamic capabilities theory
SCM	Supply chain management
GSCM	Green supply chain management
GP	Green purchasing
CC	Cooperation with customers
IEM	Internal environmental management
RL	Reverse logistics
EP	Environmental performance
FP	Financial performance
OP	Operational performance
TMS	Top management support
GDC	Green dynamic capabilities
GI	Green innovation
SPSS	Statistical package for social science
PLS	Partial least squares
SEM	Structural equation modelling
PLS-SEM	Partial least squares structural equation modelling
CE	Covariance-based
CE-SEM	Covariance-based structural equation modelling

VIF	Variance inflation factor
LV	Latent variable
HOC	Higher order construct
LOC	Lower order construct
AVE	Average variance extracted
HTMT	Heterotrait-Monotrait ratio
LM	Linear model
SD	Standard deviation
RMSE	Root-mean-square error
MAE	Mean absolute error

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter presents an overview of the research context, explains the research gaps identified within the current body of knowledge, defines the scope of the research, delineates the research questions and research objectives, outlines the research plan, and establishes the research boundaries. The delimitations encompass the specific sector and geographical area under analysis. Additionally, the chapter highlights the significance of the research in terms of its theoretical and practical implications and provides definitions of key terms. The concluding section outlines the overall structure of the study, followed by a summary of the chapter's contents.

1.2 Overall of the Study

With the increasing concern surrounding environmental pollution, corporations are now more attuned to global ecological issues than ever before (Shen et al., 2020). Notably, discussions on environmental sustainability have gained prominence worldwide. Over the past few decades, corporations have been compelled to reshape their business paradigms at an accelerated pace to align with the modern ecosystem of the world. However, this rapid development has often come at the cost of economic equilibrium, environmental stability, and social harmony. Indeed, the business community recognizes a phenomenon wherein a trade-off exists between firm performance indicators (e.g., total cost, profit) and environmental and social contributions (e.g., reputation, working conditions) (Boons and Lüdeke-Freund, 2013). This phenomenon is especially prevalent in industries reliant on natural resources, such as the chemical sector, which significantly impacts the environment. Exploring avenues to promote and uphold environmental sustainability has thus emerged as a paramount endeavor for these industries.

It is widely acknowledged that chemicals play an indispensable role in virtually every economy. Presently, the chemical industry holds undeniable significance across various rapidly expanding industrial sectors in China, encompassing consumer products, automotive manufacturing, and construction. Consequently, the Chinese government places high importance on fostering the growth of the chemical industry (Wen et al., 2023a). Over the past three decades, China's chemical sector has experienced substantial growth, mirroring the nation's overall expansion and the fundamental needs of key customer industries.

Notably, China is poised to account for approximately one-third of global chemical consumption. Despite the government's pursuit of self-sufficiency, the outlook for international chemical enterprises within China remains promising. In terms of capital investment, a pivotal moment for China's chemical industry was reached in 2008 (Peng et al., 2021). Outbound investment from China, which constituted 36 percent of the total foreign direct investment (FDI) in the global industry, became imperative for the first time. According to China's National Bureau of Statistics (NBS) (2022), even during the global economic downturn in 2020, China's outbound investment experienced a moderate decline from $53 billion to $44 billion in absolute terms, yet it surged by 56 percent in comparison to the rest of the world. This upward trajectory is anticipated to persist, with a projection of $137 billion by 2025.

Given China's substantial population, the government formulates targets based on multifaceted objectives such as economic growth, job creation, and addressing constraints like food supply, water availability, energy sources, and oil reserves. This dynamic is equally applicable to the chemical sector. Since the inception of economic reforms in 1978, government policies and objectives have evolved in tandem with changing circumstances (Zhou, 2019; Zhu and Sarkis, 2004).

China holds the position of the greatest global manufacturer of chemical products, and its impact on the international stage is steadily growing. According to the European Chemical Industry Council (CEFIC), statistics reveal that in 2019, the production value of chemical products in China reached CNY 10.4 trillion (€ 1.48 trillion), representing 40.6% of the global total. It is projected that by 2030, sales in China will account for 48.6% of global sales. The chemical sector in China has had significant expansion in recent years, with an average annual increase of 5.2% in industrial value added between 2015 and 2020 (refer to Figure 1.1).

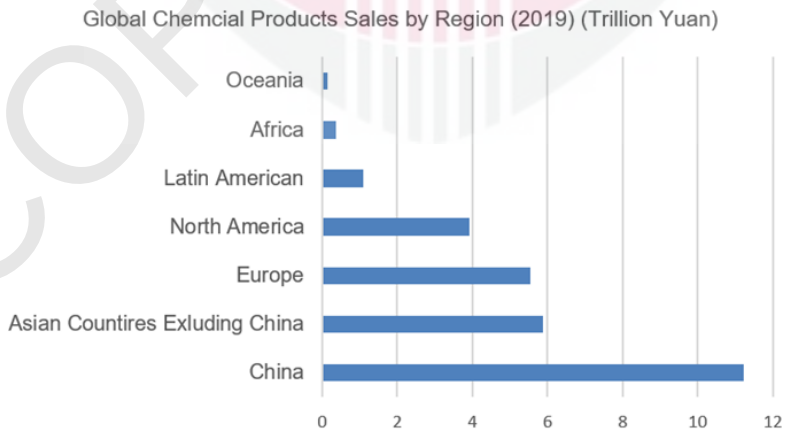

Figure 1.1 : Global Chemical Products Sales by Region (Trillion Yuan)
(Source: CEFIC, 2019)

1.3 Background of the Study

Despite China's leading position in worldwide chemical product sales, the country is currently grappling with a range of issues stemming from chemical pollution. Hence, the 14th Five-Year Plan marks the initiation of a new era in implementing Xi Jinping's ecological civilization ideology. It involves the comprehensive establishment of a beautiful China and the pursuit of the second hundred-year goal. This plan presents a significant challenge and opportunity to simultaneously advance the high-quality development of the economy and the preservation of the ecological environment, with the ultimate aim of enhancing the overall quality of the ecological surroundings. The volatility of economic and social progress is on the rise, with the ecological environment confronting a multitude of problems across various sectors and levels. The tasks of effectively managing pollution reduction and carbon reduction are challenging, necessitating a continued increase in financial investment in ecological environmental protection. According to data from China's National Bureau of Statistics (NBS) (2022), it is evident that China consistently increases its investment in ecological protection and treatment of environmental pollution. Compared to the first quarter of 2020 and the first quarter of 2021, it experienced a significant surge of 37.4%. Similarly, the fourth quarter of 2021 witnessed a substantial growth of 42.4% compared to the same period in 2020. Those data indicate that the expenses associated with environmental management in China are increasing annually, exerting financial strain on the country (Wen et al., 2023a) (refer to Figure 1.2).

