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A Literature Review on Green Supply Chain Management Adoption Drivers

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Abstract. *This article provides a systematic literature review of the driving factors influencing the application of green supply chain management (GSCM). The GSCM adoption issues have been widely given attention by researchers and practitioners since the adoption of GSCM would impact significantly on an organization's environmental, social, and financial performance. Most GSCM adoption has been discussed in the perspective of logistics management activities such as procurement, manufacturing, transportation, and reverse logistics. Nowadays, the discussion of GSCM adoption in terms of the driving factors affecting a successful GSCM application has led to complexity. In this article, a further review and discussion are conducted in terms of the driving factors dealing with GSCM adoption, including three major points, such as the driving forces of green procurement, green manufacturing, and green distribution and reverse logistics adoption. The driving factors are reviewed to highlight the recent factors affecting GSCM adoption. In this article, 94 papers from the past study are presented, associating each point of the discussion.*

Keywords. *supply chain management, drivers, logistics, remanufacturing*

I. INTRODUCTION

Green Supply Chain Management (GSCM) or known as an environmental innovative supply chain, has the aim to consider the involvement of the environment in supply chain management. As the reason for sustainable environmental responsibility, most firms presently believe that considering GSCM is a must. They currently understand that adopting the principle of green aspects in their adopted technology would gain significant benefits and positive impact on the supply chain network, from the point of supply (supplier) to the point of consumption (end-customers). As the awareness of the application of GSCM on the businesses, accredited GSCM has been done by leading SCM communities or organizations, which tends to become a trending and a hot discussion topic by researchers and practitioners. Most research about GSCM that had been done previously is focusing on the involvement of the environmental aspect and social sustainability in the application of operation management and supply chain. The results from previous researches show that there are two categories of GSCM research topics, namely the GSCM framework and performance measurement (Ninlawan et al., 2010). The focus of GSCM framework research is discussing the ways to improve the level of collaboration and relationship between producers and suppliers. It also explores the gaps between the conceptual framework and reality. Moreover, it focuses on the development and comparisons present alternatives of GSCM system and decision variables determination or the driving factors in GSCM adoption in order to obtain high performance of SCM (Zhu et al., 2010). Meanwhile, most studies about GSCM performance measurement discussed a set of measurements to measure the effectiveness and efficiency of an organization's performance of the adopted GSCM system or to determine the variables that have the most beneficial level of GSCM performance (Hervani et al., 2005).

In the last few years, prior research indicated that the area where GSCM performed and the driving factors in GSCM adoption shows diversity. In the context of GSCM conceptual framework, many kinds of literature discussed the driving factor of GSCM practices in term of green procurement (Appolloni et al., 2014), green manufacturing (Chuang & Yang, 2014; Ghazilla et al., 2015), green distribution (Strömberg et al., 2015), and reverse logistics (Akdoğan & Coşkun,

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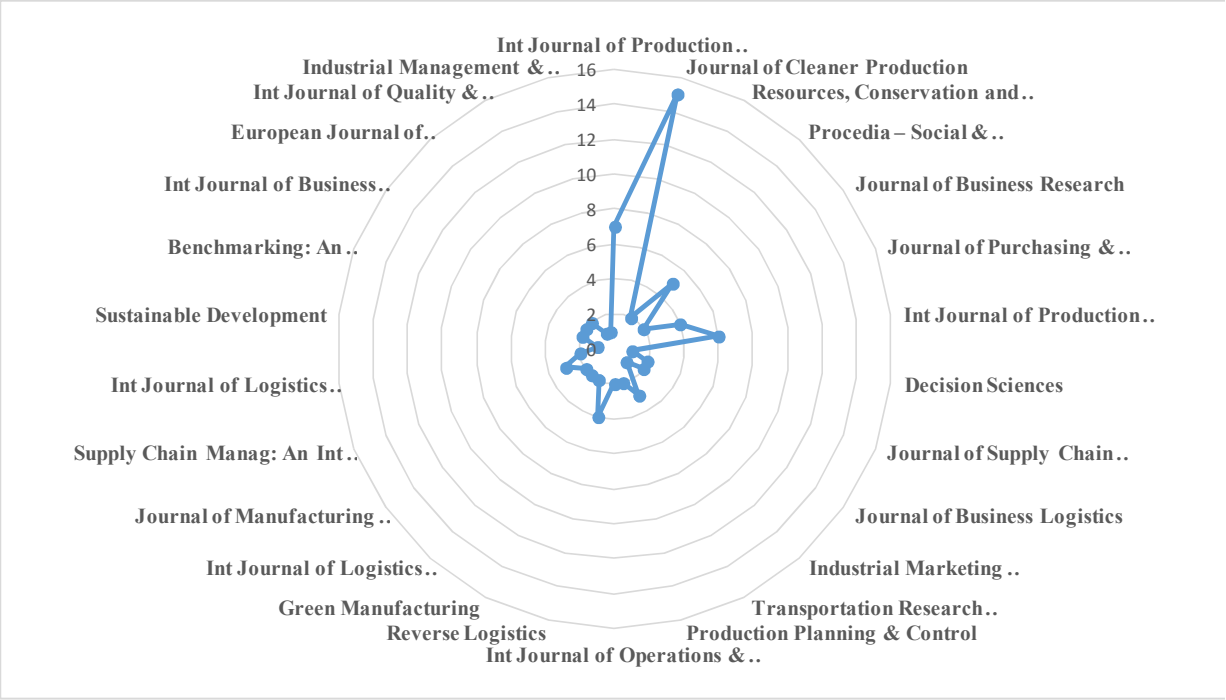

