GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND DETERMINANT FACTORS: A QUANTITATIVE STUDY ON SMALL AND MEDIUM ENTERPRISES USING STRUCTURAL EQUATION MODELING

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Green Supply Chain Management Practices and Determinant Factors: A Quantitative Study on Small and Medium Enterprises Using Structural Equation Modeling

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ABSTRACT

Considering the prominence of green supply chain management (GrSCM) research has developed expressively in this field. However, there is a dearth of studies from emerging economies comprised of modelling and empirical testing of hypotheses. Moreover, the literature is lacking the empirical evidence on the determinants of GrSCM practices by small and medium enterprises (SMEs) especially in the case of Pakistan. The literature has yet to determine what green practices are being adopted by SMEs in Pakistan, an elucidation why GrSCM practices are adhered, what construct is appropriate to evaluate adoption of GrSCM practices by SMEs in Pakistan, and whether mediation of internal factors exits between the relationship of GrSCM practices and external pressure.

This dissertation uses Structural Equation Modelling (SEM) to investigate GrSCM practices adoption, the appropriate construct for evaluating green practices, and examining three potentially important determinants in Pakistani SMEs. With the data collected in two stages from the SMEs sector of Pakistan, exploratory factor analysis (EFA) revealed a three-dimension structure for measuring the GrSCM practices. Subsequently, the confirmatory factor analysis (CFA) was carried out on two measurement models (i.e. first and second order) of GrSCM adoption based on EFA. The empirically outcomes advocates that both models for GrSCM adoption are valid and reliable, however the second order model has better fit indices. The SEM testing shows significant results for mediation of internal factors in the hypothesized relationship among the GrSCM practices and external pressures. For academicians and supply chain mangers these results yield several exciting theoretical and practical implications.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

This study focused on the issue of green supply chain management (GrSCM) practices implementation and their determinant factors in Small and Medium Enterprises (SMEs) of Pakistan. The overall purpose of this dissertation will be to explore the GrSCM practices adopted by SMEs, and examine empirically the factors (internal and external) that drive the companies to adopt the GrSCM practices. This chapter covers a brief introduction into the study. The growing magnitude of the environmental apprehensions within the business world is presented in section 1.1. Then we will discuss the importance of SMEs and the role of SMEs in Pakistan economy in section 1.4. In addition, we will also discuss the aim of the thesis, and why this thesis is needed in section 1.5 followed by research questions in this chapter.

1.1. Background

Currently, the major global problem is environmental contamination. There are several sources of environmental contamination and degradation, and a significant source is the release of contaminated gases and hazardous operational activities from businesses. In order to reduce environmental pollution, businesses need to integrate green concepts in their supply chains. Moreover, the environmental trepidation has turned into a significant factor in manufacturing and services industries around the globe. Consequently, the attention on GrSCM intensify significantly between the companies around the world. As stated by Srivastava (2007), GrSCM is *"integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product to its useful life"*. Now days to be sustainable in the global market, businesses are experiencing more pressure, to cut costs, to improve reputation and to reduce supply time. By focusing on these goals, the factors influencing the environment

are ignored at many levels of the supply chain. Moreover, the irresponsibility and lack of awareness contributes to the environmental degradation, so there is a need for responsiveness and apprehension towards environmentally friendly manufacturing and services.

As stated by Rao (2002), the major chunk of manufacturing business of the world will be shifted to Asia in near future, and there are many factors contributing to this shift. The current situation is evident of the fact that most developed countries' manufacturing companies shifted their businesses to Asia to gain the advantages of cheap labor, energy costs, location benefits, and to take advantage of fewer environmental regulations. Therefore, to compete globally the proactive thinking and implementation of GrSCM practices is inevitable. With the increased level of manufacturing activities, the GrSCM practices became more important than ever before. Generally, in developing countries many environmental related actions are nonaggressive due to economic insatiability and financial hurdles. Moreover, the financial and social gain realization by companies from these practices are nonexistent in developing countries, that is why it is inevitable to use commercial paybacks to achieve the proper implementation.

According to Bauman (2004) all industries regardless of sector are facing immense pressure for innovation, efficiency, and integrated product development. The supply chain (SC) optimization and development gained a lot of interest over time. Council of Supply Chain Management Professionals, delineates SC management as: *"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies".* This has led to the transformation in companies from

the single-minded strategy of full scale growth to leveraging core competencies to look for reliable suppliers to outsource as much as possible. Therefore, this shift of business operations increases the significance of SC management, which is surrounded by an amplified amount of procurement that is necessary for the process of product development, which results in new issues related to environmental protection and degradation. All SC tiers need to move towards environmental protection. The environmental demission has great capacity to influence organization performance and market share. Therefore, the environmental dimension needs to be part of organization strategy, together with performance related to cost reduction, quality, price and delivery-to-market. In recent times, from the aspects of business management, and customers the inclusion of green practices are growing with in companies globally.

Due to the global and domestic importance of the green concept, legislatures around the world focused more on introducing regulations for businesses to protect the environment. The regulations have been modified to fit the current needs of the environmental conservation and remediation, exerting more pressure on enterprises to enhance environmental performance. Different international rules and regulations, like ISO standards, also made companies manufacturing processes and SC environmentally friendly. Though international laws and regulations exist, the results are inconsistent among nations, especially between developed and underdeveloped nations.

In recent times businesses are more conscious about the environment than ever before. As mentioned by Sarkis (2003) and Shecterle and Senxian (2008), the environmental management concept has already gained importance and acceptance by a majority of industries. Previously, companies only tried to avoid operations that directly violated environmental regulations in order to avoid bans and fines like meeting emission standards and waste management. However,

authorities have been continuously strengthening the rules over time, and the awareness of different aspects of environmental protection and degradation have been key drivers pushing everyone to focus on the environment. Walton, Handfield, & Melnyk (1998) argued that the conceptual understanding and realized benefit of the environmental concept at the managerial level has significantly changed the strategy of environmental performance and related actions for many enterprises. The awareness drives a realization that every process within the supply chain (external or internal) has the potential of breeding a negative impact on the environmental or social spectrum, which requires true initiatives along the internal and external supply chain. Proactive thinking leads to value creation by promising environmental engagements. As mentioned by Zhu, Sarkis, & Lai (2007) there is an increasing requirement of GrSCM to take care of environmental issues. Currently companies consider greening as a competitive edge rather than just for building corporate image, that's why applying the green concept with in any enterprise not only leads to social but also financial gain. According to USEPA (2000) a significant amount of supply chain managers still does not emphasize environmental concerns, despite knowing the many possible monetary gains. The reason for not focusing on GrSCM is the invisibility of many advantages of eco-friendly ingenuities. However, to start operations in environmentally friendly manners, companies need some level of stability in terms of financial health.

1.2. The Importance of GrSCM

GrSCM is a concept that orbits around innovation in SC management to help in protecting, and improving the environmental. A green SC is comprised of different activities to control environmental distortion, these activities range from recycling and reuse to replacement of material used in production of goods and services. SC management performance in the context of the environment can be improved by a proper monitoring system. The process of GrSCM is all about

integrating eco-friendly thinking into traditional SC management and includes product and service design, the process of manufacturing, material selection and resourcing, final product distribution to its user and after the useful life the better management of the product. Hence there are many practices considering the range of different purposes of GrSCM and its management were practiced. The concept of GrSCM is a novel area of study, leading to a dearth of agreement in practice about the green supply chain definition.