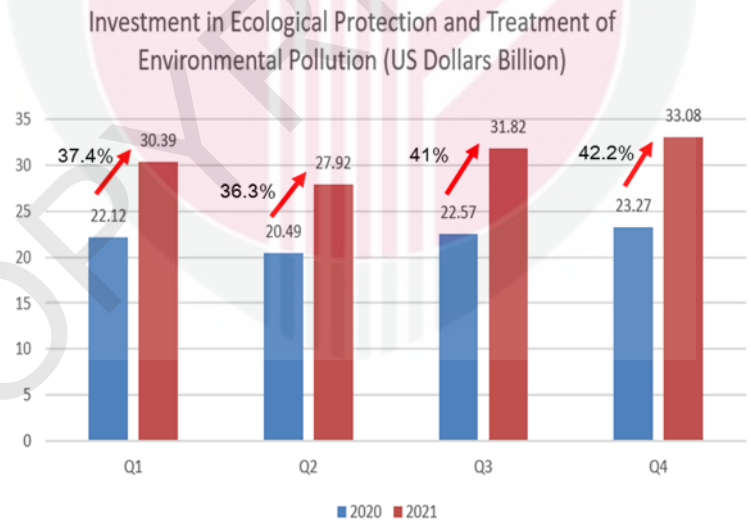

Figure 1.2 : Investment in Ecological Protection and Treatment of Environmental Pollution
(Source: NBS, 2022)

In accordance with the division method established by the NBS on June 13, 2011, China's economic regions are categorized into four main regions: the southeastern, central, western, and northeastern regions. This division aims to accurately represent the socio-economic development of different regions in China and serve as a foundation for the formulation of regional development policies by the Party Central Committee and the State Council. The southeastern area of China comprises ten provinces and cities, specifically Beijing, Tianjin, Hebei province, Shanghai province, Jiangsu province, Zhejiang province, Fujian province, Shandong province, Guangdong province, and Hainan province (refer to Figure 1.3). Due to its advantageous location, the southeastern region has experienced rapid economic development and has become one of China's most economically developed regions. It plays a crucial role in the country's overall economic growth, accounting for most of the nation's GDP (Choi et al., 2019; Zhu et al., 2007a). Over the years, both the quantity and quality of the economy in this region have made significant progress in economic development. The blueprint and experience of this pioneering development serve as a valuable reference for other regions in the country.

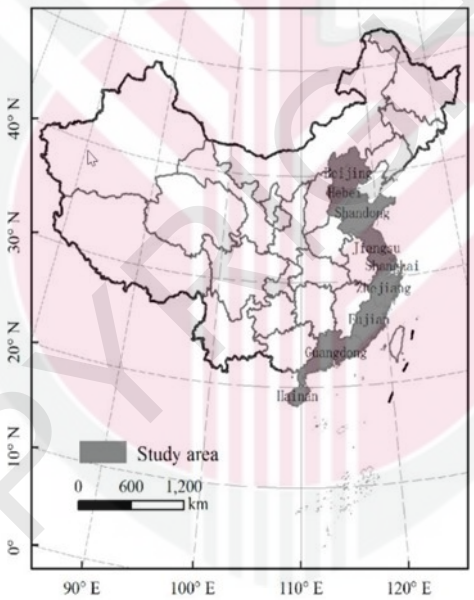

Figure 1.3 : The Southeastern Area of China

According to the NBS (2022), China's latest count of 187,325 chemical companies is now located in 30 provinces and autonomous regions, with chemical companies in each province and autonomous regions in China except Tibet (refer to Figure 1.4). Shandong province, with 51,792 chemical companies, has the largest number of companies in China, followed closely by Jiangsu province (12,616) and Zhejiang province (10,949). Based on data from NBS (2022), we can calculate that there are 106,981 chemical companies in the ten

cities along the southeast coast of China, accounting for 57% of the total Chinese chemical companies.

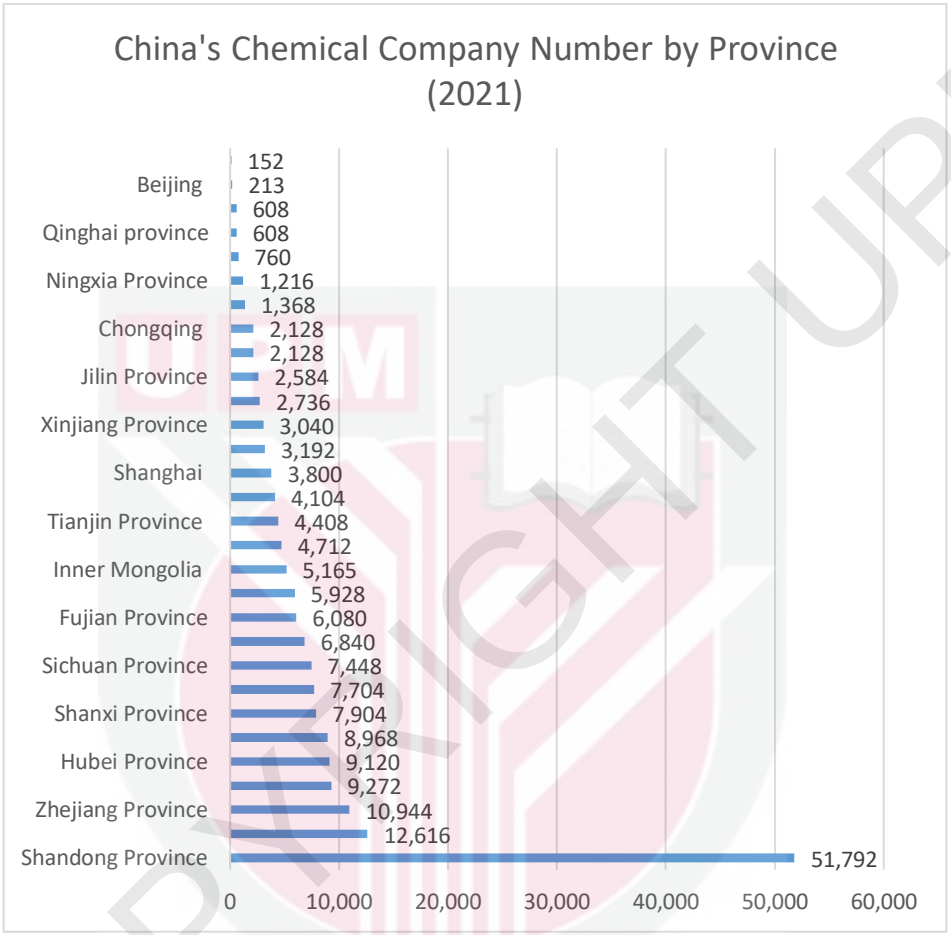

Figure 1.4 : China's Chemical Company Number by Province (2021)

In the current global economy, there is a shift away from solely focusing on quantitative changes in economic development. There is now a greater emphasis on achieving quality economic growth (Ning et al., 2022). This refers to economic growth that considers the balance between human beings and nature while also taking into account environmental protection. Based on data from China's NBS, the input factors of number of employees, fixed asset investment, pollution control input, GDP, and output value of the comprehensive utilization of wastes are used as the main measurements for economic development (refer to Table 1.1). The significance of China's southeastern coastal cities in the economic and environmental domains can be determined by examining the proportion of these crucial indicators to China's total.