Figure 1. The distribution GSCM article in journals

2012). A comprehensive review was presently done by Munim et al. (2018), which used a bibliometrics approach to review the GSCM literature. Their study used bibliometric analysis that focuses on the most- cited and impact of the citation. Meanwhile, summarizing the existing article of GSCM driving factors and key issues using systematic and content analysis that focuses on the GSCM theme and timeline to suggest for future research direction is still limited.

Thus, this article conducts a systematic and content analysis review of the influential factors or critical factors affecting the application of green supply chain management in terms of green procurement, green manufacturing, green distribution, and reverse logistics. Ninety-four papers related to green SCM practices have been collected from peer-reviewed international journals, articles, and thesis. The rest of this study is structured as follows: section two presents the methodology of this article, section three maps the results of the literature review of GSCM themes and timeline. At the end of the article, we conclude and identify some potential issues and future research directions.

II. Research Method

The systematic and content analysis method is used in this article for reviewing literature. This method is used in some studies, and it is an approach to gather valid data by the purposes of providing new insights, comprehensive understanding for readers and researchers, and managerial or practical actions (Krippendorff, 2004). A prior study by Agrawal et al. (2015) also applied this method to analyze the present progress in research and practice in reverse logistics. Furthermore, Melo et al. (2009) applied this approach to review location-allocation models from the perspective of SCM. Content analysis was also used in the literature review article about the integration and implementation of SCM practices from a strategic perspective by Power (2005).

The review limits the published literature, including thesis, proceedings of the international conference, and online articles from well-known search engines e.g., Google Scholar, Science Direct, Emerald Insight, etc. Keywords such as 'SCM', 'sustainable supply chain', 'green SCM', 'green procurement', 'green manufacturing' have been

used to find the literature. From the first collection of the articles with the keywords, there are 371 articles found in the topic of SCM, sustainable operations management, and business logistics, and it reduces to 94 articles related to green SCM. The selected journal articles are then sorted by looking at the contents of the article explaining the driving factors affecting the adoption of GSCM, and it is finally found 78 literature were used as references.

The distribution of the 78 selected publications form journals that explain the driving factors of GSCM adoption can be shown in figure 1. It is shown in figure 1 that the most journal sources of the selected publications discussing the driving factors of GSCM adoption are from the Journal of Cleaner Production (15 articles), followed by the International Journal of Production Economics (7 articles) and the International Journal of Production Research (6 articles).

III. Result and Discussion

Green Supply Chain Management is known as a newer concept rather than supply chain management. Green Supply Chain Management (GSCM) is sustainable development for an enterprise that has aligned as a new vital, innovative SCM method for every organization to obtain a financial and environmental benefit together to reduce the negative impact and risk in the environment. As Chopra and Meindel (2016) defined supply chain management as the involvement of all parties like suppliers, manufacturer, distributor, wholesaler, distributor, retailer ect., the adding "green" in SCM encompass a set of green activities in all those SCM's activities (Wisner et al., 2012).