In the era of globalization when the end user has multiple options to pick products or services, the behavior of the buyer is a critical factor for any organization to be successful internationally. As buyers become more global they talk and think more about the environment, how one can play a role in preserving nature. This puts pressure on companies to go green, leading to performance improvements for suppliers in terms of the environment. It is now a more social goal for companies rather than cost cutting, reducing risk and building public image. “Going green” is the most commonly highlighted term used in business around the globe. In this era of competition and globalization organizations around the world try to achieve greening in their manufacturing and service operations. Until the early 1990s environmental deterioration was not a concern for the manufacturing and service SC around the world .The greening of SC and the adoption of GrSCM practices received focus by researchers as a result of oil catastrophes in the early eighties with escalated air pollution threats to detrimental point (de Sousa Jabbour et al., 2013; Q. H. Zhu, Tian, & Sarkis, 2012).

According to a study performed by Srivastava (2007), the revolution in SC in the early 1990s made businesses more environmentally conscious. GrSCM sustainability has materialized as an imperative organizational philosophy to accomplish goals in terms of profits and market share by decreasing environmental hazards, improving the ecological proficiency in the SC

partners of organizations (van Hoek, 2000). Multinational organizations have established worldwide supply chains, in-order to take specific advantage of country related industries. Therefore, this topic stands well-timed and indispensable to enhanced organizations understanding of GrSCM practices, and for policy makers to take decision to exert more pressures.

With the increased level of integrated economies around the world, predominantly through movement of capital, goods and services across the globe, and with significantly increased environmental degradation awareness, protection and improvement, the concern for safeguarding the earth's ecological -resources and the trend to adopt greening in manufacturing and servicing has remarkably increased over time, in result growing pressure on organizations in developing countries to mend their processes in order to achieve environmental goals. As stated by Zhu and Sarkis (2006), these pressures and globalization stimulate organizations to improve their performance with respect to the environment. The concern for environmental protection by organizations over the previous ten years is a trend (Sheu, Chou, & Hu, 2005). It is argued by Sarkis and Tamarkin (2005) that globalization is a pressure excreting phenomena for organizations to improve their environmental performances rather than localization. The reengineering of corporations' strategies is being derived from a gradual increase in environmental distress, which become fragment of general corporate culture (Madu & Madu, 2002).

GrSCM has been termed differently at different times, according to Seuring (2004), GrSCM is also known as environmental SC management (ESCM) and sustainable SC management (SSCM). According to Sarkis & Tamarkin (2005), GrSCM pools different actions from introducing green concept in materials management, purchasing, distribution, manufacturing, reverse logistics and Marketing. Additionally, the goal of companies to adopt GrSCM practices is to achieve environmental improvement and to also have financial benefits.

The scope of GrSCM practices is not limited, as argued by Zhu and Sarkis (2004), it comprehend the management of both external and internal environment, design of product and services, and investment recovery.

The aim of this study can be summarized as follows: 1. What are green practices adopted by SMEs of Pakistan in response to green issue; 2. What are the major foreign, and domestic pressures (external) affecting GrSCM practices adopted by the SMEs in Pakistan; 3. The major internal factors affecting GrSCM practices adopted by the SMEs in Pakistan; 3. Is there any mediating role of internal factors in relationship of external pressures and GrSCM practices adoption. According to Rao (2002) GrSCM is starting to get a strong position in many world leading companies but it has not fully spread to small and medium manufacturing and service industries. GrSCM is receiving acceptance and admiration in the Asian region, but immense work and improvement is still needed, as many practices are hindered for various reasons which need to be explored to make environmentally friendly production and services. That is why the inevitability of guidance, direction and most importantly proofs of economic and social benefits are significant for adoption of the green concept.

1.3. The Importance of SMEs

As globalization is a major factor these days which has a direct impact on the economic situation of every country with an increased level of acceptance of liberal ideologies driving global economies to be integrated and inter-dependent, including trade liberalization and the World Trade Organization (WTO) efforts to make free markets, and with progression in communication technology, transportation and infrastructure, globalization has transformed the market competition in a new way both in developed and underdeveloped countries. According to Piore (1984) in the mid-1960s and 70s, SMEs startups had an immense effect on industrial clusters by

increasing the level of production and export capacity. In the late 80s large scale firms introduced more sophisticated technologies to operationalize the concept of mass production and cut costs. Therefore, SMEs at that time were under a lot of pressure to compete in the global market. Despite this pressure a SMEs continued there substantial contribution to the economic development of countries, in Latin America (Peres & Stumpo, 2000), Asia (CFR, 1998), and Europe (Lukács, 2005). According to Bianchi and Winch (2006) ; moreover they have a 90 percent share in the total number of firms, 40 to 70 percent of employment and an almost 30 to 60 percent share in gross domestic products (GDP).

According to Cowling and Sugden (1999) the foremost cause of countries having aggressive SME participation is to stimulate domestic development by a collective network of actions and most importantly SMEs bring together a greater number of individuals, who take up economic responsibility and values more as core competencies and this type of planning is key for an effective and efficient society (Cooke & Wills, 1999). It is largely believed that the flexibility of SMEs compared to large scale manufacturing companies is superior due to the fact that they are less likely to be effected by macroeconomic turmoil. According to Lages and Montgomery (2004) SMEs play a vital role in supporting markets during recessions, when domestic growth shrinks at large. Globally the definition of SMEs varies and there is no consensus on one definition as some deliberate the classification on the number of employees (Lages & Montgomery, 2004), while some take into account financial resources to classify the SMEs (Goldberg & Jonsson, 2009). SMEs are independent companies and the number of employees and financial resources classification varies across the globe. According to the European Union classification SMEs should have < 250 workforce, whereas the US cataloguing requires < 500 workforce, in short, the classification is a domestic phenomenon that is being determined by many countries differently.

1.4. SMEs and Pakistan

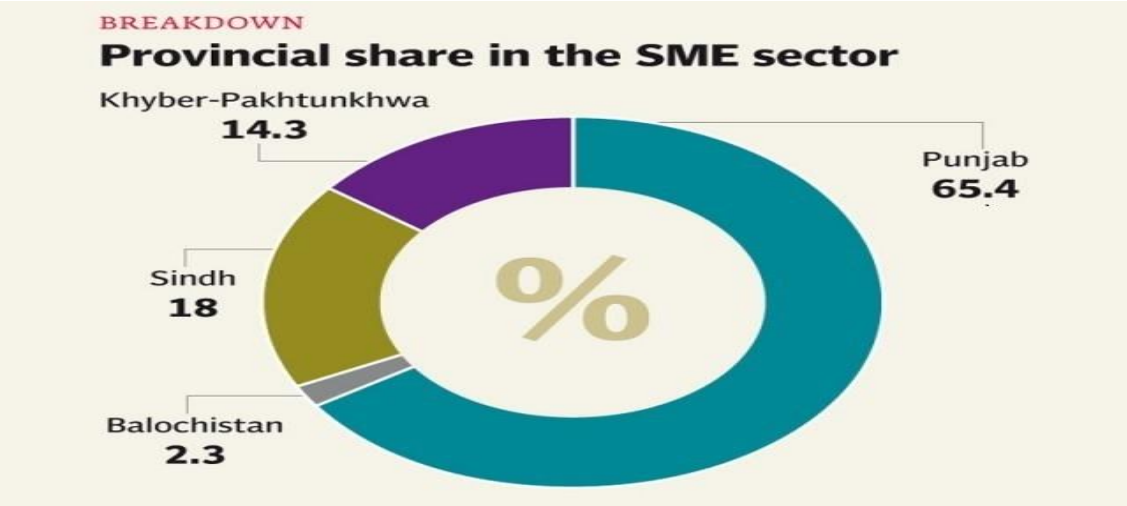
Historically in Pakistan many different classifications have been used for firm size by chambers of commerce and industry, banks, State Bank of Pakistan (SBP), and security and exchange commission of Pakistan (SECP), etc. In recent times a widely accepted definition for SMEs by the Small and Medium Enterprise Development Authority (SMEDA) was developed, this definition is provided in National SME policy 2007, *"The policy defines a manufacturing concern with less than 50 full-time employees and productive assets of Rs30 million, a service provider with less than 50 workers and productive assets of Rs20 million and a trader with less than 20 employees and productive assets of Rs20 million as small enterprise" and "a manufacturing unit with 51-250 employees and productive assets worth Rs30-100 million, a service provider with 51-250 workers and productive assets of Rs20-50 million and a trader with 21-50 employees and productive assets of Rs20-50 million falls in the category of medium enterprise*". SMEs in Pakistan comprises of different clusters as shown in table 1 below but not limited.

