THREE ESSAYS ON

CHINESE REVERSE DIRECT INVESTMENTS:

THEORY AND PERFORMANCE OUTCOMES

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Three Essays On Chinese Reverse Direct Investments:

Theory And Performance Outcomes

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CERTIFICATE OF ORIGINALITY

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ABSTRACT

China has transformed from a recipient to a contributor to the world's outward foreign direct investment (OFDI; Wang & Li, 2017). OFDI from China has more than doubled from 56,529 million USD in 2009 (UNCTAD, 2010) to 143,040 million in 2018, the world's second-largest contributor in OFDI, right after Japan (144,982 million) and followed by France (102,042 million) (UNCTAD, 2018). Notably, China has been increasing its reverse direct investment (RDI) in more developed economies (Deng et al., 2017). China's RDI stock increased from 94 billion USD in 2013 to 254 billion in 2020 (MOFCOM, 2014, 2021). European Union (32.7%) is the most popular developed country for China's OFDI, followed by the United States of America (31.5%) and Australia (13.6%) (MOFCOM, 2021).

Understanding the RDI of Chinese firms is essential to the prospect of China's transformation from a labor-intensive manufacturer to a technology-intensive innovator. First, RDI allows Chinese firms to access advanced technology, knowledge, and expertise to improve their technologies, capabilities, and competitiveness during globalization. Second, FDI enables China to diversify its industries and rely less on labor-intensive manufacturing. Third, the Chinese manufacturing industry has traditionally suffered criticism of its ethics, including its consciousness of environmental management and labor rights. RDI allows Chinese firms to enhance their image and reputation, which is crucial for sustainable competitiveness and long-term success as a global player.

In this thesis, I investigate the impact of RDI, particularly on environmental management performance and shareholders' value. RDI provides opportunities for firms to enhance their environmental management performance by allowing exposure to better practices and technologies across their operations management. Improvements in operations

imply better environmental management and sustainability outcomes, which can enhance a firm's reputation and increase its shareholder values as investors are increasingly concerned about its sustainability performance when making investment decisions. Therefore, it is crucial for firms to strategize their RDI to result in better environmental performance and increase shareholder value.

Environmental management has become one of the firm's core focuses because it has proven essential for sustainable competitive advantages. At the macro level, it is vital for a nation's economic development and the world's common good. Achieving efficient environmental management is especially crucial yet challenging for emerging countries like China, whose manufacturing industry used to be a destination for heavy polluting processes of other developed countries. Although China has been focusing on initiatives to ease the environmental issues along its internationalization journey, as a latecomer in environmental management, Chinese firms often seek advanced environmental knowledge and skills externally, which makes RDI an ideal platform for knowledge transfer.

Study 1 provides a knowledge foundation for the hypothesis development of Study 2. I systematically reviewed 178 journal articles to examine how the linkage between sustainable supply chain management and organizational learning (OL) is studied in the operations management field. The study first presents descriptive statistics and then develops a citation network analysis. Four research domains were identified, they are (a) environmental collaborations and environmental learning, (b) tensions and risks in sustainable global supplier management and OL, (c) sustainable supply chain learning, and (d) OL in social sustainability supply chain practices. Main path analysis of each domain was conducted to explore the knowledge structure further. The research concludes with future research recommendations.

Study 2 examines the impact of RDI on the firm's environmental performance through the lenses of the OLI paradigm (ownership, location, and internalization), OILL paradigm (OLI plus learning), and OL theory. Data from 1,739 publicly listed manufacturing firms from 2008 to 2017 in the Shanghai and Shenzhen Stock Exchanges were considered for empirical analysis. Our results indicate that RDI improves the environmental performance of Chinese firms. I further examined the moderating effects of cultural similarity and private ownership. Overall, it was found that RDI is more beneficial to the environmental performance of firms with higher private ownership and when they expand to culturally similar destinations.

By understanding the dynamics between RDI and shareholders' value, firms can better manage their firm's performance and ensure their long-term survival. Study 3 uses a sample of 236 RDI announcements from Chinese manufacturing firms to explore the effect of RDI on firms' stock market value. It captures positive abnormal changes in stock price, which indicates investors consider RDI beneficial to the future cash flow of firms. The results show a positive contingency effect of the external dynamics of the destination's talent resources and its regulatory environment for FDI on the impact of RDI on shareholders' value. At the same time, the results concluded a negative contingency effect of the internal dynamic with financial risk.

This thesis contributes to the FDI literature by shedding new light on the positive impact of Chinese RDI on a firm's long-term competitive survival. The majority of FDI research focuses on investments from developed countries. Many scholars have pointed out that the conventional FDI frameworks do not adequately explain the unconventional RDI of emerging countries as their motivations differ. Existing literature on FDI from developed countries overlooks the unique characteristics of emerging economies' RDI. As the motivation, the

challenges, and the desired outcomes can differ from traditional FDI from developed countries, more specific attention should be paid to RDI. I enrich this by investigating specifically RDI. Most emerging studies investigating the implication of China's RDI use province-level panel data and yield mixed results. I utilize firm-level panel data in this thesis to contribute a micro perspective to the issue. In addition, existing studies that investigate RDI overwhelmingly focus on R&D and technology. For a more sustainable approach, this thesis points out that RDI can serve as an effective measure to improve the environmental performance of firms from emerging countries. The results of this thesis also show that RDI yields a positive market reaction. Besides contributing to the relevant literature, this thesis has significant practical implications for manufacturing managers, the government, and investors.

Keywords: reverse direct investment, organizational learning, OILL paradigm, environmental management, sustainability supply chain management, abnormal returns, China

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CHAPTER 1. INTRODUCTION

1.1 Research Background

For the past two decades, China has undergone a tremendous transformation. Since its economic reform in 1978, China has attracted significant foreign direct investment (FDI) due to its large population, inexpensive labor, friendly regulatory system, and generally welcoming government (Alon et al., 2014; Collier, 2018). With its enhancement in science and technology, China has been experiencing increased domestic output and enjoying an excess in capital. Moreover, the "Going Global" strategy established in 1999 and the concession to the World Trade Organization in 2001 have enabled China to take on another direction of FDI (Agarwal & Wu, 2004; Buckley et al., 2008). This evolution motivated the Chinese government to actively sponsor and support it from an early position of controlling and limiting outward foreign direct investment (OFDI). More notably, the Chinese announced the Belt and Road Initiative in 2013 to encourage further outward investment (He & Choi, 2020). In 2020, China became the world's largest investor, contributing 17.97% of the world's outward investment, leading all countries at 132 billion USD (UNCTAD, 2020), followed by Luxembourg, Japan, and the United States.

Being the second largest economy globally, China significantly influences the trade and economic policies of the rest of the world, not only in emerging economies but also in developed economies (Gunasekaran & Ngai, 2012). The rest of the emerging economies are also becoming more active in OFDI. Emerging countries' OFDI increased from 7.64% of the world's outward investment in 2000 to 25.65% in 2010 and 52.32% in 2020 (UNCTAD, 2020). Therefore, we should not overlook the global influences of emerging economies.

In addition to the change of attitude towards OFDI, we have also started seeing a shift in the location choices of Chinese OFDI. Traditionally, Chinese firms were highly attracted to invest in emerging countries due to their close geographic proximity and similar cultural values (Alon et al., 2014). However, we have noticed increased Chinese investment in developed countries in recent years due to its long-term, global-oriented strategies. Developed countries' large consumer markets and more advanced technology are valuable resources for China's industry development (Alon et al., 2014). Jun (1987) named this specific type of FDI from emerging to developed countries "reverse direct investment (RDI)" (Jun, 1987, p.91) in his early literature when this unconventional FDI location choice was first observed in South Korea. Though remaining 9.8% of China's total OFDI stock in 2020 (a total of 2581 billion USD), China's RDI stock increased from 94 billion USD in 2013 to 254 billion in 2020 (MOFCOM, 2014, 2021), showing the growing significance of RDI over the years.

Any FDI is costly due to complexity, coordination, and resource trade-offs (Alcantara & Mitsuhashi, 2012; Carpenter et al., 2003; Hitt et al., 1997; Sapienza et al., 2006). However, RDI could be more challenging and uncertain than traditional FDI as emerging countries commenced globalization later than the more developed markets, so they suffer from late-mover disadvantages and lack of ownership advantages that they can leverage when expanding to developed countries (Guillén & García-Canal, 2009). Despite that, China is still rapidly increasing its RDI. To understand this unconventional behavior, we have to start by understanding why Chinese firms expand to more developed countries.

Research has shown that FDI can benefit ones economic growth in the long run (Chen & Zulkifli, 2012; Lee, 2010), which is an understandably desired goal of any country's economic development. However, scholars have pointed out that motivations for RDI differ

from FDI. Generally, when enterprises from emerging cities invest in other emerging cities, the goal is to acquire natural resources and market seeking (He et al., 2015; Pradhan, 2011; Wang, Hong, Kafouros, & Boateng, 2012). As for RDI, the goal is knowledge and technology seeking (Wang, Hong, Kafouros, & Boateng, 2012). To understand why Chinese companies choose more developed countries as expanding locations, we can start with the framework from Dunning (1980, 2001). The OLI paradigm by Dunning (1980) is one of the most developed and widely used theoretical frameworks for FDI (Denisia, 2010; Park & Roh, 2019). "OLI" stands for three different conditions for FDI – "O" for Ownership, "L" for Location, and "I" for Internalisation advantages. These three conditions must be fulfilled simultaneously for a firm to engage in FDI (Dunning, 2001). In short, a firm will engage in FDI when it possesses firm-specific advantages to leverage when expanding to a foreign market. The firm must also expand to a location with local-specific advantages, including technological capabilities. The firm will need to decide whether to internalize its operations or subcontract in a foreign market to enjoy greater control in its supply chain and cost reduction. Also, according to his framework (Dunning, 2001), location choices of foreign investment depend on three primary intentions: foreign market seeking, efficiency seeking, and resource seeking. Efficiency seeking is not a primary reason for China's RDI because it has always been an efficient, low-cost manufacturer (Alon et al., 2014; Buckley et al., 2007). Therefore, two main motivations of Chinese RDI are foreign market seeking—where companies seek trade opportunities, access distribution networks, and enhance exports (Buckley et al., 2007)—and resource seeking, where firms seek to secure the supply of raw materials and energy sources and acquire strategic assets such as R&D capabilities and technical and managerial expertise (Alon et al., 2014; Amighini et al., 2013; Buckley et al., 2007). Though both motivations can be plausible reasons for Chinese firms to invest outward, many have agreed that resource seeking, also known as strategic asset seeking (Bhaumik et al., 2016; Ramamurti, 2012; C. Zhou et al., 2019), should be the more

vital driver (Cozza et al., 2015; Wang, Hong, Kafouros, & Boateng, 2012). Other studies have also agreed that one of the major motivations for FDI is to gain new competitive advantages and acquire lacking strategic resources assets for imitation and exploitation (Anderson et al., 2015; Luo & Tung, 2007b; Ramamurti, 2012). Therefore, internationalization can improve the investing company's overall performance by bringing and adopting learned knowledge back home (Cozza et al., 2015). Two significant examples of Chinese technology MNCs include Lenovo, one of the earliest examples of RDI (Liu & Buck, 2009). Utilizing its ownership advantages over its brand reputation and supply chain capabilities, Lenovo acquired IBM's personal computer business as early as 2005. It also set up R&D processes in various countries to gain exposure and acquire local talent and resources. Similarly, Huawei, which enjoys ownership advantages in its telecommunication expertise, including equipment and technology, expanded in various countries, including UK, Canada, and Germany. It also set up subsidiaries in countries like Germany and Canada to internalize its operations (W. Zhang et al., 2020).

FDI has been studied extensively by researchers for the past 15 years (Paul & Feliciano-Cestero, 2021), and papers on RDI have started to become a rising focus of the field (Gaur et al., 2018; Paul & Benito, 2018; S. Yu et al., 2019; Y. Zhou et al., 2019). However, Buckley et al. (2018) pointed out that the lack of empirical studies of OFDI performance is still the weakest area in this field. This is especially true for the reverse impact of home countries (Paul & Feliciano-Cestero, 2021) and in emerging cities (Cozza et al., 2015). Therefore, this thesis fills the gap by providing two empirical studies on the outcome of RDI in Chapters 4 and 5.

1.2 Research Motivations and Objectives

This thesis aims to contribute to the gaps in the FDI literature. While reviewing past literature, I observed that RDI had gained less academic attention than FDI. Most FDI studies

focus on investigating OFDI by developed countries. Recent studies have started investigating FDI by emerging economies; however, they are primarily FDI in other emerging countries. Most literature focusing on shareholders' value creation of FDI concerns developed economies (e.g., Chari et al., 2010; Dutta et al., 2013; López-Duarte & García-Canal, 2007; Woldt & Godfrey, 2022). FDI literature that concerns FDI's environmental outcomes also heavily focuses on investment inflow (e.g., Dong et al., 2019; Hao, Wu, et al., 2020; Kim et al., 2016; Liu et al., 2019; Zeng & Zhou, 2021). I would like to present two empirical studies to enrich the FDI literature by focusing on RDI from Chinese firms to developed countries to provide insight into this peculiar phenomenon. As the motivation, the challenges, and the outcomes of RDI can be inherently different from FDI, I consider the expansion, or so to speak, the narrowing of focus to RDI essential.

The main reason for this thesis is to understand the topic using China's transformation is the controversy surrounding its economic growth. China's investment benefits host countries by promoting rational circulation and allocation of resources (Feng et al., 2018) and improving infrastructure and economic development (Jenkins, 2010). Whereas critics, especially from the West, are concerned over issues including Chinese government control, security issues, unfair competition in global takeovers led by cheap capital backed by the state, debt levels of many investment firms, and inexperience in the global market (Collier, 2018; Yang & Stoltenberg, 2014). Thus, this research aims to shed insights by performing two empirical studies to answer some controversies around China's foreign investment, including showing some positive impacts of China's globalization, especially on environmental management and shareholders' value.

I choose to study these dynamics for two reasons. First, Chinese firms constantly undermined the importance of good environmental practices as a traditional destination for the global expansions of heavy-polluting manufacturing processes from developed countries. With its rapid economic development, the nation's severe environmental problem has become a global concern. Realizing that environmental management is essential for any firm's sustainable competitive advantages and long-term survival in today's environmental-, social-, and governance-conscious business environment, stakeholders now heavily demand firms to act sustainably. On top of that, the Chinese government has launched various initiatives to promote industry development. Therefore, environmental management is essential for firms' sustainable development and for gaining political and social legitimacy domestically and internationally as it globalizes.

I also investigate the factors that moderate the impact of RDI on environmental management. Namely, private ownership, a significant sociopolitical factor in emerging economies (Lo et al., 2018), and cultural similarity, an essential consideration when examining environmental-related knowledge (Husted, 2005).

Second, regarding firms' long-term survival, it is critical to understand the impact of RDI on shareholders' value. Understanding how the market reacts to RDI is vital, as stock price reflects investors' perception of a firm's future earnings and growth. A company's stock price can significantly impact its operations, including access to capital, executive compensation, and expansion strategies (Branch & Gale, 1983). In this study, I also examine the dynamics of the impact with external factors (i.e., the destination's talent resources and its regulatory environment for FDI) and internal factors (i.e., financial risk).

1.3 Research Approaches and Findings

This thesis, with three independent yet interrelated studies, is organized as follows: My approach starts with literature reviews on various related backgrounds, including 1) the Conventional FDI Theory, OLI theory, and its development, 2) the concept of Organizational Learning, 3) the development of Chinese FDI, and 4) FDI and its environmental impact. Then I conducted Study 1 to begin the thesis by building the theoretical background for my hypothesis. As I hypothesize RDI promotes environmental management of Chinese firms through organizational learning in Study 2, I would like first to understand the knowledge foundation of environmental management and organizational learning to set a valid ground for my hypothesis. Studies 2 and 3 then study the outcomes of RDI, as mentioned above, RDI provides opportunities for firms to improve their environmental management performance by allowing exposure to better practices and technologies across their operations management, leading to enhanced firm's reputation and its shareholder values. And as investors are increasingly concerned about a company's sustainability performance when making investment decisions, RDI becomes an important strategy that results in better environmental performance and increased shareholder value. Therefore, Studies 2 and 3 investigate the environmental and firm performance outcomes of RDI.

Study 1 serves as a foundation for the hypothesis development of Study 2. In Study 2, I postulate that RDI can positively impact the home firm's environmental management through OL. Although the citation network analysis may not directly contribute to the research objective, understanding where existing knowledge lies within the relationship between SSCM and learning is a crucial first step, as OL also plays a significant role in ensuring sustainability-related knowledge sharing along the supply chain. Maintaining good SSCM is vital for firms' competitive advantages and survival, and OL is the key. Studying this relationship can help

identify how organizations learn to integrate better sustainable practices into their supply chain management. This can shed light on how RDI, essentially two organizations doing business, can improve environmental performance in the home country through OL. However, to the best of our knowledge, no existing systematic literature review provides insights directly into their linkage. This gap is also why I wanted to dedicate a citation network analysis to SSCM and OL instead of FDI and SSCM, as existing systematic literature reviews examine this direct impact (Saini & Sighania, 2019).

I used citation network analysis to identify the research domains objectively (Pilkington & Meredith, 2009). I then conducted a main path analysis to understand the significant knowledge for each research domain. I systematically reviewed 178 articles related to SSCM and OL in the 13 most reputable peer-reviewed operations management journals. I identified four clusters in the field: (a) environmental collaborations and environmental learning, (b) tensions and risks in sustainable global supplier management and OL, (c) sustainable supply chain learning, and (d) OL in social sustainability supply chain practices. As a future direction, I also find that machine learning, green logistics, and advanced eco-manufacturing technology are growing in the field. The review provides insights into how OL can promote SSCM, as RDI has proven to serve as an OL channel. This systematic review motivates me to tackle my research question in Study 2: Does RDI promote environmental management?

In Study 2, I performed a quasi-experiment to test my research question and the moderating effects of private ownership and cultural proximity. First, I used coarsened exact matching (CEM) to match a firm with an expansion event in a specific year (i.e., sample observation) with a firm without an expansion event in the same year (i.e., control observation). Then I performed a difference-in-differences estimation to compare the differences in

environmental performance changes between the sample and control observations. The findings answer the research question and show that RDI promotes the environmental management of Chinese firms by reducing environmental violation counts. Results also found that private ownership and cultural similarity have positive moderating effects on reducing violation counts of Chinese firms post-RDI.

In Study 3, I studied the long-term impact of RDI on shareholders' value. A short-horizon event study methodology was adopted to measure the magnitude of the effect of Chinese RDI events on the firm's stock price. The methodology is an approach to measure the effectiveness of unanticipated events—in our case, RDI—on the expected profitability and risk of a portfolio of firms while adjusting for both industry and market-wise influences on stock prices (Agrawal & Kamakura, 1995; Brown & Warner, 1980, 1985; Hendricks & Singhal, 2003; MacKinlay, 1997). Results show that the market reacts positively to RDI announcements from Chinese firms. I found a positive contingence effect of the external dynamics of the destination's talent resources and its regulatory environment for FDI on the impact of RDI on shareholders' value. However, I found a negative contingency effect of the internal dynamics of financial risk on RDI's impact on shareholders' value.

CHAPTER 2. LITERATURE REVIEW

2.1 Conventional FDI Theory and Modern Development

2.1.1 FDI Theories

According to Denisia (2010), there are four major FDI theories, including the 1) Production Cycle Theory, 2) The Theory of Exchange Rates on Imperfect Capital Markets, 3) The Internalisation Theory, and 4) The OLI Paradigm, also known as The Eclectic Paradigm/The OLI. We will provide a summary below :

A) Production Cycle Theory

This theory by Vernon (1992) originated to explain a certain type of FDI from U.S. companies in Western Europe after World War II in the manufacturing industry. The theory states that the production cycle includes innovation, growth, maturity, and decline. At the innovation stage, US companies manufacture new innovative goods for domestic consumption and then export the surplus to foreign markets. European firms start to imitate these products and force the US companies to establish production in domestic markets to maintain their market shares in those areas. This theory was useful to explain, not all, but a certain amount of OFDI from the US to European countries during 1950-1970.

B) The Theory of Exchange Rates on Imperfect Capital Markets

This theory explains that uncertainty in international trade drives FDI (Cushman, 1985; Itagaki, 1981). Cushman (1985)'s empirical study finds that an increase in the real exchange rate encourages FDI in the US dollar, while foreign currency appreciation leads to a

decrease in American FDI. However, this theory does not adequately apply to FDI between countries with different currencies.

C) The Internalisation Theory

This theory argues that MNCs are developing internal activities to develop specific firm-specific advantages, which are then exploited. In his paper, Hymer (1976) explains the internalization theory only applies when the benefits of exploiting firm-specific advantages outweigh the relative costs of the operations abroad.

D) The Eclectic Paradigm/The OLI Paradigm

"OLI" stands for three different conditions for FDI – "O" for Ownership, "L" for Location, and "I" for Internalisation advantages. The theory states that these three conditions must be fulfilled simultaneously for a firm to engage in FDI (Dunning, 2001). Among the traditional cross-border expansion theories, the OLI paradigm by Dunning (1980) remains one of the most developed and widely used theoretical frameworks for FDI (Denisia, 2010; Park & Roh, 2019). Hence, I built my theoretical ground of this thesis based on this theory, and I will provide a more in-depth overview in the next section.

2.1.2 OLI Theory and OILL Theory

In general, there are three routes for a firm to grow: (a) horizontally or laterally diversify production lines or vertically into new activities, (b) acquire an existing business, or (c) seek foreign markets (Dunning, 1980). When a company seeks the third option, they become a multinational enterprise (MNE). Nonetheless, foreign expansion must be economically sensible for a firm to choose the third option. Because firms need to operate in a foreign market with limited sources of information and networking (Zaheer & Mosakowski, 1997), FDI is costly, risky, and challenging. The most prominent FDI theory applied to understand the driver

of such a complex operation is the OLI paradigm developed by Dunning (1980), also known as the eclectic paradigm. *OLI* stands for three advantages, namely ownership, location, and internalization (Dunning, 2001). The paradigm was developed by observing US manufacturing firms' FDI to the UK. According to the paradigm, a firm must possess all three conditions simultaneously to expand overseas.

Ownership advantages mean the firm possesses unique tangible and intangible firm-specific assets when other competitors do not. These competitive or monopolistic advantages can help the firm offset the challenges of expanding to an unfamiliar foreign environment. For a foreign expansion to succeed, a firm must have ownership advantages that can help them outweigh the cost of operating in a foreign market (Hirsch, 1976). Competing with local firms during FDI can be disadvantageous due to liabilities of foreignness (Hirsch, 1976; Zaheer, 1995). Firms experience liabilities of foreignness during FDI because of their lack of understanding of local markets compared to their local competitors. They are often discriminated against by various local actors in the competitive market. Therefore, firms must possess firm-specific advantages to overcome this challenge (Hirsch, 1976). Some firm-specific advantages include technology and knowledge, such as advanced production techniques (Siripaisalpipat & Hoshino, 2000), superior marketing skills (Hymer, 1976), monopoly advantages such as trademarks (Siripaisalpipat & Hoshino, 2000), and economies of scale (Siripaisalpipat & Hoshino, 2000).

The three elements are interrelated. First, location advantages mean it is profitable to exploit their ownership advantages in a foreign location with their indigenous resources rather than those of the home country. Second, internalization advantages mean it is more beneficial for a firm to internalize these assets (which contributes to ownership advantages) through local

subsidiaries than selling or leasing them to other firms. It explains why firms prefer FDI over transacting with markets like exporting. This integration and alignment of internal resources can also reduce transaction costs, which is supported by the transaction cost theory (Williamson, 1975).

Extending from the OLI paradigm, Dunning (2015) points out that FDI is motivated by three primary factors: foreign market seeking, efficiency seeking, and resource seeking (which often includes strategic assets seeking). These motives contribute to the location choice of FDI.

Though the OLI paradigm remains influential in contemporary FDI research (Delevic & Heim, 2017), as the transformation of emerging countries from a receiver of inward FDI to contributors of OFDI, scholars started to question the possible shortcomings of applying the conventional OLI paradigm to the FDI behaviors of emerging countries (Barkema et al., 2015; Hennart, 2012; Li, 2007; Park & Roh, 2019; Paul & Feliciano-Cestero, 2021; Yang & Deng, 2017). Even the author suggested a revision of the OLI paradigm when applying it to emerging MNEs (EMNEs; (Dunning, 2006). Nevertheless, most research in the stream of knowledge following the OLI paradigm has used samples from developed economies and, over the years, has developed a consensus that confirms the three motivations identified by the OLI paradigm. One particular extension explains the unconventional overseas expansion strategy of emerging economies, the *OILL* (the advantages from OLI plus a second *L*, which stands for "learning motive") model proposed by Park and Roh (2019). It is developed on the notion that EMNEs view RDI as a learning platform to facilitate their capabilities development (Checchinato et al., 2017). Thus, it is a suitable model to capture the learning aspect of RDI on environmental management, as shown in Chapter 4.

When emerging countries expand overseas, they lack ownership advantages to overcome the challenges encountered in the foreign market, especially during RDI (Lattemann et al., 2012). Understandably, their RDI motivations differ from developed countries' FDI. As mentioned previously, foreign market seeking (Buckley et al., 2007) and resource seeking (Buckley et al., 2007) are the main two motivations behind Chinese overseas expansion (Alon et al., 2014; Amighini et al., 2013).

As emerging countries globalize, their industry development goal transforms from manufacturers to innovators. As late-comers, these countries have to seek new knowledge and technologies to facilitate their globalization process in developed countries (Ramamurti, 2012), which makes resource seeking—also known as strategic asset seeking (Bhaumik et al., 2016; Ramamurti, 2012; C. Zhou et al., 2019) and knowledge seeking (Petersen & Seifert, 2014)—the most potent driver (Cozza et al., 2015; Wang, Hong, Kafouros, & Boateng, 2012). Therefore, it seems only natural to add the learning aspect to the OLI paradigm when answering the call of a revisit when applied to the OFDI of EMNCs, especially within the context of RDI, given its unconventional nature.

Since a firm's internal resources and capabilities sit at the core of the OLI theory, the concept of organizational learning (OL) should be considered in the FDI discussion. OL is crucial for firms to develop and enhance their internal resources and capabilities, and it facilitates firms to acquire, disseminate and apply knowledge within the organization. Additionally, OL can enhance a firm's ability to adapt to the challenges of operating in foreign countries through continuous learning and innovation. Therefore, the following section reviews the concept of OL.

2.2 Organizational Learning

The concept of OL concerns how organizations progress through knowledge creation (Örtenblad, 2001; Sun & Scott, 2003). OL originated from the idea of learning organizations formulated by Senge (1990). Individuals play a significant role in OL, and organizations learn primarily based on their individuals' established routines and past behaviors. Intra-OL occurs when knowledge from continuous learning by individuals is contributed to the organization as a whole in the form of organizational memory (Argyris & Schön, 1997; Kim, 2009). Whereas inter-OL happens when organizations have to work and learn with each other. Organizations have different interpretations of their environment, experiences, and practices (Azadegan & Dooley, 2010). When two organizations work together, they are exposed to each other's new knowledge and experiences that will challenge and change their routines.

OL refers to the change in an organization's knowledge due to its own experience or by learning from others' experiences (Argote, 2015; Levitt & March, 1988). Both intra-OL and inter-OL can change thoughts, behavior, and actions, both individual and shared (Huber, 1991; Vera & Crossan, 2004). Schön and Argyris (1996) stated that OL occurs when individuals in an organization experience a problem and solve it as an organization. Simon (1991) defines OL as "learning by an individual that had consequences for an organizational decision" (p. 125). There is no existing single definition that can incorporate all the perspectives of OL (Patky, 2020). Generally speaking, OL is defined as the process when past actions, the effect of these actions, and future operations develop an organizational knowledge base and insights (Patky, 2020; Tsang, 1997).

One standard classification of OL is exploration and exploitation (March, 1991). This two-dimension classification has been applied to many studies (e.g., Chung et al., 2015;

Darwish et al., 2020; Huang & Li, 2012; Tian et al., 2020; Tu & Wu, 2021; Wang & Xu, 2018; Yi et al., 2020). Exploration learning refers to acquiring knowledge through behaviors such as flexibility, search, risk-taking, play, innovation, experimentation, discovery, and variation (March, 1991). In contrast, exploitation is the application of knowledge to gain profit. Exploitation incorporates production, efficiency, selection, choice, implementation, refinement, and execution (March, 1991). Often, firms apply these two learning activities ambidextrously to obtain optimal outcomes (Beckman, 2006; Gilson et al., 2005).

Many researchers have stressed the importance of OL in maintaining a firm's competitive advantage (Hitt et al., 2000; Pedler & Burgoyne, 2017; Salim & Sulaiman, 2011; Tortorella et al., 2020). Studies have shown that the outcomes of OL include improved firm performance by producing new knowledge (Hitt et al., 2000), enhanced innovativeness (Jiménez-Jiménez & Sanz-Valle, 2011; Parmigiani et al., 2011), advanced knowledge (Yang, 2007), and improved strategic business performance (Chung et al., 2015). Studies also have indicated factors that can augment OL. For example, organizational culture fosters OL (Hsu & Chang, 2014), leadership styles (e.g., transformational leadership) have an impact on OL (Shao et al., 2017), and political ties enhance exploratory learning but diminish exploitative learning (Chung et al., 2015). Moreover, studies have found mediating effects of OL, including relationships between sustainability and economic performance (Bilan et al., 2020), transformational leadership and supply chain ambidexterity (Ojha et al., 2018), cross-functional coopetition and firm performance (Bendig et al., 2018), environmental pressures from different stakeholders and green innovation (Zhang & Zhu, 2019), and supply chain integration and two dimensions of firm focal performance (i.e., customer service performance and innovation performance (Zhu et al., 2018).

2.3 Chinese FDI in the Past Two Decades

2.3.1 Transformation: From Receiver to Investor

In the 1990s, with greater economic liberalization, China started to attract a significant amount of FDI inflow with its Open Door Policy (Agarwal & Wu, 2004; Lau & Bruton, 2008). Reasons included its large market size (Ali & Guo, 2005; Wei & Liu, 2001; Zhang & Song, 2001), rapid growth (Liu et al., 1997; Wang & Swain, 1997), and low labor costs (Ali & Guo, 2005; Liu et al., 1997). Dominant FDI investors in China were Taiwan, Hong Kong, Macao, Japan, and other Asian countries, with the U.S. as an exception from the West (Ali & Guo, 2005). Almost all FDI into China belonged to the manufacturing sector, both for exports and to cater to the Chinese market (Lau & Bruton, 2008). It has also attracted a lot of heavily polluting manufacturing processes due to its loose regulatory systems, which has contributed to China's deep-rooted environmental problems. Moreover, as the Chinese government only allowed joint ventures as a type of FDI in China initially, research at that time mainly focused on the joint-venture entry mode (Lau & Bruton, 2008). However, later research on the OFDI of Chinese firms has focused primarily on M&As (Boateng et al., 2008; Wang et al., 2020; Yang & Deng, 2017; Zhou et al., 2015).

With the establishment of the Go Global Policy in 1999, OFDI increased drastically (Buckley et al., 2007; Kolstad & Wiig, 2012). Initially, Chinese firms focused on investing in other emerging countries earlier for natural resources (Du & Zhang, 2018; Jongwanich et al., 2013). Since the 2000s, the focus has been on penetrating new markets and acquiring strategic assets (Deng, 2004, 2009). Chinese OFDI started to capture scholars' attention around 2007 with pioneering works by Buckley et al. (2007) and Yiu et al. (2007). Lau and Bruton (2008) noticed the increasing trend of China's OFDI and drew scholars' attention to Chinese OFDI as a topic they should study next.

2.3.2 Chinese Reverse Direct Investment

With its rapid globalization, many manufacturing firms have accumulated abundant capital reserves, which leads them to seek industry advancement. However, as late-comers in globalization, Chinese firms lack advanced skills to facilitate their development (Piperopoulos et al., 2018). On top of their early OFDI motivation to gain new competitive advantages and strategic resources externally from other emerging countries (Ramasamy, 2012; Luo & Tung, 2007), learning and adopting advanced technology and skills from developed countries has also become their priority.

The attention to OFDI from Chinese multinational corporations (CMNCs) started with the first big RDI of Lenovo's acquisition of IBM's PC business in the United States (Liu & Buck, 2009). This example shows the rise of Chinese influence in the global market, not just in emerging economies. Scholars then started to investigate CMNCs' RDI using this expansion as a reference (Davies, 2009; He & Lyles, 2008; Liu, 2007; Liu & Buck, 2009; Si, 2014). Since then, CMNCs have successfully transformed into global investors. In 2020, China was the world's largest investor overall (UNCTAD, 2020) and a leading investor in developed economies (Deng et al., 2017). The literature has started to study OFDI from China but with a limited focus specifically on RDI. As mentioned above, the motivations of China's RDI differ from FDI, and therefore specific attention to RDI is needed.

In an earlier literature review, Alon et al. (2018) identified four research clusters in the context of the internationalization of CMNCs: testing traditional FDI theory, location choice, entry mode choice, and drivers and motivations. Here I expand upon their observations to fit the scope of this thesis by reviewing CMNCs' RDI or literature that separated investment in emerging and developed countries in their data. Comparing the vast number of literature that

examines CMNCs to other emerging countries or both emerging and developed countries homogeneously (see Alon et al. (2018)), the focus on RDI is relatively limited. Table 1 shows limited research, particularly examining RDI outcomes (Cozza et al., 2015). Therefore, my two empirical research studies enrich the literature by studying the outcome of RDI.

Table 1. Review of RDI literature

Category	Literature
Testing Traditional FDI Theory	Deng (2009); Park and Roh (2019); Yang and Deng (2017)
Location Choice	Globerman and Shapiro (2009); Lu et al. (2014); Wu and Chen (2014); Yang and Deng (2017)
Entry Mode Choice	Anderson et al. (2015); Cozza et al. (2015); Globerman and Shapiro (2009)
Drivers And Motivations	Anderson et al. (2015); Bhaumik and Driffield (2011); Deng (2009); Wang, Hong, Kafouros and Wright (2012) Ancarani et al. (2021); Reddy et al. (2022)
Outcome	Cozza et al. (2015)

2.3.3 Chinese RDI and Organizational Learning

As China advances its technological skills to transform from a labor-intensive manufacturer to an innovator, like other emerging economies, China lacks domestic R&D capabilities and has to seek them externally (Piperopoulos et al., 2018). RDI allows Chinese firms to work and learn with more advanced entities and fulfill their strategic asset-seeking and knowledge-seeking motivations.