A prior study that discussed the adoption of GSCM is great in number, specifically in the topic of the conceptual framework and business processes. For example, a study about the conceptual framework in GSCM has been conducted by Chin et al. (2015), who analyzed the relationship between GSCM practices and the performance of environmental collaboration and sustainability. The practices of GSCM involved green procurement, green production, green distribution, and reverse logistics, while sustainability performance includes environmental, the performance of social and economic.

Comparison of the benefit of the adoption of the green supply chain (GSCM) and supply chain management (SCM) have been studied by some researches. In the area of the economic implication, it shows that there is a significant relationship between the adoption of green manufacturing and green logistics, which are part of GSCM elements, and the organization's financial performance (Tippayawong et al., 2015). It is also relevant to the research by Yee Phuah (2015), who found that the major objective of adopting GSCM is achieving all balance of financial performance and environmental supply chain performance.

According to the literature review, there are many points of view related to determining the dimension need to be involved as applying GSCM. Lee et al. (2012) believed that GSCM practices should include strategic and operational corporate strategies such as internal environmental management, green purchasing, customer relationship management, and eco-design. Then a study by Green Jr et al. (2012) suggested that GSCM practices need to include internal environmental management, green information system, green purchasing, eco-design, and investment recovery. Moreover, there are four dimensions of the GSCM application that need to be considered such as green procurement, green manufacturing, green distribution and reverse logistics (Ninlawan et al., 2010; Thoo et al., 2014).

In green procurement (GP), the driving factors of GP adoption is defined as the boosters that motivate an organization to adopt GP (El Tayeb et al., 2010). Previous researches that discuss green procurement are numerous, for instance, Zhu & Geng (2013), who believed that the discussion of the drivers for green procurement adoption is still a hot issue, especially in developing countries. Another study found five driving factors of GSCM adoption were identified, such as GSCM capabilities, the purchasing/procurement strategy, the commitment to the environment, the assessment of green suppliers, and the level of

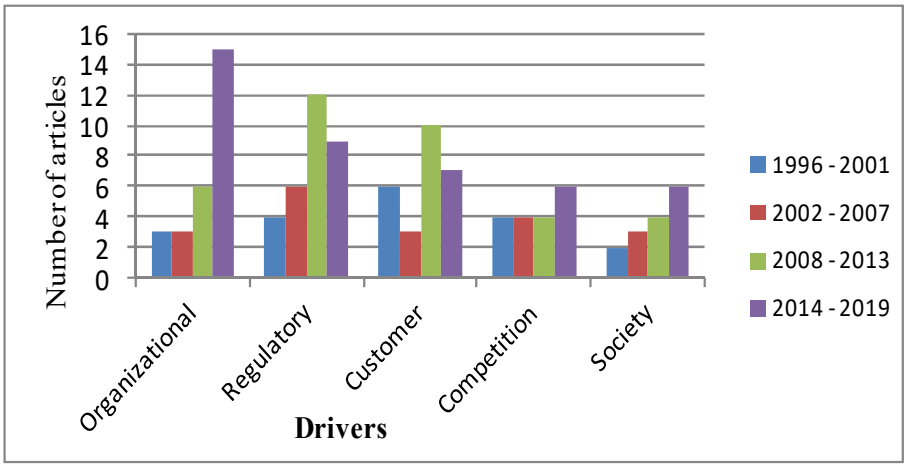

Figure 2. Articles dealing with drivers of adopting green procurement

green supplier's collaboration (Large & Gimenez Thomsen, 2011).

Two types of driving factors for the adoption of green procurement is categorized based on internal and external factors. Internal driving factors, according to some previous studies, are concerned with organizational factors, while external factors are driven by some variables such as regulation, customers, competition, and society (Walker et al., 2008). In more detail, the internal drivers deal with cost reduction (Carter & Dresner, 2001; Green et al., 1996; Preuss, 2005; Zhu et al., 2010), economic benefits (Giunipero et al., 2012) and also the commitment from managerial staff and organizations stakeholders such as inventors and suppliers to involve environmental perspective on supply and buying activities (Walker et al., 2008). In the process of the supply sector, the decision to procure things for the organization is affected by the government law or regulation in terms of the environmental standard requirement (Chan et al., 2012). Moreover, the customer is the other vital driving factor affecting green procurement adoption. Customer is an important driving factor for the firms' performance. Their decisions for not placing the order of the products of the firms which ignoring environment concerns in the procurement activities would lead to a serious problem on the financial performance of the firms. Moreover, some literature believes that customer and society together have forced management to consider when adopting green procurement. For example, Björklund (2011) and Cousins et al. (2004) in their studies indicated that the image of the firms and their reputation on the environmental green procurement activities would play a significant role for customers in the decisions or the willingness to buy the products of the firms. Society awareness of the issue of environmental the firm's activities of procurement is the most influential driving factors identified when the firm adopts green procurement.