Table 1

SMEs clusters in Pakistan

SMEs Sectors	
Fisheries	Sports goods
Livestock and Dairy	Household
Gems and Jewelry	Textile
Horticulture and Agriculture	Handicrafts
Leatherwear	Marble and Ceramics

According to SMEDA, the estimated number of SMEs in Pakistan is 3.2 million and they have quite a large share in the export of the country estimated around 40 % of total exports from Pakistan. SMEs have a very significant role in the Pakistan economy and are spread all over the country.



(Tribune, 2014)

Figure 1. Provincial share in the SME sector

The share of SMEs in different regions of Pakistan is shown in Figure 1, the Punjab province has the largest share with 65.4% and Baluchistan has the smallest share with 2.3% of the total SMEs in Pakistan. The important observation regarding export percentage as compared to neighboring countries such as Pakistan and Pakistan is very interesting, Pakistan's SME sector is contributing 30% to Pakistan's total exports while Pakistan's contributes 68 % and Pakistan's contributes more than 40 %. According to SMEDA many factors cause problems for SMEs these include technology up-grades, finance, employee training, lack of market information and regulatory hurdles. Many SMEs lost their exports, due to unawareness of international environmental regulations for example international environmental standards ISO 14000 certificates, as a result many international companies suspended their dealings with many of Pakistan's SMEs. Moreover, other laws such as child labor also had a major impact on SMEs business. Now SMEs have realized that without taking major environmental action in their operations they cannot compete in the market.

In Asia, the importance of SMEs cannot be ignored as they are critical factor in advancement of newly industrialized countries, they have been very helpful in generating employment, equal distribution of economic resources to the lower end of society to reduce poverty, contributing in export growth and most importantly contributing to development of entrepreneurship not only in urban areas but also in rural areas. The importance of SMEs cannot be ignored by any country as they are spread throughout rural and urban areas.

The SMEs in Pakistan are mostly engaged in production of consumer products; for example, leatherwear, sports goods, household goods, clothing, handicrafts, furniture and goods related to agriculture. The SMEs are considered as the back bone of the Pakistan economic structure. Rural areas of Pakistan mostly have small and medium companies with a large amount

of land, the urban areas also follow the same pattern accept the amount of land occupied by these companies is smaller. Overall the Pakistan industrial landscape consists of large, small, medium, and cottage industries. Early in the 1990s it was apparent that SMEs plays important part in the development of newly industrialized countries of Asia due to their flexibility. Meanwhile Pakistan also realized the importance and recognized the international trend that economic stability and development lies in strengthening a countries SME sector. In order to formalize, and centralize the affairs related to SMEs, Pakistan established SMEDA in 1998. This authority has been assigned broad and multi-pronged obligations. SMEDA is the apex body for SMEs in Pakistan and has enough power and leverage to play its role for the development of both public and private sectors, and to address diverse issues related to SMEs.

SMEDA continuously engages in examining worldwide developments, national rules and policies, and other macro and micro factors effecting SMEs in Pakistan, so that appropriate steps and guidance may be provided to create a conducive and favorable business environment. It has very strong interactions with all most all industrial sectors including Surgical, Fisheries, Textiles, Leather, Marble & Granite, Gems & Jewelry, Furniture, Light Engineering and others, in-order to identify problems and help SMEs implementing different business strategies. One of the very important roles played by SMEDA is to help in creating networks and match-making openings between related stakeholders (SME development report, 2010-11).

For developing countries like Pakistan, there is a scarcity of multinational or big enterprises to support the economy and industrial development, the SME sector plays a vital role in industrial development. According to a report of SMEDA approximately 90 percent of the enterprises in Pakistan fall under the category of SMEs, and have an employment share of almost 80 percent of non-agricultural labor in the country. They also claim that in GDP the participation of SMEs is

approximately 40 percent. However, SMEs face a lot of problems due to inherent characteristics, and the problems include technical upgrades, marketing, financing and human resource development. SMEs are one of the burning topics in underdeveloped counties, and how the rapid growth of SMEs effects the ecological landscape of the countries. It is true that in underdeveloped countries laws related to the environment are weak and their implementation is almost non-existent, which plays a significant role in environmental degradation. Therefore, many stake holders such as importers, the community, and end users pressurize the companies significantly to adhere to green regulations and feel responsible for the environment.

1.5. Problem Discussion

Currently to gain competitive advantage companies modifying their business strategies and greening their operations. Moreover, focusing more on outsourcing and strengthening their supply chains. With the inclusion of too many players and an increased level of activity companies must be aware of external and internal aspects that have potential to affect their business and their competitiveness.

Environmental problems, buying behavior, and social change processes bring new challenges for established businesses (Hutchinson & Quintas, 2008). It is believed that the environmental degradation is mostly a result of manufacturing and logistics activities such as depleting natural resources, ecological disruption, and waste (Fiksel, 1996). Therefore, many green practices are adopted by companies to protect the environment such as recycling, waste reduction, reuse of materials, and green transportation. Moreover, companies are now also focusing on green procurement. The highest pressure falls upon the green procurement, which has been the most neglected green practice (Green, Morton, & New, 1998) . According to Rao (2004), the literature predicts that the major chunk of manufacturing activities of the world will be shifted to Asia, the

SMEs will be major stakeholders of this manufacturing as sub-contractors of large companies. The aim of this study is to explore the GrSCM practices and their determinants in the SMEs of Pakistan. Since 2000 the literature on GrSCM has grown significantly, but there is a dearth of studies explaining determinants of green practices, and the role of external pressures as foreign and domestic, internal factors, and study the mediating role of internal in hypothesized relationship. .

The involvement of SMEs in green practices is usually carried out in the role of a business partner, such as a supplier or distributor (R. Mohanty & A. Prakash, 2013). In previous literature many researchers strived to explain and give a definition of GrSCM, famous among these are Srivastava (2007) , Vachon (2007) and Kuei and Lu (2013). However, there are few studies in developing countries especially in new emerging economies. The empirical confirmation is very limited on the determinants of GrSCM, the evidence which is present in the literature mostly comes from developed countries, in particular the United States of America and Australia (Wu, Dunn, & Forman, 2012). Moreover the evidence from emerging economies is very limited ((Varma, Wadhwa, & Deshmukh, 2006);(R. Mohanty & A. Prakash, 2013)), and almost non-existent in Pakistan. Another trend that is very common in all literature of GrSCM is that most of the researchers studied large companies, however there is little research carried out on small companies (Sarkis,(1999); Rao (2007); Zhu, Geng, Fujita, & Hashimoto (2010); Mohanty and Prakash (2013). The Majority of research concludes that GrSCM is an instrument for long-term development of green supply chains. According to our knowledge few researchers found external pressure to be a significant cause for adoption of GrSCM practices, those that did include Liu, Yang et al. (2012) and Zhu, Sarkis, & Lai (2008). A study by Mohanty and Prakash (2013) on micro, small and medium enterprises found external pressure as a significant driver for green practices. Similarly, internal factors were found significant by Zhu, et al. (2008), Liu, et al.