According to OL theory, RDI is a process for firms to develop their technical skills (Lord & Ranft, 2000). As RDI requires organizations to work with each other, firms are exposed to a new and diverse environment that challenges both their existing preferences and beliefs, thereby enforcing them to be open and share new information and knowledge (Crossan

et al., 1999; Dess et al., 2003), which leads to a critical stage in OL (Piperopoulos et al., 2018). Research has proven that Chinese firms can improve their innovation performance by benefiting from exposure and learning from developed countries' advanced knowledge and technologies and by learning from host market environments (Phene & Almeida, 2008; Piperopoulos et al., 2018). RDI facilitates reverse knowledge spill-overs, where firms from China can acquire and absorb advanced technology from their partners and then transfer and apply them back home (Driffield & Love, 2003; Gao et al., 2018; Zhu & Huang, 2017). For example, some Chinese firms learn and develop innovations by imitating and reverse-producing successful examples (Malik & Kotabe, 2009), and some indirectly observe and learn from others' experiences (Banerjee et al., 2015). Examples of successful transformation to innovators include Huawei and ZTE, which utilized RDI to enhance their technological competitiveness to become international competitors (Fan, 2011).

2.4 Foreign Direct Investment And Sustainability

In recent decades, one of the fundamental forces behind globalization has been FDI. The advantages of FDI include more significant capital investment, new jobs, knowledge transfer, and access to new markets for the host countries (Shahbaz, Mallick, et al., 2015). Yet, research has shown that FDI can harm the environment, including resource depletion and pollution (Kostakis et al., 2017). Extensive scholarly research has been conducted since the beginning of the 21st century to examine how globalization impacts the environment (Christmann & Taylor, 2001).

The "pollution haven effect" (Copeland & Taylor, 1994) and the "pollution halo effect" (Frankel, 2003) are two opposing theories proposed in the literature that explain the

contradicting impact of globalization on the environment. A brief introduction of the concepts will be presented here, and a detailed review of the concepts will be in the following sections.

On the one hand, according to the pollution haven effect, businesses may choose to invest in nations with more relaxed environmental regulations to benefit from lower production costs. Studies from this perspective show that FDI entry into developing countries may be detrimental to those nations' natural environments (e.g., Abdo et al., 2020; Cheng, 2013; Nasir et al., 2019; Ur Rahman et al., 2019). This occurs when businesses are drawn to move their pollution-intensive sectors to developing nations with laxer environmental rules on pollution emission (Akbostanci et al., 2007; Arslan et al., 2022; Eskeland & Harrison, 2003; Grimes & Kentor, 2003). This is traditionally the reason behind the popularity of China for FDI. For example, the study by Cheng (2013) shows that each 1% increase in FDI inflow would increase 0.82% in industrial waste gas emissions in Liaoning province in China. Rahman et al. (2019) also found consistent results that the inflow of FDI significantly increases CO2 emissions in China.

In contrast, the pollution halo effect contends that businesses may enhance their environmental performance when investing in nations with more stringent environmental rules. The hypothesis explains how the environmental performance of hosting emerging countries improves due to FDI inflow. Researchers have shown the improved environmental performance of the hosting emerging markets due to higher awareness and stricter standards of their more developed importers and outsourcers that pushes the host to adopt more stringent environmental regulations in their operations (Antweiler et al., 2001; Cheung et al., 2015; Hille et al., 2019; Hübler & Keller, 2010; Jiang et al., 2018; Liu et al., 2017; Mert & Bölük, 2016). FDI from developed countries also allows emerging host countries to enjoy better economies

of scale (Zarsky, 1999). As a result, these emerging countries gradually improve their environmental performance with increased economic income (Mani & Wheeler, 1998). FDI can also bring learning opportunities for emerging countries to learn, absorb and adopt advanced technologies and management skills that promote environmental enhancement (Birdsall & Wheeler, 1993).

2.4.1 Pollution Haven Effect

Copeland and Taylor (1994) proposed the "pollution haven effect" concept to examine the relationship between national income, pollution, and international trade. The concept hypothesizes that developed countries locate their polluting industries in developing countries with more relaxed environmental regulations. Due to growing concerns about the environmental impacts of globalization and trade, this concept has been studied extensively by economists, environmentalists, and other scholars since then.

Some of the earlier efforts to study the Pollution Haven Effect include the paper by Mani and Wheeler (1998) that supports the hypothesis that MNCs tend to invest in countries with weaker environmental regulations to take advantage of lower production costs. The paper by Tobey (2001) finds that countries with stricter environmental regulations may experience some reduction in their trade competitiveness, particularly in pollution-intensive industries. Yang (2001) offered support for the pollution haven effect. His research shows that CO2 emissions in Taiwan rose following trade liberalization, and the country's production structure shifted towards industries with higher pollution levels. And Acharyya (2009) examines the nexus between FDI (FDI), economic growth, and CO2 emissions in India over the last two decades. The study found a positive association between FDI and economic development but

also suggests that FDI inflows have led to a rise in CO2 emissions, highlighting the need for sustainable policies to balance economic growth with environmental protection.

Drivers of the pollution haven effect include differences in environmental regulations, labor costs, and resource access. Countries with less stringent environmental regulations may be more attractive to industries seeking to minimize costs, particularly in the context of globalization and international trade (Aliyu, 2005).

The above was particularly true for the pollution haven effect in China. The country's one-party system and centralized governance have resulted in weak regulatory institutions and inadequate enforcement of environmental laws (Zhang & Zheng, 2018). Additionally, local governments have been incentivized to attract FDI and have been reluctant to enforce environmental regulations due to concerns about harming their local economy (Wang & Tang, 2020). Firms have exploited China's lax environmental laws to produce goods more cheaply and, ultimately, increase profits (Kang & Jin, 2017). China also has abundant natural resources such as rare earth minerals, which attract multinational corporations for their extractive activities and higher pollution levels in China (Kang & Jin, 2017).

In the context of FDI in China, research has widely examined the relationship between Chinese FDI, mostly inflow, and the pollution haven effect.

For example, Liu and Liu (2018) investigated the impact of environmental regulations on the location of FDI in China. They found that stricter environmental regulations in developed regions of China were associated with reduced FDI. However, this effect was weaker for pollution-intensive industries, suggesting that these industries are more likely to

locate in areas with weaker environmental regulations. A recent paper by Zhao et al. (2020) finds that since 2006 environmental regulations have substantially impacted local carbon emissions in China. However, they found regions with weaker environmental laws become havens for carbon-intensive industries development, while areas with stringent environmental regulations have constrained the scale and employment of these industries.

The pollution haven effect can have significant environmental, social, and economic impacts in the hosting and investing countries. In the receiving countries, pollution and environmental degradation can lead to health risks, environmental damage, and biodiversity loss. In the investing countries that lose the industries, there may be job losses, reduced economic growth, and potential long-term environmental benefits due to the transfer of industries to countries with less stringent environmental regulations (Cole & Elliott, 2003; Levinson, 2001).

Various policy responses have been proposed to address the pollution haven effect, including environmental regulations, trade policies, and international cooperation. Environmental regulations in both receiving and losing countries can help to reduce the pollution haven effect by establishing consistent standards and disincentivizing environmentally harmful practices. Trade policies, such as carbon taxes or border adjustment mechanisms, can also help to level the playing field and reduce the incentives for industries to move to countries with less stringent environmental regulations. International cooperation, such as the Paris Agreement on climate change, can facilitate coordination and collaboration between countries to address environmental issues and reduce the pollution haven effect (Dong et al., 2018; Wang et al., 2019).

2.4.2 Pollution Halo effect

The opposing "Pollution Halo Effect" (Frankel, 2003) suggests multinational companies with advanced technology and management with stringent environmental regulations tend to impose higher environmental and governance standards and practices in host countries during FDI (Perkins & Neumayer, 2008; Wheeler, 2001), through technology spill over effect (Letchumanan & Kodama, 2000). This can transform environmental degradation into environmental sustainability (Eskeland & Harrison, 2003; Zarsky, 1999). For example, Singhania et al. (2015) found that foreign ownership positively affects environmental performance in Indian firms, particularly in R&D-intensive industries. The study suggests this may be due to foreign firms adopting superior technology and management practices. In another explanation, the pollution halo effect is also a phenomenon that occurs when companies engage in greenwashing or make exaggerated or false claims about their environmental performance to improve their reputation and brand image.

Drivers of the pollution halo effect include consumer demand for environmentally friendly products, the desire of multinational corporations (MNCs) to improve their reputation and brand image, pressure from stakeholders such as investors and NGOs, and regulatory requirements. Companies may engage in greenwashing to take advantage of these drivers by making claims about their environmental performance that are difficult to verify or do not reflect their actual practices (Gond et al., 2012; Parguel et al., 2011).

The pollution halo effect in FDI can positively and negatively impact the environment, society, and economy. On the positive side, MNCs that engage in greenwashing can promote awareness of environmental issues and encourage other companies to adopt sustainable practices. They can also help to transfer knowledge and technology related to environmental

management to the host country. On the negative side, the pollution halo effect can lead to a false sense of security that MNCs are engaging in sustainable practices when in fact, they may be engaging in environmentally damaging activities. This can undermine efforts to address environmental problems and harm the host country's reputation. For companies, the consequences can include reputational damage, loss of consumer trust, and potential legal liabilities. For society, the impacts can include confusion about environmental issues, reduced motivation to take action on environmental problems, and potential environmental harm due to the failure to address actual environmental issues (Gond et al., 2012; Parguel et al., 2011).

To address the pollution halo effect, different measures include increased transparency and disclosure requirements, stronger enforcement mechanisms, and greater stakeholder engagement. Increased transparency and disclosure requirements can help to ensure that companies are held accountable for their environmental claims and can help to build trust with consumers and other stakeholders. Stronger enforcement mechanisms, such as fines or legal action, can deter greenwashing and help companies comply with environmental regulations. Greater engagement with stakeholders, such as investors, NGOs, and consumers, can help to create pressure for companies to be more transparent and accountable for their environmental performance (Gond et al., 2012; Parguel et al., 2011).

2.4.3 Chinese OFDI and Pollution Haven and Halo Effects

The rise of emerging economies has made developing countries important for global OFDI, particularly China. Therefore, a growing amount of literature has shifted their focus from FDI into China to OFDI from China. But the results are mixed.

On the one hand, some studies suggest the pollution haven effect may be present in some Chinese OFDI. For example, Dong et al. (2021) found that Chinese FDI, specifically those from polluting industries move to countries with relaxed environmental regulations. But the effect weakens after the establishment of the Belt and Road Initiative in 2013, which raises the awareness of environmental protection and renewable energy industries. Hao, Guo, et al. (2020) indicate the scale effect of China's OFDI, which explains that OFDI has increased domestic environmental pollution by improving economic scale. The research by Sattar et al. (2022) shows that Chinese OFDI significantly increases carbon emissions in selected South Asian countries by 9.9%.

The pollution heaven effect may explain China's traditional relationship between FDI and environmental management. However, as the direction of Chinese FDI shifts from the receiving to investing end, some studies suggest the pollution haven effect may not be as prevalent in the context of Chinese OFDI as previously thought. For instance, Cai et al. (2023), using a panel data of 56 Belt and Road countries' from 2003 to 2019, find that China's OFDI has a positive effect on promoting green technology spillovers in lower-income and less open host countries, indicating a pollution heaven effect. Their research also finds that stricter environmental regulations can enhance this green halo effect. The results of Liu and Wang (2022) study indicates Chinese OFDI has a positive environmental effect in host countries, especially in developing countries in Asia and since the implementation of the Belt and Road Initiatives.

The preceding discussion reveals the existence of gaps. The literature tends to concentrate on evaluating the environmental effects of Chinese OFDI on the host countries,

with scant attention paid to the environmental impact of these investments in China from the investing end. Given that China is renowned for having a substantial number of pollution-intensive industries, this research focus must be redirected. While the impact of Chinese OFDI on host countries has been the subject of numerous studies in recent years, the majority of such research has relied on provincial data (Hao, Guo, et al., 2020; Tan et al., 2021; Y. Zhou et al., 2019). For example, Hao, Guo, et al. (2020) study used provincial panel data from 29 provinces in China from 2003 to 2016 to examine the impact of China's outward FDI (OFDI) on domestic carbon dioxide emissions. The results suggest that while China's OFDI has increased domestic environmental pollution through the scale effect, the reverse technology spillover effect has improved the domestic technology level and optimized the domestic industrial structure, reducing domestic environmental pollution. And Tan et al. (2021) study investigated the impact of OFDI on carbon emissions in China's 30 provinces between 2003 and 2015, considering the dual perspectives of the urbanization threshold and the mediating path. The results suggest that while OFDI expansion will increase CO2 emissions with urbanization, the different stages of urbanization show inverted U-shaped characteristics. The effects of interprovincial OFDI on CO2 emissions are influenced by industrial structure, import dependence, and technical level. The study suggests regional coordination of development, new urbanization construction, and urban low-carbon transformation. However, in contrast to these existing studies, this thesis employs firm-level panel data to provide a more granular and practical perspective on the issue at hand. By focusing on the micro-level effects of Chinese OFDI, this study aims to contribute to the literature in another valuable way.

CHAPTER 3. STUDY 1

Sustainable Supply Chain Management and Organizational Learning: A Systematic and Citation Network Analysis Review

3.1 Introduction

Sustainable supply chain management (SSCM) has become essential for firms, and stakeholders have put increasing pressure on firms regarding their SSCM practices. SSCM essentially is

> "the management of material, information, and capital flow as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental, and social, into account, which are derived from customer and stakeholder requirements" (Seuring & Müller, 2008, p.1700).

Different entities within a supply chain will have different sustainability capabilities and standards. To enhance SSCM, organizations have to work with and learn from one another; therefore, organizational sustainability learning occurs. In fact, supply chain learning is essential to creating competitive advantages for firms (Bessant et al., 2003). According to the resource-based view (RBV), OL can significantly enhance resource sharing, aiding the sharing of environmentally-related knowledge. Therefore, to achieve better SSCM, we should simultaneously discuss the components of OL.

Scholars have made separate efforts on bibliographic network analysis of the OL (e.g., Alerasoul et al., 2022; Almahendra & Ambos, 2015; Anand et al., 2021), knowledge

management (e.g., Gaviria-Marin et al., 2019; Gaviria-Marin et al., 2018), and SSCM (e.g., Lis et al., 2020; Mardani et al., 2020; X. Zhang et al., 2021; Zhou & Lo, 2018) research fields. However, to the best of our knowledge, no systematic review has linked these SSCM and OL components. It is relevant to do a comprehensive and systemic review of the two topics because they are interrelated. Silvestre (2015) remarked that, like organizations, a sustainable supply chain continuously learns and evolves.

The implementation of SSCM is a complex process. It demands significant firm-level collaboration and coordination (De Brito et al., 2008; Ho & Choi, 2012; Karaosman et al., 2020), which requires organizational members to learn and adopt sustainability protocols (Ahmad et al., 2016; Karaosman et al., 2020). Environmental learning plays a vital role in advancing SSCM practices (Graham, 2018), and can therefore facilitate firms to achieve long-term sustainability and maintain competitive advantages. A systemic review is necessary to provide a theoretical foundation when examining the role of OL in advancing SSCM. This research extends the previous reviews and attempts to provide a comprehensive and systematic literature review on SSCM and OL and position the discussion from an Operations Management (OM) perspective. Thus, specifically, the objectives of this review are as follows:

- RQ1 – What do we know about OL and SSCM in the OM literature, and how are they linked?
- RQ2 – What are some significant research domains?
- RQ3 – From our findings, what are the future research directions?

3.2 Methodology

We collected the sample articles from 13 top-tier peer-reviewed OM journals following the example of Zhou and Lo (2018), including the *International Journal of Production Economics* (*IJPE*), *the International Journal of Production Research (IJPR)*, the *International Journal of Operations & Production Management (IJOPM), Production and Operations Management (POM), Supply Chain Management: An International Journal (SCMIJ),* the *Journal of Supply Chain Management (JSCM),* the *Omega International Journal of Management Science (Omega),* the *International Journal of Physical Distribution & Logistics Management (IJPDLM),* the *Journal of Operations Management (JOM), Management Science (MS), Manufacturing and Service Operations Management (MSOM), Decision Science (DS),* and the *International Journal of Logistics Management (IJLM)*. These journals are reputable in the field that studies OL and SSCM, and they cover a broad range of topics on OL and SSCM. We limited these journals from adding general management journals to avoid confusing the network.

We conducted a full-text search of journal articles in the Web of Science database with a comprehensive set of keywords. We took references from other systematic reviews, such as Castaneda et al. (2018) and Zhou and Lo (2018), and applied our knowledge to create this final set of keywords.

These are the keywords for SSCM:

Environment(al) OR (environment(al) and management) OR (environment(al) and practices) OR (environment(al) and Performance) OR ("corporate social responsibility" OR CSR) OR Sustainability OR green OR (sustainable and investment) OR (sustainable and production) OR (sustainable and "supply chain") OR (green and production) OR (green and "supply chain") OR (green and investment) OR (sustainable and operation) OR (green and operation) OR

"environment(al) management" OR "environment(al) practices" OR "environment(al) performance" OR "sustainable investment" OR "sustainable production" OR "sustainable supply chain" OR "green production" OR "green investment" OR "sustainable operation."

In addition, these are the keywords for OL:

learning OR (organizational and learning) OR "organizational learning" OR "spill over" OR "spillover" OR "absorptive capacity" OR (knowledge and "spill over") OR (knowledge) OR ("knowledge spillover") OR ("knowledge spillover") OR (knowledge and transfer) OR ("knowledge transfer") OR (organizational and (knowledge or learning) and (generation or acquisition or creation or capture) OR ("organizational knowledge generation") OR "organizational knowledge acquisition" OR "organizational knowledge creation" OR "organizational learning capture" OR "knowledge and management" OR "knowledge management" OR (knowledge and use) OR (knowledge and application) OR (knowledge and sharing) OR ("knowledge use") OR ("knowledge application") OR ("knowledge sharing")

The initial search returned 357 articles from 1997 to 2021. After screening the articles carefully and eliminating articles outside our scope, we collected 178 articles relevant to our topic as our samples.

Scholars have noted that traditional systematic literature reviews (SLRs) can often be subjective because the knowledge structure and research domains are primarily based on the judgments from the authors' experience and capability (Colicchia & Strozzi, 2012). Therefore, the following section, which presents the descriptive statistics of our research, is followed by a citation network analysis (CNA) in section 4. CNA is a more objective way to classify research domains based on the citation links among article samples. It can guide us in understanding the evolutionary path of research tradition and mapping out changing research elements (Colicchia & Strozzi, 2012; Hummon & Dereian, 1989).

3.3 Descriptive Statistics

3.3.1 Distribution of Publications by Year

Figure 1 displays the distribution of publications by year from 1997 to 2021. The figure shows that the development of literature that studied the link between SSCM and OL can be separated into three phases. Before 2006, SSCM and OL were barely discussed together. From 2006 to 2015, they began to gain slight academic interest. The number of studies on SSCM and OL from an OM perspective has increased tremendously since 2015. Of the publications, 79.7% (142/178) have been published since 2015, and 56.7% (101/178) have been published within the last five years. This publication trend suggests the growing interest in academia, particularly in the OM field, linking SSCM and OL.

3.3.2 Distribution of Publications by Journal

Figure 2 presents the distribution of publications by journal title. Publications on SSCM and OL are most frequently published in IJPE, accounting for 23% (41/178) of the total publications. The second most productive journal is IJPR, accounting for 17.4% (31/178), and the third is SCMIJ, accounting for 15.1% (27/178). These three journals account for over half of the published research on SSCM and OL (55.6%).

3.3.3 Distribution of Publications by Article Type

Figure 3 shows that most articles published in the 13 journals in our sample are empirical studies (106/178), accounting for 59.5% of our sample. The remainder is 26 review papers (14.6%), 20 modeling papers (11.2%), 24 conceptual papers (13.5%), and two viewpoint papers (0.1%).