Appolloni et al. (2014) made a fundamental review of prior studies on green procurement between 1996 – 2019 based on five major categories proposed by Walker et al. (2008), as shown in Figure 2 such as organizational reasons, regulatory/law, customer, competition and society. Organizational reason refers to the internal variables of an organization affecting green procurement adoption, such as managerial intention and initiative (Masudin et al., 2018). The regulation factor refers to the government's law regarding incentives and benefits for an organization that apply green procurement (Zhu et al., 2013). Customer, competition, and society, which refers to external pressures, are the most factors considered for firms to adopt green procurement (Appolloni et al., 2014).

Table 1 shows that there are numerous articles discussing drivers of green procurement implementation. Including the previous literature review made by Appolloni et al. (2014), which reviewed articles dealing with drivers in adopting

Table 1. The article dealing with drivers on implementing green procurement

Author	**Internal**	**External**			
	Organiza-tional	Regula-tory	Custo-mer	Competi-tion	Society
Green et al. (1996)	√	√	√		
Lamming & Hampson (1996)			√	√	
Carter & Carter (1998)		√	√		
Carter et al. (2000)				√	
Carter & Dresner (2001)	√	√	√		
Min & Galle (2001)		√			
Carter & Jennings (2004)	√	√			
Cousins, Lamming (2004)					√
Preuss (2005)		√			
Chen (2005)		√		√	√
Zhu & Sarkis (2006)		√	√		
Zhu & Sarkis (2007)		√	√		
Walker et al. (2008)	√	√	√	√	√
Haake & Seuring (2009)	√	√	√		√
ElTayeb et al. (2010)		√	√		
Zhu et al. (2010)	√	√			
Björklund (2011)	√	√	√	√	
Sarkis et al. (2011)		√	√	√	√
Dou et al. (2014)		√			
Ruparathna & Hewage (2015)	√				√
Shen et al. (2017)		√	√	√	
Ghosh (2018)	√	√	√	√	
Masudin et al. (2019)		√	√	√	√

green procurement from 1996 to 2013, there are some other research dealing with drivers in implementing green procurement afterward (see Figure 2). Most early research between 1996 to 2000 dealing with drivers in adopting green procurement discussed customer points of view (Carter & Ellram, 1998; Carter et al., 2000). In 2001 – 2005, the discussion about green procurement regarding the drivers of adopting green procurement has changed into a governmental point of view, which is related to regulation and law.

From 2008 until 2013, most discussions dealing with the driving forces for green procurement adoption have not changed a lot comparing to the previous time range, which is regulatory. However, the number of articles concerning the driving factor of customer context on the green supply chain adoption Increases up to 10 papers or climbs to 500 percent as compared to the number of articles between 2002 and 2006. Eventually, the number of published articles discussing the driving factors for green procurement adoption from 2014 to 2019 was indicated increasing significantly. For example, comparing the published articles in 2008 – 2013, the discussion on the driving factor of organizational and social drivers concerning the adoption of green procurement in 2014 – 2019 rises about 175 and 67 percent, respectively. Recently, the most studies of green procurement adoption driver done between 2014 and 2019 dealing with the drivers of organizational factors (Blome et al., 2014; Diabat et al., 2014; Dou et al.,

Table 3. Drivers dealing with reverse logistics implementation

	Driving factors	Author(s)
Internal	Financial reasons	Senthil et al. (2014), Rahman & Subramanian (2012), Álvarez-Gil et al. (2007), Ravi & Shankar (2005), Pulansari (2019).
	Customer pressures	Abdulrahman et al. (2014), Miao et al. (2012), Rahman & Subramanian (2012), ElTayeb & Zailani (2011), Álvarez-Gil et al. (2007).
	Social responsibility	Rahman & Subramanian (2012), ElTayeb & Zailani (2011), Sarkis et al. (2010), de Brito & Dekker (2004).
External	Competition	Senthil et al. (2014), Miao et al. (2012), Kumar & Putnam (2008), Abdulrahman et al. (2014), Jayaraman & Luo (2007).
	Regulations / Law	Abdulrahman et al. (2014), Miao et al. (2012), ElTayeb & Zailani (2011), Kumar & Putnam (2008), Sorkun & Onay (2018).
	Environment	Jindal & Sangwan (2013), Chiou et al. (2012), Rahman & Subramanian (2012), Kapetanopoulou & Tagaras (2011), Chileshe et al. (2018).