(2012), and Mohanty and Prakash (2013). The demographic aspect has been under study by a lot of researchers, however studies classifying companies based on nature of business and size of assets have only been carried out by Rao (2007) and Mohanty and Prakash (2013).

There is a dearth of studies from emerging economies that are comprised of modelling and empirical testing of hypotheses and there has been no such study on the SMEs sector of Pakistan on determining forces to adopt green practices, therefore inorder to fill this gap and increase literature related to developing countries, particularly related to small and medium enterprises of Pakistan. This will be a very important contribution as many Pakistani companies are recognized as world class and major exporters of agricultural, leather, sports, and textile products. The suppliers of these large companies are usually fall under the category SMEs, when they initiate greening processes they have direct impact on operations of SMEs (R. Mohanty & A. Prakash, 2013). The SMEs are playing pivotal part in Pakistan's socio-economic development. According to Shaikh, Shafiq, & Shah (2011), SMEs in the rural area of Sindh Pakistan contribute 45 % of the total export of the province. However, they are also considered a major contributor of environmental degradation, the compliance rate of SMEs to the rules and regulation are considered very low as compared to large companies where command and control systems are organized and monitoring is strict. Therefore, a proper check and balance system for SMEs related to environmental protection is important. The negligence of environmental considerations by SMEs may be a result of many factors such as absence of awareness, dearth of financial resources, and absence of empirical evidence of the benefits related to the greening of activities. Mostly SMEs in Pakistan are non-ISO certified but the trend of obtaining ISO certification is growing as SMEs realize that when exporting, to enhance their image and to be a partner of large companies, they need to take greening measures. The SMEs that exist as suppliers or suppliers of the suppliers need

to be green in-order to make the production process completely environmentally friendly. Pakistan considers SMEs as a back bone of its economy but they are less inclined to greening their operations. Consequently, the broad determination of this dissertation will be to probe the Pakistani SMEs conforming to different green activities. It is also pertinent to judge the GrSCM practices by their effectiveness in delivering ecological assurance and also meeting the expectation of stakeholders.

1.6. Purpose

Considering the prominence of GrSCM practices and the drivers which are compelling organizations to adopt green practices, specifically in developing countries like Pakistan, to our knowledge there is lack of investigation on SMEs of Pakistan. This subject requires further attention and investigation to help managers in the area to be able to make robust decisions based on empirical evidence. In-order to encourage small and medium businesses in underdeveloped countries, especially in Pakistan, it is significantly imperative to understand and comprehend the driving forces for companies to adopt green initiatives. Moreover, empirical evidence will help companies to recognize the prominence of green practices and how to develop a competitive advantage to benefit their business by adopting green practices. As highlighted in the preceding section the largely this dissertation will explore and gage the determinants of the GrSCM implementation, and to determine the mediating effect of internal factors in a relationship of external pressures with GrSCM practices, and to understand the managerial implications. More specifically, we will explore the relationship between major international and domestic external pressure on GrSCM practices in the SMEs sector of Pakistan, and will also explore and test the relationship of internal factors to GrSCM practices. Moreover, we will also look for the mediating effect of internal factors on GrSCM.

There is no specific study available on Pakistan. Thus, this dissertation will be a significant contribution to the literature associated to GrSCM practices and the effect of external pressures and internal factors in the SMEs sector of Pakistan. The dissertation will help SMEs with scarce knowledge of GrSCM practices affected by external pressures and internal factors. Moreover, it will play a useful role for government, regulatory establishments, and eco-consultants to build up the advice, strategies, and progress towards ecologically sustainable industrial development in Pakistan.

1.7. Research Questions

The objective of this dissertation is to probe the GrSCM practices and examine empirically the external pressures and internal factors that motivate the adoption of these practices in the SMEs sector of Pakistan. There are four main questions to be answered regarding GrSCM practices and their determinants in the SMEs sector:

1. What are the GrSCM practices adopted by the SMEs in Pakistan in reaction to the greening problem.
2. What are the most important external pressures affecting GrSCM practices in the SMEs sector of Pakistan?
3. What are the major internal factors affecting GrSCM practices?
4. Is there any mediation by internal factors in a relationship of companies' external (Foreign and domestic) pressure and adoption of GrSCM practices.

CHAPTER 2. LITERATURE REVIEW

This section includes brief review of the past work done in the field GrSCM practices. We will briefly discuss the SC management, motives for the GrSCM, GrSCM and product life cycle, and building an environment friendly supply chain. This section concluded with present standing of research and identifying research gaps some of which will be filled by this research.

2.1. Supply Chain Management

In the era of extreme competition, the integration among the suppliers and clients plays vital part in the progress of companies. Often companies try to cut costs, increase efficiency and transfer savings to customers. In-order to take full advantage of suppliers, companies need a formalized process known as a SC. Initially the concept of SC appeared aimed at managing the supply of raw materials, as the early focus was on management of inventories, specifically raw materials but later on due to its competitive importance it started growing from supplier to end-users and adding more diversity and complexity. Mentzer et al (2001), define SC as: *"A set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer"*. The SC is present at all times in business, its management requires great determination due to its complexity (Mentzer et al., 2001). SC management consists of many integrated and formalized activities, the activities consist of procuring raw materials, manufacturing, assembling, inventory control, order taking, distribution and logistics, and supply to the final customer (Markovits-Somogyi, Nagy, & Török, 2009).

In the beginning the SC was introduced to bring together vital business processes aimed at adding value for buyers. In modern days the supply chain has been modified significantly for different strategies of manufacturing and distributions companies (Wallerius & Zakrisson, 2010).

Now a day's companies are keeping their core competencies with in organizations and outsourcing almost all other processes, which ultimately raises the demand for SC management in the companies. The SC management is defined by council of supply chain management professionals as *"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies"*.

The SC has been segregated into three distinct categories, a. Traditional SC, and b. The extended SC, and c. The ultimate SC. The traditional SC explained by Mentzer, et al., (2001), the two way movement between supplier, manufacturer and customer. Traditionally it is based on operational cooperation between supplier and customer in-order to complete the required demand for the product. The demand from the customer is communicated through the reverse supply chain that leads to product manufacturing or order fulfillment from the warehouse to the desired customer.

Beamon (1999) define the extended SC as one which considers green practices in its processes from manufacturing to procuring of raw material; and disposal. However Mentzer, et al.(2001) defines the extended SC as one in which there is two way (up/down) movement of information, products and finances between instant supplier of supplier and instant customers of customer (see. Fig 2).