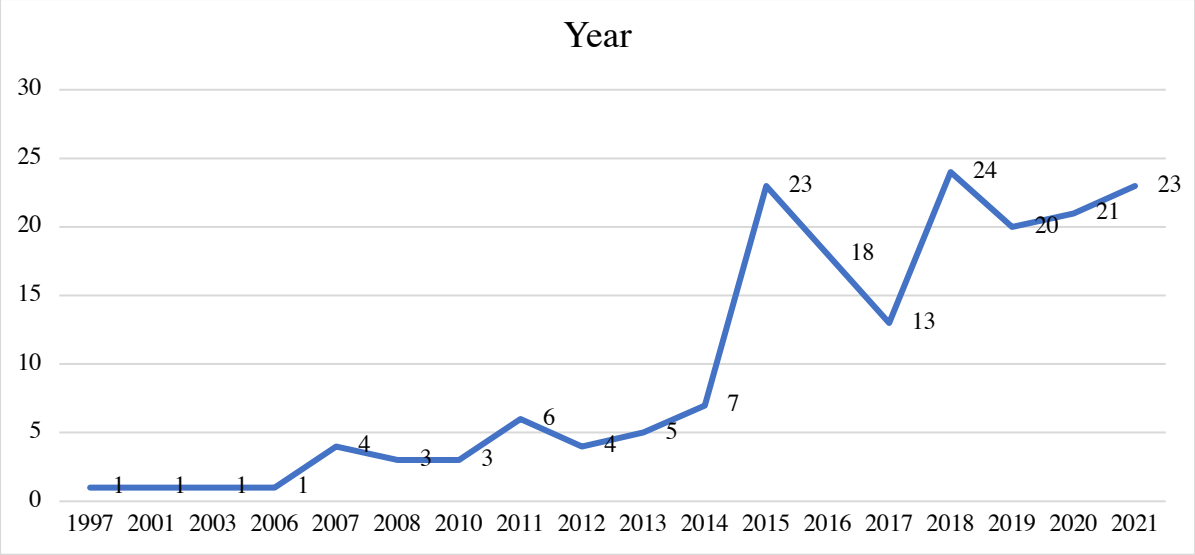


Figure 1. Distribution of articles by year

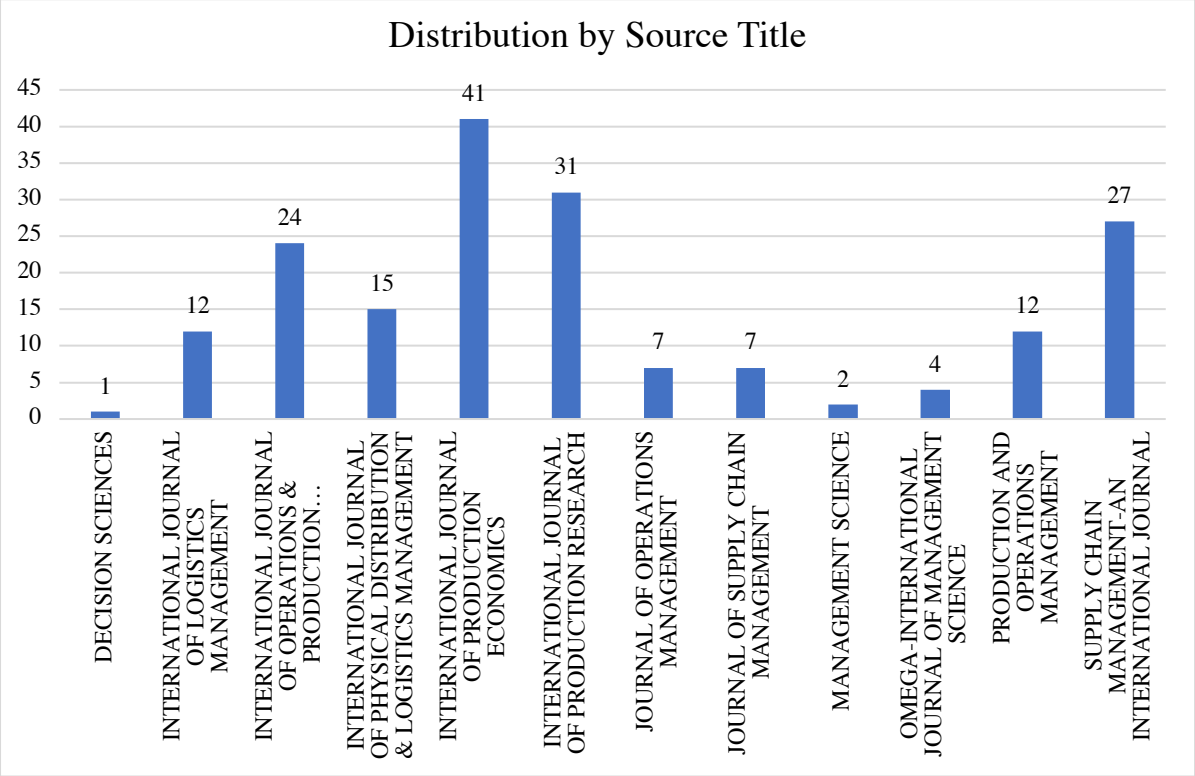


Figure 2. Distribution of articles by journals

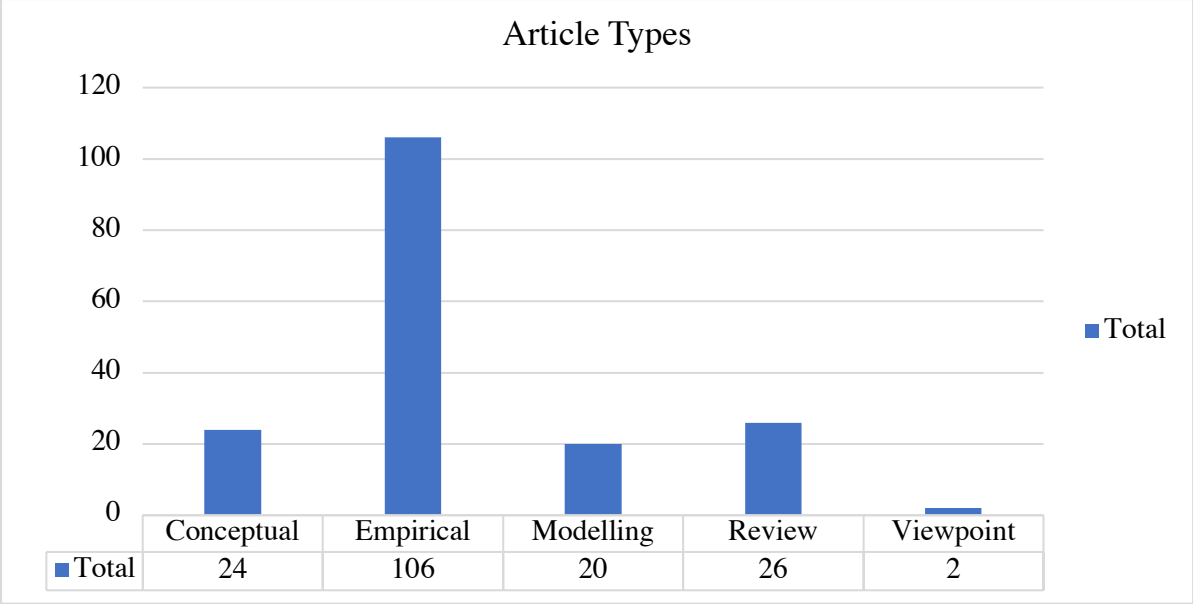


Figure 3. Distribution of articles by journals

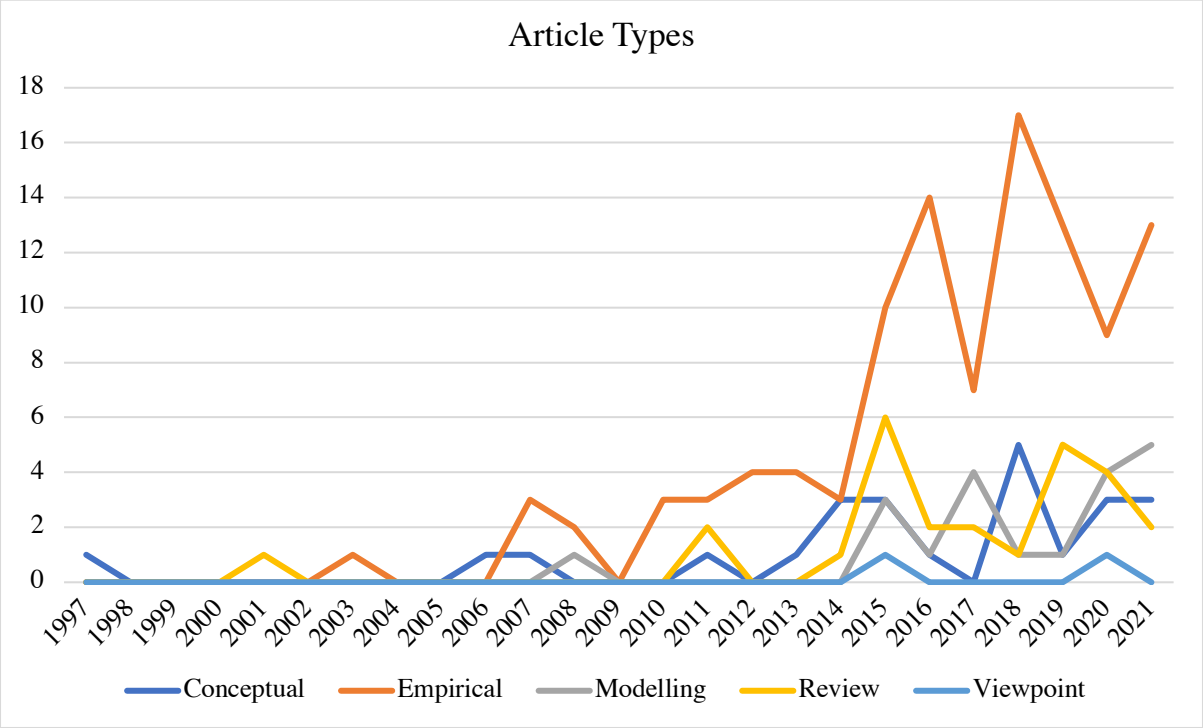


Figure 4. Distribution by type and by year

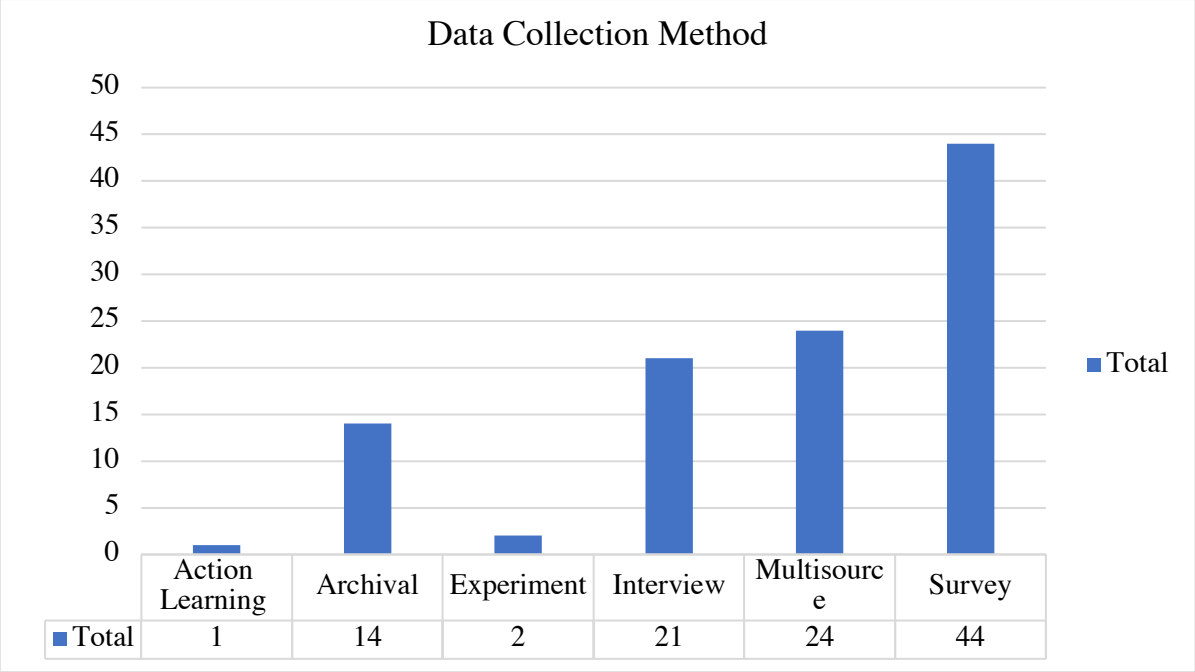


Figure 5. Distribution by data collection methods in empirical studies

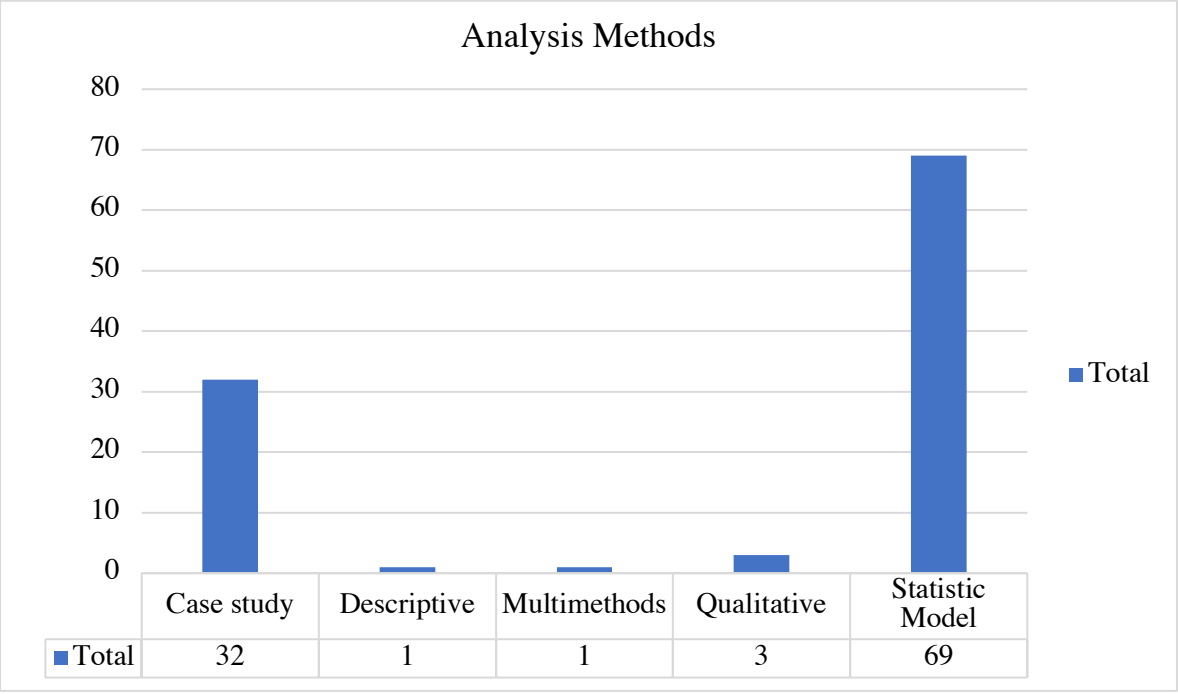


Figure 6. Distribution by analysis methods in empirical studies

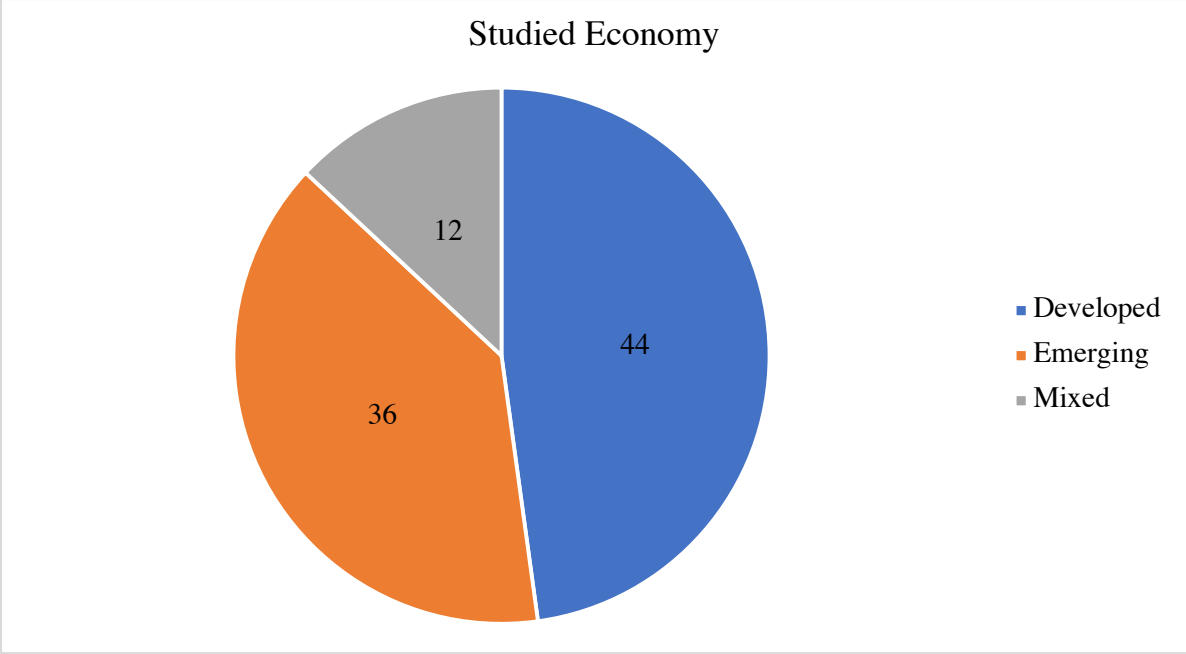


Figure 7. Distribution by the studied economy in empirical studies

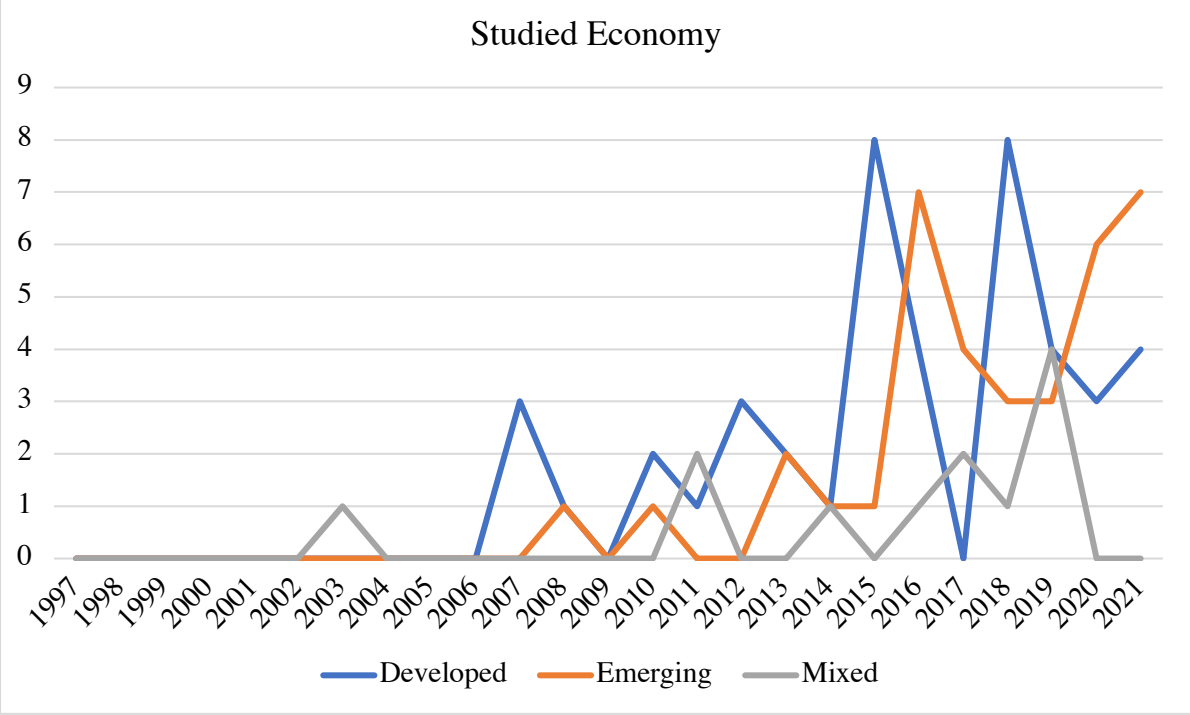


Figure 8. Distribution by the studied economy in empirical studies

3.3.4 Distribution of Empirical Research by Data Collection and Analysis Methods

Figure 5 presents the data collection method used to study SSCM and OL empirically. Surveys account for 41.5% (44/106), and interviews account for 19.8% (21/106) of the

empirical studies in our sample. This statistic implies that self-reporting is the most popular data collection method (61.3%). Figure 6 indicates that the statistical model analysis is the most popular methodology in our sample's empirical studies. 69 papers used this analysis method (65%).

3.3.5 Researched Economies in Empirical Studies

Figure 7 shows that the number of articles empirically studying SSCM and OL within developed and emerging countries is relatively similar (44 vs. 36, respectively). The number of studies that focus on developed countries is slightly higher. Whereas 12 studies include multiple countries from both developed and emerging economies, 14 articles in our sample do not disclose their exact sample location. Figure 8 shows there is not much difference between the time when scholars began to focus on each economy and when they simultaneously increased drastically in 2015. Studies on different economies can yield different findings because SSCM and OL practices vary between developed and emerging economies. However, in the last two years, we have seen an increase in articles focusing on emerging economies and a decrease in studies on developed countries.

3.3.6 Most-Cited Articles

Table 2 shows the most cited papers in OM that study the relationship between SSCM and OL. We did not use total citations to avoid the cumulative advantage process (Price, 1976), which indicates that earlier publications will most likely be cited more often and have text seniority advantage (McLaren & Bruner, 2022). The most influential paper is Sarkis et al. (2011), a systemic literature review on organizational theories and SSCM, with an average citation of 85.25 times per year and 1023 total citations.

3.3.7 Most Productive Authors

Table 3 shows that Fu Jia is the most productive author in the study of SSCM and OL. The second is Joseph Sarkis, then Kee-Hung Lai. Although Lai is the third most productive within the premise, he is the most cited (total) and has the highest average number of citations per publication.

3.3.8 Review of Top Two SLRs on SSCM and OL

In our sample, there are 24 SLRs. These papers mention OL in their exploration of SSCM. However, the link between SSCM and OL theory was not the main focus of these SLRs. These SLRs only mentioned OL as a part of some subcategories, especially those related to dynamic capabilities (DC). In this section, we review the top two SLRs, shown in Table 4, in this area to understand, though limited, the link established between OL and SSCM for further study on this relationship.

We first review the SLR by Sarkis et al. (2011) because it is the most-cited study of all time in our sample and gives a comprehensive outlook on the theoretical review of the area. The study reviews SSCM literature under nine broad organizational theories: complexity theory, ecological modernization, information theory, institutional theory, the resource-based view (RBV), resource dependence theory, social network theory, transaction cost theory, and stakeholder theory. Five of these organizational theories can be linked to OL. First, through the lens of complexity theory, knowledge-sharing during interaction among the different parties reduces the uncertainty in SSCM. Second, the RBV refers to the sustainable competitive advantages harnessed from valuable, rare resources that are difficult to imitate and substitute, including learned knowledge and information in SSCM practices. Third, the institutional theory states that competitive benchmarking exists when firms follow successful competitors

by learning and imitating. Fourth, social network theory concerns network learning when SSCM knowledge diffuses through the social network among the top executives, directors, and employees. Fifth, stakeholder theory indicates that collaboration with external stakeholders can promote learning opportunities that promote environmental management capabilities and avoids conflicts typically associated with environmental misconduct (Sarkis et al., 2011).

We also examined the SLR by Beske et al. (2014), which listed 16 popular SSCM categories and practices. However, only one practice concerns learning: pro-activity for sustainability, which enables OL between parties, which is not widely discussed in the reviewed papers. Only six of 52 articles emphasized the learning aspect of SSCM practices.

The paper shows the connection between SSCM and DC, an extension of RBV. Of the nine relevant categories of DC they reviewed, only one concerned learning and knowledge, Knowledge Assessment. This DC was categorized as knowledge sharing, common IT system, licensing, and knowledge acquisition and evaluation. Knowledge assessment is of great importance, and 32 of 52 reviewed papers emphasized at least one aspect of Knowledge Assessment. The subcategory knowledge sharing seems to be the most important because 15 articles emphasized it, whereas only three highlighted the other subcategory, knowledge acquisition and evaluation.

These two reviews show that there is a link between SSCM and OL. However, the focus is not particularly strong. Sarkis et al. (2011) remarked that future researchers should incorporate additional theoretical learning and knowledge management perspectives, focusing on environmental-related inter-OL and knowledge-sharing. For example, Sarkis et al. (2011) suggested future studies could examine the relationship between inter-OL theory in SSCM and

the complex adaptive systems, which is how firms can adapt a responsive and sensitive SSCM to their complex environment. They also suggested highlighting the inter-OL elements in the further development of natural RBV, an extension of RBV that emphasizes using natural resources. Furthermore, Beske et al. (2014) noted that although their review contributes to further theory building in SSCM and learning, this link still needs further development (Zhu et al., 2011). These remarks show that at that time, future scholars were encouraged to study SSCM with an emphasis on OL further.

Many research reviews on OL and SSCM appear to be an extension of the discussion on SSCM and DC, an extension of RBV. DC represents a firm's ability to develop new competencies through reconfiguring resources (Teece et al., 1997). DC is related to OL because new organizational practices and routines develop when an organization develops DC. The new routines enable sharing of new knowledge among individuals, leading to OL (Brix, 2017; Morland et al., 2018). Beske et al. (2014) reviewed 52 articles on sustainable food supply chains, directly linking SSCM and DC, implying that SSCM and OL are related, as OL and DC are related. Eight of nine identified DC in the paper linked to knowledge assessment, and vice versa; knowledge assessment was related to nine of 16 SSCM practices. Knowledge acquisition was involved in seven of 16 SSCM practices. The review also confirmed that the learning aspect of SSCM is correlated with knowledge management. Knowledge assessment and knowledge acquisition are related because they can provide a routine, especially for knowledge generation or preservation. These capabilities are essential for proactive sustainability companies (Smit et al., 2008; Wiskerke & Roep, 2007).

Beske et al. (2014) also pointed out that the link between the two research domains remains conceptual and lacks empirical research. This trend changed drastically after 2015, and most of the research in our sample after 2015 is empirical studies (See Figure 4).

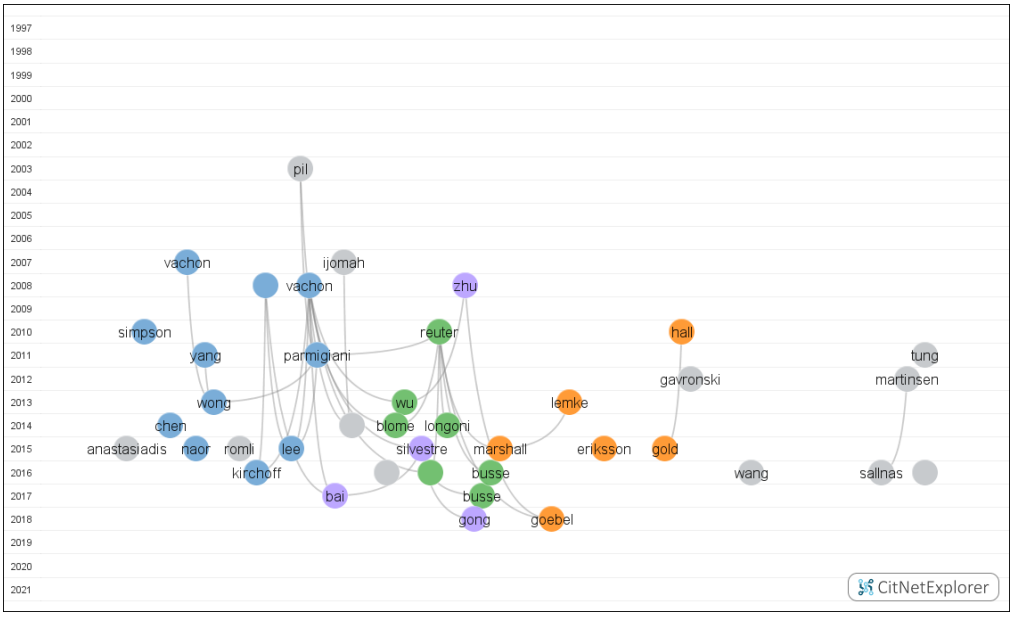
3.4 Classification of Research Domains

We used CitNetExplorer to cluster our sample articles (Van Eck & Waltman, 2014). The software first produces a visual path map to display corresponding articles along the time axis. It shows different clusters with different colors where details of each domain can be further studied. CitNetExplorer facilitates constructing a citation network by representing individual publications as nodes and establishing citation links as edges between the citing and cited publications. Figure 9 shows the complete citation network. Publications are arranged along the time axis, and clusters are indicated by colors. The visualization demonstrates the most commonly cited publications in the network, as well as the citation relations between them and the clusters to which they belong (Van Eck & Waltman, 2017). For our CNA, we deleted review-type publications to avoid bias and noise in citation-based clustering analysis (Ho et al., 2017). This leaves 155 publications for CNA. After clustering analysis in CitNetExplorer, we identified four clusters, including 74 publications with 119 citation links. They are environmental collaborations and environmental learning, tensions and risks in sustainable global supplier management and OL, sustainable supply chain learning, and OL in social sustainability supply chain practices. Relatedness of the publications is used to determine the clusters. Relatedness is the degree to which two publications are similar or connected. Typically, relatedness can be generated using either citation relations or word relations. CitNetExplorer uses direct citation relations to be more direct and accurate (Van Eck &

Waltman, 2017). Clusters are determined by maximizing a quality function[1] . Appendix A displays the lists of articles included in each main cluster.

Next are the main paths of these four main clusters using Pajek software (Batagelj & Mrvar, 2004). The Pajek software uses the shortest path algorithm, which calculates the shortest path between any two nodes in the network. Upon applying the shortest path algorithm to the network, the resulting paths may be sorted based on their length or weight, thereby enabling the identification of the primary paths. Typically, in network analysis, the main paths are construed as those which link the most prominent or influential nodes within the network, such as those nodes with high degree, centrality, or other pertinent network measures that denote a node's importance (Mrvar & Batagelj, 2016).

These clustering techniques can allow better visualization for an efficient understanding of the structure and dynamics of the existing knowledge.



[1] For detailed explanation of the equation, refer to Waltman, L., & Van Eck, N. J. (2012). A new methodology for constructing a publication-level classification system of science. *Journal of the American Society for Information Science and Technology*, *63*(12), 2378-2392.

Figure 9. Citation Network Analysis

Table 2. Most-cited articles

Title	Authors	Average Citations Per Year	Total Citations	Publication Year	Journal Title	Article Type
"An Organizational Theoretic Review of Green Supply Chain Management Literature"	Sarkis, Joseph; Zhu, Qinghua; Lai, Kee-hung	85.25	1023	2011	*International Journal of Production Economics*	Literature Review
"Environmental Management and Manufacturing Performance: The Role of Collaboration in the Supply Chain"	Vachon, Stephan; Klassen, Robert D.	58.07	871	2008	*International Journal of Production Economics*	Empirical
"Sustainable Supply Chain Management Practices and Dynamic Capabilities in the Food Industry: A Critical Analysis of the Literature"	Beske, Philip; Land, Anna; Seuring, Stefan	43.67	393	2014	*International Journal of Production Economics*	Literature Review
"Impact of Lean Manufacturing and Environmental Management on Business Performance: An Empirical Study of Manufacturing Firms"	Yang, Ma Ga (Mark); Hong, Paul; Modi, Sachin B.	41.75	501	2011	*International Journal of Production Economics*	Empirical
"Sustainable Consumption and Production in the Food Supply Chain: A Conceptual Framework"	Govindan, Kannan	31.2	156	2018	*International Journal of Production Economics*	Conceptual

Table 3. Most Productive Authors

Author's Name	Affiliation	No. of articles	Total Times Cited	Average No. of Citations per Publication
Jia, Fu	University of York Management School	7	241	34
Sarkis, Joseph	Worcester Polytechnic Institute	6	1426	238
Lai, Kee-hung	The Hong Kong Polytechnic University	4	1433	358
McCarthy, Lucy	University of Bristol	4	207	52
Seuring, Stefan	University of Kassel	4	469	117

Table 4. Most-Cited Systematic Literature Review Articles

Title	Authors	Average Citations Per Year	Total Citations	Publication Year	Journal Title
"An Organizational Theoretic Review of Green Supply Chain Management Literature"	Sarkis, Joseph; Zhu, Qinghua; Lai, Kee-hung	85.25	1023	2011	*International Journal of Production Economics*
"Sustainable Supply Chain Management Practices and Dynamic Capabilities in the Food Industry: A Critical Analysis of the Literature"	Beske, Philip; Land, Anna; Seuring, Stefan	43.67	393	2014	*International Journal of Production Economics*

3.4.1 Main Path Analysis of the Major Research Domain

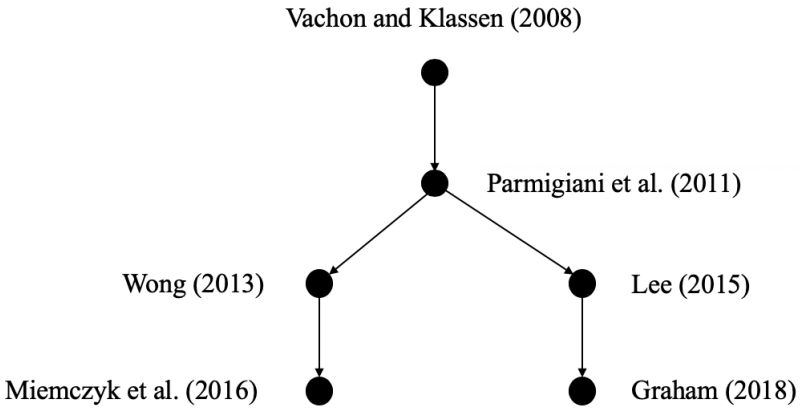


Figure 10. The main path of Cluster 1

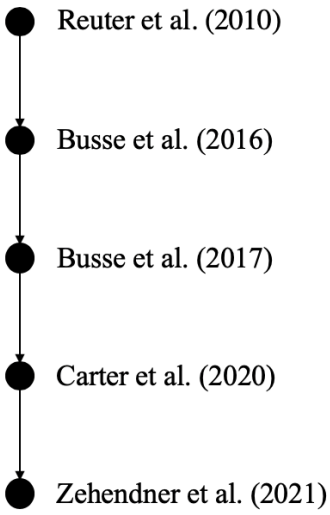


Figure 11. The main path of Cluster 2

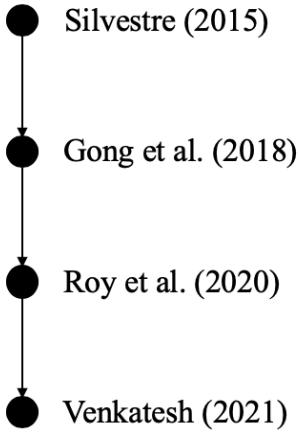


Figure 12. The main path of Cluster 3

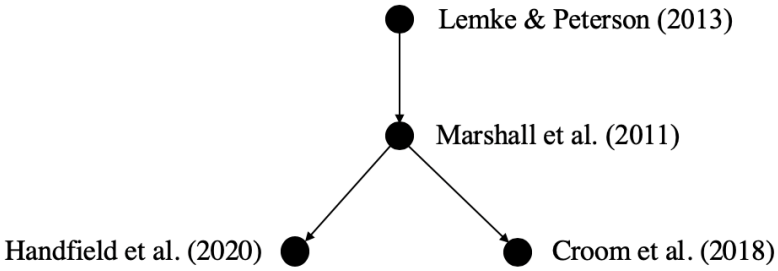


Figure 13. The main path of Cluster 4

3.4.1.1 Cluster 1: Environmental Collaborations and Environmental Learning

Our biggest cluster is Cluster 1. There were 26 articles from 2007 to 2019, with 2708 total citations and 35 citation links. Central to this domain is the importance of environmental collaborations and environmental learning. In this main path, the literature stresses the role of environmental collaborations and environmental learning in advancing SSCM with the knowledge passed down by Vachon and Klassen (2008). All empirical papers in this main path are based in developed countries.

Environmental collaborations can be defined as "the direct involvement of an organization with its suppliers and customers in planning jointly for environmental management and environmental solutions" (Vachon & Klassen, 2008, p.301). Environmental collaboration is interrelated with OL because it requires a high level of engagement from parties to learn from one another's operations. This learning process facilitates planning and setting goals for environmental improvement (Lee, 2015; Vachon & Klassen, 2008), reduces the environmental impact on material flows in the supply chain (Bowen et al., 2001; Carter & Carter, 1998), and maintains a good understanding of one another's responsibilities and capabilities related to environmental management (Vachon & Klassen, 2008). Collaboration can enable inter-OL, and inter-OL can entail a problem-solving routine involving the supplier and customers (Schroeder et al., 2002). Vachon and Klassen (2008) covered environmental collaboration both upstream with the supplier and downstream with the customer, which Parmigiani et al. (2011) in their conceptual framework and Graham (2018) in their empirical test followed.

Parmigiani et al. (2011) further investigated this through an efficient versus responsive supply chain framework. The result stresses that collaboration is especially crucial for market-responsive firms. They must communicate frequently with suppliers to develop new products in response to customer needs and share and respond to sensitive environmental information in the supply chain (Wong, 2013). Therefore, knowledge and information-sharing are essential for adapting to changing market needs.

Environmental learning is not only a benefit or an outcome facilitated by environmental collaborations (Vachon & Klassen, 2008). Environmental learning and environmental integration have a mediating effect on how a firm can advance its SSCM. Graham (2018)

showed that environmental integration and environmental learning could support a firm's progression from internal environmental practices to implementing a more advanced environmental practice that spans the entire supply chain. This is because the capabilities, experience, and learning developed through internal procedures are essential resources for more advanced practice (Blome et al., 2014; Jacobs et al., 2016).

Before the study by Vachon and Klassen (2008), researchers made little effort to study the connection between environmental management and organizational performance. Vachon and Klassen (2008) developed a theoretical basis for linking environmental collaboration in the supply chain to manufacturing performance with the two extensions of the RBV, which was widely used to analyze manufacturing and supply chain strategies (Hult et al., 2006; Schroeder et al., 2002; St. John et al., 2001). The two extensions used by Vachon and Klassen (2008) were the relational view (Dyer & Singh, 1998) and the natural-resource-based view (NRBV). RBV remains one of the predominant theories used to study environmental management and is considered in more recent literature as the main path (Graham, 2018; Miemczyk et al., 2016; Wong, 2013). Later research continued extending these two views. NRBV (used in Graham, 2018; Miemczyk et al., 2016) refers to the natural environment in the RBV. NRBV suggests that firms generate unique resources, including knowledge, for competitive advantage by proactively engaging with the natural environment (Hart, 1995; Hart & Dowell, 2011). NRBV categorizes three proactive environmental strategies: pollution prevention, product stewardship, and sustainable development (Hart, 1995; Hart & Dowell, 2011). The relational view (used in Lee, 2015) suggests that the combination of resources in different supply chain organizations leads to inter-OL and develops organizational capabilities.

Meanwhile, through the lens of stakeholder theory, Parmigiani et al. (2011) pointed out that collaboration with external stakeholders can promote dialogue and learning to avoid the conflict typically associated with calls for accountability; this is referred to as environmental management capabilities.

Studies around that time attempted to study environmental collaboration's antecedents, practices, and impact. Still, there was a lack of examination into how companies can implement environmental strategies more effectively. With the increasing pressure for firms to go beyond internal practices and consider the environmental impact of the entire supply chain (Parmigiani et al., 2011), Hart and Dowell (2011) called for studies to investigate further the key factors that facilitate the implementation of more advanced environmental strategies. Lee (2015) and Graham (2018) answered the call and explored how to implement proactive environmental strategies effectively to enhance SSCM.

Through the social capital model, Lee (2015) examined how SSCM affects the environmental and operational performances of the supply chain by considering social capital accumulation as a mediating role. Social capital is a valuable asset from access to resources through social relationships (Lee, 2015). This is similar to Vachon and Klassen (2008) relational view on how SSCM can develop manufacturing capabilities. For SSCM to foster collaborations, frequent communication is needed, and it requires practices like OL, which are considered prerequisites of structural social capital (Inkpen & Tsang, 2005; Lawson et al., 2008). Lee (2015) showed that this capital could quickly be accumulated through SSCM practices across the supply chain. Improvement in environmental performances requires a high level of technical expertise, production, and product design, which suppliers often lack but can learn through OL in the supply chain. The results by Lee (2015) were consistent with

Parmigiani et al. (2011) and confirmed that social capital, such as collaborations, can facilitate environmental OL (Cheng et al., 2008) and enable suppliers to learn how to address limitations and improve their environmental capability and performance (Parmigiani et al., 2011). OL in this relationship can facilitate the development of an innovative solution to address different environmental challenges (Parmigiani et al., 2011). In addition, long-term collaborations with suppliers increase the supplier's commitment and motivate them to improve environmental practices (Lee, 2015).

In later research, Graham (2018) advanced the knowledge in this area by examining how environmental learning and environmental collaboration positively moderate the progress of advancing internal environmental practices across the supply chain (process stewardship). Graham (2018) analyzed their theoretical framework following Vachon and Klassen (2008) and Lee (2015) by using a process-based view instead of a product-based one (Sarkis et al., 2010) for two reasons. First, all manufacturing companies face pressure to reduce process-related environmental misconduct, whereas not all products revolve around being eco-friendly (Lee, 2015). Second, the concept of collaboration between suppliers and customers from Hart and Dowell (2011); Vachon and Klassen (2008) capture the essence of engagement inherent in the practical implementation of a process stewardship strategy.

Graham (2018) developed a theoretical model through the lens of NRBV that examines how environmental learning and environmental collaboration can advance SSCM. The framework shows that internal environmental practices (in this study, particularly pollution prevention) serve as an antecedent to the development of environmental learning and collaboration. The environmental learning and integration capabilities mediate the advancement from pollution prevention to process stewardship. Process stewardship implies

conducting environmental management beyond internal boundaries by reducing environmental impacts at different points in the product cycle (Hart, 1995). In their statistical model, Graham (2018) also established the independent variable *process stewardship,* referencing Vachon and Klassen (2008), using the supplier and customer-oriented collaboration as variable measures. Graham (2018) further highlighted the importance of environmental learning and integration in advancing SSCM.

On the other stream of this main path, Wong (2013) and Miemczyk et al. (2016) applied the knowledge in their research of the closed-loop supply chain (CLSC). Whereas previous papers highlight the importance of supply chain collaboration, Wong (2013) stressed that collaboration and communication are inherently complex. Therefore, establishing an effective information-sharing mechanism to support environmental management beyond an individual firm is necessary. She explored the effects of environmental information integration established internally and externally on the environmental management capabilities of firms. Internal environmental information integration allows information and knowledge transfer to respond quickly to new environmental requirements, and it improves cooperation across functions and the capabilities of firms to adapt to changes and organizational processes. Moreover, Miemczyk et al. (2016) showed that knowledge sharing is vital to facilitating CLSC development.

At the end of this main path, in their closing remarks, Graham (2018) noted that future studies could investigate the different antecedents to environmental practices at various supply chain stages and further understanding by applying a broader OL perspective and highlighting possible future directions in the field. From the development of this path, we can also see a trend of combining the discussion of environmental collaborations and monitoring. Moreover,

it seems timely to consider SSCM from a process-based view rather than a product-based view (Graham, 2018). Such a perspective can clarify utilizing environmental learning, collaboration, and monitoring to advance internal processes to an efficient SSCM.

3.4.1.2 Cluster 2: Tensions and Risks in Sustainability Global Supplier Management and Organizational Learning

Our second largest Cluster has 21 publications from 2010 to 2021, with 27 citation links and 1194 total citations. This stream of knowledge on tensions and risk in sustainability global supplier management (SGSM) and OL began with Reuter et al. (2010), who noted the importance of sustainable supplier development (SSD) in SGSM.

Risk mitigation via risk management is increasingly vital in GSM (Kamauff & Spekman, 2008; Manuj & Mentzer, 2008), and many have studied feasible mitigation strategies (Kleindorfer & Saad, 2005; Tang, 2006; Tomlin, 2006). Reuter et al. (2010) observed that few studies have focused on the risks stemming from ethical and environmental irresponsibility. After observing the then phenomena in which many firms from developed economies outsourced and off-shored production to emerging countries with lower sustainability-related standards, Reuter et al. (2010) pointed out that SSD is crucial for buyers because supplier misconduct can damage both the supplier and the buying firm's publicity and reputation and cause legal obligations (Carter & Jennings, 2004; Koplin et al., 2007; Reuter et al., 2010). Later, Busse et al. (2017) referred to this responsibility that buyers bear for suppliers' noncompliance with stakeholders' sustainability requests as a supply chain sustainability risk. Busse et al. (2016) observed that no research by that time had been done on identifying specific risks that may arise from the global nature of SGSM. They noted that addressing this gap is vital in SGSM because a global-origin supplier is less easily approachable than a local supply chain,

making regular and frequent collaboration more challenging and leading to more risk. Moreover, low supply chain visibility in SGSM creates challenges and tensions (Busse et al., 2017; Zehendner et al., 2021).

OL plays a vital role in SSD and SGSM. First, in general, firms voluntarily establish corporate codes of conduct for suppliers and demand self-declarations from suppliers to avoid reputational risks. However, in SGSM, that is not sufficient. Especially for suppliers from emerging countries who are less reliable, firms must build DC with their suppliers for better SGSM (Reuter et al., 2010). Therefore, through the lens of the DC, a sub-stream of RBV, Reuter et al. (2010) studied how firms integrate economic, ecological, and social criteria in their sourcing processes and sourcing decisions for successful and genuine sustainability practices. Reuter et al. (2010) pointed out that continuous SSD efforts lead to OL for all entities in the supply chain. OL enhances supplier evaluation and development processes, eventually stabilizing the supply chain. Reuter et al. (2010) also noted that the earlier a firm emphasizes its SSD, the greater the accumulation of sustainability-related capabilities relative to its competitors. Early movers developed these capabilities repetitively within the firm, and the resulting processes tend to be highly tacit and socially complex, preventing immediate imitation (Peteraf, 1993). Therefore, OL and access capacity contribute to the firm's competitive position through more advanced and broader risk mitigation.

However, Busse et al. (2016), through the lens of goal-setting theory, identified five contextual barriers to SSD in SGSM: the conceptual complexity of the sustainability concept that obstructs the specificity of goal definition; socioeconomic differences that obstruct goal setting; and the three other barriers that obstruct communication during the pursuit of goals. In particular, communication barriers, including spatial distance, linguistic distance, and cultural

differences, all hinder OL. Knowledge cannot be exchanged through personal interaction because of spatial distance. Communication efficiency and quality are affected by linguistic distance, often to the extent that knowledge exchange becomes impossible. A lack of respect for another country's goals and culture during collaboration (Asgary & Mitschow, 2002) can jeopardize commitment and overall satisfaction with the relationship because of cultural differences (Griffith & Myers, 2005) and ultimately obstruct intercultural knowledge transfer (Bhagat et al., 2002). These differences can create different interpretations of sustainability between culturally different buyers and suppliers, such as Western buying firms and Chinese suppliers (Busse et al., 2016). However, these challenges from cultural differences are most likely unintended and ubiquitous (Carter et al., 2020).

Busse et al. (2016) suggested promoting practical joint communication activities that can facilitate ol; build a shared understanding of the concepts, processes, and goals of SSD; and overcome these differences. Moreover, promoting diversity enlarges the pool of available knowledge and experience and creates competitive advantages. Later, Carter et al. (2020) utilized the paradox theory to conceptualize these unintended consequences of the SGSM initiative. That is the paradoxical nature of desirable, undesirable, intended, and unintended outcomes. They demonstrate that the tensions of paradox can motivate learning and agility (Carter et al., 2020).

Following Carter et al. (2020), Zehendner et al. (2021) noted that there can be tensions during OL in SGSM (Hahn et al., 2015; Smith & Lewis, 2011; Zehendner et al., 2021). OL tension usually occurs during transformations, when firms face the paradox of abandoning current unsustainable or less sustainable practices and building upon existing routines and systems to develop more advanced and innovative practices (Hahn et al., 2018). The structural

complexity of SSCM can lead to low visibility and varying measures and requirements in the supply chain that can hinder the transformation. They highlight the importance of acknowledging and embracing the paradoxical perspective in sustainability tension to prevent the risk of avoiding contradictions. Moreover, contextualization (Hahn et al., 2015) seems to be a standard solution to SGSM tensions (Zehendner et al., 2021), which involves accepting the paradox, contextualizing the paradox by considering the interconnection and differences between the two poles, and resolving the paradox by separating or synthesizing the two poles of the paradox.