Table 1.1 : The Significance of China's Southeastern Coastal Cities in the Economic and Environmental

Project	Number of Employees (Ten thousand people)	Fixed Asset Investment (Billions Yuan)	Pollution Control Input (Billions Yuan)	GDP (Billions Yuan)	Output Value of the Comprehensive Utilization of Wastes (Billions Yuan)
Beijing	1,317.7	5,403	231.4	14,113.58	3.4366
Tianjin	920.8	6,278.1	109.7	9,224.46	19.265
Hebei Province	3,790.2	15,083.4	370.9	20,394.26	107.1801
Shanghai	924.7	5,108.9	134	17,165.98	17.0379
Jiangsu Province	4,731.7	23,184.3	466.4	41,425.48	218.9
Zhejiang Province	3,989.2	12,376	333.7	27,722.31	286.4
Fujian Province	2,181.3	8,199.1	129.7	14,737.12	37.5
Shandong Province	5,654.7	23,280.5	483.9	39,169.92	187.19
Guangdong Province	5,776.9	15,623.7	1,416.2	46,013.06	62.426
Hainan Province	445.7	1317	23.6	2064.5	3.16
Total (Southeastern of China)	29,732.9	115,854	3,699.5	232,030.7	942.4956
Throughout the Country	46,773	285,898	9,491.8	1,143,000	1621.4
Proportion (%)	63%	40.52%	38.90%	20%	58%

Although the CO_2 emissions of China's three industries and most of its industries are all on the rise, the CO_2 emissions of different industries and sectors also show more noticeable disparities. According to NBS (2022), CO_2 emissions from the secondary industry have always occupied a large proportion of the overall CO_2 emissions, with the average proportion of CO_2 emissions from the secondary industry accounting for about 70 percent from 2014 to 2021. In 2020, for example, the top three industries with the largest CO_2 emissions are, in order, the chemical raw materials and chemical products manufacturing industry (accounting for about 16.03%), oil, coal and other fuel processing (accounting for about 8.9%), and mining industry (accounting for about 5.93%).

Table 1.2 : CO_2 Emission by Industries and Sectors in China, 2014-2021 (tons/year)

Industry Name	2014	2015	2016	2017	2018	2019	2020	2021
Primary Industry	18,804	19,120	17,735	19,649	20,264	21,034	21,916	21,514
Secondary Industry	696,045	713,070	730,460	749,273	743,570	743,482	760,850	783,598
Tertiary Industry	233,407	253,051	271,242	290,494	299,741	317,143	334,014	351,108
Agriculture, Forestry, Animal Husbandry, and Fisheries	18,804	19,120	19,735	19,649	20,264	21,033	21,915	21,513
Mining Industry	57,372	60,103	58,614	52,148	47,748	43,544	44,343	46,504
Coal Development and Washing Industry	35,518	36,953	34,741	27,871	25,478	23,118	23,633	24,458
Oil and Gas Development Industry	9611	9548	10,016	10,444	10,459	9,594	9,692	9,354
Oil, Coal, and Other Fuel Processing	44,548	46,136	47,175	49,341	59,251	59,204	64,822	70,288
Chemical Raw Materials and Chemical Products Manufacturing	99,820	104,250	107,999	116,167	121,356	121,819	120,922	125,631
Metal Products Industry	9,153	10,202	11,525	11,780	11,380	12,186	15,597	15,393

Based on the background of the study above, it is not difficult to find that the escalation of environmental concerns, coupled with the depletion of natural resources and the degradation of the ecosystem, has led governments, consumers, and competitors to demand chemical products and services with a reduced environmental footprint (Huang et al., 2009). This growing expectation from governmental bodies, customers, and industry rivals has pushed chemical companies to align their practices with social, environmental, and economic responsibilities, assume full responsibility for their business operations and processes, and demonstrate their commitment to socially responsible practices (Ashby et al., 2012).

In response to the mounting pressure to prioritize environmental concerns, chemical firms are adopting a more balanced approach, departing from a profit-driven strategy to encompass both economic and environmental objectives (Yusr et al., 2020). Many chemical companies have also adapted their traditional innovation practices to be more environmentally friendly (Salmah and Akmaliah, 2016; Wen et al., 2023b; Yune et al., 2016). To accomplish these transformations, previous scholars underscore green supply chain management

(GSCM), green innovation (Lisi et al., 2020), and green dynamic capabilities (GDCs) (Qiu et al., 2020b) as environmental strategies that influence various performance aspects. These include environmental performance (Huang and Li, 2018; Kazancoglu et al., 2020; Peng et al., 2021; Samad et al., 2021), and operational performance (Bhatia and Gangwani, 2021; Chaudhuri et al., 2023; Cheah et al., 2022; Hong et al., 2018; Huang and Li, 2018).

In fact, the last few decades have witnessed a significant evolution in supply chain management (SCM) due to its critical role across various domains. The effective control and management of the green supply chain are recognized as pivotal sources of sustainable competitive advantage in the contemporary global economic landscape (Chaudhuri et al., 2023; Kazancoglu et al., 2020; Samad et al., 2021; Song et al., 2019; Sun et al., 2021). GSCM, as an environmental management approach, is being advocated to address ecological challenges (Awan et al., 2019; Le et al., 2022; Teng et al., 2023; Yi and Demirel, 2023) and is seen as a robust response to both internal and external pressures. In the contemporary landscape, most companies, including chemical firms, are involved in at least one green supply chain. How these chemical companies manage GSCM practices can effectively mitigate negative environmental impacts and enhance ecological management (Ahmed et al., 2020; Badi and Murtagh, 2019), underscoring the critical role of GSCM in improving environmental management and attaining a sustained competitive green advantage (Chen, 2005).

The adoption of GSCM practices significantly impacts a company's environmental strategies and behaviors in an efficient manner (Li et al., 2019). Most importantly, GCSM practices play a pivotal role in influencing green innovation (Siddiqui, 2020), thereby enhancing the capability for such innovation and adaptation to external and internal barriers (Chen et al., 2006). In turn, green innovation, facilitated by GSCM practices, addresses institutional pressures, elevates product quality, reduces production costs, and enhances natural resource productivity (Aron and Molina, 2019). However, Abdullah et al. (2016) highlighted that external barriers impede green innovation in the Malaysian manufacturing sector. Primary obstacles include environmental concerns, government support, customer demands, and competitive forces. GSCM practices have emerged as responses to these challenges, resulting in chemical products, services, and combinations that are more sustainable in the long term (Salmah and Akmaliah, 2016).