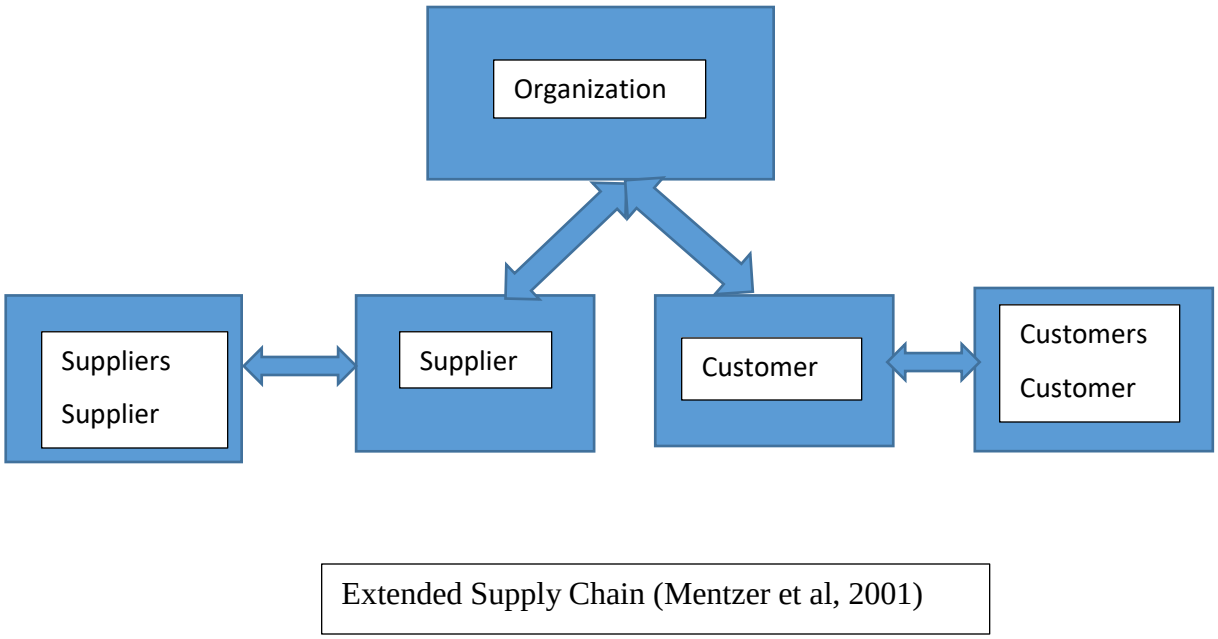


Figure 2. Extended supply chain

Similarly, Mentzer et al, (2001) argued that the ultimate SC is one in which all organizational processes from final supplier to final customer stream both directions (up/down). The organizations that have adopted SC management have shown significant enhancements in operational efficiency, resulting in huge cost savings (Stadtler, 2007). The concept of lean manufacturing together with supply chain management helped in achieving the goal of waste management which leads to environmental improvement. On the other side of the picture when companies are calculating the benefits of a traditional accounting system it ignores the cost that companies are generating in terms of environmental degradation. In-order to keep track of the environment and reduce pollution there is a need for more extended supply chains known as green supply chains to accomplish the goal of environmental protection.

2.2. Green Supply Chain Management

As stated by Srivastava (2007), environmental concerns are missing in the traditional SC as companies were focusing on cost reduction techniques and methods and ignoring the issues regarding the environment. To address the issue of the environment the old-fashioned SC was remodeled by researches and companies to include the environmental dimension. With the integration of markets and globalization the pressures on companies from the external and internal environments significantly increased to follow green SC practices (Q. H. Zhu et al., 2008). As a result of pressure exerted from different sources the curiosity to adopt and implement the needed practices rose over time. GrSCM is described as *"integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product its useful life"* (Srivastava, 2007). GrSCM helps in reducing air, water and land contamination by continuous improvement of manufacturing processes (Johansson & Winroth, 2009). Green production is a complex phenomenon, comprised of many challenges such as satisfying customer demand for environmentally friendly products, considering environmental factors while purchasing raw materials and increasing efficiency (Richards, 1994). According Network (2001), GrSCM includes multiple tactics to engage suppliers and customers to achieve environmental performance see Figure 3.

➡	Efficiency in production (Reducing raw material)
➡	Environmental regulations compliance by company itself and its supplier.
➡	Collaboratively developing new methods, process and products to solve environmental issues.
➡	Demanding certificate of environment compliance by suppliers and making it sure that they are implementing environment management method.
➡	Taking steps to coach suppliers how to preclude pollution, use of material and design for dismantling.
➡	Recruiting supplier's assistance to solve environmental issues in process or product development.
➡	Appraising suppliers' agreement status on environment.

Figure 3. Targets of SC environmental management (Green Business Network, 2001)

With the increased level of coordination among different industries and customers, establishments are now responsible for social and environmental performance of their suppliers. There are different internal and external sources exerting pressure on companies to go green such as top management, employees, nonprofit organizations working for the environment and governments (Q. H. Zhu & Sarkis, 2006). Zhu & Cote (2004) argued that the objective of GrSCM is to balance business factors such as marketing performance with the environment. It brings new challenges for organizations from controlling pollution and energy management to keeping the financial performance in check. Broadly speaking, GrSCM is more an ethical issue then a financial issue, it caters to the concept of sustainable development. Sustainable development means that

financial objectives are achieved along with social and environmental objectives. This concept also branded as the triple bottom line and it is considered as an important feature of GrSCM.

The Triple bottom line framework includes ecological, social and financial dimensions for sustainable development, these are also known as the three pillars of sustainable growth (see Fig 4). Traditionally the bottom line for companies is profit, whereas the environment and social aspects were never under discussion. The triple bottom line brings two more bottom lines such as environmental protection/improvement and social aspects of businesses (Elkington, 1999). Now corporate performance not only means the benefits a company generates for shareholders but it accounts for all stakeholders either direct or indirect. Broadly, sustainable development understood as phenomena of growth that doesn't compromise the future generations' need in the process of meeting today's needs and considering the environment as a major aspect in economic and policy development (Brundtland, 1987). Accordingly, research on sustainable development includes biological sustainability, viable resource use which doesn't harm the environment, proper waste management and sustainable social development.

In developed regions of the world the environmental concerns derive from depletion of natural resources and the hazardous emissions from large production activities, and their threats to the global and domestic environments. Similarly, in developing economies, where population and economic growth are expected to be very high in the future, there is a need to reevaluate companies' development approaches within the parameters of environmental regulations.

2.2.1. Motives for GrSCM

In the 21th century companies were more focused on vertical integration (forward and backward), therefore manufacturers have motives to own suppliers and distributors in order to cut the manufacture cost, distribution cost, and to achieve greater efficiency. But this trend can no

longer be considered as a sustainable strategy, so companies shifted to a new strategy of outsourcing and they tend to depend more on the suppliers for enhancing quality, achieving efficiency, competitive pricing and reducing product time to market. Therefore, the heavily interdependent industries emerged globally, therefore the environment of suppliers can significantly affect overall performance of company. According to USEPA (2000) few organizations significantly increase their profit margins and build their environmental protection profiles by working together with suppliers to reduce precarious material and to reduce unnecessary packaging.

The driving forces which leads companies to go for greening of SC are heterogeneous for example, building brand image, compliance management, reducing risk to the environment, and government regulations. Some companies may adopt green practice in-order to build their image as environmentally responsible corporations. Drumwright (1994), argues that in addition to some organizations who practice the inbound greening in line with social responsibility, there are many who do so to gain a competitive edge and increase their efficiency. In the literature the motives are divided into internal and external, the major motives are customer pressure, boosting brand image, regulatory stance, risk management, and international purchasing restrictions (Network, 2001). According to Schecterle & Senxian (2008), the motives behind environmental initiatives in SC are the rising cost of energy, desire to be a leader in green implementation, to gain competitive advantage, government compliance, and cost related to transportation.