3.4.1.3 Cluster 3: Sustainable Supply Chain Learning

For Cluster 3, there are 17 articles between 2008 to 2021, with a total number of 1046 citations and 23 citation links. We name this domain sustainable supply chain (SSC) learning, and this cluster primarily focuses on *how* the supply chain learns sustainability knowledge. All the papers included in this main path are empirical studies focusing on emerging economies: two in India, two in Brazil, and one in China.

Silvestre (2015) first described SSC as a journey rather than a destination, meaning that supply chains learn and evolve toward sustainable practices like organizations do via a complex, dynamic, and evolutionary learning process. Therefore, continuous OL is essential for the evolution of SSC. This line of thinking greatly influences how the later research in this cluster considered the relationship between SSC and OL.

Through the lens of three theories, institutional theory, evolutionary theory, and complexity theory, Silvestre (2015) enhanced the knowledge of how sustainability can be incorporated and managed within supply chains in emerging economies. According to

institutional theory, enterprises may follow or "mimic" competitors' success, that is, competitive benchmarking. For example, firms from developing countries learn to implement environmental management practices from their more advanced foreign competitors. Evolutionary theory states that supply chains learn and evolve just like other organizations. Furthermore, complexity theory suggests that the dynamic network of relationships in SSCM practice (e.g., supplier integration in eco-product design) allows knowledge sharing and meaning creation, reducing the uncertainty and complexity that arise from implementing the SSCM activities that guide the functioning of the system.

Silvestre (2015) showed that SSC trajectories exist when supply chain firms jointly learn, interpret, and apply sustainability knowledge, which allows them to develop technological, organizational, and business model innovations that move them toward enhanced integration, collaboration, and sustainability performance. This implies that sustainability is essential not just for the focal companies but for the cooperation of the entire supply chain (Gong et al., 2018; Seuring & Müller, 2008). Silvestre (2015) also noted that natural-resource-based supply chains in emerging economies are geographically bounded and susceptible to local social demands. Supply chains involve entities from emerging economies can face extra barriers, contributing to greater uncertainty and complexity levels because of the prevalent turbulent business environments and institutional voids, which set the stage for later research that studied SSC learning in emerging economies, including the three papers in this main path (Gong et al., 2018; Roy et al., 2020; Venkatesh et al., 2021).

In later research, Gong et al. (2018) highlighted the lack of studies that examine SSCM learning in the supply chain at multi-tier levels. Therefore, following the few exceptions (Biotto et al., 2012; Gosling et al., 2016; Silvestre, 2015), Gong et al. (2018) studied how firms

orchestrate internal and external resources to facilitate SSC learning at a multi-tier level. Gong et al. (2018) investigated how firms can orchestrate resources and disseminate sustainability knowledge in multi-tier supply chains. Multiple organizations develop, share, and collaborate on supply chain and product problems and solutions jointly across organizations (Flint et al., 2008; Gong et al., 2018). Although many previous studies adopted a static or snapshot view of SSCM, similar to Cluster 1, Gong et al. (2018) stressed the importance of considering a temporal dimension of the process view because SSCM is a learning process for both focal companies and their supply chain partners.

Whereas Silvestre (2015) and Gong et al. (2018) studied multitiered SSC learning from an inter-firm perspective, in recent research, Roy et al. (2020) investigated SSC learning from an intra-firm view. The research examined the organizational processes that facilitate continuous OL on sustainability.

To specify sustainability is essential for firms' competitiveness, Roy et al. (2020) remodeled the study by Jiménez-Jiménez and Sanz-Valle (2011), which demonstrated four concurrent states of intra-firm learning by refocusing on sustainability-oriented knowledge. Also called OL toward responsible management (OLRM), the four states are sustainability-oriented knowledge acquisition, where organizational members acquire needed knowledge from disseminating forums, experimentation, and R&D throughout the production process; sustainability-oriented knowledge distribution, where organizational members explore different ways to realign their working protocols to improve sustainability; sustainability-oriented knowledge interpretation; and organizational memory, where firms utilize and share sustainability-oriented knowledge and continue to improve in the future. In later research, Venkatesh et al. (2021) found that their sample (Indian apparel suppliers) rarely tried to achieve

OLRM. Therefore, the authors agreed with Roy et al. (2020) that firms must reorient continuous OL initiatives to align more closely with sustainability goals.

3.4.1.4 Cluster 4: Organizational Learning in Social Sustainability Supply Chain Practices

There are 10 papers in Cluster 4 from 2010 to 2021 with 10 citation links and 510 total citations. This cluster focuses mainly on the social aspect of SSCM. This main path started with the knowledge of Lemke and Petersen (2013), who highlighted the importance of reputational risk management in the supply chain because it is often overlooked. Lemke and Petersen (2013) noted that although there are different options for managing risk, sustainable practices are a contemporary foundation for avoiding risk behavior altogether. Sustainable practices can mitigate long-term reputational risks in the supply chain, which is more efficient than conventional risk management practices. In their framework of the six-step management process to achieve supply chain social responsibility, OL plays a role in the first step, member orientation. In this step, firms gather information from all their supply chain members. Analyzing their CSR policies and procedures, corresponding performance, the quality of their metrics, and connections to other business parties provide transparency to the supply chain (Doorey, 2011) and a platform where knowledge sharing occurs (Hernández-Espallardo et al., 2010). This step provides the foundation for the following steps, namely risk analysis assessment, risk analysis options, decision-making, implementation and evaluation, and feedback.

On one side of the main path, the focus is developing a framework for classifying the differences between basic and advanced social sustainability supply chain (SSSC) practices. In Marshall et al. (2015), basic SSSC practices are those concerned with the health and safety,

code of conduct, human rights, and working conditions of the workers (Ashby et al., 2012; Awaysheh & Klassen, 2010; Ayuso et al., 2013; Huq et al., 2014; MacCarthy & Jayarathne, 2012; Spence & Bourlakis, 2009). Advanced SSSC practices concern stakeholder and community benefits in the supply chain through product and process development (Klassen & Vereecke, 2012) or supply chain refinement (Pagell & Wu, 2009).

OL is primarily related to advanced SSSC practices (Marshall et al., 2015). Although the paper does not encompass the relationship between reputational risk and SSSC practices, its findings are consistent with Lemke and Petersen (2013) that basic and advanced SSSC practices can both protect a firm's reputation. Certain basic practices are essential for protecting the firm's reputation. These include monitoring, compliance, and advanced practices like building social capital by embracing new members such as nongovernmental organizations and community groups as part of the supply chain innovation process (Lemke & Petersen, 2013). Therefore, in their practical implications, Marshall et al. (2015) recommended that supply chain managers remain open to and highly interconnected with their more comprehensive internal and external social networks to facilitate appropriate knowledge exchange and learning.

The research by Croom et al. (2018) extends the study by Marshall et al. (2015). This research explored the impact of SSSC on operational performance with the classifications of basic and advanced SSSC developed by Marshall et al. (2015). Among others, OL is one of the positive outcomes of the product and process changes within advanced SSSC practices. Identifying process and product inefficiencies for further advancement requires much operational data incorporation (Hervani et al., 2005; Klassen & Vachon, 2003), promoting collaborative knowledge sharing. Therefore, the results (Croom et al., 2018) showed that OL

during this product and process advancement has a positive impact on helping the firm achieve sustainability goals and improve operational performance.

As the end node of this main path, the more recent research by Croom et al. (2018) remarked on a lack of research on SSSC practices, and little is understood of the antecedents and their impact, suggesting future research potential.

On the other end of the main path is a study by Handfield et al. (2020), who developed a machine-based learning algorithm to analyze newsfeed data to assess regional supply-base risk in the apparel sector of low-cost countries for long-term planning. The study did not directly quote any other papers from this main path. However, the authors mentioned the study by Marshall et al. (2015) in the Future Reading section. Readings included in this section suggested that the authors did not consider the knowledge passed down in this path essential, but it is still helpful as additional information. This shows a link between machine learning and SSSC practices, but the significance might be small or just beginning to germinate. Future research in machine-learning literature should investigate whether this link is relevant and, if so, ensure the links are valued in the development of the field.

3.5 Discussion

RQ1 – What do we know about OL and SSCM in the OM literature, and how are they linked?

There has been a growing interest in connecting OL and SSCM in the OM field since 2015. Before 2006, these two topics were not commonly discussed together. From 2006 to 2015, their relationship started to receive academic attention but remained marginal. The majority of the publications on SSCM and OL are empirical studies (59.5% of the sample), with surveys being the most commonly used data collection method (41.5%) and statistical

model analysis being the most popular methodology (65%). The number of researchers that study developed and emerging countries is relatively equal, but there has been an increase in interest in emerging economies in recent years.

To summarize, the four clusters from our analysis show the link between OL and SSCM, highlighting the significance of collaborative learning within the supply chain to enhance sustainable practices. The studies emphasize the importance of continuous OL for improving SSCM, suggesting that firms should strategies and align their learning initiatives with sustainability goals. In addition, the literature indicates that practical joint communication activities can help tackle contextual challenges, such as cultural and linguistic differences and facilitate shared understanding and learning to achieve sustainable supply chain management. Overall, the literature highlights the key role of organizational learning in better sustainable practices in supply chain management.

RQ2 – What are some significant research domains?

We identified significant research domains by categorizing the literature into four major clusters. They are 1) environmental collaborations and environmental learning, 2) tensions and risks in sustainable global supplier management and OL, 3) sustainable supply chain learning, and 4) OL in social sustainability supply chain practices.

Cluster 1 highlights the link between OL and Sustainable Supply Chain Management (SSCM) with environmental collaborations and environmental learning. Environmental collaborations require the direct involvement of an organization with its upstream suppliers and downstream customers in planning collaboratively for environmental management and environmental solutions, which requires a high level of learning from one another's operations

(Vachon & Klassen, 2008). The capabilities, experience, and learning developed through internal procedures in environmental learning and environmental integration facilitate the advancement of SSCM in a firm (Graham, 2018).

Cluster 2 discusses the tensions and risks in sustainability global supplier management (SGSM) and organizational learning (OL) and their linkage and importance. Tensions and risks in SGSM include ethical and environmental misconduct and supply chain sustainability risks that can damage the supplier's and buying firm's reputation (Busse et al., 2016; Reuter et al., 2010). OL plays a critical role in SGSM because it facilitates the development of a shared understanding of concepts, processes, and goals for better communication and collaboration, which can mitigate tensions and risks. (Busse et al., 2016).

Cluster 3 focuses on how a supply chain learns sustainability knowledge. As sustainable supply chain management (SSCM) is essentially a journey, continuous organizational learning (OL) is vital for its evolution (Silvestre, 2015). The sustainable supply chain (SSC) trajectories highlight joint learning among supply chain firms, allowing them to develop technological, organizational, and business model innovations that move toward enhanced integration, collaboration, and sustainability performance. Later research in this cluster focuses on studying multitiered SSC learning from both an inter-firm and intra-firm perspective and emphasizes the importance of considering a temporal dimension of the process view of SSCM Gong et al. (2018).

Cluster 4 focuses on the social aspect of SSCM. The main path discusses the importance of (OL) in achieving supply chain social responsibility, with Lemke and Petersen (2013) highlighting the role of sustainable practices in mitigating reputational risks. Advanced SSSC

practices concern stakeholder and community benefits in the supply chain through product and process development or supply chain refinement. Research suggests that OL can facilitate this innovation process (Marshall et al., 2015).

RQ3 – From our findings, what are the future research directions?

In general, our descriptive statistics show that interest has been increasing since 2015 in linking SSCM and OL in top OM journals, especially in empirical research. Our systematic review of 178 journal articles from 1997 to 2021 shows that most existing studies examine SSCM and OL on a relatively surface level. They only consider OL as a part of the discussion. For example, Marshall et al. (2015) only considered OL one of many positive outcomes of advanced SSSC practices. They did not dedicate the entire discussion of their papers to studying the relationship between SSCM and OL, which suggests that they are interrelated, but the examination may not be sufficiently in-depth. This is also why not all end nodes of our main path analysis clusters provide future research direction based on OL. Future studies can extend to a more sophisticated theoretical connection between SSCM and OL. There remains a general need to increase the learning perspectives when studying SSCM. For example, Graham (2018) remarked that there is a need to apply a broader OL perspective to study different antecedents to environmental practices at various supply chain stages. We consolidate the results of our descriptive statistics analysis and the end nodes of main path analysis to provide more future research opportunities below. A future development framework of SSCM and OL research is summarized in Figure 14. In the figure, we identified the organizational theories mentioned that link between SSCM and OL from existing literature. We then matched with our identified clusters. Two organizational learning theories mentioned by Sarkis et al. (2011) were not mentioned in our main path analysis. They are social network theory and structuration theory. This suggests future studies can look deeper into the relationship between

SSCM and OL through these theories. From Cluster 4, we also discover that incorporating machine learning into the discussion of OL can be a future trend when studying the relationship between SSCM and OL. From future cluster analysis, we identified that eco-process and logistics service providers and shipper's alignment are two growing areas. With our framework, future research can identify both already established and missing links. Researchers can adopt a 'mix and match' approach in future studies. For example, research can attempt to discover the relationship between social network theory and OL (with both human and machine learning aspects) and eco-process outcomes. We explain the future development we've identified in more detail in the followings:

First, empirical studies contribute to most of the research on SSCM and OL. Beske et al. (2014) pointed out that there was no empirical effort to link SSCM and DC back in 2014. Because DC is strongly related to OL, this implies that by 2014 there was no empirical effort to connect SSCM and OL. Before 2015, SSCM and OL were barely discussed together in any type of research. Figure 4 shows that after 2015, with the increase in the total number of studies, empirical research experienced the most drastic increase. Future research can utilize other approaches to study SSCM and OL. Research has supported the idea that environmental learning can lead to effective SSCM (Graham, 2018). The learning effect of environmental collaboration has also been proven to improve performance, manufacturing delivery, and flexibility but can potentially harm a firm's financial performance (Vachon & Klassen, 2008). Future research can utilize a mathematical modeling approach to study what levels of SSCM and OL can optimize firms' performance. Another example is Venkatesh et al. (2021), who suggested that continuous OL initiatives can positively impact SSCM by triggering sustainable thinking within their operations to meet market needs (Caniato et al., 2012) but can also negatively affect sustainability practices because of increased recruitment, maintenance, and

training costs. Future research can utilize a mathematical modeling approach to determine which level of OL can optimize SSCM performance.

Second, even though the number of empirical studies that focus on developed and emerging countries is more or less similar, since 2018, fewer studies have focused on developed countries. We can see increased studies focusing on emerging countries in the last three years. This is consistent with two current phenomena: first, traditionally, many firms locate their operations in emerging countries, especially their heavy polluting processes; and second and more recently, many emerging countries are transforming from manufacturers to foreign investors. As latecomers to globalization, these firms from emerging countries have less experience in SSCM. Working with more environmentally conscious partners is an excellent platform for OL for efficient practices to achieve SSCM. Therefore, essentially, this trend will continue. In our main path analysis, all articles in Cluster 3's main path focus on emerging countries to study sustainable supply chain learning. All papers included in the main paths in Cluster 1 focus on developed countries exploring the relationship between environmental collaboration and environmental learning. This allocation implies a demand for scholars to study this topic in emerging economies.

Third, although being the most popular data collection method, surveys and interviews can often involve self-reporting bias (Pagell & Gobeli, 2009; Podsakoff et al., 2003). Future research can consider using multiple-data collection techniques because scholars have pointed out that they can help mitigate these biases (Doty & Glick, 1998; Pagell & Wu, 2009). Furthermore, a recent search by Powell and Coughlan (2020) adopted an action-learning methodology to explore learning-to-learn in sustainable lean transformation. Powell and Coughlan (2020) paper was the only one that proposed such a methodology in our sample. In

an action-learning approach, data are collected through engagement with others during action cycles, meaning that collecting data is an intervention (Coghlan & Brannick, 2019). The observations made during the action cycles are not simply data collection but generate learning for the researcher and the participants in the action. Powell and Coughlan (2020) noted that such an approach could provide a more affluent data foundation to generate knowledge and learning. This methodology can be a direction for further study when studying the role of OL in SSCM.

Fourth, notably, at the end node of Cluster 4, the paper by Handfield et al. (2020), which is a paper that offers a machine-based learning algorithm to achieve long-term SSCM, linked to other studies in our sample by mentioning Marshall et al. (2015) in their Future Reading section. Recent research that studies the role of machine learning and OL, though not studied here, points out that machine learning plays an essential role in OL (Sturm et al., 2021), suggesting incorporating machine learning and human learning within an organization can lead to future efficient OL. This can imply a future direction in a rising cluster of research focusing on the relationship between machine learning (as part of the future trend of OL) and SSCM. The fact that Handfield et al. (2020) only included Marshall et al. (2015) in their Future Reading section means that authors consider previous knowledge of conventional OL and SSSC practices to play a relevant role in the field but are not considered essential. Future research that studies machine learning in SSCM should investigate further and ensure that the significance of this link continues to develop in this field. Future research should also utilize various theoretical frameworks to explore the role of machine learning in SSCM. For example, according to RBV, machine learning can tangibly provide interconnectivity and intangibly provide intelligence to manufacturing systems to facilitate the development of OL capabilities (Tortorella et al., 2020), which can, for example, help firms better customize the output to

consumer interests (Varadarajan, 2020) and minimize waste in the supply chain. Through the lens of institutional theory, firms are pressured to adopt digitization and incorporate machine learning in SSCM to catch up with other competitors. Furthermore, with stakeholder theory, machine learning can help firms better understand the needs of various stakeholders, which may help to meet the sustainability requirements of stakeholders actively.

Fifth, our CNA only identified clusters with at least 10 papers following the default setting (Liu et al., 2022). However, we also examined the smaller clusters to identify rising trends. We have identified two smaller clusters that can provide insights into potentially developing topics in the field. First is advanced eco-manufacturing technology, a stream of studies focusing on eco-processes toward sustainability. Second is green logistics, a stream of literature that studies the environmental alignment between logistics service providers and shippers. Future studies can review and further examine the research opportunities in this area.

Sixth, additional theories have been linked to OL in SSCM since the review by Sarkis et al. (2011) mentioned previously. There are two organizational theories mentioned in the review that link to OL, but we do not see them in our main path analysis. They are social network theory and structuration theory. Future research can further examine the learning aspect of these two theories in SSCM practices to enrich the theoretical development of this field.

3.6 Limitations

The research methods used in this study are bound to have some limitations. First, the sample may not include all related articles. Because of the use of specific keywords for searching, the omission of some studies is inevitable. Although we mainly used keywords

based on objective references from previous research, the selection is mixed with some objective opinions. To a certain extent, the choice of keywords is based on our understanding. Additionally, we only included articles from selected top 13 OM journals (Zhou & Lo, 2018), and the search was conducted solely on the Web of Science database. Only English articles were included, which can lead to bias in the overall structure (McLaren & Bruner, 2022).

Second, the articles identified in our main path analysis do not necessarily contain the most significant or groundbreaking results because we do not assign weight to our citations. They are the most cited, and their findings are more widespread among our sample (Colicchia & Strozzi, 2012). Although main path analysis can help us identify essential milestones of different knowledge structures more straightforwardly, it leads us to focus on a limited number of critical articles and overlook some other important knowledge from studies not included in the main path.

Third, negative citations, that is, citations for criticizing, are not considered in CNA, which may not provide the complete citation picture of the field (Fan et al., 2014).

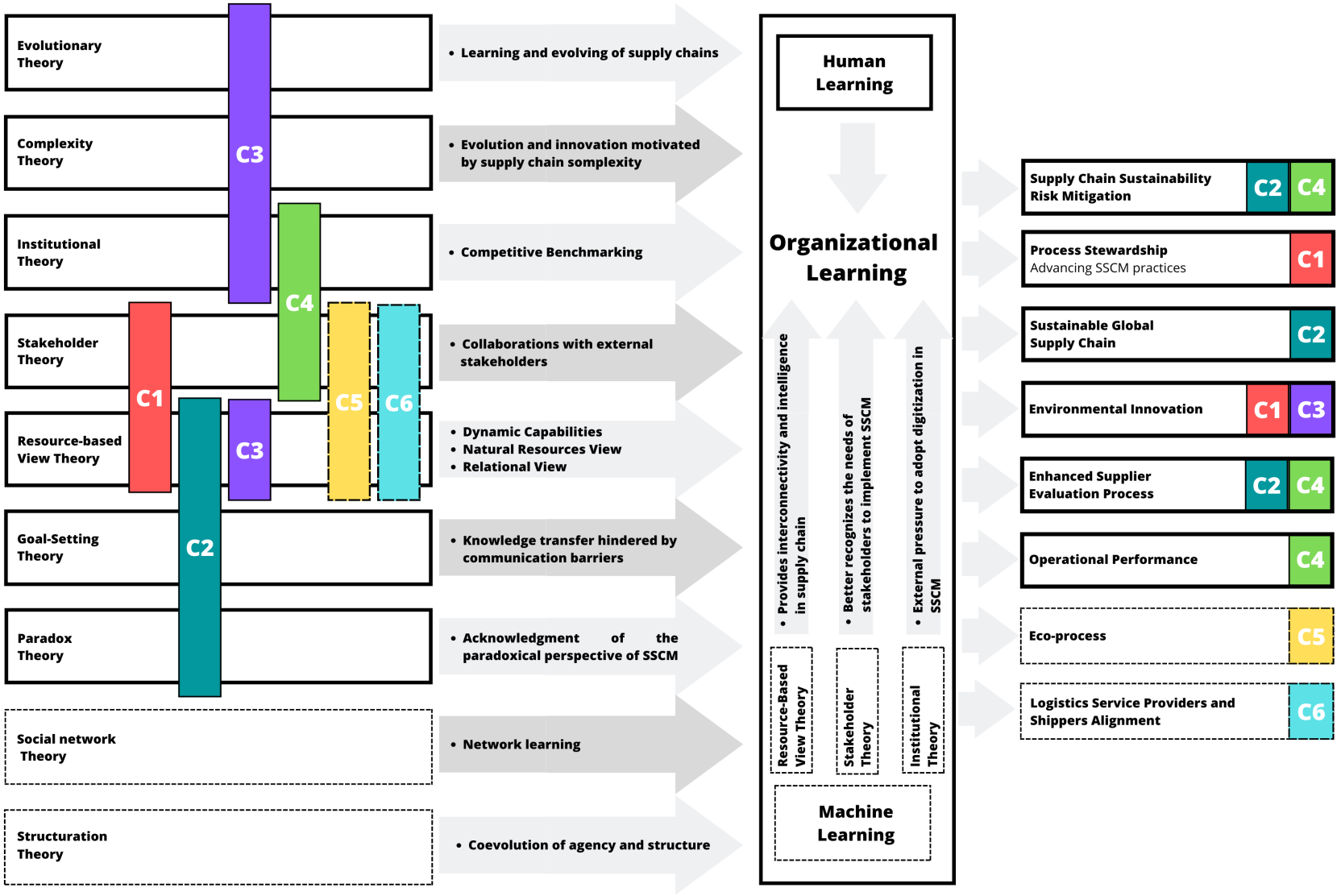


Figure 14. Summary and future research framework

CHAPTER 4: STUDY 2

Does Reverse Direct Investment Make Chinese Manufacturers Greener?

4.1 Introduction

Emerging countries have expanded overseas more rapidly than ever in the recent decade. Shares of emerging countries in total world OFDI increased from 7.6% (88721.45 million USD) in 2000 to 42% (414 747 million USD) in 2018 (UNCTAD, 2018). In particular, China has significantly transformed from a receiver to a contributor to the world's OFDI. OFDI in China has more than doubled from 56 529 million USD in 2009 to 143 040 million in 2018 (UNCTAD, 2018). Notably, China's overseas expansion increased substantially after the inception of the Belt and Road Initiative in 2013 (Feng et al., 2018; S. Yu et al., 2019). More interestingly, China has become one of the significant investors in developed economies (Deng et al., 2017). Emerging economies' OFDI to developed countries is termed reverse direct investment (RDI) by Jun (1987). Two examples of Chinese RDI include one of the first significant deals from China to Southern Europe, Three Gorges Corporation's 3.5 billion acquisition of a 21% stake in the Portuguese power company Energias de Portugal in 2011 (Ma & Kowsmann, 2011), and carmaker Geely Holding Group's 92 billion acquisition of a 9.69 % stake in German Daimler AG in 2018 (Li, 2018).

Along with the bloom comes increasing world attention and a mixed global debate and sentiment towards China's growth in their overseas expansions. Some believe there are benefits to Chinese investment globally, such as promoting rational circulation and allocation of resources (Feng et al., 2018) and improving infrastructure and economic development in host countries (Jenkins, 2010). In contrast, some criticize and show concerns over issues like unfair

competition in global takeovers led by state backing, the debt level of many investment firms, and inexperience in the global market (Yang & Stoltenberg, 2014). Notably, a report released in May 2020 by the government of the US suggests that China's expansion would harm American interests (The White House, 2020). Many Chinese firms face resistance and opposition during their expansions from host developed countries mainly due to the perception of being low quality (Yu & Liu, 2018). One recent example is the controversies around Huawei's 1.2 billion R&D and manufacturing plant expansion in Cambridge, UK (Hatton, 2020). Critics have shared concerns over the Chinese code of conduct. The US has indicated it is "an extension of the Chinese government" that is not beneficial to the UK—provoking concerns over data privacy issues, and their real goal is to absorb local talents, technology, and intellectuals (Brackley, 2020). Some also worry about the pressure on local housing as the plants occupy 530 acres. China's RDI has substantial implications for the economic development of the world economy as a whole (Cheung & Qian, 2009), yet its impact remains controversial.

A particular concern for emerging countries, especially China, regarding their growth is their strategy to solve their severe environmental issues. Continuous economic development has led to severe environmental problems, including shortages of natural resources and pollution in many emerging economies, including China (Lo et al., 2018; Yong, 2007). In particular, being one of the core industries of China's economy, the manufacturing industry traditionally had received much foreign investment to relocate its heavily polluting manufacturing process into China. The manufacturing industry has become one of the most significant contributors to the nation's environmental issues as a major consumer of natural resources and an emitter of greenhouse gas (Ge et al., 2016). Furthermore, environmental violations are increasing (Chang et al., 2015; Meng et al., 2013). Environmental violations that

occur in a cross-border supply chain due to poor environmental management often negatively affect the violating firm, such as their stock returns (Lo et al., 2018). Their partners along the supply chain are also affected (Xiong et al., 2021). That is why it is somewhat surprising that, despite all the controversy surrounding China's globalization and environmental issues, not many debates around China's RDI investigate the potential environmental implications to the home country. Researchers are noting the potential of knowledge spillover effect on China's green development through its rising RDI only until very recently (e.g.,Hao, Guo, et al., 2020; Liu et al., 2021; Pan et al., 2020; Yang et al., 2021; Y. Zhou et al., 2019).

Environmental performance refers to an organization's impact on the natural environment. In other words, it is the effectiveness of a firm's environmental management practices in reducing its environmental impact and achieving sustainable strategic objectives, including output. Environmental performance can include air and water quality, energy use, greenhouse gas emissions, waste management, biodiversity conservation, and compliance with environmental regulations. Research has shown that good environmental management improves operational and business performance (Corbett & Klassen, 2006; Molina-Azorín et al., 2009; Zaid et al., 2018). Studies have acknowledged that environmental management promotes sustainable competitive advantages (Agyabeng-Mensah et al., 2020; Chang, 2011; González-Benito & González-Benito, 2005). Being eco-efficiency (i.e., gaining competitive advantages through environmental management) implies producing and developing goods while simultaneously reducing environmental impact and the use of resources (Starik & Marcus, 2000). Benefits of environmentally sustainable practices include improved company reputation (Miles & Covin, 2000); higher prices and increased sales (Miles & Covin, 2000); and more effective stakeholder management (Hull & Rothenberg, 2008; Sarkis et al., 2010). In particular, the manufacturing industry has been constantly demanded to undertake heavily

sustainable practices that achieve environmental, economic, and social needs (Diabat et al., 2013; Hussain et al., 2018). Therefore, since 2005, the Chinese government has heavily focused on undergoing a tremendous green movement by actively pressing firms on the importance of sustainability and launching significant initiatives and standards to support green industry development. For instance, the introduction of "green growth" at the 5th Ministerial Conference on Environment and Development in Asia and the Pacific in 2005, organized by UNESCAP (UNESCAP, 2005); the establishment of the Measures on Open Environmental Information (MOEI) in 2007 to require governmental organizations to disclose environment-related information (Tan, 2014); the consideration of being green one of five development philosophies in China's 13th Five Year Plan; the revision of guidelines and penalties by the Environmental Protection Law of People's Republic of China in 2014 towards stricter legal responsibilities for environmental violations; and the launch of the Green Manufacturing Association of China (GMAC) in 2017. One of the "going out" objectives is to encourage overseas investments that can promote economic transformation and industrial upgrading, which can potentially lead to green development (Cozza et al., 2015). Cross-border expansions provide a path for firms to learn advanced environmental knowledge externally.

The above shows the eagerness of China to improve its environmental performance to sustain long-term survival and competitiveness. Also, they show the enthusiasm of their foreign partner to facilitate their less developed partners to improve their overall environmental management efficiency to mitigate supply chain sustainability risk. Therefore, we believe there should be a strong potential for a beneficial spillover effect of environmental development via Chinese globalization (Hao, Guo, et al., 2020; Wang & Hu, 2017; Y. Zhou et al., 2019). China's RDI allows exposure to developed countries with more advanced practices and experience in environmental management. Through this exposure, firms can acquire green innovation

resources from their partners and then bring them back to the home company to improve the overall level of green innovation (G. Li et al., 2016). The newer and more advanced knowledge can help them maintain good environmental management and avoid further environmental violations. This is especially true for emerging countries like China, which, while striving to improve their competitiveness with the developed countries, has substantial environmental issues to be solved due to the previous welcoming strategy of heavily polluting businesses. We explore this hypothesis development through our research question: Does RDI promote better environmental management?

In 2013, China announced another historical policy - the Mixed Ownership Reform. Before that, even though the Chinese economy was becoming more diverse, its dominant control force remained state-owned (Chen & Young, 2010; Morck et al., 2008). This reform allows private firms to acquire state-owned enterprises (SOEs) partially. With the ongoing green initiatives, it is timely to investigate how these policies intersect. The environmental management practices between SOEs and Non-SOEs traditionally differ significantly (Godfrey, 2005; Huang & Yu, 2006).

Large-scale SOEs often are more inefficient in environmental management due to their excessive dependence on government support (Yuan et al., 2021). This raises a few questions about the impact of private ownership on Chinese environmental performance - Does private ownership improve firms' environmental performances? Does it help to achieve the green initiatives of China while fulfilling the 'going out' globalization initiatives? It is essential to address the contingent role of private ownership because of China's unique socio-political business environment (Lo et al., 2018). Therefore, we also examine the moderating effect of private ownership with our second research question: Can private ownership strengthen the impact of RDI on environmental management?

Research questions one and two suggest that RDI is likely to improve the environmental management of home countries, especially for more privately owned firms. Research question one concerns the strategic decision to expand overseas, and research two concerns firm-specific characteristics. We believe it is also essential to explore the investment characteristics that can affect the impact of RDI on environmental management. Husted (2005) remarked that considering cultural influence is crucial when understanding whether environmental practices and instruments used in one country are effectively transferrable to another. RDI is a highly complex process, and often firms experience challenges and barriers arising from the 'liability of foreignness' (Barkema & Drogendijk, 2007; Zaheer, 1995). Often cultural similarities between home and host countries can ease these challenges (Vaara et al., 2012) by reducing uncertainties (Shane et al., 1995) and ensuring more efficient communication (Birkinshaw et al., 2000). Therefore, we explore the following research question: (3) Can cultural similarity strengthen the impact of RDI on environmental management?

This study is motivated by the desire to shed light on the controversy around Chinese investment worldwide. As shown in Huawei's recent expansion to the UK, the debate around the impact of China's effort in investing outward has never been eased. We would like to investigate some of the positive outcomes of China's growth by extending the investigations into the consequences of China's RDI on its environmental performance. We believe this is very important as China plays a crucial role in global climate change, being the second-largest OFDI contributor globally and the international manufacturing center (UNCTAD, 2020). Therefore, one cannot overlook its economic footprint (Yang et al., 2021). Thus, in this paper, we focus on how these firms could achieve sustainability goals by expanding to more developed countries through the lens of learning. As Study 1 points out, there is a lack of studies

that put their primary focus on linking OL to SSCM. We would like to contribute by centering our theoretical development

We build our theoretical framework based on the learning-emphasized cross-border expansion theory OILL (OLI plus learning) paradigm developed by Park and Roh (2019), which is an extended complement to the most used well-known cross-border expansion theory – the OLI (ownership, location, and internalization) paradigm (Dunning, 1980, 2001). Together with Organizational Learning theory (OL), we hypothesize that RDI is an effective way for firms from China to learn and improve environmental management. Our study shows that RDI will reduce the environmental violation counts of Chinese firms.

Our paper offers a new perspective on understanding environmental management diffusion in the global supply chain. Accordingly, the negative sentiment towards Chinese globalization might have overlooked a timely aspect: the possible diffusion of environmental practices. Much previous research that supported any learning mechanism has proven the knowledge spillover effects on technology and R&D capabilities (e.g., Buckley et al., 2002; Fu, 2008; Ning et al., 2016; Wang et al., 2016), but limited research has focused on any transferrable environmental management-related knowledge. Moreover, most of the literature that has studied the relationship between FDI and environmental management focused on the effects on the host countries (e.g., Ashraf et al., 2021; Cheng, 2013; Li & Ramanathan, 2020; Opoku & Boachie, 2020; Rahman et al., 2019; Shahbaz, Nasreen, et al., 2015; Xie et al., 2020). Few exceptions recently have started investigating the impact on home countries, especially emerging economies (e.g., Hao, Guo, et al., 2020; Yang et al., 2021). Therefore, the intersection of RDI strategies, OL, and environmental knowledge is under-theorized. Our research indicates that emerging countries will likely learn environmental expertise and bring

them back home during RDI, eventually improving their environmental management and reducing environmental violations. In the view of a global eco-system, better environmental performance in China can bring common good to societies and the world. Furthermore, as an important emerging economy, the practice of China may also provide insights for other emerging economies in dealing with their environmental management performance.