2014; Govindan et al., 2014; Hauschildt & Schulze-Ehlers, 2014; Kannan et al., 2015; Masudin et al., 2019; Rostamzadeh et al., 2015; Ruparathna & Hewage, 2015; Testa et al., 2014), meanwhile, prior studies dealing with the society driving factors in the adoption of green procurement can be found in such as Diabat et al. (2014), Hauschildt and Schulze-Ehlers (2014), Kannan et al. (2015), Luthra et al. (2014), Ruparathna and Hewage (2015).

In the context of its contributions to green supply chain management (GSCM) in the present decades, green manufacturing (GM) or green production has become a vital topic that discussed widely by researchers. The main objective of the adoption of green manufacturing is to decrease the negative effects resulted from the activities of green manufacturing applications, while at the same time, it also has the aim to minimize the use of resources. Dornfeld et al. (2013) describe that the involvement of "three R" which consists of remanufacturing, reduce and reuse or remake are important to consider as environmental awareness. Furthermore, most studies that concern to minimize the use of resources when a firm is adopting green manufacturing have a standard measurement such as minimizing the use of fuel while machining, minimizing the use of electricity and energy, selective material handling equipment (MHE) (Saputro et al., 2015) and considering rework-raw material in manufacturing activities. The aims of minimizing the use of resources are reducing the negative environmental impacts on manufacturing activities such as reducing the volume of hazards, wastes, and pollution (Kusrini et al., 2015; Sofyan et al., 2016).

In the adoption of supply chain management, it is clear that the drivers of green manufacturing adoption play an important role. Prior published studies show that the discussion on the driving factors which drives the adoption of green manufacturing activities is widely conducted by researchers and practitioners in terms of the type of factors discussed. Govindan et al. (2015) indicated that there are 12 driving factors that should be involved when a firm decides to adopt green manufacturing. The three of them are such as compliance with regulation, stakeholders, and customers are the most considered drivers. Santolaria et al. (2011) considered the driver of integrative eco-design as the considered driver of green manufacturing adoption, while Wu and Wirkala (2009) and Agan et al. (2013) stated that the driving force for a firm to adopt green manufacturing are regulation and customer, competitor and investor pressure. Meanwhile, Routroy (2009) and Chuan and Yang (2014) have different findings in their research. They believed that the government's commitment, top management awareness, green sourcing, green operations, green packaging, reverse logistics, and

eco-design are the important driving factors of the adoption of green manufacturing. Previous studies discussing green manufacturing drivers can be seen in Table 2.

The dominant drivers of the adoption of green manufacturing are different based on the size, level, and location of the firms. For example, previous studies discussing the driving factors of green manufacturing adoption for a prior study dealing with the drivers of the adoption of green manufacturing in Small Medium Enterprises (SME) in Malaysia shows that the most affected drivers when a firm applies green manufacturing are regulation, financial issues, environmental knowledge, innovation, and public/customer awareness (Ghazilla et al., 2015). Moreover, a study in the developed country, Spain, that has been done by Cuerva et al. (2014) indicated that green manufacturing adoption for SME is dominated by drivers of green innovation. The results of that study also show that other drivers considered by a firm in the developed countries are financial constraints, regulation, and competitors. In the other sector of green supply chain management, the considered factors for firms to increase their performance in environmental aspect are eco-packaging, environmental distribution, and wastes management (Rao, 2002). Moreover, Saridogan (2012) designed a model of the impacts of green supply chain management adoption by reducing the costs of distribution from the context of fuel consumption, maintenance, repairing, and expenditure. In their study, there are five dimensions considered in the adoption of green supply chain management, like environmental distribution, eco-friendly supplier selection, supplier's EMS (environmental management system) establishment, minimizing vehicle movement, and reverse logistics. These five dimensions are utilized as independent variables, which affect the moderator variables such as fuel consumption, maintenance, repairing, and expenditure. It finally affects the dependent variable, which is transportation cost reduction (TCR). Previous green distribution studies, which include the discussion of energy, emission, and fuel consumption, was also developed by Demir, Bektaş, & Laporte (2014). It concluded that the level of planning of road for freight transport contributes to fuel consumption, energy, and emission. From the perspective of operational transportation planning, the implementation of the transportation routing problem (TRP) is presently concerned with energy, gas emission, and the level of fuel consumption. For example, (Palmer, 2007) involved the model of CO2 emission for the problem of routing considering Time Windows (VRPTW). From the study, it was indicated that CO_2 could be reduced by up to 5 percent when the approach is implemented. Moreover, Kim, Janic et al. (2009) determined the relationship between freight transport costs and CO_2 emission, and the findings indicated that the speed and the distance of vehicle traveling are the factors affecting the CO_2 emission.