One of the key causes for businesses to green their SC is customer pressure. Min & Galle (1997), argued that the consumer awareness about environmental problems significantly increased due to rapid environmental degradation. Therefore, introduction of environmental friendly products in developed countries increased significantly. Where as in South Asia the phenomena is

still not wide spread (Rao, 2007). Additionally, companies in South Asia do business with different companies in Europe and the United States. The manufacturing process is carried out in the region and exported and marketed to internal markets across Europe and United States (Rao, 2007). Therefore, to avoid the potential export limitation they need to comply with environmental regulations both domestic and international, hence entire SC needs to be green. Hence the companies in the region not only adopt green practices to increase efficiency but to avoid any potential export limitations. Therefore, supplier encouragement is necessary, in addition to adoption of green practices by companies to green their operations.

2.2.2. GrSCM during product life cycle

For the manufacturers the green SC is an operative way of managing the environmental plans (Yingluo, Nengmin, & Linyan, 2003). Product life cycle (PLC) is a fundamental method of assessing the impact on environment. It comprised of all events over the time from an items development through its end-of-life. The PLC valuation is a comprehensive method to trace out the degradation in ecological system and resources needed to develop a product or procedure from supplies to disposal of product. Basic principle of GrSCM is to integrate the green concept into the PLC. The GrSCM can be classified into three groups, green design, green operations, and green manufacturing (Srivastava, 2007).

The green design concept can conceptualize as an eco-friendly design process for total PLC. According to Srivastava (2007), the major objective of green design is to reduce waste. Navtn Chandra (1994), argued that the green design helps in understanding how decisions effect production of environment-friendly products. Most of the time the environmental aspects in designing product and processes are ignored. There is a negligence of the environmental aspect in development of new products (Hendrickson, Conway-Schempf, Lave, & McMichael, 1997). At

present, most companies believe that green design helps in cost reduction of the whole production process (Johansson & Winroth, 2009). The environmental burden can be condensed significantly by implementation of green design. According to Hendrickson et al. (1997), the green design objective is to ensure a sustainable society by using available resources. They also highlighted the three major goals to achieve ultimate green design these goals are, shrinking the use of non-renewable means, management of renewable resources for sustainability, and controlling toxic emission that can affect the environment.

Green manufacturing can be defined as a manufacturing process, which generates very little or no environmental pollution, by using environmentally friendly inputs, and is highly efficient (Atlas & Florida, 1998). The aim of green manufacturing is continuous improvement of product and manufacturing processes to reduce or eliminate land, water, and air pollution (Johansson & Winroth, 2009). They also argued that the environmental risk to human and other species can be reduced significantly by adopting green manufacturing. The production efficiency and energy cost, the cost efficiency of raw material, and the occupational safety and environmental cost efficiency can be achieved by adopting green manufacturing (Atlas & Florida, 1998).

Green procurement plays an important role in achieving overall environmental objectives. It integrates environmental thinking into purchasing decisions. Green procurement includes recycling, reduction, and reuse of material in the course of procuring (Salam, 2008). The purchasing of material or services that protect the environment and put a lesser amount of hazardous effect on the environment throughout the PLC is known as green procurement (Lacroix, 2008). Lacroix (2008), also suggested some elements of green procurement such as purchasing of non-ozone diminishing materials, using substitute energies, energy proficient transportation, bio-based products, and recycled content products. Never the less, these elements

play a significant role in purchasing environmentally friendly products, but the major role in green purchasing is played by the supplier selection process. The green manufacturing process actually derived from green inputs and minor changes leading to substantial environmental improvement. According to Srivastava (2007), the important part of green operations is green manufacturing and remanufacturing. Hoshino, Yura, & Hitomi, (1995) defined a recycling-integrated manufacturing, and it is commonly used by automobiles, tiers, and electronics industries. It is very important to control pollution at the source rather than managing it later (Srivastava, 2007).

2.3. Building a Green SC

For creating green SC there is no utter rule, but there are numerous recommendations from different authors to perform green actions that can best fit to prevailing practices. As mentioned by Zhu, et al. (2007), prominence of different actions differs depending on companies' characteristics and nature of the SC. Agreeing to Rao & Holt (2005), SC greening can be divided into internal supply chain (manufacturing), outbound, inbound and reverse logistics. Thus, contingent on the type and characteristics of companies SC management, different SC fragments deliberate dissimilar actions. Likewise Zhu, et al. (2007), divided GrSCM into five practices: green purchasing, managing internal environment, cooperation with customer, recover the investment , and environment friendly design. These practices are hard to decompose, and they are highly integrative, having strong cross functional connectivity, and some kind of overlapping. According Zhu et al. (2007), export of products and cooperation with foreign customers brings pressure to domestic industry , and increase the level of implementation.

The association with international supply chain enhanced knowledge, awareness and understanding of GrSCM practices. Therefore, adoption of GrSCM in manufacturing companies could improve and make their operations green along with cost reduction with this knowledge.

Brody & Ben-Hamida (2008), argued that inbound logistics incorporates the choosing of green suppliers and collaborating with them. Inbound logistics includes activities such as, relationships with suppliers and transportation of material to the process. According to Rao & Holt (2005) the choosing of a supplier is a very significant factor, as it shows companies own total environmental performance and overall impact. Transportation of material to the manufacturing facility can have a significant effect on the environment, one of the most important strategies these days to eliminate pollution and waste is to control it at the source.

The internal SC considered as vital area for ecological improvements. It is essential for companies to gauge green performance in order to incorporate necessary modifications. The internal supply chain can incorporate many initiatives for the environment such as improvement of assembly, source reduction of waste, pollution and air emission, cleaner production, worker involvement, and supplier integration (Rao, 2007).

Product design is considered a vital feature that can affects processes. Designing of product plays a significant role in achieving environmental objectives (Network, 2001). According to Rao & Holt (2005), production efficiency, and the environment objective can be achieved by lean production, reducing all kinds of waste with production related operations. The managing of waste considered as most significant aspect of green management (Beamon, 1999). Responsible companies always try to manage and reduce the waste generated from their activities. Similarly, Brody & Ben-Hamida (2008), argued that internal recycling and cleaner production is an import source of addressing environmental concerns.

Outbound logistics consists of waste disposal management and other actions for distributing the final goods or service to customers (Rao, 2007). Therefore, companies have to consider provision of logistics, marketing, packaging, and waste removal potentials. Since

outbound logistics play an important role in environmental degradation. Rao & Holt (2005), argue that transportation determine the major level of impact on the environment by outbound logistics in the SC. The competitiveness, and the greening can be achieved by optimizing the distribution network. As mentioned by Brody & Ben-Hamida (2008), the objectives of outbound logistics are shorter routes and consolidated the shipments. Compared to inbound logistics where environmental impacts are predictable, in this case it's hard to gauge the environmental impact as customers are from diverse locations. According to APO (2008), purchasing coordination, and strategic communication is essential for customer and partner relationships. According to Rao & Holt (2005), the connection among environmental innovation and competitive advantage is enhanced by green marketing and eco-labelling, it also helps satisfy the customer. According to Rao (2007), to make this segment of SC green the activities like green marketing, green packaging, environmental friendly transportation, and waste management are crucial action which every company should focus on.