We make important extensions to three fields of literature. First, we contribute to the FDI literature by focusing on emerging countries as investing countries. To this date, major theories on FDI focus on investment by developed countries (Park & Roh, 2019). We see an emerging effort to study the impact of RDI in the home countries themselves (Chen et al., 2012; L. Li et al., 2017; Piperopoulos et al., 2018). Nevertheless, there is still a lack of academic focus on the consequences of the globalization of emerging markets (Buckley et al., 2017; Hendriks, 2017). Even until very recently, academics that have studied the relationship between environmental management and foreign investment tend to center around foreign investment inflow to China and analyze the impact on the economy as a hosting country (e.g., Dong et al., 2019; Hao, Wu, et al., 2020; Kim et al., 2016; Liu et al., 2019; Zeng & Zhou, 2021).

Second, we contribute to the environmental literature by bringing more insight into the antecedent of the improved environmental performance of emerging countries. Most studies on corporate environmentalism have focused on the context of developed economies, whereas emerging economies account for an increasingly more prominent part of global environmental concerns (Li et al., 2018).

Third, previous OL literature pays overwhelming attention to the knowledge spillover of technology and R&D (Chen et al., 2012; J. Huang et al., 2017; Jian Li et al., 2016; Potterie

& Lichtenberg, 2001; Pradhan & Singh, 2008; Zhu & Huang, 2017). We reduce the void and focus on environmental management-related knowledge as transferrable knowledge via RDI. Furthermore, although there is a consensus that globalization generates learning opportunities for firms, previous research is primarily based on the internationalization of developed economies (Piperopoulos et al., 2018).

To explore our research questions, we collected 352 RDI events and identified 8,797 environmental violations committed by 1739 publicly listed Chinese manufacturing firms from 2008 to 2017. We used Coarsened Exact Matching (CEM) with the Difference-In-Differences (DID) Regression method to deal with the endogeneity problem inherence in comparing the performance of firms with and without RDI. Our findings explain the growing awareness of environmental management of Chinese firms by demonstrating how RDI positively influences the reduction in environmental violations. Our results show that RDI benefits Chinese firms' environmental management and reduces environmental violations, and we also find positive moderating effects of cultural similarity and private ownership.

4.2 Hypotheses Development and Theoretical Framework

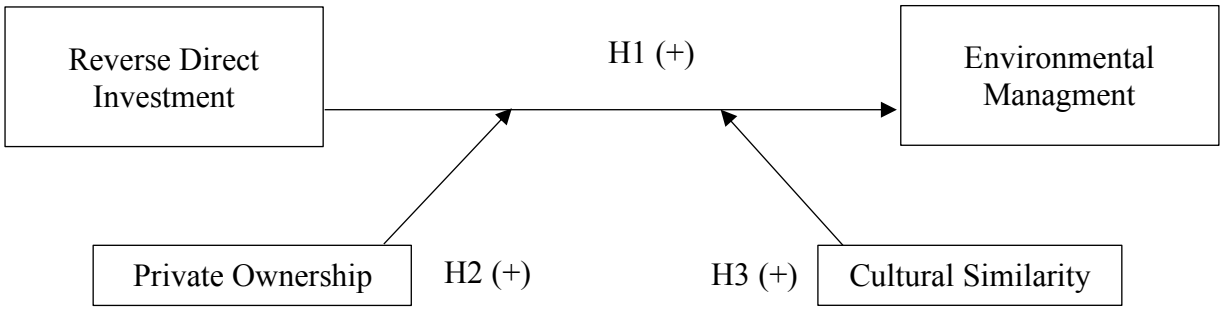


Figure 15. Theoretical framework

4.2.1 FDI and the Natural Environment of Emerging Countries

Existing literature that studies the impact of globalization on the natural environment separates into two categories. On one side, the literature suggests that the inflow of FDI to emerging countries can harm their natural environment (e.g., Abdo et al., 2020; Cheng, 2013; Nasir et al., 2019; Ur Rahman et al., 2019). Traditionally, firms are attracted to relocate their heavily polluting industries to emerging countries, which have loose regulations on pollution emission, called the "pollution haven effect" (Walter & Ugelow, 1979). For example, the study by Cheng (2013) shows that each 1% increase in FDI inflow would increase 0.82% in industrial waste gas emissions in Liaoning province in China. Rahman et al. (2019) also found consistent results that the inflow of FDI significantly increases CO_2 emissions in China.

On the other side, Birdsall and Wheeler (1993) put forward the opposing "pollution halo effect," which explains how the environmental performance of hosting emerging countries improves due to FDI inflow. Researchers have shown the improved environmental performance of the hosting emerging markets due to higher awareness and stricter standards of their more developed importers and outsourcers (Antweiler et al., 2001; Cheung et al., 2015; Hille et al., 2019). FDI from developed countries also allowed emerging host countries to enjoy better economies of scale (Zarsky, 1999). As a result, these emerging countries gradually improve their environmental performance with increased economic income (Mani & Wheeler, 1998). FDI can also bring learning opportunities for emerging countries to learn, absorb and adopt advanced technologies and management skills that promote environmental enhancement (Birdsall & Wheeler, 1993).

However, besides the inconsistent results, these current works focus on the environmental outcome of FDI inflow to emerging countries as host countries. We would like

to fill the research gap and investigate the impact of RDI on emerging countries as investing countries, whether or not there is a reverse halo effect – to empirically find out if these firms learn and enhance environmental performance back home after RDI. (Birdsall & Wheeler, 1993).

4.2.2 RDI and Reverse Environmental Knowledge Spillovers

Early research on the environmental spillover effect through FDI was primarily concerned with the impact on emerging countries as the host. For example, Zhu et al. (2010) results show that Chinese manufacturing firms improved their green supply chain management and greatly benefited by acquiring skills and knowledge from their Japanese partners, who are superior in the related area through their inward investment. Nyuur et al. (2016) confirm the successful knowledge transfer of CSR performance through an increased inflow of foreign investment from developed countries to emerging countries. As mentioned above, emerging countries are no longer just destinations of FDI but significant RDI contributors. Therefore, a shift in research direction is needed.

Even though evidence has confirmed the role of FDI in the reverse spillovers effect and has studied different investment outcomes in investing countries, this area is overwhelmingly based on reverse technology spillovers (Chen et al., 2012; J. Huang et al., 2017; Jian Li et al., 2016; Potterie & Lichtenberg, 2001; Pradhan & Singh, 2008; Zhu & Huang, 2017), performance, productivity, and innovation (Chen, 2018; L. Li et al., 2017; Piperopoulos et al., 2018). Reverse technology spillover occurs when firms in emerging countries attempt to absorb and learn advanced technology from host countries via FDI, transfer them back home, and obtain overall technological development (J. Huang et al., 2017; Zhu & Huang, 2017). Researchers have started to pay attention to the reverse environmental knowledge spillover

effects in recent years. For example, Y. Zhou et al. (2019) confirm that green knowledge is a transferable asset through RDI to home through the reverse spillover effect. Gao et al. (2018) show that the reverse technology spillover effects can improve green innovation efficiency.

Oddly, there is a lack of attention to studying environmental knowledge spill-overs on emerging countries as home countries despite the rapid growth of emerging countries' outward expansion and the growing effort for green development. We would like to fill the research gap and investigate the impact of investing emerging countries where there is a more severe environmental concern. Therefore, in this study, we draw on the OILL theory, which is an extension of the OLI paradigm that added emphasis on learning and the OL theory, two learning theories commonly used in this field, to understand the knowledge spillovers outcome of Chinese firm's RDI on their environmental performance as the investing side.

4.2.3 The Eclectic Paradigm/The OLI Paradigm

"OLI" stands for three different conditions for FDI – "O" for Ownership, "L" for Location, and "I" for Internalisation advantages. The theory states that these three conditions must be fulfilled simultaneously for a firm to engage in FDI (Dunning, 2001). According to Dunning (2001), ownership advantages refer to the tangible and intangible assets that are firm-specific and exclusive to that firm. The specific advantages include 1) monopoly advantages such as limited resources, patents, and trademarks; 2) technology and knowledge; and 3) economies of large size such as economies of learning, economies of scale, and scope. These advantages should lower production costs and allow the investment firm to overcome the cost, risk, and difficulties of operating in a foreign country. Second, location advantages denote a nation's economic, political, and social advantages. The firm must be more profitable to own and use these advantages (internalization) rather than sell or lease them to foreign firms

(externalization). Third, it must be profitable for a firm to use these advantages outside its home country in collaboration with at least some additional input factors. Alternatively, the foreign market would instead rely on exports than engage in foreign production.

Conventional theories like the OLI paradigm are still widely applied by recent studies to explain the phenomena of China's growth of RDI (e.g., Das, 2021; Li et al., 2021; Yang & Deng, 2017). The problem is that the majority of these theories were developed by observing the traditional FDI of developed countries in emerging countries, and scholars have pointed out them being inadequate to explain emerging countries like China's RDI behavior and require a revision (Barkema et al., 2015; Dunning, 2006; Jun, 1987; Park & Roh, 2019). We believe that we should consider that the motivation and desired outcomes of RDI from emerging countries can differ from that of developed countries. When emerging countries expand overseas, they lack ownership advantages to overcome the challenges encountered in the foreign market, especially when investing in developed countries (Lattemann et al., 2012). Therefore, unlike traditional perspectives, which focus on developed countries and stress market-seeking, efficiency-seeking, and resource-seeking intentions, learning motivation or knowledge-seeking is one of the critical drivers of Chinese firms investing overseas (Cozza et al., 2015; Wang, Hong, Kafouros, & Boateng, 2012). However, many traditional cross-border expansion theories lack emphasis on the learning aspect of the expansion (Park & Roh, 2019). In our theoretical framework and hypothesis development, we look into the extension of traditional theories that emphasize the learning motivation of Chinese firms. We consider the OILL paradigm by Park and Roh (2019), which extends the added learning focus of the conventional OLI paradigm by Dunning (1980), should be a good starting point for investigating the impact on environmental management as an emphasized learning outcome of RDI.

4.2.4 The OILL Paradigm

As latecomers of globalization, in order to catch up, firms from emerging countries usually take a more aggressive approach when expanding overseas (Luo & Tung, 2007a). Their approach to investing overseas generally differs from that of developed countries. When going abroad, firms from emerging countries like China are attracted to acquire and learn new advanced knowledge that has not been available internally in order to become more competitive in domestic and foreign markets (Jian Li et al., 2016; Li, 2010; Park & Roh, 2019; Wei et al., 2014). Therefore, realizing this significant difference and emphasizing the learning component of traditional views is essential for our research based on Chinese firms. Compared to the conventional OLI paradigm, Park and Roh (2019), along with other scholars (Barkema et al., 2015; Hennart, 2012; Li, 2007; Paul & Feliciano-Cestero, 2021; Yang & Deng, 2017), cast doubt on the possibility of different motivations of companies from emerging countries like China to go abroad, such as to absorb technology and managerial know-how.

Furthermore, the literature on emerging countries' RDI suggests that they did not follow traditional models because these firms have limited conventional ownership advantages to exploit when venturing abroad (Luo et al., 2011). Instead, their subsidiaries learn from the local markets by imitating known processes to manufacture products, acquiring skills and knowledge of local entities, and exploiting relationships with individuals, competitors, and networks (Srinivasan et al., 2007). Therefore, we support reframing the OLI when applied to RDI. Park and Roh (2019) suggested revamping the OLI theory and developed the OILL paradigm, which emphasizes adding learning as one of the main motivations in their theory. Our theoretical framework suggests that learning is a big part of Chinese firms improving their environmental management performance by learning from their RDI partners, which aligns with Park and Roh (2019), so we see fit to use it within our scoop. The OILL paradigm proposed by Park and Roh

(2019) combines a learning motivation with the existing OLI perspective and emphasizes the learning motives of emerging countries' RDI.

Given that more firms realize that sound environmental practices are essential for long-term growth and sustainability and benefits firms' business performances, we believe the know-how to improve environmental management has become one of the desired knowledge areas through their rapid outward investment activities. Moreover, since we would like to emphasize the learning that would occur during expansions to other countries, which requires an existing organization to work with another organization, expose them to new and diverse environments, and enforces them to absorb new information and knowledge, we bring in the OL theory. OL theory can further explain how learning can happen during RDI and how it can help improve the environmental management performance of investing firms.

4.2.5 Organizational Learning Through RDI

Organizations learn primarily based on their individuals' established routines and past behavior. Over time, members of an organization develop similar beliefs and preferences. Different organizations will develop different interpretations of their environment and perceptions of their experiences (Azadegan & Dooley, 2010). OL produces new knowledge that can result in competitive advantage and improved firm performance (Hitt et al., 2000). It changes thoughts, behavior, and individual and shared actions (Huber, 1991; Vera & Crossan, 2004). The OILL paradigm emphasizes the role of learning as a motivation for RDI. RDI requires an existing organization to work with another organization. Exposure to new and diverse environments and collaboration with foreign partners challenge both hosting and home organizations to question their existing preferences and beliefs, thereby enforcing them to be open and absorb new information and knowledge (Crossan et al., 1999; Dess et al., 2003),

which set the perfect stage for organization learning to occur. RDI has been identified as a critical vehicle for the OL of firms from emerging countries (Piperopoulos et al., 2018). It is because it provides a platform to achieve reverse knowledge spill-overs, where firms acquire and absorb advanced technology from their partners and then transfer them to the home (Driffield & Love, 2003; Gao et al., 2018; Zhu & Huang, 2017). Therefore, the expansion of the OILL paradigm from the traditional OLI paradigm is fitted in this context to provide a more comprehensive understanding of the role of learning in RDI from emerging countries.

As mentioned above, attention in this area heavily focuses on technology spill-overs. Very limited studies have looked into environmental knowledge spillover. In fact, organizational and environmental practices are fundamentally interrelated since developing green innovation challenges firms' traditional operating methods. It requires not only harnessing existing capabilities but also creating new ones, and this typically means firms are required to gain and use knowledge through OL activities (Albort-Morant et al., 2016; Chang, 2011; Fortis et al., 2018; Huang & Li, 2017; Jiménez-Jiménez & Sanz-Valle, 2011). In general, more developed countries have started to focus on social sustainability since the 1990s. They have substantial experience, knowledge, and capability in initiating, developing, and implementing effective environmental management (Jenkins, 2005). Their environmental standards are usually higher than emerging countries (Kim & Adilov, 2012). Therefore, learning through RDI helps firms from emerging countries forge network ties with countries with more experience and better environmental management awareness, thus laying the foundation for OL between the host and home firms.

The OILL theory shows the importance of realizing learning as an essential antecedent for emerging countries' RDI, while the OL theory shows the mechanism of how RDI can

facilitate learning. Furthermore, since firms from emerging countries increasingly realize the benefit of good environmental practices in their long-term survival, when they learn from their more advanced partners, they would not just focus on gaining technical knowledge but also seek new ways to improve their long concerning environmental issues. Based on the above rationales, we postulate that when Chinese firms invest in more developed countries with better environmental practices and experiences, their motivation should be knowledge-seeking.

Hypothesis 1: RDI promotes the environmental management of Chinese firms.

4.2.6 Private Ownership

Ownership is one of the most important matters in firms because it holds decision-making rights, and different ownership have different strategies and structures when making decisions (Khalid et al., 2021). For example, State-Owned Enterprises (SOEs) and Non-SOEs have different strategies for their FDI (Hong et al., 2015) and environmental management (Godfrey, 2005; Huang & Yu, 2006). State ownership typically provides privileges to enterprises by providing government-supported finance, subsidies, procurements, and regulations (Song et al., 2011). As a result, state ownership leads to firms' dependence on governments for essential resources (Choudhury & Khanna, 2014; Xia et al., 2014). Some researchers have pointed out that this dependency does not necessarily benefit firms in their RDI (Choudhury & Khanna, 2014; Y. Huang et al., 2017; Yang et al., 2017) and, in turn, created a state of 'liability of stateness' (Musacchio et al., 2015). For example, SOEs are less market-oriented (Y. Huang et al., 2017), and thus, they are less willing to expand and take risks associated with the expansions (Y. Huang et al., 2017; Tang, 2019; Yang et al., 2017). They also tend to enjoy a lower level of autonomy and, thus, suffer from complicated bureaucratic procedures and internal governance that impedes their efficiency (Y. Huang et al., 2017;

Vahabi, 2012). They are more likely to suffer from decreased legitimacy in host countries when expanding and, thus, face extra legitimacy barriers (Cuervo-Cazurra & Dau, 2009; Cui & Jiang, 2012) which can hinder the ability of a firm to fully exploit its ownership advantages by limiting its ability to take autonomous decisions, innovate and adapt to changes, which is one of the three components of the OLI paradigm and the OILL paradigm.

During RDI, firms must achieve environmental legitimacy to operate or compete in the foreign market, especially for firms from emerging countries. Different ownership entities will use different practices to attain this legitimacy (Khalid et al., 2021), including proactivity in environmental practices (Huang & Kung, 2010). Therefore, green transformation relies on government forces, and market forces also play an essential role (L. Yu et al., 2019). Due to the lower marketization of state ownership management (Hao & Gong, 2017), SOEs typically suffer from environmental inefficiency caused by over-dependence on government support (Yuan et al., 2021).

SOEs operate on such high-control modes of organizing rather than market-based arrangements. Even though more advanced environmental practices are readily available for them to acquire during RDI, they are less likely to allow their foreign counterparts to impact their operations (Hendriks, 2020); this leaves fewer opportunities to implement learned practices. In addition, SOEs are less pressurized by external stakeholders on their environmental legitimacy since their legitimacy depends on the government but not the firms themselves (Khalid et al., 2021). Therefore, they are less eager to improve their environmental performance individually. Cheung et al. (2015) also note that SOEs usually have less pressure to act on their social responsibilities due to their support from the government with more resources to expand abroad, obtain contracts, and maintain relationships with overseas

customers. Thus, pressures from foreign importers or customers have a limited effect on the environmental performance of SOEs.

On the other hand, with less support from the government, private ownership motivates firms to pay significant attention to ensuring maximized return and efficiency from their foreign expansion decisions. Lo et al. (2018) findings show that government ownership can mitigate the negative consequences of environmental violations. In turn, private ownership motivates firms to practice good environmental measures to maintain their legitimacy in the eyes of stakeholders carefully, mainly when operating in international markets (Khalid et al., 2021). Moreover, with less pressure and monitoring from the state, private ownership provides more flexibility in adjusting their production and management modes (S. Zhang et al., 2021). It encourages efficient management of their available resources (Radić et al., 2021). That is why Huang and Zhang (2017) and S. Zhang et al. (2021) find that privately-owned enterprises (POEs) enhance productivity through FDI more significantly than SOEs and L. Li et al. (2017) further confirm that POEs benefit more from their FDI, while SOEs do not. Private ownership motivates competitiveness and eagerness to promote the culture of learning organizations (Wang & Yang, 2007). Incorporating this logic, knowing that efficient environmental management is essential to their competitiveness and stakeholders' satisfaction, private ownership pushes firms to absorb these skills to improve their environmental performance during RDI. Hendriks (2020) has confirmed that the reverse knowledge spillover effect through the RDI of POEs is more significant than that of SOEs.

In fact, in November 2013, the Chinese government officially put forward the Mixed Ownership Reform to allow private sector equity ownership to merge with SOEs. Studies have shown that the reform improves SOE's performance by enhancing innovativeness (X. Zhang

et al., 2020) and promoting green transformation (Yuan et al., 2021). The diffusion of private ownership into SOEs establishes a more market-oriented governance system and operation mechanism, where resource allocation relies on the market (Hao & Gong, 2017). As a result, mixed ownership can act as a driving force for green transformation. The above shows that private ownership has impeded benefits in environmental changes and strategic environmental choices.

Hypothesis 2. Private ownership has a positive moderating effect on improving the environmental management of Chinese firms post-RDI.

4.2.7 Cultural Similarity

Cross-border expansion is a highly complex process that entails many challenges and obstacles to both expanding and hosting parties (Lord & Ranft, 2000). The Internationalization Process Theory by Johanson and Vahlne (1977) recognizes the moderating role of cultural similarity; it indicates that firms prefer to expand to a culturally similar country because it alleviates communication barriers and unfamiliar business practices of foreign supplies. Existing literature has opposing results on whether there is a positive relationship between cultural similarity and the knowledge spillover effect. One of the biggest challenges of any FDI is the liability of foreignness (Barkema & Drogendijk, 2007; Zaheer, 1995). Any firm that operates internationally has disadvantages relative to local competition, leading to the liability of foreignness (Hymer, 1976). Especially for RDI, firms from emerging economies typically lack reputation and capabilities for internationalization (Goldstein, 2009; Ramamurti & Singh, 2009; Zaheer & Mosakowski, 1997). Liability of foreignness can create high levels of uncertainty and information asymmetry (Bruce & Harbir, 1988; Shimizu et al., 2004). It can hinder the realization of intended synergies (Brock, 2005), impede effective decision-making, create difficulties in dealing with local governments and partners, and the challenges of

adapting products and processes to different cultural and national requirements (Lord & Ranft, 2000). Diverse local tastes and preferences, languages and cultures, and business systems and practices increase the odds that foreign firms will make costly errors, encounter substantial delays, or even struggle with their attempts to operate abroad (Lord & Ranft, 2000). Therefore, cultural distance is an external learning barrier to environmental knowledge exchange, an important component pointed out by the OILL paradigm when assessing the destination for RDI.

Indeed, one of the most common challenges expanding firms face in foreign countries is being an outsider in local market networks and a relative lack of knowledge of local business conditions (Basuil & Datta, 2015). Also, people with possibly conflicting cultural values must coordinate, impeding mistrust, misunderstanding, or mismatched goals that could reduce coordination (Ahern et al., 2015). Therefore, the learning processes and associated outcomes of RDI depend highly on the cultural similarities between the hosting and investing countries. These similarities also allow firms to comprehend the highly complex expansion processes (Nadolska & Barkema, 2007).

Cultural similarity can ease considerable challenges during knowledge transfer in RDI (Vaara et al., 2012). Executives often mention cultural fit as one of their motivating factors in expanding. Cultural similarity implies that partnering countries share similar values, cultural norms, and business practices and often have mutual understanding and expectations (Richter et al., 2016). Since there are lower translation needs (Morosini, 2005), cultural similarity reduces causal ambiguity from the perspective of expanding firms (Shane et al., 1995). It facilitates communication between the expanding and hosting firms, which is important for effective knowledge transfer (Birkinshaw et al., 2000). Research also shows that the exchange

between culturally more similar countries is more seamless (Bhagat et al., 2002). These similarities minimize unforeseen events and the usual barriers experienced during RDI (Cahen et al., 2016). Cuervo-Cazurra and Genc (2008) point out that the similarity between home and host countries is crucial for the success of any internationalization activities.

Husted (2005) remarked on the importance of realizing the influence of culture to understand whether environmental practices and instruments used in one country are transferrable effectively to another. Limited research has looked into the relationship between cultural distance and the reverse spillover effect, focusing on environmental knowledge transfer and how it can facilitate better environmental management. Therefore, we aim to fill this research gap by investigating the moderating role of cultural similarity in environmental knowledge transfer. Based on the above evidence of how cultural similarity provides a more suitable ground for effective communication, we postulate that the impact of RDI on environmental knowledge spillover should be higher when the cultural similarity between the Chinese investing firm and its RDI.

Hypothesis 3. The cultural similarity between the Chinese firm and the expansion destination has a positive moderating effect on improving the environmental management of Chinese firms post-RDI.

4.3 Methodology

To analyze the impact of RDI events on a firm's environmental performance, we first sample all public Chinese manufacturing firms on Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE). This thesis only focuses single industry, the manufacturing sector, to control for fundamental differences between firms in manufacturing and other

industries (Lu et al., 2011). Furthermore, the manufacturing industry is the core pillar of China's green transformation (Holzmann & Grünberg, 2021). In our data, there are 1,739 manufacturing firms. We then collect data for those firms from multiple sources. We describe the detailed procedures of data processing below.

4.3.1 Data

4.3.1.1 RDI Events

We used the WiseNews[2] database for our search for RDI events. RDI includes foreign direct investment from China to higher GDP per capita destinations. We search the firm's stock code combined with each keyword representing all types of expansion activities. The keywords used are "Overseas Acquisition" or "Overseas Merger" or "Set Up Overseas Manufacturing Plant" or "Overseas Investment" or "Purchase Overseas Shares" or "Overseas Expansion" or "Overseas M&A" or "Acquisition" or "Merger" or "Set Up Manufacturing Plant" or "Investment" or "Shares purchase" or "Expansion" or "M&A" [3]. The search period from 2008 to 2017 is considered because of an interesting phenomenon that happened in 2008 during the global financial crisis - despite the concern, China continued to grow (Womack, 2017). OFDI doubled from 2007 to 2008 and expanded fourteen-fold between 2003 and 2008. It continues to grow from 2009 onwards. (Comission, 2015). China's resilience in the challenging global financial crisis was remarkable as it grew against the global decline. We manually check each announcement and identify the earliest one for each RDI event. We record the date and

2 WiseNews is a database that includes over 20 years and growing Chinese media information and semantic resources, including e-Commerce (sales and consumer reviews), print media (newspaper, magazine) and TV /broadcast media. The database covers Mainland, Hong Kong, Macau and Taiwan. (wisers.com)

[3] Chinese translation of these keywords are used in WiseNews, they are 海外收购 or 海外合并 or 海外设厂 or 海外投资 or 海外入股 or 海外参股 or 海外扩展 or 海外并购 or 收购 or 合并 or 设厂 or 投资 or 入股 or 参股 or 扩展 or 并购.

expansion details. Finally, we have collected 352 RDI events from 195 firms. We provide examples of the RDI announcements in Appendix B.

4.3.1.2 Environmental Violations

The number of environmental violations can directly reflect a firm's environmental performance (Clarkson et al., 2004; Ma et al., 2021). Following previous literature, we used environmental violations to measure performance in this research (Lo et al., 2014; Pagell & Gobeli, 2009; Wiengarten et al., 2017). The stock code of 1,739 listed manufacturing firms was used to search for their environmental violations between 2006 and 2019 on the Green Stocks database of the Institute of Public and Environmental Affairs (ipe.org.cn). The search period for environmental violations (i.e., 2006 - 2019) is broader than RDI events (i.e., 2008-2017) because the analysis period for environmental performance is year -2 to year 2, relative to RDI year 0. We include two years after the FDI because the impact on environmental performance might not come immediately after the event. We record each environmental violation date and calculate the total number of violations in a specific year for all the firms. Through the search, we identified 8,797 environmental violations committed by 1098 firms. We have collected a comprehensive list of environmental violations, and the top 5 are wastewater, exhaust emission, environmental misbehavior, sewage, and sulfur dioxide emission. We provide some examples of environmental violations in Appendix C.

4.3.1.3 Cultural Similarity

We measure cultural similarity between the location of Chinese manufacturing firms (i.e., China) and the location of the RDI destination (i.e., a foreign country) at the country level. We first identify the destination in each of the RDI events, such that there are 34 foreign

countries in the dataset. We then collect Hofstede et al.'s (2010) six cultural dimensions (i.e., power distance, uncertainty avoidance, individuality, masculinity, long-term orientation, and indulgence/restraint) for China and those countries from Hofstede's database (Hofstede, 2015). Hofstede et al.'s (2010) model has been widely used to measure cultural similarity between countries within the FDI context (e.g., Amal & Kang, 2019; Cieślik, 2020; Deng et al., 2019; Steigner et al., 2019). We calculate the Euclidean cultural similarity between China and a foreign country using the six dimensions (Li et at., 2019). The formula is as follow.

$$CD_j = \sqrt{\sum_{k=1}^{6} \left\{ \left(I_{kj} - I_{kc} \right)^2 / V_k \right\}} \quad (1)$$

Where CD_j is the cultural distance between China and destination country j, I_{kj} and I_{kc} are the destination country $j's$ and China's score on the k^{th} cultural dimension, and V_k is the variance of the score on the k^{th} cultural dimension. The smaller the value, the closer the cultural similarity.

4.3.1.4 Private Ownership And Other Firm Data

We obtain a firm's yearly private ownership percentage and financial data between 2006 and 2019 from China Stock Market & Accounting Research (CSMAR) database. The firm's basic information, such as industry and firm age, is also collected on the same database. We merge the above data based on a firm's stock code and event year, then create firm-year observations for subsequent analysis.

4.4 Analysis and Results

We apply a quasi-experiment on the firm-year observations to test hypotheses. Specifically, we first use Coarsened Exact Matching (CEM) to match a firm with an RDI event in a specific year (i.e., sample observation) with a firm without an RDI event in the same year (i.e., control observation). A sample observation is either a firm’s first RDI event or a firm

without any expansion event during Year -2 to 2. The sample comprises 200 observations and 9878 control observations in the dataset.

Then we perform a difference-in-differences (DID) estimation to compare the differences in environmental performance changes between the sample and control observations. The CEM-DID design accounts for unobservable counterfactual outcomes that cannot be calculated from a direct comparison between an expansion firm's pre- and post-performance (Caliendo & Kopeinig, 2008; Heckman et al., 1998). We choose to use CEM and DID first because the probability of a firm engaging in RDI can be affected by a lot of factors. Using CEM-DID allows us to make causal inferences, as randomization in our sample is impossible. This method can reduce bias and control for confounding factors that may affect treatment outcomes (Blackwell et al., 2009). The detailed procedures of data analysis are explained below.

4.4.1 Coarsened Exact Matching

We use CEM as the matching approach to reduce the randomized effect by controlling multiple factors, at the same time, to increase the sample size by coarsening each control variable into strata as much as possible (Iacus et al., 2009). Following the common practices in previous research, we choose to consider the industry, year, firm age, percentage of private ownership, total assets, and operating ROA as the matching variables because those factors are major sources of heterogeneity issues (Barber & Lyon, 1996; Corbett et al., 2005; Swift et al., 2019). The information on the matching variables is presented in Table 5.

We coarsen the continuous variables into strata based on the above cut-off points. There are 72,000 (=10*10*9*80) strata; all firm-year observations can fall into one of these strata.

We match each sample observation with a control observation based on the following standards: they must be 1) in the same industry and year and 2) in the same stratum with the shortest Euclidean distance. We calculate Euclidean distance as follow:

$$D_{ij} = \sqrt{\sum_{k=1}^{K} \left\{ \left(C_{ik} - S_{jk} \right)^2 / \hat{\sigma}_k \right\}} \quad (2)$$

Table 5. ***Information on matching variables for CEM***

Matching variable	Cut-off points	No. of Categories
1. Industry	Industry code: C13 - C43	30
2. Year	Observation year: 2008 - 2017	10
3. Firm age (years)	5 years: 0, 5, 10, …, 35, 40, 45	10
4. Private ownership (%)*	10%: 0, 10, 20, …, 80, 90, 100	10
5. Total Assets*	9 cutting points: 10 equal value strata	9
6. Operating ROA*	0.1: -7.3, -7,2, …, 0.5, 0.6, 0.7	80

Note: * These values are calculated based on the average value of year -1 and year -2; 1 and 2 are categorical variables; 3-6 are continuous variables.

Where C_{ik} is the covariates of control firm i, S_{jk} is the covariates of sample firm j, and $\hat{\sigma}_k$ is the standard deviation of the k^{th} variable. The covariates include the firm's age, percentage of private ownership, total assets, and operating ROA. We generate 140 sample-control pairs from the matching steps. We removed one pair since it was considered an outlier because the sample firm had an extreme number of environmental violations in the observation year. We then remove one pair because the control firm is delisted after the observation year, so we do not have information for the post-RDI analysis. We also remove one pair with RDI in Kazakhstan because we cannot find the cultural values from Hofstede et al.'s (2010) for the sample firm's expansion destination. Finally, we include 137 sample-control pairs in our later analysis.

4.4.2 Difference-in-differences

We use DID method to assess differences in a firm's post-RDI environmental performance. We first create 1,349 firm-year observations from the 137 sample-control pairs

generated in CEM. Each firm has a five-year period (i.e., Year -2 to 2) in our sample, and we keep the longest possible period if a firm has missing data. We then apply the following estimation model:

$$EP_{it} = \beta \cdot Post_t \cdot RDI_i + \gamma X_{it} + \alpha_i + \delta_t + \varepsilon_{it} \quad (3)$$

Where the dependent variable EP_{it} indicates environmental performance (i.e., the total number of environmental violations) of firm *i* in year *t*. $Post_t$ equals 1 for every year after an RDI and 0 otherwise. RDI_i equals 1 if a firm has an RDI and 0 otherwise. Thus, the interaction term $Post_t \cdot RDI_i$ equals 1 if firm *i* has an RDI by the year *t*, and β should capture the change in environmental performance after RDI. We also include X_{it} controls for the firm-level characteristics such as firm age, log of total assets, operating ROA, percentage of private ownership, and cultural similarity. The first three control variables are the same variables used in CEM. The last two control variables are the moderators. In addition, we control for firm fixed effect: α_i, and year fixed effect: δ_t. ε_{it} is the error term. $Post_t$ and RDI_i are omitted in the model because we have controlled for the firm and year fixed effect.

Table 6 presents descriptive statistics and correlations between the above DID analysis variables. All correlations are below 0.31 except for the correlation between Post x RDI and cultural similarity. We exclude those moderators (i.e., percentage of private ownership and cultural similarity) in robustness tests and obtain identical results. In addition, we compute the Variance Inflation Factor (VIF), and the largest VIF value is 5.76. Therefore, multicollinearity is unlikely a concern in our study.

Table 6. Descriptive statistics and correlations for the variables in DID analysis.

Variables	mean	sd	min	max	1	2	3	4	5
1. Post x RDI	0.30	0.46	0.00	1.00	1				
2. Firm age	15.03	5.36	3.00	28.00	-0.01	1			
3. Log of total assets	22.18	1.20	17.47	25.62	0.31**	0.23**	1		
4. Operating ROA	0.04	0.07	-0.90	0.36	-0.06*	-0.04	0.07*	1	
5. Private ownership	0.97	0.11	0.18	1.00	0.04	0.07**	-0.06*	0.01	1
6. Cultural similarity	1.28	2.14	0.00	13.13	0.91**	-0.03	0.28**	-0.09**	-0.04

Notes: n=1,349, **$p < 0.01$ (two-tailed tests).