In addition to the conventional flows of distribution operations, this often causes environmental problems; reverse logistics, which concern with all reverse flows of various products, reuse package, and unsold commercial goods, are also involved in green distribution. The identification of the possible destination of the returned products is the basic concept of reverse logistics, where the activities involved in reverse logistics can be named as repair, re-utilization, reprocessing, recycling, and reuse (Thierry et al., 1995). There two parties which are involved in reverse logistics activities as the products are started to be moved back from the supply chain, and they are the returner party and the receiver party (de Brito & Dekker, 2004). The returner party has the aim to recall product or recovery the value which is related to product's consumers, while the receiver party has the purpose of gaining profit, regulation forces, and social forces.

Prior studies concerning reverse logistics are currently growing in the numerous numbers even though this topic is relatively new as one of the reverse logistics disciplines. It is relatively adopted by limited industries by firms in developed countries, while it is not popularly applied by industries in developing countries (Seitz & Wells, 2006). The driving factors used in the adoption of reverse logistics in this study are based on the findings of de Brito and Dekker (2004), who are categorized the reverse logistics drivers into three

classes: economic reasons (ER), regulation (R) and corporate citizenship (CC). Table 3 shows the distribution of related works of driving factors on reverse logistics. The driving factors considered in the implementation of reverse logistics are categorized into two aspects, which are internal organizational factors such as economic reason, customer pressure, and social responsibility, and external organizational factors as regulations/law and environment.

This literature review article discusses GSCM articles published in the journal outlets from 1996 to present in terms of the driving factors affecting the adoption of GSCM. All the subsections discussed (themes and timeline) in the literature review of this article from 1996 to the present could draw the potential directions for future research. Starting from the timeline of 1996 - 2000, the discussion of GSCM driving factors of prior research focuses on the customer perspective (Carter et al., 2000; Green et al., 1996), while in the period of 2010 – 2016, the issues of the organizational (Rostamzadeh et al., 2015), regulatory (Abdulrahman et al., 2014), society (Ruparathna & Hewage, 2015) and environmental (Jindal & Sangwan, 2013) perspectives were most discussed by researchers, which are worth for further study. In term of the distribution outlet of GSCM publications, the most selected outlets so far (Q1 journal in Scimagojr rank) such as the Journal of Cleaner Production, the International Journal of Production Economics (IJPE) and the International Journal of Production Research (IJPR) would remain the main choice for publishing GSCM article in the future.

IV. Conclusion

Green supply chain management practices have grown progressively as the consideration of adopting GSCM become more complex. The driving factors of the adoption of GSCM are different based on the case study where GSCM performed. In this paper, a review of 78 papers related to GSCM, which are discussed in each content as green procurement, green manufacturing, green distribution, and reverse logistics. Most Researchers agreed that the adoption of GSCM impacts positively on firm performance. To deal with it, it is important to explore the driving factors in adopting GSCM, particularly to those four aspects.

Among the driving factors applied to GSCM practices in previous literature, it can be summarized that the adoption of GSCM impacts firm performance in terms of financial and sustainability performance. In green procurement practice, the driving factors have changed in number in the last decades, where recently, organizational, regulation and society factors are the most drivers considered in green procurement adoption. In green manufacturing, the factors affecting GM adoption are differentiated according to the size of the firms. For instance, financial issues are the most influential factor affecting green manufacturing adoption for SME, while environmental value, product quality, regulations, and customers are the most influencing factors for the large industry in green manufacturing adoption. In green distribution and reverse logistics, economic reason, regulation, and corporate citizenship are the most influencing factors in the green distribution and reverse logistics adoption.

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