Additionally, the concept of GDCs is highlighted through the evaluation of organizational processes and strategic management perspectives, indicating their necessity for the execution of GSCM (Ge et al., 2018). This capability pertains to businesses constantly refining their organizational paths to respond effectively to changing conditions (Joshi and Dhar, 2020). In Chapter 2, the causal relationships between traditional innovation practices, the shift towards GSCM practices, GDC, and green innovation will be elucidated, providing a comprehensive understanding of the research context.

1.4 Problem Statement

The chemical industry occupies a pivotal role in driving Chinese economic growth. However, due to its extensive development, ecological challenges within the chemical industry are a pressing concern (Pan et al., 2020). The modernization of the chemical sector hinges on finding an equilibrium between pollution control and firm performance. In response, numerous investigations have been conducted to understand the impact of greening initiatives, such as GSCM practices, on a company's performance. GSCM practices are recognized as a vital avenue to augment revenues while mitigating the adverse environmental impacts of industrial operations (Ahmed and Najmi, 2018;Pan et al., 2020;Xing et al., 2020).

Substantial research has emphasized the critical role of GSCM practices in long-term development (Fang and Zhang, 2018; Lin, 2022; S. Liu et al., 2020; Maulamin et al., 2020; Shohan et al., 2020). Besides, external institutional pressures necessitate the organization's strategic realignment and operational restructuring to uncover novel opportunities and cultivate emerging markets (Teece et al., 1997). Notably, institutional pressures steer environmental management practices, a main concern particularly within the chemical industry of emerging nations like China. Escalating concerns over environmental pollution have significantly reverberated within Chinese chemical enterprises' environmental management frameworks (Baah et al., 2021; Baah et al., 2021; Qi et al., 2021). In response, public demands have spurred companies (Lisi, Zhu, & Yuan, 2019) to adopt and execute environmentally conscious activities, such as GSCM practices (Chen and Chang, 2013a), to meet environmental sustainability imperatives.

Scholarly literature (DiMaggio and Powell, 1983; Fligstein, 1997) points to three mechanisms of institutional pressures that impact organizations' strategies and environmental endeavors as they seek legitimacy, namely coercive, normative, and mimetic pressures. These pressures as antecedents contribute to the adoption of GSCM practices (Zhu and Sarkis, 2007). Multiple researchers have recognized these three isomorphisms as pivotal drivers of GSCM practices (Ahmed et al., 2020; Jazairy and von Haartman, 2020; Maulamin et al., 2020). Nonetheless, conflicting outcomes have emerged, especially concerning the influence of coercive pressure (Eiadat et al., 2008; Zhu et al., 2013b) and normative pressure (Lin & Ho, 2011; Yang, 2018). For instance, Eiadat et al. (2008) revealed a negative connection between coercive pressure and GSCM practices within Jordan's chemical industry. Similarly, Zhu et al. (2013b) provided empirical evidence that coercive pressure drivers do not significantly motivate GSCM practices within the Chinese manufacturing sector. Conversely, Hoejmose et al. (2014) emphasized the strongly positive impact of coercive pressure on GSCM implementation in UK companies, while Ahmed et al. (2019) accentuated the necessity of coercive pressure to drive GSCM practices adoption within the manufacturing industry of Pakistan. Lin and Ho (2011) and Yang (2018) highlighted that existing GSCM practices and frameworks fall short of satisfying normative pressure across different industries. Lin and Ho's (2008)

focus was on Chinese logistics companies, while Yang (2018) examined the context of Chinese container shipping. Consequently, this investigation strives to enrich existing literature by introducing coercive, normative, and mimetic pressures as pivotal factors influencing the adoption of GSCM practices within the Chinese chemical industry. The aim is to comprehensively capture the array of institutional pressures shaping Chinese chemical firms' shared societal values and identity, fostering sustainable growth while upholding the integrity and legality of corporate conduct (DiMaggio and Powell, 1983).

Top management support (TMS) is crucial for discerning organizations' authentic commitment to sustainability (Chu et al., 2017), and holds a pivotal role in implementing various managerial practices that influence organizational performance. Drawing from Hambrick and Mason's Upper Echelon Theory (1984), top managers, as crucial intermediaries between businesses and their stakeholders, must recognize that each attribute is dynamic rather than static. They should remain attuned to shifts in external forces' attitudes and demands toward the company, promptly adapting managerial decisions while maintaining a delicate balance between the company's relationships with essential stakeholders. Despite the valuable insights gained by scholars, empirical research on how TMS, as a moderator, influences the relationship between institutional pressures and GSCM practices remains relatively unexplored, leaving a significant and well-documented gap in the literature. Both Wijethilake and Lama (2019) and Colwell and Joshi (2011) have noted that existing TMS models are inadequate to capture the intricacies of GSCM practices. Hence, this research centers on the moderating role of TMS in GSCM practices, aiming to deepen the understanding of how this moderator can fortify GSCM practices.

Apart from the antecedents of GSCM, its implications for firm performance are also of interest. Companies striving to implement GSCM practices are primarily driven by their aspiration to enhance performance (Ahmed et al., 2019; Lin, 2022; Martínez-Falcó et al., 2023; Maulamin et al., 2020; Samad et al., 2021). To date, numerous empirical studies have scrutinized the impact of GSCM on organizational performance (Feng et al., 2018; Geng et al., 2017; Green et al., 2012; Saeed et al., 2018; Zhu et al., 2013b). Nevertheless, the empirical evidence on the relationship between GSCM practices and performance is conflicting, inconsistent, and complex (Zhu et al., 2013a; Lee et al., 2012; Zailani et al., 2012; Lai and Wong, 2012). Therefore, this study attempts to enrich the existing literature by introducing GSCM practices as holistic and systematic mechanisms that influence environmental, financial, and operational performance. Drawing from Barney's (1991) Resource-Based View (RBV), organizations can secure enduring competitive advantages by implementing strategies that harness GSCM practices, capitalize on environmental opportunities, mitigate external risks, and address internal weaknesses.

Another pivotal environmental management concept aimed at addressing pollution issues is green innovation (Li et al., 2018; Yang and Lin, 2020). Recent studies by Singh and El-Kassar (2019) and Albort-Morant et al. (2018) underscore green innovation as a fundamental core competency that empowers

companies to attain environmental objectives. Despite the presence of numerous inquiries into GSCM practices and green innovation, the relationship between the two remains somewhat unclear or underexplored. Moreover, the role of green innovation as a mediator influencing the link between GSCM practices and performance outcomes remains insufficiently studied. Adopting the RBV by Barney (1991), green innovation is treated as a moderation role in this study as distinctive firm internal resources to explore its influence on GSCM practices and performance in the market.