Table 7 presents the result of the DID model. The interaction term $Post_t \cdot RDI_i$ is significantly negative (b = -0.466, $p < 0.05$), indicating that the number of environmental violations reduced by about 46.6% after the firm's RDI than control firms. Thus, the result supports our hypothesis 1 that RDI will reduce violation counts of Chinese firms. We follow previous studies to test the moderating effects by applying a multi-group DID analysis (Ye et al., 2020). The research argues that subgroup analysis is more appropriate for indicating the strength of moderators across different environments (Arnold, 1982; Su et al., 2015). We hypothesize that the level of cultural similarity and private ownership moderate the impact of RDI on environmental performance. Thus, we divide the firm-year observations into two groups (i.e., low-level group and high-level group) based on the yearly industry mean of the moderators and apply DID analysis to each group.

Table 7. DID result: the impact of a firm's RDI on its environmental performance.

	No. of environmental violations
Post x RDI	-0.466* (0.217)
Firm age	-0.021* (0.009)
Log of total assets	0.326** (0.039)
Operating ROA	-0.540 (0.601)
Private ownership	0.169 (0.438)
Cultural similarity	0.052 (0.047)
Firm fixed effects	YES
Year fixed effects	YES
n	1349
R-Squared:	0.053
Adj. R-Squared:	0.039
F-statistic:	12.397**

Notes: $^{**}p < 0.01$, $^{*}p < 0.05$ (two-tailed tests).
Standard errors are in parentheses.

Table 8 shows the results for comparing the level of cultural similarity and private ownership. For private ownership, the interaction term $Post_t \cdot RDI_i$ in the high-level group (Model 3) is significantly negative (b = -0.483, $p < 0.05$), which indicates that firms having a high level of private ownership reduce the number of environmental violations by 48.3% compared to non-RDI firms. However, firms having a low private ownership level (Model 4) do not have the benefit. Thus, the result supports our hypothesis 2 that private ownership positively modifies reducing violation counts of Chinese firms post-RDI.

Table 8. Multi-group DID result: moderating effect of private ownership and cultural similarity

	No. of environmental violations			
	Model 1: High level of cultural similarity	Model 2: Low level of cultural similarity	Model 3: High level of private ownership	Model 4: Low level of private ownership
Post x RDI	-0.440* (0.193)	0.057 (0.17)	-0.483* (0.238)	-0.384 (0.482)
Firm age	-0.039** (0.012)	0.013 (0.013)	-0.022* (0.009)	-0.032 (0.025)
Log of total assets	0.379** (0.05)	0.225** (0.06)	0.316** (0.042)	0.484** (0.088)
Operating ROA	-0.870 (0.844)	-0.136 (0.812)	-0.352 (0.644)	-2.369 (1.691)
Private ownership	0.195 (0.65)	0.058 (0.555)	-	-
Cultural similarity	-	-	0.055 (0.051)	0.037 (0.107)
Firm fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
N	869	480	1180	169
R-Squared:	0.069	0.040	0.048	0.175
Adj. R-Squared:	0.051	0.002	0.033	0.076
F-statistic:	12.557**	3.792**	11.610**	6.349**

Notes: $^{**}p < 0.01$, $^{*}p < 0.05$ (two-tailed tests).
Standard errors are in parentheses.

For cultural similarity, the interaction term $Post_t \cdot RDI_i$ in the high-level group (Model 1) is significantly negative (b = -0.440, $p < 0.05$), which indicates that firms that have a high level of cultural similarity in their RDI reduce the number of environmental violations by 44.0% compared to non-RDI firms. However, firms having a low cultural similarity level RDI (Model 2) do not have the benefit. Thus, the result supports our hypothesis 3 that cultural similarity between the Chinese firm and RDI destination positively moderates the violation counts of Chinese firms post-RDI.

4.5 Robustness Tests

The basic assumption of DID approach is that the treatment and control groups share a common trend in dependent variables before the treatment. To demonstrate the parallel trend assumption, we follow Song et al. (2020) to visualize the dependent variables for treatment and control groups in Figure 2. The figure shows that the average violation counts for non-RDI and RDI firms indicate a constant difference between the two groups.

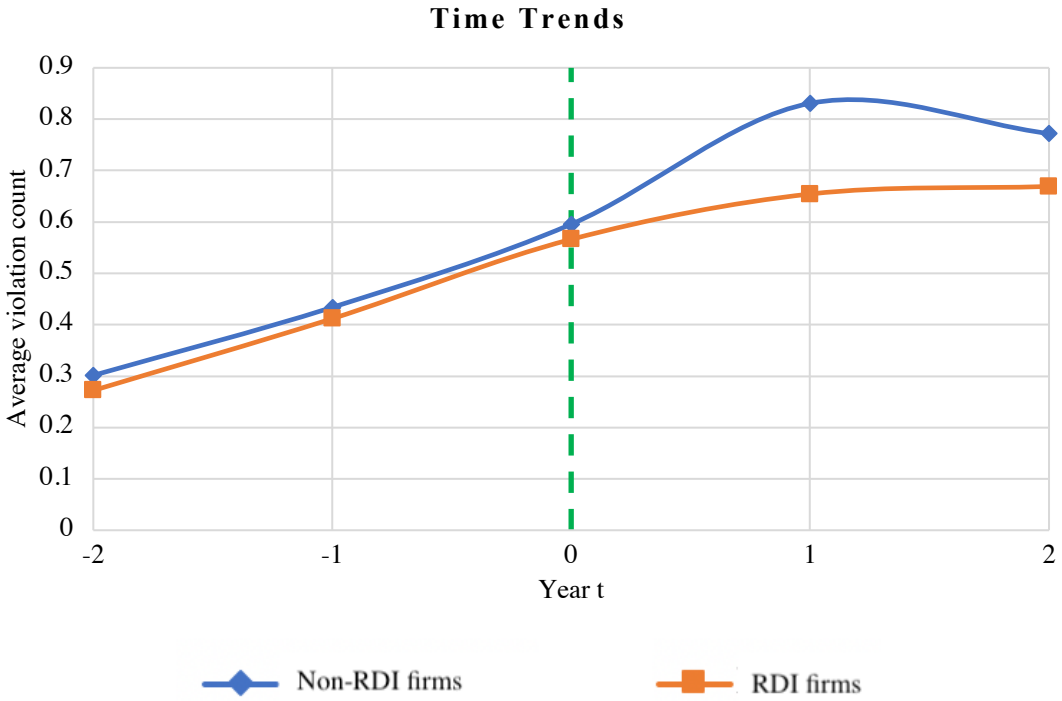


Figure 16. Time trends for expansion and non-expansion firms

We then apply the following relative time model (Angrist & Pischke, 2008; Song et al., 2020) to conduct an additional common trend analysis.

$$EP_{it} = \beta \cdot RDI_i + \sum_{t=-T}^{T} \kappa_t \cdot RDI_i \cdot D_{it} + \gamma X_{it} + \alpha_i + \delta_t + \varepsilon_{it} \qquad (4)$$

Where D_{it} are dummy variables that indicate years relative to RDI year. For example, the year of the RDI event is year 0 (t=0), one year before the event is year -1 (t=-1), and one year after the event is year 1 (t=1). The range of T in the robustness test is from -2 to 2, consistent with our main analysis. We show the coefficients κ_t in Table 9, which indicates whether there is a

pre-treatment tread. As shown in Table 9, there is no significant difference between RDI firms and non-RDI expanded firms regarding the number of environmental violations before RDI events. The differences only appear after a firm's RDI. The results support the parallel assumption in our analysis.

Table 9. Results of Common Trend Analysis

	No. of environmental violations	
Year -2	-0.237	(0.153)
Year -1	-0.309	(0.147)
Year 0	-0.558	(0.236)*
Year 1	-0.601	(0.247)*
Year 2	-0.445	(0.259)$^{+}$

Notes: $^{**}p < 0.01$, $^{*}p < 0.05$ (two-tailed tests).
Standard errors are in parentheses.

To test the robustness of the results, we conducted a placebo test. For this, we randomly created 200 "false" RDI events and repeated the CEM-DID analysis. If the "true" RDI events in the study can decrease the number of environmental violations, it is expected that the $Post_t \cdot RDI_i$ in Equation (3) for the faked events is insignificant. Table 10 shows that the coefficient of Post x RDI is insignificant, supporting our result.

Although CEM has proven to be a superior matching method, there is not a once-for-all matching method suitable for all data. We conduct a propensity score matching (PSM) as a robustness check to match the overseas-expanded firms with non-overseas-expanded firms. We use the same factors applied in CEM and set the caliper to 0.2 to ensure the matching quality. We perform the DID analysis based on PSM and yield similar results (Table 11).

4.6 Discussion

The heated debate surrounding China's rapid internationalization has drawn much interest in investigating the potential impact of its RDI. Most current interests focus on

technology, innovation, production, and performance outcomes. (Chen, 2018; Chen et al., 2012; J. Huang et al., 2017; Jian Li et al., 2016; L. Li et al., 2017; Piperopoulos et al., 2018; Potterie & Lichtenberg, 2001; Pradhan & Singh, 2008; Zhu & Huang, 2017). As a traditional destination of global expansions of heavy polluting processes from developed countries that constantly undermined the importance of good environmental practices, recognition of improved environmental management is critical for Chinese firms to gain political and social legitimacy in society as they globalize (Lo et al., 2018). Therefore, the answer to our first research question (1) *Does RDI promote environmental management?* is highly significant in shedding light on the debate and can eliminate some negative sentiments toward Chinese globalization. We use a quasi-experiment to test our hypothesis, and the answer to the question is yes. By looking at the issue through the lens of learning drawing from the OLI, OILL, and OL theories, we discover that Chinese firms effectively achieve reverse green knowledge spillover from working with and learning from their host countries during RDI. Chinese firms who conducted RDI improved their environmental performance post-RDI and reduced the number of violations by about 46.6% after the firm's RDI than firms without expanding overseas. Our finding is important given the significance of environmental issues for the long-term sustainability of the economy and strategic development of the country. Our results also suggest that existing policies and efforts to promote RDI to encourage integration and learning are beneficial for the long-term environmental sustainability goals of the country or, even more so, the world's future.

The answers to both of our research questions: (2) Can private ownership strengthen the impact of RDI on environmental management? and third research question: (3) Can cultural similarity strengthen the impact of RDI on environmental management? are also yes. Firms with a high level of private ownership and expanding to destinations with a high level of

Table 10. DID result of placebo test

	No. of environmental violations
Post x RDI	-0.086
	(0.079)
Firm age	0.012*
	(0.007)
Log of total assets	0.309**
	(0.032)
Operating ROA	-0.526
	(0.364)
Private ownership	0.395
	(0.291)
Firm fixed effects	YES
Year fixed effects	YES
n	1967
R-Squared:	0.049
Adj. R-Squared:	0.041
F-statistic:	20.220**

Notes: **$p < 0.01$, *$p < 0.05$ (two-tailed tests).
Standard errors are in parentheses.
We exclude cultural similarity because we cannot obtain Hofstede et al.'s (2010) culture scores for the fake events.

Table 11. DID result based on PSM

	No. of environmental violations
Post x RDI	-0.173*
	(0.076)
Firm age	-0.016*
	(0.006)
Log of total assets	0.352**
	(0.028)
Operating ROA	0.141
	(0.245)
Private ownership	-0.145
	(0.270)
Cultural similarity	-0.002
	(0.003)
Firm fixed effects	YES
Year fixed effects	YES
N	1349
R-Squared:	0.053
Adj. R-Squared:	0.039
F-statistic:	12.397**

Notes: **$p < 0.01$, *$p < 0.05$ (two-tailed tests).
Standard errors are in parentheses.

cultural similarity to China reduce the number of environmental violations by 48.3% and 44.0% more than non-RDI firms post-RDI, respectively.

The results contribute theoretically and practically by examining if expanding overseas can benefit positive environmental outcomes within Chinese manufacturing firms by considering improved environmental management as one of the prioritized outcomes of RDI.

4.6.1 Theoretical Implications

Theoretically, when reviewing literature that focuses on China's RDI and environmental development, we discover a few lacunas that we would like to address, given the economic transformation of China and the alarming environmental issues the nation and the world are facing. First, this paper answers the call of a few recent researchers who highlighted the lack of academic focus and theoretical development concerning the consequence of emerging countries' RDI (Buckley et al., 2017; Hendriks, 2017; Park & Roh, 2019). Literature concerning FDI and environmental management of China heavily focuses on investment inflow into the country (e.g., Dong et al., 2019; Hao, Wu, et al., 2020; Kim et al., 2016; Liu et al., 2019; Zeng & Zhou, 2021). It seems obsolete because even though China remains a receiver of foreign investment inflow, it is now one of the largest outward foreign direct investors, and so are other emerging economies.

Second, the field of OL and knowledge spillover heavily focuses on technology and innovation transfer (e.g., Chen, 2018; Chen et al., 2012; J. Huang et al., 2017; Jian Li et al., 2016; Piperopoulos et al., 2018; Potterie & Lichtenberg, 2001; Pradhan & Singh, 2008; Zhu & Huang, 2017). This paper enriches this field of study and environmental literature by considering environmental knowledge substantial and transferrable as an outcome of RDI.

Third, the study extends the RDI literature by shedding insights into the differential moderating effects of a firm's characteristic and a destination's characteristic factors - private ownership and cultural similarity. They are both significant moderators of the relationship between RDI and environmental violations. These findings add additional nuance to the understanding RDI of Chinese firms.

Regarding private ownership, our finding pushes researchers to rethink the assumptions that dependence on state ownership support is a benefitting factor in their process of green learning during RDI. There is a potential to investigate further the 'dark side' of state ownership on environmental management and the 'bright side' of private ownership. We provide an alternate view opposing the literature on RDI that suggest the potential benefitting impact of state ownership (e.g., Luo et al., 2010; Wang, Hong, Kafouros, & Boateng, 2012). On the one hand, state ownership may be able to drive RDI that is not aiming for environmental improvement and are aiming for other outcomes. On the other hand, our findings show the potential hindrance of state ownership in the knowledge transfer process for environmental management during RDI. They may overlook the importance because of the over-dependence on government resources and the reliance on the mitigating power of the state on the consequences when they commit environmental misconduct. In turn, our results show that private ownership positively impacts the environmental outcome of RDI due to 1) being more market-oriented than SOEs, 2) having to make more effort in gaining competitive advantages and social legitimacy, and 3) having more freedom in adjusting their decisions, operations, and strategies to maximize the green learning outcome.

Fifth, even though Husted (2005) pointed out that we must include the influence of culture for a complete discussion of whether environmental practices and instruments used in

one country are transferrable to another. It is somewhat surprising that there is a lack of attention to considering the cultural similarity in the construct of green knowledge transfer. Our findings show that cultural similarity facilitates environmental knowledge transfer via RDI. This is why, if a firm sets environmental knowledge-seeking as one of the top agendas when going abroad, they should consider more culturally similar destinations to achieve a more seamless knowledge transfer.

Finally, we use a more practical methodology to verify the positive impact of Chinese RDI on its environmental management. It allows us to examine the premise from another perspective and may explain and resolve the inconsistency in previous papers. We enrich the research on the impact of RDI on environmental performance using firm-level panel data, which has more practical significance for improving the efficiency of environmental management, almost all recent research in this construct adopts a macro province-level perspective (Hao, Guo, et al., 2020; Yang et al., 2021; Y. Zhou et al., 2019). In the literature evaluating misconduct or noncompliance, such as violations and accidents in sustainable operations, firm-level data has been wildly favored (Lo et al., 2014; Pagell & Gobeli, 2009; Wiengarten et al., 2017; Wiengarten et al., 2019).

Also, our research uses violations as an indicator of performance, following the example of Lo et al. (2014); Ma et al. (2021); Pagell and Gobeli (2009) and Wiengarten et al. (2017). Using environmental violations as our dependent variable reflects a bigger picture than most of the existing literature, which uses carbon dioxide emissions as a single-dimension indicator. The number of environmental violations directly demonstrates a firm's environmental performance (Clarkson et al., 2004; Ma et al., 2021). Environmental violation is a universal standard for the public to understand. As such, when a firm commits an

environmental violation, the public can easily understand that the firm has failed beneath the standard, even without knowing precisely what the benchmark is. Comparatively, it is not usual for the public to understand at which level of carbon dioxide emissions should be considered alarming. Also, environmental violations are more of a public concern as they involve penalties that can harm a firm's finances and require public announcements that can damage a firm's reputation more directly. It is specifically vital for China, where reputation and social recognition are essential for its legitimacy. Therefore, our research serves better as a reference for various stakeholders seeking to better understand Chinese firms' environmental performance.

4.6.2 Practical Implications

This study has practical implications for managers and policymakers in emerging economies regarding their strategic decisions for environmental management and RDI. We empirically found that RDI from China would positively impact environmental management in the home country. It provides firms opportunities to absorb and learn more advanced skills and practices and reduce their number of environmental violations post-RDI. It is vital for managers in any Chinese enterprise as they must comply with the numerous governmental initiatives that encourage domestic firms to "go out" and expand to a foreign market for economic growth and green development (Cozza et al., 2015).

Efficient environmental management has become increasingly recognized as essential for a firm's sustainable competitive advantages. Our results provide managers insights into the importance of utilizing their RDI as a learning opportunity to acquire more advanced environmental management skills to improve their own. This is especially important as we specifically point out that it can eventually reduce environmental violations, and research

shows environmental misconduct can damage the firm value (Lo et al., 2018) and reputation (Kumar et al., 2019).

For example, Chinese firms can reduce their misconduct in wastewater by RDI in various ways. First, they can learn from the more advanced wastewater treatment technologies and practices implemented in developed countries. They can also learn from environmental experts to gain access to expertise and knowledge on environmental management practices. By doing so, they can improve their environmental management practices, reduce the amount of wastewater discharged and improve the quality of the treated wastewater.

Second, they can learn from the regulatory frameworks and enforcement measures developed countries have in place. By learning those practices, Chinese firms can improve their compliance with environmental regulations and reduce environmental violations.

Third, firms can learn from environmental management systems and reporting practices. By adopting such systems, Chinese firms can track and monitor their environmental performance more efficiently, identify areas where improvements can be made, and take proactive actions to implement corrective actions to address environmental issues. Transparency in reporting also allows firms to maintain better stakeholder relationships.

Meanwhile, managers should be aware of the alternate ‘dark side’ of state ownership. Dependency on state resources or its mitigating power over negative consequences from environmental malpractice could undermine the importance of maintaining sound environmental practices. During RDI, these firms with higher state ownership may overlook the importance of acquiring environmental knowledge and pay more attention to using the

opportunity to improve other outcomes, such as financial, production, innovation, and technology.

While one might be eager to acquire knowledge that is very different from that at home, the knowledge gap can be wider, and one might consider countries with higher cultural distance. Managers should strategically choose a destination similar in culture, and approach it step by step can be more beneficial than overachieving and expanding to a destination with very different values, including power distance, uncertainty avoidance, individuality, masculinity, long-term orientation, and indulgence or restraint.

Our research also supports and encourages policymakers on the feasibility of their existing initiatives on 'going out' and 'green growth'. We recommend policymakers from emerging countries proactively encourage local firms to expand to more developed countries. They should utilize the learning opportunities from their more environmentally advanced partners to enhance their home environmental performance. Besides, imposing stricter enforcement may not often be efficient in pushing manufacturers to reduce environmental violations (Ma et al., 2021). Our results provide a basis for the government to look at the alternative and consider devoting more resources to facilitate green learning in the process of RDI to achieve their environmental goal. It shows a potential global environmental management diffusion, first improvement of the firm, then of the community and the nation, and the world environmental condition at best.

4.6.3 Limitations And Future Research Direction

We acknowledge that every study has limitations, and this study is no exception. First, this study uses data from a single country (i.e., China). Other research can lead to different

implications when applying our study using data from another emerging country. Future research should investigate the impact of RDI on the home country's environmental management in other emerging economies to avoid generalizing our findings.

Second, we include only included Chinese publicly-listed manufacturing companies in our sample. However, many small- and medium-sized manufacturers are not listed in China. Future studies can consider replicating this current study in the context of non-listed firms.

Third, our study only focuses on the manufacturing sector. We point out that manufacturing is the key to China's green transformation (Holzmann & Grünberg, 2021), given that the industry was a popular destination for heavy pollution processes from other developed countries. The manufacturing industry should be on the top agenda if China wants to achieve better green growth. However, future research can extend this study to other industries.

Fourth, we use secondary data to explore our research questions. Though it has provided objectivity to sustainability research, it limits us to a relatively high or abstract level of analysis. This can lead to generalisability as our population can be limited.

Fifth, we have studied the moderating effect of two crucial factors on the relationship between RDI and home country environmental management. Future research can explore other contingent factors (e.g., firm-level: R&D intensity and past RDI experience; country-level: destination's environmental performance, past partnership experience with China) that may affect this relationship.

Finally, since the Chinese government does not share a common platform for reporting environmental violations, we collected our violation data of Chinese firms from the IPE database. Even though IPE is the most comprehensive database for environmental violation data, we cannot dismiss the possibility of some violations being missed from the database.

CHAPTER 5. STUDY 3

The Dynamics of Reverse Direct Investment from China to Developed Economies

5.1 Introduction

Overseas expansions allow capital to flow across different borders, which is essential for a country's economic growth and development. China has long embraced foreign investment and welcomed inward investment since introducing an open-door policy in 1978 (Agarwal & Wu, 2004; Lau & Bruton, 2008). Worth noticing is that China has undergone a significant transformation in the recent two decades and has led many manufacturing firms to accumulate abundant capital reserves for investments (Jenkins, 2022). China has been actively promoting OFDI since establishing the 'Go Global' strategy in 2000 and its accession to the World Trade Organisation (WTO) in 2001 (Agarwal & Wu, 2004; Buckley et al., 2008). From a conventional receiver of foreign investment, China is now a significant contributor to the world's OFDI. Its amount has grown exponentially - from 916 million USD in 2000 to an astonishing 132 940 million in 2020, transforming from a minor player two decades ago (0.079% of the world's outward investment) to the largest contributor in the world in 2020 (17.968%) (UNCTAD, 2021). Even when the economies were experiencing slow growth worldwide with an observed decrease in foreign expansions in most emerging economies in 2015, China was the only emerging country increasingly invested overseas (UNCTAD, 2016). Looking at China's OFDI trend, it can be expected that China's global expansion will continuously grow in the long run.

China's continuous transformation from a labor-intensive manufacturer to a technology-intensive center with high-end innovative technologies requires constant economic

restructuring and equipment and skills upgrading (Zhou, 2013). However, as late movers in globalization compared to more advanced economies (Guillén & García-Canal, 2009), these firms have lower managerial and organizational skills, absorptive capacity, and learning capabilities (Bahl et al., 2021; Zhu et al., 2006). As a result, Chinese firms must search for external knowledge to develop competencies and capabilities (Eapen et al., 2019), and seek reverse direct investment (RDI) (Jun, 1987), which means foreign direct investment in more developed countries. They value the exploration opportunities to learn from more developed countries to tackle technological gaps in the international market and establish global competitiveness (Aulakh, 2007; Wang & Zhao, 2017). As seen in the statistics, China's RDI stock increased from 94 billion USD in 2013 to 254 billion in 2020 (MOFCOM, 2014, 2021), showing the growing significance of RDI over the years.

There are inevitable challenges and uncertainties inherent in RDI, which have led to failures for many firms (Jones et al., 2011). It requires firms to work in an unfamiliar environment with different cultures and different ways of dealing with interpersonal dynamics, business practices, institutional forces, and customer preferences (De Beule & Sels, 2016; López-Duarte & García-Canal, 2007). These differences can lead to further misunderstandings, schedule delays, and costs that increase project risks for global operations (Orr, 2005; Orr & Scott, 2008), leading to the biggest yet common challenges of going aboard, the liability of foreignness (Zaheer, 1995) and double-layered acculturation (Barkema et al., 1996). These cross-cultural challenges have led to failures of Chinese investment in developed countries, such as the Shanghai Automotive Industry Corporation (SAIC) and SsangYong Motors' M&As, and China's largest glass manufacturer, FuYao Glass's one billion USD investment in their first factory, Fuyao Glass America, in the U.S. (Fan, 2018). Fu Yao Glass faced various challenges, from product quality to labor union management. As emerging countries began

globalization later than the more developed markets, they suffered late-mover disadvantages (Guillén & García-Canal, 2009) during RDI. Therefore, RDI could be more challenging and uncertain than traditional FDI. H. Li et al. (2017) point out that the reasons include having a lesser developed financial system, limiting their access to financial capital when expanding overseas (Aulakh et al., 2000); lesser pre-expansion legitimacy and credibility in overseas markets (Gubbi et al., 2010; Luo & Tung, 2007b); reduced experience in international operations to compete with more advanced economies that have superior resources and capabilities (Aulakh et al., 2000; Ramachandran & Pant, 2010); having underdeveloped institutional environments causing higher costs to access resources and to operate (Khanna & Palepu, 1997); and being isolated by cultural, administrative, geographic, and economic distance from international markets (Ghemawat, 2001).

Much literature that studies Chinese OFDI has confirmed that it offers significant benefits for home firms. To name a few, promoting the enhancement of industrial structure (Jiang et al., 2020); reducing domestic environmental pollution (Hao, Wu, et al., 2020); improving domestic innovation performance (Jian Li et al., 2016; Wu et al., 2017); and enhancing productivity (Cozza et al., 2015). Although there is an apparent improvement in intangible assets, Cozza et al. (2015) pointed out that OFDI can be detrimental to financial performance. Since the outcome between intangible gains and financial performance may contradict, and there are additional challenges of RDI, scholars have begun investigating if ODFI provides actual shareholder values for investing firms. However, we have observed a lack of studies investigating the relationship between OFDI and shareholder values dedicated explicitly to emerging economies and even less so within the Chinese context. The extensive existing literature on this topic does not offer a conclusive result. On the one hand, researchers suggest that overseas expansions such as Mergers & Acquisition (M&A) deals create value for

acquiring firms' shareholders (e.g.,Barbopoulos et al., 2014; Francis et al., 2008; Goergen & Renneboog, 2004; Gubbi et al., 2010; Jain et al., 2018; Jain et al., 2021; Kohli & Mann, 2012; López-Duarte & García-Canal, 2007). On the other hand, researchers found zero or negative returns from overseas expansion (Alexandridis et al., 2012; Beitel et al., 2004; Goergen & Renneboog, 2004; Hackbarth & Morellec, 2008; Uddin & Boateng, 2009), while De Beule and Sels (2016) finds a U-shaped relationship between shareholders value creation from overseas expansion. Limited studies have focused on shareholders' reactions to emerging countries' RDI. However, the results are mixed. Some found a negative effect (Aybar & Ficici, 2009; Gubbi et al., 2010), while some show the opposite (Bhagat et al., 2011; Chari et al., 2010; Francis et al., 2008; Jain et al., 2021). Even with data based explicitly on Chinese firms, some found positive effects (Boateng et al., 2008; Du & Boateng, 2015; Kling & Weitzel, 2011; Jiatao Li et al., 2016; Wang et al., 2020; Yang et al., 2013; Zhou et al., 2015), whereas Chen and Young (2010) and (Ma et al., 2016) found a negative effect.

Most literature focuses on shareholders' value creation of RDI from developed economies to emerging countries (Chari et al., 2010; Dutta et al., 2013; López-Duarte & García-Canal, 2007). It is debatable that these findings do not adequately apply to RDI, as emerging countries' shareholder expectations and management perspectives can differ from those of developed countries (De Beule & Sels, 2016). RDI is often considered unconventional (Godwin & Cook, 2018). Furthermore, firms from emerging countries may find overseas expansions more challenging when operating in more developed countries because they lack institutional resources and relevant knowledge (De Beule & Sels, 2016). At the same time, these disadvantages often cause a "push effect" for these firms to go abroad (Godwin & Cook, 2018). Therefore, existing frameworks need to be revisited to suit the unique characteristics of emerging countries.

We find the focus in the scope on RDI necessary because the outcomes of RDI can vary as the motivations of RDI to invest in developed countries can differ entirely from that of FDI from developed to emerging countries or from that of emerging to other emerging countries. For example, Chinese investment in emerging countries like Indonesia, Malaysia, the Philippines, and Thailand, provides proximity to the local markets or reduces production costs (Kang & Jiang, 2012). Whereas investment in developed countries like Japan and Singapore often aims at technology or strategic asset (Kang & Jiang, 2012).

This study focuses on Chinese expansion to only more developed countries (i.e., countries with higher GDP per capita) using the term RDI developed by Jun (1987). His study started the academic discussion of RDI by studying Korean consumer electronics firms' unconventional foreign expansion to the US and revisited traditional FDI theory. His results show that the conventional FDI theories do not adequately apply to Korean firms' foreign expansion behavior to the US because they have different underlying motivations than developed countries. Hence, he named these unconventional expansions RDI. He considered South Korea's RDI a premature defensive strategic move that firms are forced to make to protect their exports in the international market. Since then, limited studies have examined South Korean electronics giants' foreign expansion for their production process. We aim to extend this paper's knowledge of South Korea for two reasons. First, using a concept developed for South Korea's advancement of RDI can shed light on China as a reference for successful internationalization. It is because, in 2021, the United Nations Conference on Trade and Development (UNCTAD) officially upgraded South Korea's status from an emerging to a developed country. It is a notable achievement as it is the first time UNCTAD has upgraded a country's classification from developing to developed since its establishment in 1964 (Jung & Lee, 2021). While China remains an emerging economy striving to transform and earn

recognition internationally, this stream of research that studies South Korea's RDI development is a good reference for the successful globalization of emerging economies.

Second, in our broad research of existing literature on the FDI behavior of emerging economies to developed countries, it seems to lack a unified terminology to identify this type of expansion, and limited studies have used the term RDI for it. We observed that the reason for the limited number of studies descending from Jun (1987) conducted their research focusing on the unconventional destination choice and motivation of RDI. Instead, the following literature in the stream concentrates more on the premature defensive strategic nature of South Korea's foreign investment and applies it to general OFDI in other emerging countries like China (Lee et al., 2013), or developed and emerging countries (Lee & Jung, 2015). None pays particular attention to the core focus of the discussion of RDI mentioned in Jun (1987) to point out the importance of the differentiation in theoretical development between developed countries' FDI and emerging economies' RDI. As a result, existing FDI studies focus on the foreign expansion behavior of emerging countries to developed countries (e.g., Chen et al., 2012; Pan et al., 2020; Yoo & Reimann, 2017) but they do not have a unison term. We believe there is a loss in connection of this early developed term with the current development in the field. Using the overlooked framework of RDI developed by Jun (1987) in our study, we may link this term back to the current development of FDI research from emerging economies to developed countries to provide a more complete and unison picture of this field.

In this study, we examine the dynamic relationship between RDI and shareholders' value by adopting a contingency perspective. The contingency theory suggests there might not necessarily be one best way to operate, and organizations must incorporate management practices into their operating environments and be able to adapt when the environments change

(Larson & Foropon, 2018). Therefore, it is essential to understand the contingency factors to have a bigger picture of the impact of RDI on shareholders' value. From a shareholder's point of view, RDI involves external aspects of the investment destination environment and internal firm factors. We adopt a dynamic perspective by investigating the contingent effect of both external and internal factors. Namely, externally – destination's labor force quality and regulatory environment for foreign investment entry; and internally - financial risk. We will explain the hypothesis development in the following section. Accordingly, we examined a sample of 236 RDI associated with 157 Chinese-listed manufacturing companies from 2008 to 2017. Our findings indicate that the RDI of Chinese manufacturing firms results in positive performance in the short term. The findings suggest that shareholders perceive Chinese RDI as beneficial to the firm's future cash flows. We also find that the destination's talent resources and regulatory environment for foreign investment positively affect the performance of the expanding firm, while financial risk affects it negatively.

We organized the paper as follows. In the next section, we review the theoretical background and evidence in the literature, based on which we propose a set of hypotheses. Then, we will introduce the data, measures, and empirical methodology, followed by presenting and illustrating statistical results. Finally, we provide concluding remarks and discussion.

5.2 Hypothesis Development

5.2.1 Chinese Firms' RDI to More Developed Economies and the Market Value of Firms

'Reverse Direct Investment' (RDI) is a term Jun (1987) developed to coin investments from emerging countries exclusively to more developed countries. In his research, Jun (1987)

studied the RDI of Korean consumer electronics firms in the US. It is an early observation of this unconventional FDI from emerging economies. In this study, the author concluded that the traditional FDI theories do not adequately apply to the RDI phenomenon of South Korean firms because RDI has different underlying motivations than FDI from developed countries. South Korea's RDI is a premature defensive strategic move that firms from emerging economies are forced to make. The aim is to protect their export market despite not having ownership advantages. The author suggests the need for a broader framework to consider the difference in the motivation of RDI from general FDI.