According to Rao (2004), the least practiced green practice in South Asia is reverse logistics. Though, with the passage of time some applications are now common in Asia. According to Brody & Ben-Hamida (2008), the complete PLC need to be assessed by the product designers in design phase, and have to look where the product will go at the end of the PLC. Therefore the design phase has an important connection with reverse logistics, designing the product in way that it become easier to recover for recycling or reuse, also recyclable packing can be developed to achieve the green objective (Network, 2001). By reusing at the end of PLC, the production cost can be lowered significantly (Beamon, 1999). To achieve these targets the customer communication and collaboration plays an important role (Network, 2001). In addition to this a certain level of customer awareness is also required to accomplish this objective.

2.4. Summary

According to Liu, et al. (X. B. Liu et al., 2012) GrSCM emphasizes the concern for environment throughout the SC and necessitates a strategic collaboration among all members of the SC. As mention by Mohanty & Prakash (2013) that the GrSCM is a developing concept from amalgamation of productivity improvement and environmental protection. They also claimed that GrSCM is a tool to improve productivity and enhance environmental performance. Nagel (2000) argued that GrSCM involves all the activities and management of PLC, from manufacturing to the disposal at the end. The theoretical aspect of green initiatives at different stages of the supply chain have been probed in numerous studies. Greening of SC results in numerous gains to companies such as cost reduction, competitive advantage, and brand image, all of which help in developing novelty with respect to the environment and deliver several benefits to society(Bowen, Cousins, Lamming, & Faruk, 2001; J. Hall & Clark, 2003). Bowen, et al.(2001) and Sarkis (1999) argued that in-spite of all these benefits the greening of SC is not widely practiced in industry. Additionally, green purchasing has great impact on companies' environmental goals (Min & Galle, 1997). A framework has been developed by Sroufe (2006), which he claims to enable companies to gain competitive advantage and reduce risk; in the framework he presented the indicators of environmental performance, a metric for assessing suppliers, and different environmental initiatives.

According to Rao (2007) the concept of inbound greening is not well known in South Asia, but there are many firms in the area that already incorporated it into corporate strategy. The incorporation of inbound greening is derived from different motivations, some companies see this as a new opportunity to increase their performance and gain competitive advantage; in some organizations, this practice is a result of corporate mission; while some adopt due to external

restrictions. Drumwright (1994), argued that the practicing of green inbound logistics by companies is a result of many factors such as social obligation initiatives to improve competitiveness and efficiency.

Many researches like Zhu, et al.(2005) and Linton, Klassen, & Jayaraman(2007) , argued that research, and debate in the area of GrSCM is at a developmental stage. There has been prescriptive research more than explanatory or predictive research in the area of GrSCM in the past (Mohanty & Prakash, 2014). Over time different perspectives have been discussed by different researchers such as, the reverse logistics discussed by Srivastava (2007) and the analysis of PLC discussed by Birou, Fawcett, & Magnan, (1998).

Although there many researchers who had developed, and used their own instrument for exploring the GrSCM factors such as Handfield, Sroufe, and Walton (2005), Q. H. Zhu et al. (2005) Q. Zhu et al. (2007), Q. H. Zhu et al. (2008), Guiffrida, Datta, Kim, and Min (2011), R. P. Mohanty and A. Prakash (2013), and de Sousa Jabbour et al. (2013). Howerver it is considered very limited due to diverse business nature around the globe and heterogeneity in the definition of GrSCM. The empirical evidence from developed economies on GrSCM mainly came from USA, Australia, and Canada (Wu et al., 2012). However, from developing economies the empirical evidences are very rare R. Mohanty & A. Prakash, (2013) and Liu, Wang, Dong, Yang, & Bao,(2012). Additionally most of the research was carried out large companies, though few researchers focused on small companies, among these are Sarkis (1999), Rao (2007), Zhu, et al. (2010), and R. Mohanty and A. Prakash (2013) who have studied GrSCM practices for smaller firms.

From the literature, it is apparent that theoretical contributions are lacking. There are only a few studies that incorporate the modeling and subsequently empirical testing of hypotheses (R. Mohanty & A. Prakash, 2013). They also argued that famous studies only give subjective cases,

descriptive commentary, and case studies. Therefore, it is imperative to go for additional research relating to greening of SC in SMEs sector of Pakistan. The estimated number of SMEs in Pakistan is 3.2 million and they have quite a large share in the export of the country estimated around 40 % of total exports from Pakistan. SMEs have a very significant role in the Pakistan economy and are spread all over the country. SMEs are believed to be less likely to adhere to regulation pertinent to the environment as compared to large companies that have strong control and command systems. There are many factors which hinders the adoption of green practices by SME's owners such as a lack of awareness, lack of technical knowledge, availability of appropriate human resources, and financial resources. SMEs are considered the critical part of economy and on the other side they are accused of being a big contributor of pollution.

CHAPTER 3. ANALYRICAL FRAMEWORK AND DEVELOPMEMT OF RESEARCH HYPOTHESIS

Over period of time multidimensional literature has been developed in the environment management area around the globe, but there is lack of research on developing economies especially in Pakistan on greening of SC. This study concentrates on exploring the current level of green practices and their determinant factors in SME's sector of Pakistan. Zhu & Sarkis (2004) argued that these four areas signify company's internal and external functions and actions related to SC. Four phases of traditional supply chain were incorporated in the research study i.e. (1). Inbound logistics (2). Production (3). Outbound logistics. (4). Reverse logistics with the assimilation of ecological initiatives in each phase (Rao, 2007).

Since there are many management practices suggested by different authors such as Rao (2007), Zhu, Sarkis, & Geng (2005), and Handfield, Sroufe, & Walton (2005), the role of management to select the appropriate practices/actions in the process of making decision about green management on different levels of the SC remains an intimidating challenge for managers (R. P. Mohanty & A. Prakash, 2013). This research will explore the internal factors grouped as organizational culture, cost pressure, and human resource in SMEs in Pakistan, which previously have been empirically investigated differently by researchers such as Daily and Huang (2001), Zhu et al. (2005), Zhu et al. (2012), Liu, et al. (2012), Mohanty & Prakash (2014). This study will also explore the external foreign pressures and external domestic pressure (Q. H. Zhu, J. Sarkis, & K. H. Lai, 2012). In addition to that, the mediation of internal factors in the association of foreign and domestic pressures with GrSCM practices will also be investigated.

The GrSCM practices can be viewed from different theoretical perspectives i-e. (1) Stakeholder theory (2) institutional theory. According to Liu, Wang, Dong, Yang, & Bao (2011),

stake holder theory is more appropriate for discussing GrSCM issues with inter–organizational collaboration instead of management of intra-organizational activities. Logical framework (see figure 6) developed by identifying the determinants of GrSCM practices in the existing literature of different authors such as Daily and Huang (2001), Zhu and Sarkis (2006), (Qinghua Zhu, Sarkis, Cordeiro, & Lai, 2007), Sarkis, Gonzale-Toree, and Belarmino-Diaz (2010), X. B. Liu et al. (2012), X. Liu et al. (2011), Q. H. Zhu, J. Sarkis, et al. (2012) , and R. P. Mohanty and A. Prakash (2013).