According to Teece, Pisano, and Shuen (1997), dynamic capabilities offer a novel and potentially comprehensive lens for understanding new sources of competitive advantages, with the ultimate goal of enhancing firm performance. This notion finds further resonance in the Dynamic Capabilities Theory (DCT) (Teece et al., 1997), suggesting that not all companies possess equal dynamic capabilities. While GDCs as motivational factors have garnered attention in environmental management literature, their role as moderating factors impacting the effects of GSCM practices and green innovation on performance remains relatively unexplored. Hence, it is imperative to explore how these capabilities can augment the relationships between 1) GSCM practices and firm performance outcomes and 2) green innovation and firm performance outcomes.

This study is grounded in Barney's (1991) RBV, wherein GSCM practices are identified as fundamental organizational assets capable of mitigating environmental pollution. Furthermore, green innovation is introduced as a mediating factor that influences the relationship between GSCM practices and performance outcomes. In alignment with Institutional Theory, institutional pressures are posited as the driving forces behind these endeavors. Drawing on the Upper Echelon Theory, TMS is conceptualized as a moderator that can enhance or diminish the link between institutional pressures and GSCM practices. Simultaneously, in accordance with the DCT, GDCs are incorporated as moderating variables that can reinforce or attenuate the associations of GSCM practices and green innovation with performance (Barney, 1991).

1.5 Scope of the Study

Taking into account the research background, this segment delineates the scope of the research. The problem statement outlined earlier in Section 1.2 encapsulates the dual objectives of the thesis, as follows:

i. Determining the role of institutional pressures (coercive pressure, normative pressure, and mimetic pressure) as driving factors in implementing GSCM practices.

ii. Investigating the consequences of implementing GSCM practices in terms of performance outcomes, particularly environmental, financial, and operational performance.

iii. Examining the moderation effect of TMS between the driving factors and

GSCM practices.

iv. Investigating GDCs' moderation effect between green practices (GSCM practices and green innovation) and organizational performance.

v. Evaluating the mediation effect of green innovation between GSCM practices and organizational performance outcomes.

This research employs a conceptual framework rooted in four foundational theories: RBV, UET, DCT, and IT. Leveraging these theories, the study empirically assesses the interplay among institutional pressures and GSCM practices in shaping performance outcomes within the Chinese chemical manufacturing sector. This research scope is illustrated in Figure 1.1, highlighting the aim of understanding the conceptual relationship between institutional pressures, GSCM practices, and performance outcomes.

Figure 1.5 : Research Scope
(Source: Author, 2023)

1.6 Research Questions

Despite the existing advancements in the GSCM literature, it is evident that significant research gaps persist within the current knowledge landscape, particularly pertaining to the antecedents of GSCM practices. To comprehensively explore the dynamics of pressures, practices, and performance related to GSCM within the Chinese context, the following research questions have been formulated. The principal research questions for this study are as follows:

RQ1: Do institutional pressures (i.e., coercive pressure, normative pressure, and mimetic pressure) influence GSCM practices among Chinese chemical manufacturers?

RQ2: Does TMS moderate the relationship between institutional pressures (i.e., coercive pressure, normative pressure, and mimetic pressure) and GSCM practices among Chinese chemical manufacturers?

RQ3: Do GSCM practices affect performance outcomes among Chinese chemical manufacturers?

RQ4: Do GSCM practices affect green innovation among Chinese chemical manufacturers?

RQ5: Does green innovation affect performance outcomes among Chinese chemical manufacturers?

RQ6: Do GDCs moderate the relationship between green innovation and performance outcomes among Chinese chemical manufacturers?

RQ7: Do GDCs moderate the relationship between GSCM practices and performance outcomes among Chinese chemical manufacturers?

RQ8: Does green innovation mediate the relationship between GSCM practices and performance outcomes among Chinese chemical manufacturers?

1.7 Research Objectives

The research questions outlined above underscore the overarching objective of constructing a theoretical framework encompassing GSCM pressures, practices, and performance outcomes. This framework is designed to shed light on the complex interplay between institutional pressures, GSCM practices, and performance outcomes. In alignment with this overarching aim and the specific research inquiries of the thesis, the research objectives are as follows:

RO1: To analyze the relationship between institutional pressures (e.g., coercive pressure, normative pressure, and mimetic pressure) and GSCM practices among Chinese chemical manufacturers.

RO2: To examine the moderating role of TMS in the relationship between institutional pressures (e.g., coercive pressure, normative pressure, and mimetic pressure) and GSCM practices among Chinese chemical manufacturers.

RO3: To study the relationship between GSCM practices and performance outcomes among Chinese chemical manufacturers.

RO4: To investigate the relationship between GSCM practices and green innovation among Chinese chemical manufacturers.

RO5: To examine the relationship between green innovation and performance outcomes among Chinese chemical manufacturers.

RO6: To investigate the moderating role of GDCs in the relationship between green innovation and performance outcomes among Chinese chemical manufacturers.

RO7: To evaluate the moderating role of GDCs in the relationship between GSCM practices and performance outcomes among Chinese chemical manufacturers.

RO8: To study the mediating role of green innovation in the relationship between GSCM practices and performance outcomes among Chinese chemical manufacturers.

1.8 Research Plan

The preceding sections have established the research background, statement, scope, questions, and objectives. This segment now presents the research plan for this thesis, which empowered the researcher to effectively carry out this study. Figure 1.2 illustrates the research plan devised to achieve the primary objectives of this research.

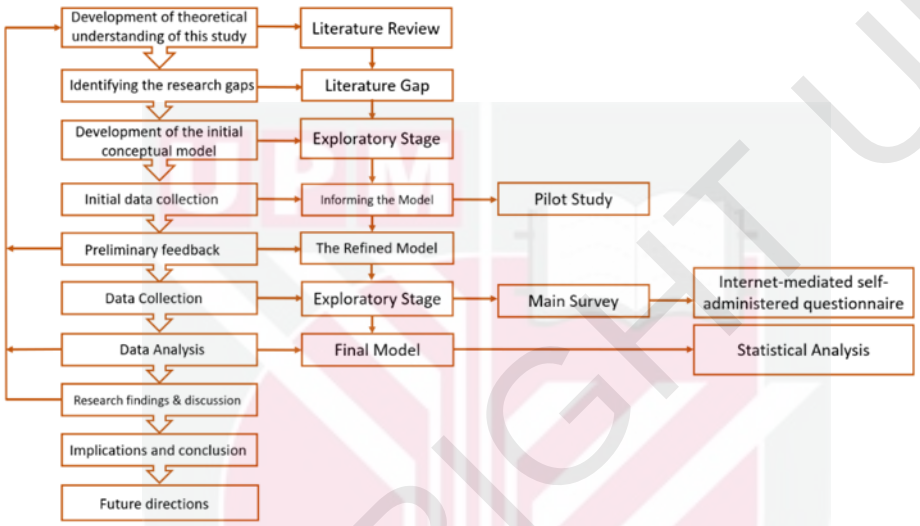

Figure 1.6 : Research Plan
(Source: Author, 2023)

1.9 Background of the Study

This section outlines the research's limitations, specifying the sector and geographical scope of the analysis.