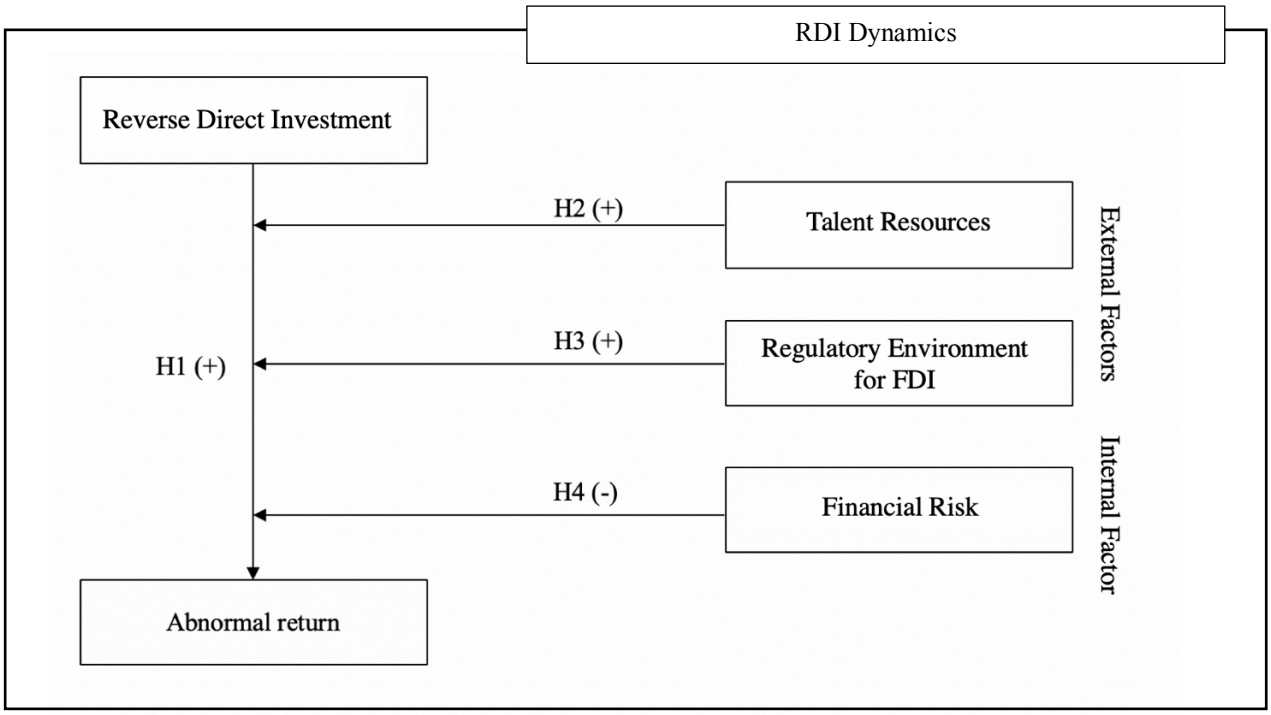


Figure 17. Hypothesis development

Many recent studies on Chinese RDI have revisited the conventional theories, adjusted and applied them according to the Chinese context. In particular, when considering the three primary motivations mentioned in the traditional FDI theory – The Eclectic Paradigm (Dunning, 1980), namely 1) resource seeking (including strategic-asset seeking); 2) foreign market seeking; 3) efficiency seeking, most of the literature that touches on China's OFDI does not

explicitly consider efficiency seeking as one of the motivations of Chinese firms since China is already a well-established low-cost global producer (Alon et al., 2014; Buckley et al., 2007). Resource-seeking FDI involves acquiring resources from the host country that are either unavailable at home or too costly to achieve cost minimization (Dunning, 1980). Market-seeking FDI involves gaining direct access to a local market and its production and distribution (Dunning, 1980). Many have also highlighted that learning motivation, or knowledge seeking, is, in fact, one of the critical drivers of Chinese firms investing overseas (Cozza et al., 2015; Park & Roh, 2019; Wang, Hong, Kafouros, & Boateng, 2012). RDI serves as a channel for faster technology diffusion and knowledge spillover between developed and emerging economies (Wang & Zhao, 2017). The reverse technology spillover mechanism (from host to home countries) has also been confirmed true (Chen, 2018; L. Li et al., 2017; Piperopoulos et al., 2018; Pradhan & Singh, 2008). It allows investing firms from emerging countries to absorb and learn advanced technology from host countries during RDI, transfer back home, and obtain overall technological development (J. Huang et al., 2017; Zhu & Huang, 2017).

In fact, due to the change in motivations of Chinese OFDI over time, their investment locations have changed, too, from investing in other emerging countries to developed countries in recent times (Du & Zhang, 2018). In its early OFDI during the 1990s, China's motivation was its increased demand for natural resources (Du & Zhang, 2018; Jongwanich et al., 2013). As the economy has transformed since the 2000s, the main objective of investing abroad has been altered to penetrate new markets and acquire strategic assets (Deng, 2004, 2009).

RDI enhances competitive advantages (Hitt et al., 2000; Piperopoulos et al., 2018). It allows firms to combine and expand domestic and foreign production, increasing productivity and competitiveness for home and host countries (Herzer, 2012). Firms cannot own all the

necessary resources for innovation at any given time (Jiang et al., 2021). Particularly, due to its late entrance into the development of the high-technology industry, Chinese firms typically have weaker technology capabilities than developed countries (Guillén & García-Canal, 2009). Therefore, expanding abroad is ideal for learning human resources, marketing skills, and advanced technology from developed countries that cannot be transferred in traditional trade settings. (Deng, 2009; Jain et al., 2018; Jain et al., 2021; Jongwanich et al., 2013; Kumar, 2009; Stucchi, 2012; Zhou et al., 2014). As pointed out in Study 2 in the previous chapter, RDI also enhances Chinese firms' environmental management performance, which is at the top of the stakeholder and shareholder's agenda.

RDI is often seen as an effective critical platform to promote cross-organizational cooperation by facilitating the access, creation, learning, retainment, transfer, and integration of knowledge and technologies from more advanced countries (Argote, 2015; Kafouros et al., 2018; Piperopoulos et al., 2018). As many have agreed, resource seeking (including strategic-asset seeking) is currently the main objective behind Chinese overseas expansion. RDI allows firms to catch up with their technological capabilities in the international market (Aulakh, 2007). Developed economies are more politically stable, export-orientated, R&D-focused, advanced in technology adoption and intense technical skill (Pantelopoulos, 2022), have a more advanced institutional environment, and have a higher resource quality (Gubbi et al., 2010).

Knowledge transfer can also mediate the inherent risks of overseas expansion, including "liability of foreignness" (Zaheer, 1995), which is considered one of the biggest challenges for firms when going overseas. These risks are caused by geographical distance or dispersion, limited access to information about business potential and reliable value chain partners in foreign markets, discriminatory behavior by local stakeholders, and the

unpredictability of political, regulatory, economic, and financial environments for foreign investments (Alcantara & Mitsuhashi, 2012; Johanson & Vahlne, 1977; Mauri & de Figueiredo, 2012; Zaheer & Mosakowski, 1997). RDI can ease firms' and shareholders' concerns about the risk of the RDI by facilitating knowledge transfer between entities. Learning and network building allow firms to profitably exploit firm-specific advantages through foreign investment (Delios & Beamish, 2001; Dunning, 1998). Therefore, RDI assuages the risks and costs of liabilities of foreignness and yields added value to the firm and shareholders.

Furthermore, RDI can diversify and mitigate the overall risk level of RDI. They can reduce a firm's risk by entering into new lines of business, reducing cash flow uncertainty, and reducing supply-chain disruption (Lin et al., 2018). At the same time, it helps the firm achieve geographic diversification, thus, increasing operational flexibility and enhancing the opportunity for market exploitation (Ma et al., 2016). Often, though RDIs are complex, costly, and risky (Alcantara & Mitsuhashi, 2012; Carpenter et al., 2003; Hitt et al., 1997; Sapienza et al., 2006), the benefits associated with operating in various markets often outweigh the costs (Aybar & Ficici, 2009).

H1. RDI generates positive abnormal returns for Chinese firms

5.2.2 The Contingency Factors Of External RDI Dynamics

5.2.2.1 Destination's Talent Resources

As Chinese manufacturing firms desire to transform into technology- and innovation-focused producers, R&D and technology capabilities are increasingly critical to their long-term survival and competitive advantages development. That is also why strategic assets-seeking and knowledge-seeking have become the most crucial motivation in their RDI. RDI connects

them to more technological-advanced host countries, allowing Chinese firms to learn, absorb and adapt their R&D capabilities. Although R&D projects can generate substantial future benefits, they involve high uncertainty (Chan et al., 2001; Kothari et al., 2002; Shi, 2003). With RDI, firms can externally source their R&D in their more advanced country, facilitating speedy and efficient outcomes and often involving fewer risks and uncertainties (Foss & Roemer, 2010). RDI also allows collaboration in R&D activities between investing and hosting countries, allowing firm flexibility and ensuring efficiency in knowledge spillovers and risk sharing (Kuittinen et al., 2013).

As R&D is people and knowledge-intensive, the quality of talent is essential, and it can determine how successful the knowledge transfer process is during RDI. Therefore, the education level of the labor force in the host country is significantly essential. It ensures a smooth OL process during RDI because they have a higher absorptive capability (Okafor, 2021; Un, 2017).

The educated workforce in the host country understands the value of external knowledge. They are more skillful in using, transforming, and integrating external knowledge (Un, 2017), making them more willing and proficient in facilitating knowledge sharing with their partners from less developed countries in their RDI. An educated workforce creates an ideal and attractive investment climate for foreign and domestic investors (McMahon, 2000). Education not only enhances labor productivity, encourages the creation of modern technologies, and increases innovative capacity, it also facilitates knowledge diffusion and ensures a faster and easier adoption process for new technology and learning new skillsets (Belkhodja et al., 2017; Rathnayaka Mudiyanselage et al., 2021; Shahbaz et al., 2021). It benefits the investing firm's time and cost advantages (Schomaker & Zaheer, 2014). Research

has proven that formal education allows individuals to be more multicultural since these individuals tend to have a more open mindset about transferring knowledge (Narvaez & Hill, 2010), which is particularly important for RDI integration.

As more educated the workforce is, the more efficient the learning sharing between entities is during RDI. Thus, it can give shareholders confidence in the RDI announcement. Hence, a higher education level in expansion destinations can yield value in the eyes of shareholders.

In addition, the quality of the labor force can help fulfill cost minimization objectives (Rathnayaka Mudiyanselage et al., 2021), which is another concern among the shareholders. Quality human capital reduces transaction costs by building legitimacy for the firms in its hosting countries and by overcoming the risk and expense aroused by bounded rationality such as "liability of foreignness" (Delios & Beamish, 2001; Dunning, 1998; Zaheer, 1995) and "double-layered acculturation" (Barkema et al., 1996). Bounded rationality is caused by the inherent limitation of employees' limited knowledge, memory, and attention span (Simon, 1955; Simon, 1957). An educated workforce in the host countries can decrease the cost of acquiring, accumulating, and applying knowledge and information (Baer et al., 2013), reducing the cost and complexity of information collection, assessment, and sharing within the firm (Cohen et al., 2019; Hallen & Pahnke, 2016). It can also facilitate the firm to tackle intense pressures from stakeholders to conform to the institutional environment of the host country and local industry.

Therefore, from a shareholder's point of view, a higher education level can facilitate the fulfillment of resource-seeking (including strategic asset-seeking) and knowledge-seeking motivations of Chinese RDI. It can also accelerate the firm to gain legitimacy in host countries

and help it tackle the risk and challenges of bounded rationality. It can further enhance a firm's competitive advantage (Amal et al., 2009).

H2. RDI destination's talent resources positively affect the impact of Chinese RDI on shareholders' value

5.2.2.2 Destination's Regulatory Environment For Foreign Direct Investment

To fulfill Chinese FDI's foreign market seeking motivation, from the shareholders' point of view, we postulate that shareholders prefer RDI to markets that are well protected from competitors entering or are not already saturated with investment from the competitors. Moreover, many Chinese firms face resistance and opposition during their expansions from host developed countries, mainly due to the perception of being low quality (Yu & Liu, 2018; Zhang & Van Den Bulcke, 2014). Therefore, one of the biggest concerns of a firm in entering a restrictive market is to gain market legitimacy (Cui et al., 2011). With the "shield" against competitors built up by the restrictive entry requirements of the host country, firms can associate more resources in tackling legitimacy issues with host countries without being distracted by the incoming competition. Therefore, when a firm can successfully undertake the barriers and enter a restrictive market, it is a sign that it has prevailed over other competitors and successfully penetrated a sacred foreign market.

Following previous literature, we use the FDI Regulatory Restrictiveness Index to measure the destination's regulatory environment for FDI (Jauhari & Mohammed, 2021; Rajput, 2022; Zhang & Van Den Bulcke, 2014). The higher the value of the index, the more restrictive it is for foreign firms to enter, implying higher the protection the regulatory environment provides for existing foreign entries from competitors' entries. The FDI Index

measures the restrictiveness of a country's FDI rules by considering four categories: foreign equity restrictions, screening and approval of discriminatory foreign investment, employment of foreign key personnel, and other operational conditions.

Countries with higher FDI indexes are separated into two groups in our sample. On the one hand, some countries are more developed and are protective of their local development. For example, New Zealand and Canada have a high FDI index, with their main manufacturing business surrounding agricultural products. Countries with well-endowed natural resources are generally more restrictive because of resource nationalism, and these governments usually feel a greater need to intervene and protect their resource (Mistura & Roulet, 2019).

On the other hand, lesser-developed countries like Malaysia and Mexico have a high FDI index. There are more barriers to entering these countries because these emerging economies are often considered 'latecomers' to foreign investment (Mathews, 2006). Though rapidly promoting FDI reforms, there are still relatively stringent restrictions on FDI. The reason may be the high cost required for reform and their limited ability to regularly assess the associated costs and benefits to design efficient policy reforms (Mistura & Roulet, 2019).

Countries with a higher FDI index typically experience less inward FDI (Rajput, 2022) indicating the country has more stringent entry barriers and regulations for foreign investors. Such barriers can imply higher costs and difficulty of FDI, which could discourage potential foreign investors from entering.

One common reason for setting a high FDI Index can be the protection of local resources. Therefore, entering these countries is often seen as a unique opportunity not all

entities can enjoy. A company's successful investment in a country with higher entry restrictions serves as a signal of penetrating a market that is not usually easy to enter. It shows the eagerness and willingness of the firm despite the challenges. It shows that the firm values this expansion and predicts a valuable outcome. This signals to shareholders that the firm believes in the potential of those particular RDI. It also implies that the firm can gain competitive advantages easily. It can serve as a "shield" from competitors entering and enable higher performance advantages, including higher market share. Countries with higher entry barriers reduce the intensity of competition in the marketplace, thus trading off higher entry costs in return for greater subsequent profit capture from stronger contract enforceability (Contractor et al., 2020). Being well protected from other competitors lowers the risk of the investment in the eye of shareholders. The success of entering a country with more protection is valuable to shareholders in Chinese firms as RDI involves many risks for firms (Sapienza et al., 2006). In addition, being early movers to a market with fewer potential competitors entering, firms enjoy various competitive advantages, such as higher market shares over time, early access to critical assets, and establishment of entry barriers for follower firms. These advantages are desirable to shareholders as they yield potential long-term performance.

H3. RDI destination's regulatory environment for foreign investment positively affects the impact of Chinese RDI on shareholders' value.

5.2.3 The Contingency Factor Of External RDI Dynamics

5.2.3.1 Financial Risk

Return maximization and risk minimization is the common goal of shareholders. Even though the intangible benefits of China's RDI are verifiable, it is still ingrained with uncertainty and bounded rationality due to imperfect information from differences with their foreign

counterpart, including differences in culture, institution, business practices, and languages (Aharoni et al., 2011). Decision-making in this circumstance is not as straightforward, where investors may perceive risk and gains differently. Because researchers have pointed out the detrimental financial impact of outward investment (Cozza et al., 2015), shareholders inevitably may cast doubt and concern about the long-term returns of the RDI. They may concern about the financial risk that is attached to the investment. Financial risk is the likelihood of monetary loss on the investment decision. According to the prospect theory (Kahneman & Tversky, 1979), investors prefer perceived gains over losses and certainty over probable outcomes due to incomplete information. Decision-makers use a heuristic than an optimizing approach to fulfill their goal (Aharoni, 2010; Fiegenbaum et al., 1996; Kahneman & Tversky, 1979; Shoham & Fiegenbaum, 2002). According to the prospect theory, investors are risk averse and prefer guaranteed wins in the initial stage, then change to risk-seeking behavior when potential losses are at stake (Kahneman & Tversky, 1979). As our study concerns the announcements of RDI, shareholders should be more risk-averse at this early stage. Thus, even if they believe that RDI can bring long-term improvement to the firm, as the financial return of RDI is not certain, they might view a significant investment as riskier, therefore, prefer a smaller RDI. We calculate financial risk by the investment size of each RDI by dividing the investment price of that RDI by the net cash flow from the operating activities of the investment firm that year. Therefore we hypothesize:

H4. RDI financial risk negatively affects the impact of Chinese RDI on shareholders' value

5.3 Methodology

5.3.1 Data

We define the event date as the earliest announcement date of the RDI event. We obtained our data from WiseNews with a search combining the firm's stock code and each of the keywords representing all types of expansion activities; they are "Overseas Acquisition" or "Overseas Merger" or "Set Up Overseas Manufacturing Plant" or "Overseas Investment" or "Purchase Overseas Shares" or " Overseas Expansion" or "Overseas M&A" or "Acquisition" or "Merger" or "Set Up Manufacturing Plant" or "Investment" or "Shares purchase" or "Expansion" or "M&A" [6]. The search period is from 2008 to 2017. We manually check each announcement and identify the earliest one for each RDI event. We record the date and expansion details and the expansion destination. The event date is the day of the first public announcement of the RDI. We have gathered a final sample of 236 announcements[7] of RDI from 157 Chinese listed manufacturing firms from 2008 to 2017 as samples to test the impact of RDI on the abnormal returns of these firms. Our start year is 2008 because China introduced new accounting rules in 2007. Following Piperopoulos et al. (2018) suggestion, we started one year later to avoid any transitioning year confusion and discrepancy. We then read the full texts and extracted details of each event. We excluded firms that are not publicly traded. After that, we collect the historical stock prices through China Stock Market & Accounting Research (CSMAR). RDI events in this study include all standard entry modes, including M&A (Mergers and Acquisitions), Joint Venture, Partnering, and Greenfield Investment (i.e., setting up a new plant). The data focuses on a single industry - manufacturing firms, drawing Dos Santos et al. (2008) suggestions that indicated a significant diversification in value creation in

[6] Chinese translation of these keywords are used in WiseNews, they are 海外收购 or 海外合并 or 海外设厂 or 海外投资 or 海外入股 or 海外参股 or 海外扩展 or 海外并购 or 收购 or 合并 or 设厂 or 投资 or 入股 or 参股 or 扩展 or 并购.

[7] We collected 362 announcements initially. And after excluding confounding events and handling AR outliners, we have a final sample of 236 announcements.

the industrial diversification subsample. Table 12 shows information about the distribution of the RDI announcement we have collected in terms of industry and location (according to the differences in GDP per capita between destination and China[8]), whereas Figure 18 shows the year distribution. We provide some examples of the RDI announcements in Appendix B.

5.3.2 Confounding Events

We excluded confounding events to remove their influence on our research. McWilliams and Siegel (1997) suggested that these confounding events include declarations of dividends, signings of a significant government contract, filings of major damages lawsuits, changes in key executives, and announcements of an impending merger, new product, and unexpected earnings. Using WiseNews, we searched for confounding events near the date of each announcement by using a 21 days window (i.e., Days −10 to 10), following examples of Shen and Cannella (2003); Whittington et al. (2016); Zhang and Wiersema (2009). Searching with the stock code of the firm involved in the OFDI, we then verify the content of each identified confounding event if they align with the events suggested by McWilliams and Siegel (1997). We found 49 announcements in our sample with confounding events and excluded them from our sample. We also found 47 announcements that announce more than one RDI within the same piece, which might lead to potential confusion in our stock price analysis. In total, we discarded 95 events with confounding events.

5.3.3 Event Study Methodology

We adopt the event study methodology to measure the magnitude of the effect of the RDI events on the firm's stock price. Initially developed by finance scholars, event study is

[8] As discussed in previous sections, only OFDI to more developed countries (higher GDP per capita) are considered in this research.

now widely applied in other fields, including operations management, to examine and understand the impact, effectiveness, and efficiency of different strategies and activities (Sorescu et al., 2017). The methodology is an approach to measure the effectiveness of unanticipated events (McWilliams & Siegel, 1997), in our case, Chinese RDI on the expected profitability and risk of a portfolio of firms while adjusting for both industries and market-wise influences on stock prices (Agrawal & Kamakura, 1995; Brown & Warner, 1980; Hendricks & Singhal, 2003; MacKinlay, 1997). This paper adopts the short-horizon event study approach, which is suitable for examining the stock market or shareholder reaction to an event. The methodology supports that, in an efficient market, the wealth impact and the market reaction will immediately reflect in the stock prices and serve as a fair proxy of the short-term firm performance or value.

According to the efficient market hypothesis, the basic assumption underlying the methodology (Fama et al., 1969) is that stock prices are creditable indicators of a firm's value. It reflects the market's expectations of the discounted value of all future cash flows expected of the firm (Agrawal & Kamakura, 1995; Geyskens et al., 2002). The present value of future cash flows expected from a firm's assets reflects the price of a security and, at any given time, reflects all the information available about the firm's, both current and future, profit potential(Agrawal & Kamakura, 1995). It is assumed, in the methodology, that changes in the stock prices reflect the present value of future cash flows, time, and risk discounted. Any new information from an unexpected event about the firm (which in this paper is the announcement of the RDI of Chinese manufacturing firms) going public will affect the investors' expectations

Table 12. Industry and location distribution of OFDI of sample firms

Part 1. Industry distribution		
	Frequency	**Percent**
Computer, communication, and other electronic device manufacturing	35	14.8
Automobile Manufacturing	21	8.9
Smelting and Pressing of Nonferrous Metals	21	8.9
Electric Machines and Apparatuses Manufacturing	18	7.6
General Equipment Manufacturing	16	6.8
Raw Chemical Materials and Chemical Products	15	6.4
Special Equipment Manufacturing	15	6.4
Pharmaceutical manufacturing	14	5.9
Food Manufacturing	11	4.7
Metal Products	11	4.7
Non-metallic Mineral Products	8	3.4
Farm Products Processing	7	3.0
Railway, shipbuilding, aerospace and other transportation equipment manufacturing	6	2.5
Smelting and Pressing of Ferrous Metals	5	2.1
Culture and Education, Arts and Crafts, Sports and Entertainment Products Manufacturing	4	1.7
Petroleum Processing, Coking and Nuclear Fuel Processing	4	1.7
Textile	4	1.7
Textiles, Garments and Apparel industry	4	1.7
Wine, drinks and refined tea manufacturing	4	1.7
Rubber and plastic product industry	3	1.3
Chemical Fibre Manufacturing	2	0.8
Instrument and meter manufacturing	2	0.8
Other Manufacturing	2	0.8
Furniture Manufacturing	1	0.4
Leather, fur, feathers, and related products and shoe-making	1	0.4
Papermaking and Paper Products	1	0.4
Printing and Reproduction of Recorded Media	1	0.4
Total	236	100.0
Part 2. Location - GDP per capita difference between OFDI destination and China at the time of the expansion		
Below 25%	60	25.4
50%	58	24.6
75%	60	25.4
Above 75%	58	24.6
Total	236	100

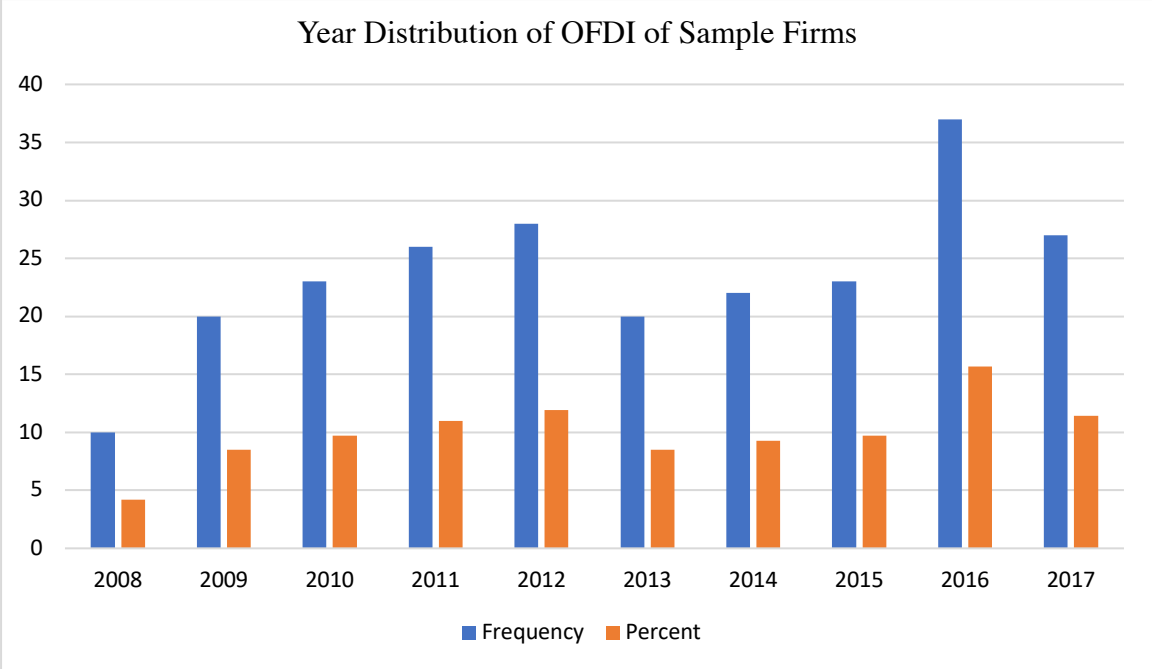


Figure 18. Year Distribution of OFDI of Sample Firms

about the long-term future cash flows of the firm. They will react immediately by buying or selling stocks, and the security price changes as soon as the market learns of the event (Agrawal & Kamakura, 1995; Geyskens et al., 2002). All information disclosed to the public is wholly reflected and unbiased, making it impossible to earn an economic profit. Thus, the only unexpected event can influence the stock price, which is equivalent to the anticipation of the changes in the firm's future cash flows adjusted for the risk of those cash flows. To examine the impact of an event, abnormal return, which is the difference between the expected returns based on general market movement and the actual returns, as the percentage change in stock price associated with the event, is measured (Agrawal & Kamakura, 1995). The amount of difference in the price of a security after the RDIevent, compared to its price before the event, as well as the estimated abnormal stock return, reflect the market's unbiased anticipation and estimate of the future earnings and economic value of that event (Brown & Warner, 1985; Elberse, 2007; Fama, 1970).

We applied event study methodology to Chinese RDI to investigate whether investors view the decision to make such a challenging investment as wise and worthy, even though RDI does not generally yield financial benefits (Cozza et al., 2015). RDI announcement implies growth and development not only of the firms but also of the country, and it signifies the success of the 'go global strategy.' Therefore, it usually implies much pride in announcing it to the major media. Thus, investors can independently judge the future profit impact of the events, which will be shown in the changes in the firm's stock returns.

The event in our study is the RDI. The announcement date is when the public first knew the event, and we set that as our event day (Day 0). If the announcement happened when the stock exchange market was closed, the event day would be the day after (Day+1). As commonly adopted in event studies (e.g., (Agrawal & Kamakura, 1995; Brown & Warner, 1985; Chen et al., 2009; Elberse, 2007; Geyskens et al., 2002; MacKinlay, 1997), we follow a period an estimation period of 250 trading days before announcement day to 21 days before that day (i.e., Day -270 to Day -21) to estimate normal returns. Normal returns are estimated through the market model (Chen et al., 2009; Hendricks & Singhal, 2003; MacKinlay, 1997):

$$\mathbf{R}_{it} = \alpha_i + \beta_i \mathbf{R}_{mt} + \varepsilon_{it} \quad \textbf{(5)}$$

where R_{it} and R_{mt} are the day t (t = –270, ..., –21) returns of stock *i* and a standard market portfolio *m,* respectively. We applied estimations of α and β to the event day to calculate the expected return and by subtracting from the actual return to obtain the abnormal return (AR), which is the unexpected change in the stock price:

$$\mathbf{AR}_{it} = \mathbf{R}_{it} - (- \hat{}\mathbf{iR}_{mt}) \quad \textbf{(6)}$$

Following the standard procedures of the event study, we tested our research question by running a regression analysis to examine whether the abnormal returns for the events differed significantly from zero.

Table 13. Cumulative Abnormal Returns [Day -2 to 2] of OFDI Announcements

	n	Mean CAR	t-statistic	Median CAR	Wilcoxon signed -rank Z-statistic	% CAR positive	Binomial sign test *Z*-statistic
CAR [-2 to 2]	236	0.0147	4.6972**	0.0094	4.1552**	62%	3.6530 **

*Note: **p < 0.01 (two-tailed tests)*

Table 13 shows that the cumulative impact over four days from Day -2 to +2 reveals that the mean CAR is 1.47%, while the median CAR is 0.9% and significantly higher than zero (p=0.000). 62% of abnormal returns are favorable; this proportion is substantially greater than 50% (p=0.000). Table 13 indicates that investors well receive the long-term benefits of the RDI. Investors react positively to the RDI announcement because they believe this decision will benefit future cash flow.

5.3.4 Regression Analysis

Concurrently, we explore the contingency factors, namely 1) *talent resources*, 2) *regulatory environment for foreign investment,* and; 3) *financial risk*, moderating effect on the positive stock market reaction towards Chinese RDI. *Talent resources* are measured by Education Index. The Education Index is a component of the Human Development Index (Conceição, 2020). The education index is an average mean year of schooling (of adults) and expected years of schooling (of children). Both are expressed as an index obtained by scaling with the corresponding maxima. We measure the regulatory environment for foreign investment by the FDI Regulatory Restrictiveness Index published by the Organisation for Economic Cooperation and Development (OECD, www.oecd.org), which calculates the restrictiveness of a country's FDI regulations by considering four categories: foreign equity

restrictions, screening and approval of discriminatory foreign investment, and employment of foreign key personnel, and other operational conditions. *Financial risk* is the price spent on the RDI deal as a percentage of net cash flow from operations.

We used multiple linear regression analysis as it is suitable for our study because, according to Cohen et al. (2014), the form of the relationship and the nature of the research factors expressed as independent variables are not constrained and are highly flexible. Alongside *year dummy* and *industry dummy* variables, we have included three firm-level controls 1) *firm age* was measured by the logarithm of the number of years a firm has been in existence as the variation of age is large across the firms (Piperopoulos et al., 2018; Wang, Hong, Kafouros, & Wright, 2012). We added 1 before taking the logarithm to avoid missing values generated by the transformation (Jiang et al., 2021); 2) *firm size* was calculated by the natural logarithm of total assets; 3) *firm performance* was calculated by the Operating ROA (net operating income / total assets). These controls are collected from the CSMAR database.

Table 14 presents the results from the regression analysis and can provide a percentage of variability in the dependent variable, i.e., cumulative abnormal return is accounted for by all the independent variables together, by showing multiple R-square in Model Summary Table; information on whether the model fit for the data by showing the p-value from f-test in the ANOVA table. Based on this research, the adjusted regression equation will be,

$$CAR_i(\text{Cumulated Abnormal Return Day -2 to +2}) = \alpha + \beta_1 \text{Industry\_dummy}_i + \beta_2 \text{Year\_dummy}_i + \beta_3 \text{Total Assets}_i + \beta_4 \text{Operating ROA}_i + \beta_5 \text{Firm Age}_i + \beta_6 \text{Talent Resources}_i + \beta_7 \text{Regulatory environment for foreign invesment}_i + B_8 \text{Fiancial Risk}_i + \varepsilon_i \quad (7)$$

is constructed by the coefficients provided in the Coefficients table.

Table 14. Regression Results for the Event Period Day -2 to 2

	Model 1		Model 2		Model 3	
Intercept	0.153	(2.286)*	-0.140	(-2.155)+	-0.121	(-1.642)
Industry dummy$_i$		-		-		-
Year dummy$_c$		-		-		-
Total Asset$_i$	0.004	(-1.928)+	0.004	(2.435)*	0.004	(2.502)*
Number of Employees	-0.005		-0.008	(-2.572)*	-0.008	(-2.240)*
Operating ROA$_i$	-0.055	(-0.865)	0.245	(2.718)**	0.246	(2.689)**
Firm Age$_i$	-0.005	(-0.517)	-0.004	(-0.006)	-0.007	(-0.086)
Talent Resources$_i$			0.139	(2.164)*	0.144	(2.227)*
Regulatory environment for foreign invesment$_i$			0.118	(1.682)+	0.118	(1.667)+
Financial Risk$_i$			-0.001	(-1.780)+	-0.001	(-1.761)+
IMR					0.002	(0.131)
N	224		198		189	
Model F value	1.762**		1.776**		1.567*	
R^2	26.5%		31%		30.3%	
Adjusted R^2	11.4%		13.5%		10.9%	

*Note. All tests are two-tailed: +p<0.1;*p < 0.05; **p < 0.01; t statistics are indicated in parentheses*

5.3.5 Potential Sample Selection Bias

5.3.5.1 Heckman Two-Stage Selection Model

Since our sample only includes Chinese manufacturing firms that conducted RDI, there might be sample selection bias (Wang et al., 2022). Selection bias arises when unobserved factors can affect a firm's decision-making process to undertake RDI (Xie, 2022). We used Heckman's two-stage selection model (Heckman, 1979) to address potential selection bias and controls for endogeneity. Stage one estimates the probability of firms RDI using a probit model. In stage two, we incorporate the inverse Mills ratio (IMR) generated by the probit model into our regression model as a control variable to estimate the impact of our hypotheses on shareholders' value incorporating the parameters evaluated.

In stage one, we use a complete sample of 1506 firms, including the full list of listed manufacturing firms in China regardless of whether they have RDI, to estimate a probit model that concerns the probability of all observations in expanding overseas. Firm-year observations

in our sample are coded as 1, and those not in our sample 0. We included independent variables: *state-owned enterprises,* since SOE is more likely to according to the government's 'Go Global' policy (Wu et al., 2022); 2) *ROA (return-on-assets)* since firms with better performance have more resources for RDI (Wu et al., 2022); 3) *Total Assets* (calculated by the natural logarithm of total assets) - larger firms have more resources to spare for RDI; 4) *foreign shares*- a higher level of foreign ownership facilities access to foreign markets (Wu et al., 2022); 5) *R&D intensity* (R&D Expenditure/Operating Revenue) – firm's R&D intensity promotes RDI (Qiao et al., 2020); 6) *industry_dummy*, since different industry natures led to different propensities for RDI; 7) *year_dummy,* to address other temporal effects. The coefficient on the variables regarding firm size *(Total Assets)* and firm performance (*ROA*) is significant in the probit model. Results from stage one are shown in Table 15.

$$Pr\,(RDI_i = 1) = \Phi(\beta_0 + \beta_1 SOE + \beta_2 ROA_i + \beta_3 Total\ Assets_i + \beta_4 Foreign\ Shares_i + \beta_5 R\&D\ Intensity_i + \beta_6 Industry\_Dummy_i + \beta_7 Year\_Dummy_i + \varepsilon_i) \quad (8)$$

In stage 2, we include the IMR in our regression model as an additional control variable

$$CAR_i = \alpha + \beta_1 Industry\_dummy_i + \beta_2 Year\_dummy_i + \beta_3 Total\ Assets_i + \beta_4 Operating\ ROA_i + \beta_5 Firm\ Age_i + \beta_6 Talent\ Resources_i + B_7 Regulatory\ environment\ for\ foreign\ invesment_i + \beta_8 Fiancial\ Risk_i + + \beta_9 IMR_i + \varepsilon_i \quad (9)$$

Table 15. Probit model (Stage 1) from Heckman 2-stage model

Industry dummy$_i$	-
Year dummy$_i$	-
Operating ROA$_i$	1.78 (0.437)+
R&D Intensity	0.45 (0.007)
SOE	0.95 (0.060)
Total Assets	12.76 (0.023)**
Foreign Shares	-1.04 (0.000)
Constant	-0.09 (122.3)
Number of observations	11235
Log-likelihood	-1162.2427
LR Chi-Square	244.48
McFadden's pseudo R2	0.0952
Prob>Chi Square	0.000**

*Note: Standard errors are in parentheses : +p<0.1;*p < 0.05; **p < 0.01*

5.4 Results

Table 14 summarizes the regression analysis results. Model 1 presents the results of control variables, and model 2 shows the result of our hypothesis testing. While Model 3 shows robustness with inverse Mills ratios (IMR).