1.9.1 Sector of Analysis

The economic advancement in developing countries has led to a significant challenge in the form of chemical pollution, largely attributed to the swift growth of industrialization and urbanization. Notably, the chemical industry has emerged as a central component of China's industrial economy, contributing substantially to its recent rapid progress (Hong et al., 2018, 2019; Wen et al., 2023b; Yune et al., 2016). However, the industry's substantial energy consumption, pollutant emissions, and resource utilization have raised concerns. In 2017, China's chemical sector consumed 3.03 billion tons of standard coal, constituting 60.31 percent of the total industrial energy consumption. This excessive energy

consumption significantly impacts the environment. CO_2 emissions attributed to the chemical industry represent nearly 56.67 percent of China's total CO_2 emissions, as documented by Zhou et al. (2013). Post-2012, instances of haze have become commonplace in regions concentrated on chemical industry activities, such as the Beijing-Tianjin-Hebei region and the Northeast China region. The Chinese Environmental Status Bulletin (2019) illustrates the correlation between regions with poor air quality and those with high chemical industry presence. This persistent haze threat underscores the vulnerability of China's ecosystem and accentuates the environmental pollution concerns arising from the chemical sector (Zhou et al., 2013; Li and Lin, 2016).

Additionally, the financial burden imposed by pollution stemming from the chemical sector, encompassing segments like chemicals, coking, and cement, continues to strain the long-term sustainability of China's economy. However, as noted by Wong (2013), China's government has been committed since 1990 to enacting legislation and regulations aimed at mitigating environmental pollution caused by the chemical industry. This trajectory necessitates a reversal. To facilitate a greener transition within the traditional chemical industry, strategies to curtail energy intensity and enhance energy efficiency are imperative.

For Chinese chemical enterprises aspiring to take a leadership stance, a comprehensive focus on external forces and the supply chain becomes crucial. Green dynamic capability emerges as a pivotal factor in shaping environmental management, whether in response to heightened demand or cost reduction imperatives. Consequently, this research predominantly centers on chemical manufacturing companies in China, addressing their ecological challenges while exploring the ways institutional pressures and GSCM practices catalyze their adoption of green innovation.

1.9.2 Geographical Scope

The geographical scope of this research encompasses the east coast of China. In 2020, the emergence of COVID-19 resulted in the most significant global public health crisis, impacting China and countries worldwide. The rapid transmission, widespread infection, and challenges in prevention and control presented substantial difficulties, leading to extensive consequences on various aspects, including public health, social economy, culture, governance, international relations, policies, and regulations. The chemical industry, a vital sector of the national economy, was not exempt from the profound impact of the pandemic.

As per the Chinese National Bureau of Statistics in 2020, the chemical industry witnessed an annual increase of 4.8 percent in added value yet experienced declines in total profits, imports, and exports on a yearly basis. Despite overall growth in recent years, the chemical industry's industrial added value growth rate remained relatively low. Specifically, during the period from January to

August 2020, the added value of the chemical industry registered a year-on-year increase of 0.5 percent, as detailed in Figure 1.3.

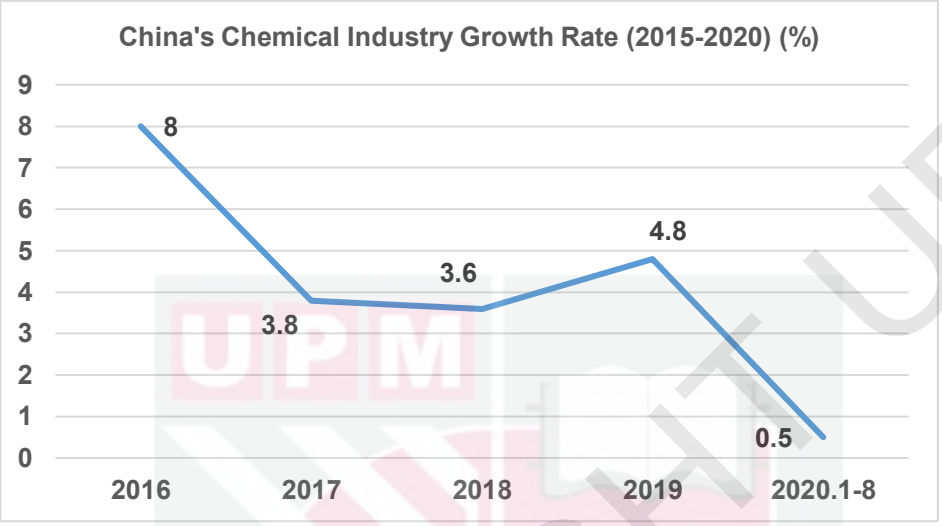

Figure 1.7 : China's Chemical Industry Growth Rate (2015-2020)

The operational efficiency of the Chinese chemical industry has experienced a continuous decline, with a downturn in operating income over the past three years. In 2019, the operating income of the Chinese chemical industry stood at 6.89 trillion yuan, marking a year-on-year decrease of 0.9 percent. The initial half of 2020, marked by the impact of the COVID-19 pandemic, witnessed a substantial drop in overall demand within the Chinese chemical industry. During this period, the industry recorded an operating income of 2.93 trillion yuan, reflecting a year-on-year decline of 10.5 percent (refer to Figure 1.4).

The eastern coastal regions of China encompass the Yangtze River Delta Economic Belt, the Pearl River Delta Economic Belt, and the Bohai Edge Economic Belt in their entirety. Over an extended period, this region has maintained robust economic efficiency and notable economic vibrancy within China (Haas and Ban, 2014; Wang et al., 2021). Notably, 73 percent of companies situated in this area have earned the distinction of being listed among China's top 500 chemical companies (Hong et al., 2019).

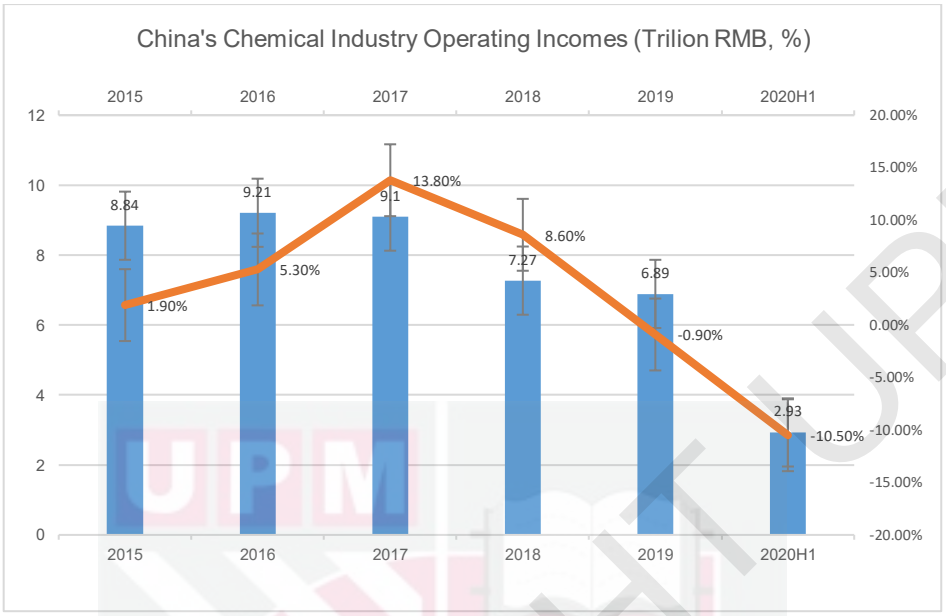

Figure 1.8 : China's Chemical Industry Operating Income (Trillion RMB, %)

As per data from the Chinese National Bureau of Statistics in 2020, Chinese chemical companies collectively produce an impressive 938.27 million tons of hydrochloric acid annually. Consequently, the chemical industry significantly contributes to a country's economic development. However, the problem emerges when waste gases and pollutants generated by these chemical enterprises are released into the environment, leading to substantial pollution concerns. This compelling reason drives Chinese chemical companies to embrace GSCM practices. By doing so, they can mitigate the detrimental impacts of these components and effectively manage the waste generated in their operations. Recognizing the factors that facilitate the adoption of GSCM practices in the chemical sector becomes imperative.

The central objective of this study is to establish a practical framework that explicates the interplay between GSCM drivers, GSCM practices, and performance outcomes within the Chinese chemical industry.

1.10 Significance of the Study

This research seeks to contribute to the field of GSCM research, with a specific focus on how GSCM practices impact an organization's performance outcomes. The theoretical and practical significance of this research are explained below.

1.10.1 Theoretical Significance

Previous studies have researched the intricate relationships between the implementation of GSCM practices and organizational performance outcomes (Chavez et al., 2016; Pham and Pham, 2021; Santoso et al., 2022; Teng et al., 2023). However, the body of research on this topic has undergone shifts and revelations that challenge previously established viewpoints. Newly emerged studies have raised doubts by questioning the existing notion of the unequivocal positive impact of GSCM practices on a firm's performance outcomes (Shi et al., 2012). Consequently, the relationship between GSCM practices and the performance of chemical companies has become unclear within the current body of knowledge (Rupa and Saif, 2021). This ambiguity and uncertainty underscore the need for further investigation, particularly given the lack of consensus in this domain.

Moreover, the existing research, while addressing the relationship between GSCM practices and performance outcomes, has overlooked the nuanced influence of institutional pressures in terms of normative and coercive dimensions (Ahmed et al., 2019). This study underscores that the presence and responsiveness to these various driving pressures can lead to diverse connections between GSCM practices and performance outcomes (Burki, 2018; Fasan et al., 2021; Kalyar et al., 2019; Rajabion et al., 2019; Wu et al., 2012). Furthermore, the dearth of studies that systematically explore the interplay between GSCM adoption, performance outcomes, and the influence of antecedent factors underscores the need for this research. It stands apart from prior investigations by empirically considering the impact of driving forces linked to GSCM practices when analyzing the effect of GSSCM practices on performance outcomes. By incorporating motivating factors related to GSCM practices, this study contributes to the ongoing discourse linking GSCM practices to a firm's performance outcomes. This not only leads to more robust conclusions but also bridges gaps in current knowledge. Notably, some empirical inquiries have hinted at interdependencies among performance outcomes, an aspect largely overlooked in previous research. Additionally, this study establishes a connection between GDCs and GSCM practices as well as performance outcomes.

This study further enriches the GSCM literature by unifying newly developed constructs within a framework that amalgamates previously fragmented and disjointed studies, culminating in a comprehensive GSCM drivers-practices-performance framework. An additional distinguishing feature of this research is its holistic and inclusive design, facilitating a thorough empirical evaluation of the ramifications of GSCM implementation on performance outcomes (Dubey et al., 2015; Shafique et al., 2017). In short, this study contributes to the existing body of knowledge on GSCM practices by elucidating whether GSCM adoption can yield operational, environmental, and financial benefits (Bag et al., 2022; Rajabion et al., 2019; Roh et al., 2022), which makes it academically significant.

1.10.2 Practical Significance

This research assesses the intricacies of implementing GSCM practices and addresses the uncertainties surrounding the benefits of such environmental initiatives. The insights generated from this study offer novel perspectives for practitioners engaging with the GSCM agenda. Chinese chemical manufacturing companies can derive managerial insights on integrating environmental endeavors into their supply chain and effectively implementing GSCM practices (Elbaz and Iddik, 2020). Furthermore, policymakers and legislators can glean valuable information to guide them in fostering the adoption of GSCM practices among manufacturers (Lisi et al., 2019). In this context, the study presents valuable insights for both managers seeking to implement GSCM practices and regulatory bodies striving to advance GSCM practices (Choi et al., 2018).

In a broader sense, the exploration of GSCM with a specific focus on its impact on company performance outcomes remains a relatively unexplored area in China. This gap is particularly pronounced in the Chinese chemical manufacturing sector, where existing scholarly literature predominantly consists of practical knowledge and theoretical discussions (Shi et al., 2012). Consequently, this research holds practical implications for this sector. It offers quantitative evidence regarding the influence of GSCM practices on the performance of Chinese chemical enterprises, coupled with actionable recommendations drawn from the study's findings in this domain (Zhou et al., 2018).

Moreover, practitioners can access a validated model for assessing the synergistic impact of GSCM practices on overall financial and environmental performance (Malviya and Kant, 2015). The practical significance of this investigation extends further as it provides valuable insights for the Chinese chemical industry operating within a resource-constrained context on how to leverage GSCM, thereby mitigating environmental harm and enhancing performance (Fang and Zhang, 2018).