Model 2 indicates that overall, our proposed model is highly significant (F=1.776, p =0.007). Approximately 31% (R^2) of the total variation, which is, in our case, cumulative abnormal return (CAR) Day -2 to +2 is accounted for by the variables in the model. 13.5% (adjusted R2) of the variability of RDI announcements is accounted for by the model, even after considering the number of predictor variables in the model. Our results agree with all the following hypothesis and they are H2 which postulates destination's educational level will yield a positive impact on the CAR (t-statistic = 2164, p = 0.040), H3 which indicates destination's FDI entry barriers level significantly positively impact CAR (t-statistic = -2.1.682, p = 0.095). And H4, which hypothesizes investment size will yield significant negative results on the impact on CAR (t-statistic = -1.780, p = 0.078).

Whereas Model 3 shows an insignificant coefficient for IMR, suggesting selection bias is not a concern, our results are robust after controlling the effect of IMR.

5.5 Discussion

Shares of emerging cities' OFDI have undergone a significant transformation. China, which was once the world's most popular manufacturer, has been going through a significant transformation since its establishment of the 'Go Global' strategy in 2000 and its accession to the World Trade Organisation (WTO) in 2001 (Agrawal & Kamakura, 1995; Buckley et al., 2008). Two decades later, China is now the largest foreign investor globally. Notably, China

now spends a significant RDI (MOFCOM, 2021). As Buckley et al. (2007) point out, in the three primary motivations of FDI identified in the Eclectic Paradigm by Dunning (1980), resource seeking and foreign market seeking are the primary motivations for Chinese firms' RDI. Based on a sample of 236 announcements[9] of RDI from 157 Chinese listed manufacturing firms from 2008 to 2017, our study examines the short-term shareholder value reaction of Chinese RDI. Through the lens of contingency perspective, we example the dynamic impact of RDI on shareholders' value of a firm. Firms from emerging countries are exposed to new knowledge and information to sustain their competitive advantage by engaging in RDI. Our dynamic approach to studying external factors' contingency indicates that firms should expand to a destination with better talent resources and a tighter regulatory environment for FDI. While internally, our results show that less financial risk implies that the announcement is more favorable to shareholders. A higher quality of talent in the destination ensures smooth knowledge transfer between entities. It allows firms from emerging economies to learn advanced technology during RDI and improve their capabilities back home.

Furthermore, successfully entering a destination with a more challenging entry regulatory environment sends a healthy signal to the shareholders that the firm has prevailed and penetrated a market that is not easily accessible to everyone. It means that this investment is protected from competitors by this external environment. Nevertheless, even though shareholders acknowledge the intangible benefits RDI can bring, they prefer smaller investments because of their risk-averse mentality.

[9] We collected 362 announcements initially. And after excluding confounding events and handling AR outliners, we have a final sample of 236 announcements.

5.5.1 Literature Implications

Although there is a vast number of studies on OFDI, most studies focus on investment by developed countries. Recent studies have started investigating RDI; however, they are primarily in other emerging countries. Moreover, the studies on the impact of OFDI on shareholder values remain inconsistent. Our analysis uses event study methodology to study Chinese FDI in only developed countries using the framework of RDI by Jun (1987). We observe that the challenges and risks firms from emerging countries face during RDI vary from expanding to other emerging countries or less developed countries, as well as their motivations. Our empirical results show the positive dynamic relationship between Chinese investing firms and the abnormal returns at the announcement of RDI, which indicates that RDI brings prosperity to shareholders' value of the expanding Chinese firms.

This study agrees with the emphasis by scholars that it is necessary to consider the differentiation of conventional theory for FDI and theory for RDI (Barkema et al., 2015; Dunning, 2006; Jun, 1987; Park & Roh, 2019) . However, we observe that there is no specific terminology to conclude OFDI from emerging to developed countries, which can hinder the clarity and unison of the development of the framework of this unconventional FDI. This study draws on the early term RDI developed by Jun (1987) by linking this paper back to the theoretical development of the field. We provide a complete picture of the product of RDI and extend the knowledge of RDI literature. We extend the literature on RDI by exploring the impact of RDI on firms' stock returns in the presence of various contingency factors. Specifically, we contribute to research on RDI by demonstrating the dynamics between external aspects of the expansion destination and the internal factor of financial risk as contingency factors, which lead to different benefits from RDI on shareholders' value.

Furthermore, extending the research by Jun (1987), which examines South Korea's RDI practice, provides a good reference for successful internationalization for other emerging countries, especially China, which also aims to transform into a technology-focused innovator in the international market. Because never before, the UNCTAD recently upgraded South Korea's status from emerging to a developed country, implying South Korea s global strategy has successfully transformed the economy. Therefore, we provide the RDI framework for studies that want to examine the internationalization of China. In addition, dedicating this research to the Chinese context can serve as an excellent representation of the general behavior of emerging countries as the Chinese business environment inherent many unique conditions which are rarely presented in a single country (Buckley et al., 2015).

5.5.2 Managerial Implication

Given the increasing RDI from China to achieve active economy and industry advancements, our results have some timely managerial implications. First, our empirical results indicate the short-term financial implications for emerging market firms' RDI have a positive dynamic relationship between RDI and stock market reaction. RDI is complex, risky, and costly; thus, managers must pay close attention to the impact of different contingencies of the RDI to achieve desirable outcomes, especially as statistically proven in our analysis that the outcomes may lay beyond yielding returns. By carefully considering the dynamics between external and internal factors of the decisions regarding the expansion, the manager can maximize this reaction. For instance, our results show that choosing a destination with a higher talent quality will yield positive shareholder value. It ensures efficient and smooth knowledge sharing between investing firms and host countries with more advanced technical skills. Despite the added challenges and uncertainties in targeting an expansion destination with a more rigid and restrictive regulatory environment for FDI, these countries will bring future

protection to the operation. It naturally provides a shielding effect from other competitors from entering. It brings security and confidence to shareholders' perspective that this will enhance the sustainability of the expansion's competitive advantages. However, during decision-making for RDI, managers must be careful about the amount of money (relative to firm size) spent on the expansion. Our results show that shareholders do not prefer the financial risk inherent in a significant investment. As an announcement is the initial stage of the expansion, in the beginning, shareholders tend to perceive potential loss as more significant than perceived gain and take a risk-averse approach. This may imply that managers should start small and consider increasing the investment in the operation in the later stage of the investment. However, this will require future research to examine the value creation potential in different investment phases.

Finally, the Chinese government plays an important role in transforming Chinese manufacturers, and this study found that investors react positively to RDI. Thus, the government may see a bright in the current initiatives to promote foreign investment and advanced technology learning through RDI to more developed countries. Our conclusion provides support to policymakers to make evidence-based decisions on RDI.

5.5.3 Limitations And Future Research Directions

Like any other research, our study has limitations. First, given the empirical context of our research, it was limited to overseas expansion by Chinese manufacturing firms. This context can extend to other emerging countries to enrich the credibility of our findings and minimize the generalization. Second, our event study methodology only includes listed firms as samples for CAR. Non-listed, privately held, and firms only listed after the RDI announcement are not included in our sample. Third, our event study provides insights into the

short-term impact of RDI on shareholders' value. Future research can explore the longitudinal effect of RDI and investigate the dynamics over time. Fourth, our study examines the moderating effects of several essential contingency factors on the dynamics of RDI and shareholders' value. There may be other contingent factors that impact these dynamics. Future research can explore other conditions of the external (e.g., destination's political stability) and internal factors (e.g., local employees deployed to RDI destination and overseas experience of the top management team (TMT)) to enrich the knowledge of these dynamics. Our research considers external factors on a country level. Future research can further investigate the dynamics at the firm level (e.g., the hosting firm's operational flexibility, innovativeness, and overseas experience of their top management team (TMT)).

CHAPTER 6. CONCLUSION AND FUTURE WORKS

6.1 Summary of Major Study Findings

The primary motivation of this thesis is to seek insights into the controversy around China's globalization, especially its rapid RDI. I wanted to find out what are the positive impacts of Chinese RDI. Our results in studies 2 and 3 find that RDI positively impacts Chinese firms' environmental management and shareholder value. As a foundation for study 2, I also conducted a systematic review (study 1) to provide insights for our hypothesis development in study 2, where I postulated that RDI improves the environmental management of Chinese firms. In summary, the three findings contribute to the existing literature by providing empirical evidence that supports the hypothesis that FDI can have positive environmental impacts and economic growth in emerging countries, but the impact is shaped by a range of factors, for example, destination choices and ownership structure. By providing a more nuanced understanding of this relationship, your research helps policymakers and practitioners better leverage FDI for environmental sustainability in emerging countries and economic growth.

6.2 Research Implications

6.2.1 Theoretical Implications

SSCM and Organizational Learning

The analysis of Study 1 shows that there is potential for a more sophisticated theoretical linkage between SSCM and organizational learning. Therefore, I fill this gap by studying the relationship between RDI and environmental management through OL theory and the OILL paradigm in Study 2.

In addition, I identified four research domains from the citation network analysis—namely, environmental collaborations and environmental learning, tensions and risks in sustainable global supplier management and OL, sustainable supply chain learning, and OL in social sustainability supply chain practices. I followed this up with a main path analysis to further identify each domain's knowledge structure and explore future research trends and directions. I identified two emerging domains—green logistics and advanced eco-manufacturing technology- which provide a future study direction in this field. One recent paper on the main path of Cluster 3 by Powell and Coughlan (2020) proposed an action learning methodology to explore learning-to-learn in sustainable lean transformation. As incorporating machine learning and human learning within an organization can be the future implication of efficient OL(Sturm et al., 2021), this discovery can imply a future direction focusing on the relationship between machine learning (as part of the future trend of OL) and SSCM.

FDI literature

First, this thesis answers the call of a few recent researchers who highlighted the lack of academic focus and theoretical development concerning the consequence of emerging countries' RDI (Buckley et al., 2017; Hendriks, 2017; Park & Roh, 2019), especially on RDI (Cozza et al., 2015). The two empirical studies show that improved environmental management and increased shareholders' value are two positive outcomes of Chinese RDI.

Second, this thesis agrees with the recent emphasis by scholars that it is necessary to consider the differentiation of theories for FDI and theories for RDI. This thesis draws on the early term 'RDI' developed by Jun (1987). By linking this paper back to the theoretical development of the field, the results provide a more comprehensive picture of RDI knowledge.

Furthermore, the application of the RDI framework by Jun (1987), developed for Korea's early RDI practice, provides a good reference for successful internationalization for other emerging countries, especially China, which aims to transform into a technology-focused innovator in the international market. Because the UNCTAD recently upgraded Korea's status from an emerging to a developed country, this implies Korea's global strategy has successfully transformed its economy. Therefore, we provide the RDI framework as a reference for studies that want to examine the internationalization of China.

In addition, study 2 uses the OLLI theory (Park & Roh, 2019) as an extension of the traditional FDI theory OLI (Dunnings, 2001) for a more timely and fitting explanation of RDI.

Most FDI studies focus on investment by developed countries. Recent studies have started investigating RDI; however, they are primarily in other emerging countries. Most literature focuses on shareholders' value creation of FDI from developed economies to emerging countries (e.g., Chari et al., 2010; Dutta et al., 2013; López-Duarte & García-Canal, 2007) or from emerging to other emerging countries (e.g., Fu et al., 2020). Moreover, FDI literature concerning environmental outcomes also heavily focuses on investment inflow in emerging countries. (e.g., Dong et al., 2019; Hao, Wu, et al., 2020; Kim et al., 2016; Liu et al., 2019; Zeng & Zhou, 2021). My two empirical studies contribute to the FDI literature by focusing on RDI from Chinese firms to provide insight into this peculiar phenomenon.

The two empirical studies also extend the RDI literature by shedding insights into the differential moderating effects of private ownership, cultural similarity on environmental management, and external and internal dynamics on shareholder value. They are significant moderators of the relationship between RDI and environmental violations. Study 2 finds that

both private ownership and cultural similarity positively moderate the impact of RDI on environmental management. While Study 3 shows that the destination's talent resources and regulatory environment for FDI have a positive impact, and financial risks have a negative effect on the market reaction to Chinese RDI.

Environmental management literature

In Study 2, I use a more practical methodology to verify the positive impact of Chinese RDI on its environmental management from another perspective that may explain and resolve the inconsistency in previous papers. I used firm-level panel data, which has more practical significance than the macro province-level perspective that most existing literature uses and that almost all recent research in this construct adopts. I used violations as an indicator of performance, which can provide a bigger picture than carbon dioxide emission, a single-dimension indicator widely used in the field. The number of environmental violations directly reflects a firm's environmental performance (Clarkson et al., 2004; Ma et al., 2021). Furthermore, it is more easily understood by the public and is more of a public concern. Therefore, our research serves better as a reference for various stakeholders seeking to improve their environmental performance in China.

Organizational learning literature

OL studies heavily focus on technology and innovation transfer (e.g., Chen, 2018; Chen et al., 2012; J. Huang et al., 2017; Jian Li et al., 2016; Piperopoulos et al., 2018; Potterie & Lichtenberg, 2001; Pradhan & Singh, 2008; Zhu & Huang, 2017). This paper enriches this field by considering the environmental learning outcomes of RDI.

6.2.2 Managerial Implications

This thesis provides managers insights into the positive implications of RDI. In particular, the results of Study 2 provide an alternative and effective measure for managers to improve a firm's environmental management. Managers can utilize RDI as a learning opportunity to acquire more advanced environmental management skills to improve their own. This is important as sound environmental practices can protect a firm's value (Lo et al., 2018) and reputation (Kumar et al., 2019). Meanwhile, managers should be careful about decency on state ownership of state resources as it could lead to firms undermining the importance of maintaining sound environmental practices to gain legitimacy in stakeholders' eyes. Managers wisely choose foreign destinations similar in culture to ensure an efficient knowledge transfer.

The empirical results in Study 3 indicate that RDI has short-term financial implications for stock market reaction. To achieve more desirable outcomes, managers must carefully consider the dynamics between the external and internal factors of RDI decisions. Our results show that choosing a destination with a higher quality of talent ensures efficient and smooth OL. A destination with a more restrictive regulatory environment for FDI can shield competitors from entering the same market. These are favorable external factors that shareholders value in RDI. However, managers must be careful about the amount of money (relative to firm size) to spend on RDI. Our results show that shareholders do not prefer the financial risk inherent in a significant investment. Managers can find ways, e.g., a mathematical approach, to determine the optimal investment size at a given level.

6.2.3 Policy Implications

The results also show support and confidence in China's existing initiatives on "going out" and "green growth." Our results provide an alternative to enforcement—which might not

always be effective in reducing the environmental misconduct (Ma et al., 2021) of policymakers—and recommend devoting more resources to facilitate green learning in the process of RDI to achieve environmental goals.

6.3 Limitations and Future Directions

Inevitably, this thesis has limitations, which can also serve as implications for future directions. In Study 1, the systemic review may not include all related articles. This is because I used specific keywords (albeit based on objective references), the screening processes are bound to be objective opinions to a certain extent, I only included articles from the selected top-13 OM journals (Zhou & Lo, 2018), data was from a single search engine, negative citations (citations for criticizing) were not considered in this citation network analysis (Fan et al., 2014), and only English-language publications were included. Second, the articles identified in our main path analysis do not necessarily contain the most significant or ground-breaking results, as we did not assign weight to our citations. They are, however, the most cited, and their findings are widespread (Colicchia & Strozzi, 2012).

Our empirical studies also have shortcomings—first, Studies 2 and 3 use single-origin data (i.e., China). Even though the Chinese context can serve as an excellent representation of the general behavior of emerging countries (Buckley et al., 2015), different implications can arise when using data from another emerging country. Future research should investigate other emerging economies to avoid generalizing our findings and enhance credibility.

Second, only Chinese publicly-listed manufacturing companies were included in the samples. Unlisted, privately held, and firms only listed after the RDI announcement were not

included, and many small and medium-sized manufacturers are not listed in China. Future studies can consider replicating this current study in the context of unlisted firms.

Third, to control for fundamental differences between firms in manufacturing and other industries, this thesis only focuses on one of the most critical industries, the manufacturing sector (Lu et al., 2011). Future research can extend this study to other industries, such as the service industry, which is also a pillar of the Chinese economy.

Fourth, the thesis uses secondary data, limiting the results to a relatively high or abstract level of analysis. Other studies can study this context with qualitative methods to test if they find agreeing implications.

Fifth, I studied the moderating effect of crucial factors on the relationship between RDI and environmental management and shareholder value. Future research can explore other contingent factors, for example, on the firm level (e.g., R&D intensity and past RDI experience), the country level (e.g., destination's environmental performance, past partnership experience with China), externally (e.g., destination's political stability), and internally (e.g., local employees deployed to RDI destination and overseas experience of the top management team to enrich the knowledge of these dynamics). Our research considers external factors on a country level. Future research can also further investigate the dynamics at the firm level (e.g., the hosting firm's operational flexibility and innovativeness and the overseas experience of their top management team).

Finally, in study 2, because the Chinese government does not share a common platform for reporting environmental violations, we collected our violation data of Chinese firms from

the IPE database. Even though this is the most comprehensive database for environmental violation data, we cannot dismiss the possibility that some violations are missing from the database.

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Appendix A. List of Articles In Each Main Clusters From Citation Network Analysis

Cluster 1

Authors	Title	Source	Year
Beh, Ls; Ghobadian, A; He, Ql; Gallear, D; O'regan, N	Second-Life Retailing: A Reverse Supply Chain Perspective	Supply Chain Management-An International Journal	2016
Chen, Cm; Ho, H	Who Pays You To Be Green? How Customers' Environmental Practices Affect The Sales Benefits Of Suppliers' Environmental Practices	Journal Of Operations Management	2019
Cheng, Jh; Yeh, Ch; Tu, Cw	Trust And Knowledge Sharing In Green Supply Chains	Supply Chain Management-An International Journal	2008
Chen, Pc; Hung, Sw	Collaborative Green Innovation In Emerging Countries: A Social Capital Perspective	International Journal Of Operations & Production Management	2014
Chen, X; Wang, Xj; Zhou, Mm	Firms' Green R&D Cooperation Behaviour In A Supply Chain: Technological Spillover, Power And Coordination	International Journal Of Production Economics	2019
Fernandez, L; Ventura, Ac; Andrade, Jc; Lumbreras, J; Cobo-Benita, Jr	The Effect Of Clean Development Mechanism Projects On Human Resource Management Practices In Brazil	International Journal Of Operations & Production Management	2017
Graham, S	Antecedents To Environmental Supply Chain Strategies: The Role Of Internal Integration And Environmental Learning	International Journal Of Production Economics	2018
Graham, S; Mcadam, R	The Effects Of Pollution Prevention On Performance	International Journal Of Operations & Production Management	2016
Hayami, H; Nakamura, M; Nakamura, Ao	Economic Performance And Supply Chains: The Impact Of Upstream Firms' Waste Output On Downstream Firms' Performance In Japan	International Journal Of Production Economics	2015
Jia, F; Gong, Y; Brown, S	Multi-Tier Sustainable Supply Chain Management: The Role Of Supply Chain Leadership	International Journal Of Production Economics	2019
Johnson, Jl; Dooley, Kj; Hyatt, Dg; Hutson, Am	Emerging Discourse Incubator: Cross-Sector Relations In Global Supply Chains: A Social Capital Perspective	Journal Of Supply Chain Management	2018

Kirchoff, Jf; Tate, Wl; Mollenkopf, Da	The Impact Of Strategic Organizational Orientations On Green Supply Chain Management And Firm Performance	International Journal Of Physical Distribution & Logistics Management	2016
Lee, Sy	The Effects Of Green Supply Chain Management On The Supplier's Performance Through Social Capital Accumulation	Supply Chain Management-An International Journal	2015
Liu, Y; Srai, Js; Evans, S	Environmental Management: The Role Of Supply Chain Capabilities In The Auto Sector	Supply Chain Management-An International Journal	2016
Miemczyk, J; Howard, M; Johnsen, Te	Dynamic Development And Execution Of Closed-Loop Supply Chains: A Natural Resource-Based View	Supply Chain Management-An International Journal	2016
Monios, J; Bergqvist, R	Using A "Virtual Joint Venture" To Facilitate The Adoption Of Intermodal Transport	Supply Chain Management-An International Journal	2015
Naor, M; Bernardes, Es; Druehl, Ct; Shiftan, Y	Overcoming Barriers To Adoption Of Environmentally-Friendly Innovations Through Design And Strategy Learning From The Failure Of An Electric Vehicle Infrastructure Firm	International Journal Of Operations & Production Management	2015
Parmigiani, A; Klassen, Rd; Russo, Mv	Efficiency Meets Accountability: Performance Implications Of Supply Chain Configuration, Control, And Capabilities	Journal Of Operations Management	2011
Rossi, S; Colicchia, C; Cozzolino, A; Christopher, M	The Logistics Service Providers In Eco-Efficiency Innovation: An Empirical Study	Supply Chain Management-An International Journal	2013
Shou, Yy; Che, W; Dai, J; Jia, F	Inter-Organizational Fit And Environmental Innovation In Supply Chains: A Configuration Approach	International Journal Of Operations & Production Management	2018
Simpson, D	Use Of Supply Relationships To Recycle Secondary Materials	International Journal Of Production Research	2010
Tuan, Lt	From Cultural Intelligence To Supply Chain Performance	International Journal Of Logistics Management	2016
Vachon, S; Klassen, Rd	Supply Chain Management And Environmental Technologies: The Role Of Integration	International Journal Of Production Research	2007
Vachon, S; Klassen, Rd	Environmental Management And Manufacturing Performance: The Role Of Collaboration In The Supply Chain	International Journal Of Production Economics	2008
Wong, Cwy	Leveraging Environmental Information Integration To Enable Environmental Management Capability And Performance	Journal Of Supply Chain Management	2013

Yang, Mg; Hong, P; Modi, Sb	Impact Of Lean Manufacturing And Environmental Management On Business Performance: An Empirical Study Of Manufacturing Firms	International Journal Of Production Economics	2011

Cluster 2

Authors	Title	Source	Year
Reuter, C; Foerstl, K; Hartmann, E; Blome, C	Sustainable Global Supplier Management: The Role Of Dynamic Capabilities In Achieving Competitive Advantage	Journal Of Supply Chain Management	2010
Cantor, De; Morrow, Pc; Montabon, F	Engagement In Environmental Behaviors Among Supply Chain Management Employees: An Organizational Support Theoretical Perspective	Journal Of Supply Chain Management	2012
Wu, Gc	The Influence Of Green Supply Chain Integration And Environmental Uncertainty On Green Innovation In Taiwan's It Industry	Supply Chain Management-An International Journal	2013
Blome, C; Paulraj, A; Schuetz, K	Supply Chain Collaboration And Sustainability: A Profile Deviation Analysis	International Journal Of Operations & Production Management	2014
Longoni, A; Golini, R; Cagliano, R	The Role Of New Forms Of Work Organization In Developing Sustainability Strategies In Operations	International Journal Of Production Economics	2014
Meehan, J; Bryde, Dj	A Field-Level Examination Of The Adoption Of Sustainable Procurement In The Social Housing Sector	International Journal Of Operations & Production Management	2015
Busse, C; Schleper, Mc; Niu, Ml; Wagner, Sm	Supplier Development For Sustainability: Contextual Barriers In Global Supply Chains	International Journal Of Physical Distribution & Logistics Management	2016
Kirchoff, Jf; Omar, A; Fugate, Bs	A Behavioral Theory Of Sustainable Supply Chain Management Decision Making In Non-Exemplar Firms	Journal Of Supply Chain Management	2016
Meinlschmidt, J; Foerstl, K; Kirchoff, Jf	The Role Of Absorptive And Desorptive Capacity (Acdc) In Sustainable Supply Management A Longitudinal Analysis	International Journal Of Physical Distribution & Logistics Management	2016
Busse, C; Schleper, Mc; Weilenmann, J; Wagner, Sm	Extending The Supply Chain Visibility Boundary Utilizing Stakeholders For Identifying Supply Chain Sustainability Risks	International Journal Of Physical Distribution & Logistics Management	2017

Kuznetsov, A; Dinwoodie, J; Gibbs, D; Sansom, M; Knowles, H	Knowledge Capture To Inform Sustainable Maritime Operations	International Journal Of Operations & Production Management	2017
Kumar, A; Paraskevas, Jp	A Proactive Environmental Strategy: Analyzing The Effect Of Scm Experience, Age, And Female Representation In Tmts	Journal Of Supply Chain Management	2018
Golini, R; Gualandris, J	An Empirical Examination Of The Relationship Between Globalization, Integration And Sustainable Innovation Within Manufacturing Networks	International Journal Of Operations & Production Management	2018
Meinlschmidt, J; Schleper, Mc; Foerstl, K	Tackling The Sustainability Iceberg: A Transaction Cost Economics Approach To Lower Tier Sustainability Management	International Journal Of Operations & Production Management	2018
Danese, P; Lion, A; Vinelli, A	Drivers And Enablers Of Supplier Sustainability Practices: A Survey-Based Analysis	International Journal Of Production Research	2019
Bellamy, Ma; Dhanorkar, S; Subramanian, R	Administrative Environmental Innovations, Supply Network Structure, And Environmental Disclosure	Journal Of Operations Management	2020
Carter, Cr; Kaufmann, L; Ketchen, Dj	Expect The Unexpected: Toward A Theory Of The Unintended Consequences Of Sustainable Supply Chain Management	International Journal Of Operations & Production Management	2020
Zhang, Qs; Pan, Jy; Xu, Dh; Feng, Tw	Balancing Coercive And Non-Coercive Powers To Enhance Green Supplier Integration: Do Relationship Commitment And Closeness Matter?	Supply Chain Management-An International Journal	2020
Le, Anh; Nguyen, Tt; Cheng, Jms	Enhancing Sustainable Supply Chain Management Performance Through Alliance Portfolio Diversity: The Mediating Effect Of Sustainability Collaboration	International Journal Of Operations & Production Management	2021
Zehendner, Ag; Sauer, Pc; Schopflin, P; Kahkonen, Ak; Seuring, S	Paradoxical Tensions In Sustainable Supply Chain Management: Insights From The Electronics Multi-Tier Supply Chain Context	International Journal Of Operations & Production Management	2021
Nudurupati, Ss; Garengo, P; Bititci, Us	Impact Of The Changing Business Environment On Performance Measurement And Management Practices	International Journal Of Production Economics	2021

Cluster 3

Authors	Title	Source	Year
Zhu, Qh; Sarkis, J; Cordeiro, Jj; Lai, Kh	Firm-Level Correlates Of Emergent Green Supply Chain Management Practices In The Chinese Context	Omega-International Journal Of Management Science	2008
Lai, Kh; Wu, Sj; Wong, Cwy	Did Reverse Logistics Practices Hit The Triple Bottom Line Of Chinese Manufacturers?	International Journal Of Production Economics	2013
Silvestre, Bs	Sustainable Supply Chain Management In Emerging Economies: Environmental Turbulence, Institutional Voids And Sustainability Trajectories	International Journal Of Production Economics	2015
Chileshe, N; Rameezdeen, R; Hosseini, Mr; Lehmann, S	Barriers To Implementing Reverse Logistics In South Australian Construction Organisations	Supply Chain Management-An International Journal	2015
Xu, Y; Liu, Jf; Wu, J; Luo, C	Improving Supply Chain Performance Through Industry Standards Use And Community Socialization A Perspective Of Standards Consortia	International Journal Of Physical Distribution & Logistics Management	2016
Dubey, R; Gunasekaran, A; Childe, Sj; Papadopoulos, T; Hazen, B; Giannakis, M; Roubaud, D	Examining The Effect Of External Pressures And Organizational Culture On Shaping Performance Measurement Systems (Pms) For Sustainability Benchmarking: Some Empirical Findings	International Journal Of Production Economics	2017
Bai, Cg; Sarkis, J; Dou, Yj	Constructing A Process Model For Low-Carbon Supply Chain Cooperation Practices Based On The Dematel And The Nk Model	Supply Chain Management-An International Journal	2017
Gualandris, J; Klassen, Rd	Emerging Discourse Incubator: Delivering Transformational Change: Aligning Supply Chains And Stakeholders In Non-Governmental Organizations	Journal Of Supply Chain Management	2018
Wu, Zh; Jia, F	Toward A Theory Of Supply Chain Fields - Understanding The Institutional Process Of Supply Chain Localization	Journal Of Operations Management	2018
Li, Q; Xue, Qz; Truong, Y; Xiong, J	Mncs' Industrial Linkages And Environmental Spillovers In Emerging Economies: The Case Of China	International Journal Of Production Economics	2018
Gong, Y; Jia, F; Brown, S; Koh, L	Supply Chain Learning Of Sustainability In Multi-Tier Supply Chains: A Resource Orchestration Perspective	International Journal Of Operations & Production Management	2018

Kaur, J; Sidhu, R; Awasthi, A; Chauhan, S; Goyal, S	A Dematel Based Approach For Investigating Barriers In Green Supply Chain Management In Canadian Manufacturing Firms	International Journal Of Production Research	2018
Batista, L; Gong, Y; Pereira, S; Jia, F; Bittar, A	Circular Supply Chains In Emerging Economies - A Comparative Study Of Packaging Recovery Ecosystems In China And Brazil	International Journal Of Production Research	2019
Roy, V; Silvestre, Bs; Singh, S	Reactive And Proactive Pathways To Sustainable Apparel Supply Chains: Manufacturer's Perspective On Stakeholder Salience And Organizational Learning Toward Responsible Management	International Journal Of Production Economics	2020
Silvestre, Bs; Silva, Me; Cormack, A; Thome, Amt	Supply Chain Sustainability Trajectories: Learning Through Sustainability Initiatives	International Journal Of Operations & Production Management	2020
Pereira, Mmo; Silva, Me; Hendry, Lc	Supply Chain Sustainability Learning: The Covid-19 Impact On Emerging Economy Suppliers	Supply Chain Management-An International Journal	2021
Venkatesh, Vg; Zhang, A; Deakins, E; Mani, V	Antecedents Of Social Sustainability Noncompliance In The Indian Apparel Sector	International Journal Of Production Economics	2021

Cluster 4

Authors	Title	Source	Year
Hall, J; Matos, S	Incorporating Impoverished Communities In Sustainable Supply Chains	International Journal Of Physical Distribution & Logistics Management	2010
Lemke, F; Petersen, Hl	Teaching Reputational Risk Management In The Supply Chain	Supply Chain Management-An International Journal	2013
Eriksson, D; Svensson, G	Elements Affecting Social Responsibility In Supply Chains	Supply Chain Management-An International Journal	2015
Gold, S; Trautrims, A; Trodd, Z	Modern Slavery Challenges To Supply Chain Management	Supply Chain Management-An International Journal	2015
Marshall, D; Mccarthy, L; Mcgrath, P; Claudy, M	Going Above And Beyond: How Sustainability Culture And Entrepreneurial Orientation Drive Social Sustainability Supply Chain Practice Adoption	Supply Chain Management-An International Journal	2015

Goebel, P; Reuter, C; Pibernik, R; Sichtmann, C; Bals, L	Purchasing Managers' Willingness To Pay For Attributes That Constitute Sustainability	Journal Of Operations Management	2018
Croom, S; Vidal, N; Spetic, W; Marshall, D; Mccarthy, L	Impact Of Social Sustainability Orientation And Supply Chain Practices On Operational Performance	International Journal Of Operations & Production Management	2018
Schulze, H; Bals, L; Johnsen, Te	Individual Competences For Sustainable Purchasing And Supply Management (Spsm) A Literature And Practice Perspective	International Journal Of Physical Distribution & Logistics Management	2019
Handfield, R; Sun, H; Rothenberg, L	Assessing Supply Chain Risk For Apparel Production In Low Cost Countries Using Newsfeed Analysis	Supply Chain Management-An International Journal	2020
Chang, Xy; Huang, Yh; Li, M; Bo, X; Kumar, S	Efficient Detection Of Environmental Violators: A Big Data Approach	Production And Operations Management	2021

Appendix B. Examples of Chinese firms' RDI announcement

Company Name	Stock Code	Event Date	Article Number	Source	Article Title	Expansion Destination	Expansion Type	Expanded Company	Business Type	Price	Share %
Tianqi Lithium Corp	002466 .SHE	14/11/2012	20121	华西都市报	天齐集团拟收购泰利森	Australia	M&A	TalisonLithium Ltd.	Mineral Resources	>600 million USD	14.99 %
Shanghai Raas Blood Products Co. Ltd	002252 .SHE	18/04/2017	20085	北京商报	上海莱士母公司拟 97 亿收购 Biotest	Germany	M&A	Biotest	Pharmaceutical manufacturing	1.3 billion USD	100%
Zhejiang Yankon Group Co.,Ltd	600261 .SHA	04/03/2008	60150	证券时报	浙江阳光投资 298 万美元在美设子公司	Belgium	Greenfield Venture	-	Computer, communication and other electronical device manufacturing	2.98 million USD	100%

Appendix B. Examples of Chinese firms' environmental violations announcement

Event No.	Final Announcement Date	Stock Code	Industry	Company Name (English)	Violation Category	Brief Content	Record Source
14	28/12/2007	000039.SHE	Metal Products	China International Marine Containers (Group) Ltd	Water	直接向环境排放水污染物超过本市规定的排放标准，严重污染水环境。违反水污染防治管理规定	2007 年第二批本市环保系统查处违法企业名单，2007-12-28，上海市环保局
1113	05/01/2012	600332.SHA	Pharmaceutical manufacturing	Guangzhou Baiyunshan Pharmaceutical Holdings Co., Ltd	Others	2011 年行政处罚案件统计表: 超标排放	2011 年荔湾区环保局行政处罚案件统计表，荔湾区环境保护局，2012-01-05
1408	01/07/2008	600691.SHA	Raw Chemical Materials and Chemical Products	Yangmei Chemical Co., Ltd.	Gas	晋城市 2008 年度第一批环保限期治理: 锅炉烟气脱硫除尘治理	晋城市人民政府关于下达 2008 年度第一批环保限期治理任务的通知，晋城市人民政府办公厅，二 OO 八年六月十四日