Furthermore, the GSCM activities elucidated in this study can aid Chinese chemical manufacturing companies in gaining a broader perspective on the South Asian landscape. This perspective facilitates the identification of supply chain areas requiring improvement and the prioritization of eco-friendly efforts (Kazancoglu et al., 2018). The outlined GSCM activities can also serve as an evaluation tool and potential benchmark for company top management to gauge the overall perception of GSCM practices within their organizations (Shohan et al., 2020), thereby enhancing the practical significance of the study. Consequently, it is evident that this investigation holds substantial practical value.

1.11 Definition of Terms

Table 1.1 presents the definitions for the constructs utilized in this study. It underscores six pivotal concepts: IP, TMS, GSCM, GI, GDCs, and performance outcomes.

Table 1.3 : Definitions of Key Terms

No.	Construct	Definition	Source
1)	Institutional Pressures	"institutional pressure's three institutional isomorphic pressures, namely coercive, normative and mimetic pressures, can affect an organization's competitive environmental position."	DiMaggio and Powell (1983) and Sarkis et al. (2011)
2)	Mimetic Pressure	"from both internal and external pressures placed upon businesses by various entities such as governmental bodies, legal systems, courts, professions, and the social expectations relevant to the organization's role. These pressures can manifest as coercion, persuasion, or collaborative invitations."	DiMaggio and Powell (1983)
3)	Normative Pressure	"an organization's inclination to respond to varied external pressures by committing to more robust environmental initiatives. This propensity is determined by the extent to which adjustments in a company's behavior lead to heightened levels of "legitimacy"."	Zhu et al. (2013b)
4)	Coercive Pressure	"prompts organizations to replicate the practices of their peers, including competitors."	Zhu and Geng (2013)
5)	Top Management Support (TMS)	"top management support powerfully directs the organization's environmental activities and conditions due to its position within the company."	Ilyas et al. (2020)
6)	Green Supply Chain Management (GSCM)	"GSCM ranges from green purchasing to integration of supply chain starting from suppliers, to manufacturers, to customers, and finally reverse logistics, which involves closing the loop."	Zhu and Sarkis (2004)
7)	Green Innovation	"as hardware or software innovation that is related to green products or processes, including the innovation in technologies that are involved in	Chen, Lai, and Wen (2006)

Table 1.3 : Continued

		energy-saving, pollution-prevention, waste recycling, green product designs or corporate environmental management."	
8)	Green Dynamic Capabilities (GDCs)	"the ability of a company to exploit its existing resources and knowledge to renew and develop its green organizational capabilities to react to the dynamic market."	Chen and Chang (2013)
9)	Performance Outcomes	"analyzing a company's performance against its objectives and goals."	Carr and Pearson (1999)

1.12 Structure of the Thesis

This section outlines the comprehensive structure of the research, outlining the key concepts addressed in each chapter. The thesis is organized into six distinct chapters: Introduction, Literature Review, Theoretical Framework and Hypotheses Development, Methodology, Analysis and Findings, and Discussion and Conclusion. The overall structure of this thesis is as follows.

The outline of the thesis is elucidated in Chapter 1 (Introduction). This chapter commences by providing contextual background information on the subject matter under study, followed by the identification of research gaps within the existing literature. The chapter encompasses the research scope, research questions, research objectives, research plan, research delimitation, sector and geographic area of analysis, and the research's relevance. Moreover, the chapter discusses the research methodologies employed in this study and presents the holistic organization of the research.

Chapter 2 (Literature Review) reviews the pertinent literature related to the research topic. Theoretical foundations of the primary research factors governing the research phenomenon are provided. Commencing with a succinct overview of the chemical industry in China, the chapter imparts essential information about the Chinese chemical industry. Subsequently, it explores the theoretical underpinnings of the GSCM concept, encompassing its terminology and fundamental components. The chapter accentuates the key research factors of the research phenomenon: GSCM driving forces, GSCM practices, and corresponding performance outcomes. Each of these research factors is expounded theoretically, establishing a robust grounding for various research phenomena. The objective is to establish relevant dimensions for GSCM driving forces, GSCM practices, and corresponding performance outcomes. Ultimately, this chapter aims to construct a comprehensive conceptual GSCM drivers-practices-performance framework to effectively address the primary research questions.

Chapter 3 (Theoretical Framework and Hypotheses Development) introduces the integrated GSCM drivers-practices-performance framework. Theoretical linkages between the three primary research factors—GSCM motivating forces, adoption of GSCM practices, and resultant performance outcomes—are elaborated upon. The construction of the theoretical framework is detailed, focusing on the cause-and-effect relationships between antecedents and outcomes, and how research constructs are integrated into the framework. The chapter further explicates the hypothesis-building process concerning the impact of motivating antecedents, GSCM practices, and firm performance outcomes, as well as the formulation of each hypothesis.

In Chapter 4 (Methodology), constituting the “research onion” of this thesis, the fundamental methodology employed in this research is highlighted and explained. This includes the research philosophy, approach, strategy, research design, and research method. The chapter provides an in-depth view of the questionnaire development process, encompassing questionnaire selection and structure design. It expounds on the construction of the measuring scale and the rationale behind utilizing primary data. The chapter also discusses the sampling approach employed and ethical considerations. The process of pilot testing and the primary survey are extensively detailed in the latter part of the chapter.

Chapter 5 (Analysis and Findings) elucidates the proposed data analysis approach, Partial Least Squares Structural Equation Modelling (PLS-SEM). The chapter provides descriptive results of the research findings and encompasses various analyses such as common technique bias, scale assessment methods, and measurement model assessment. The findings of the PLS-SEM analysis are then presented in this chapter, along with the validation or rejection of the proposed hypotheses.

Chapter 6 (Discussion and Conclusion) is dedicated to drawing conclusions from the research conducted. This chapter meticulously outlines the outcomes pertaining to each proposed hypothesis, aligning with the results expounded in Chapter 5. It expounds on the research questions, focusing on the complex causal connections between GSCM motivating forces and the implementation of GSCM practices. Additionally, the theoretical correlation between GSCM implementation and its resultant performance outcomes is thoroughly examined. The chapter also discusses the alignment or divergence of the findings with previous research, while offering insights into the reasons behind any inconsistent results. A consolidated summary of the theoretical viewpoint emerging from this empirical study concerning GSCM drivers-practices-performance is presented. The concluding segment of the chapter reflects on the notable theoretical, methodological, and practical contributions of the thesis.

1.13 Chapter Summary

In summary, the primary goal of this study is to enhance the comprehension of the factors impacting organizational performance outcomes within the context of the Chinese chemical industry. This chapter serves as a comprehensive guide, paving the way for the subsequent chapters. Notably, it has explained essential components such as the research background, problem statement, research scope, research questions, research objectives, research plan, research delimitation, research significance, and definition of terms. The subsequent chapter will focus on a thorough review of the literature concerning organizational performance outcomes and will address any existing research gaps that warrant attention.

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