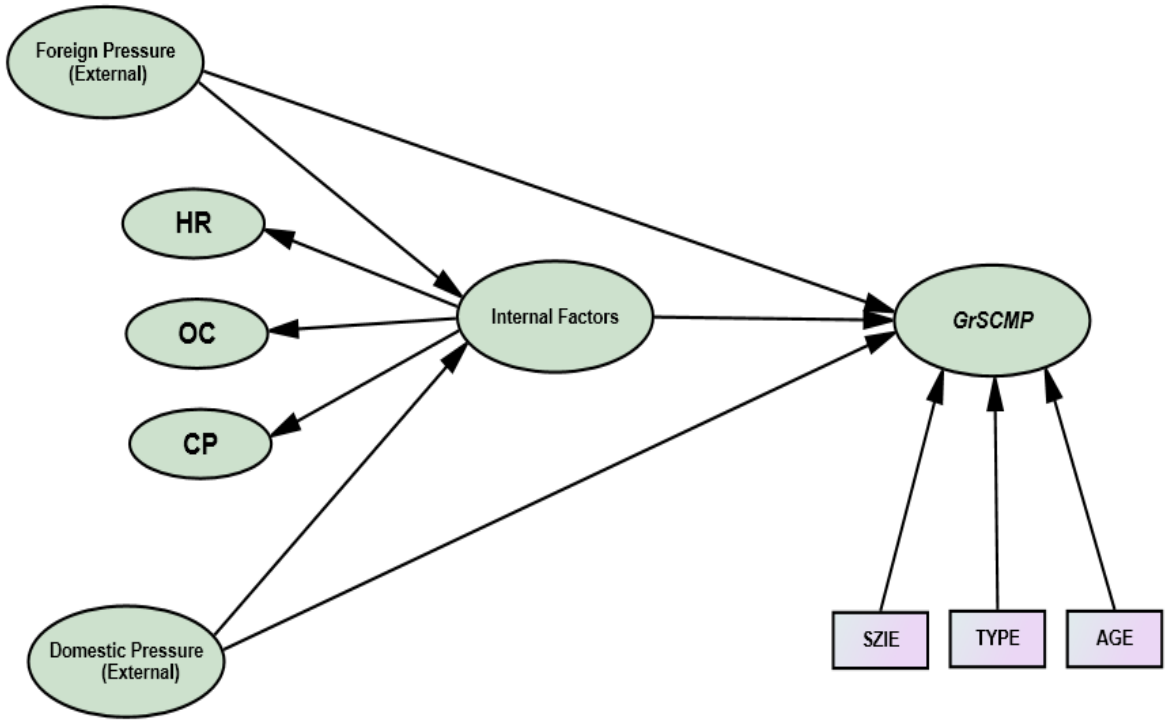


Figure 4. Analytical framework

According to Hall (2000), the external factors such as domestic customers, foreign customers, neighboring communities, and market competitors in addition to government

regulations are important sources of external pressures on companies to adopt GrSCM practices. Since SMEs in Pakistan are at an early stage of adopting GrSCM practices due to environmental policy transformation; the significance of outside pressures to adopt GrSCM practices in Pakistan have become critical over time. Sarkis (1998) and Hervani, Helms, & Sarkis (2005), argued that the external pressures jointly impelled the companies to adopt certain green practices and make them more aware of the problems and consequences of not implementing those practices. It has been empirically tested and justified by many researchers, that the external factors are an important source of motivation/pressure on companies to adopt GrSCM practices ((Mohanty & Prakash, 2014); Liu, et al. (2012); (Q. H. Zhu & Sarkis, 2006); (Jeremy Hall, 2000); (Sarkis, 1998)).

Although all foreign and domestic pressures as whole important determinants for implementation of GrSCM practices, expectations of customers' deemed most vital pressure on companies to implement green practices (Doonan, Lanoie, & Laplante, 2005). To gain competitive advantage the products environmental side has satisfy customers while meeting their demands (Q. H. Zhu & Sarkis, 2006). As defined by Nelson, Rashid, Galvin, Essien, & Levine (1999), communities are entities that may not be involved in business directly but may be affected by and have sound knowledge of local business. The community angle should be given adequate importance and representation as it tends to influence the decision making process of any company (Kearney, 2004). The general social reputation of a company is vulnerable because of the abilities of the communities' to influence their social reputation (Henriques & Sadorsky, 1996). Q. H. Zhu, J. Sarkis, et al. (2012), argued that the international pressure positively relates domestic environmentalisms and subsequently adoption of green practices. The above discussion leads to the two hypothesis of this study about SMEs of Pakistan:

H1: SMEs are most likely to implement GrSCM practices with higher level of foreign pressures.

H2: SMEs are most likely to implement GrSCM practices with higher level of domestic pressures.

The external pressures are not considered as the only set of factors influencing the business strategies (Aseem Prakash, 2000); (Gunningham, Kagan, & Thornton, 2003; Aseem Prakash, 2000). In addition to that operational strategies of the companies greatly depend on internal capacity. The same level of external pressure generates different response from companies due to their levels of understanding and capacity. X. Liu et al. (2011), argued that the different levels of understanding and interpretations of outside pressures lead companies to adopt dissimilar environmental practices. They also argued that the difference in response is directly linked to perceived pressure, and different objectives of companies. Therefore, we have added three internal organizational factors in our model the top management support, employees' education level, and recurrence of internal environmental training to adopt GrSCM practices. It has been argued by Daily and Huang (2001) that the critical element for the introduction, and adoption of an environment management system are the support from top management, team work, and environmental training According to Carter and Ellram (1998), support from top management is vital for integration and cross functional programs. Therefore, executive level backing is imperative for green SC management action by affectively involving employees and bringing a new culture to a company. According to Hart (1995), the improvement in the skill level of employees, participation, expertise sharing , and team work greatly benefits an organization's motive to achieve sustainability. Employees' specialized training, and self-learning improve the capacity of an organization to implement advanced environmental methods. Moreover, Qinghua Zhu et al. (2007) argued that management support includes ideas related to GrSCM practices at executive level, collaboration among different function of company, and companies learning have

positive association with the implementation of GrSCM practices. Thus, we hypothesize the following:

H3: A SMEs level of GrSCM practices are positively linked with the internal factors.

It is argued by many researchers, such as Liu, et al. (2012), Matopoulos & Bourlakis (2010) and Lamond, Dwyer, Huang, and Jim Wu (2010), that the internal factors realistically complement the external pressures and explain the GrSCM practices from different stakeholders in a market setting. For the successful implementation of GrSCM practices the critical aspect is the capacity of an organization to absorb external pressures. A company is unlikely to implement GrSCM practices without needed capacity. Therefore, factors internal to the company can be considered as mediating for adjusting pressure coming from external forces. This produces following hypothesis for the study on the mediation of internal factors in the relationship of external pressures (foreign and domestic) and determining the GrSCM practices in SMEs sector in Pakistan.

H4a: The internal factors mediate the relationship between SMEs foreign pressures (external) and implementation of GrSCM practices.

H4b: The internal factors mediate the relationship between SMEs domestic pressures (external) and implementation of GrSCM practices.

The SMEs in Pakistan has been categorized as small and medium, service, manufacturing and traders. Also, the number of year in business may also have impact on adoption of green practices, therefore three hypothesis with respect to size, and type and number year in business included as control variable in this study as follows:

H5a: There is a significant difference in the mean scores for different sizes of SMEs in respect to various factors affecting GrSCM.

H5b: There is a significant difference in the mean scores for different types of SMEs in respect to various factors affecting GrSCM.

H5c: There is a significant difference in the mean scores for different ages of SMEs in respect to various factors affecting GrSCM.

CHAPTER 4. RESEARCH METHODOLOGY

This section will cover the methodology in detail involving variables of the study, measures for the variables of the study. Data collection method, sample description, instrumentation, coding of data, and data examination techniques will be discussed as summarized in Figure 6 below. This study will employ a quantitative research method by using surveys to collect data. The analysis of data is done by using structural equation modeling technique (SEM).

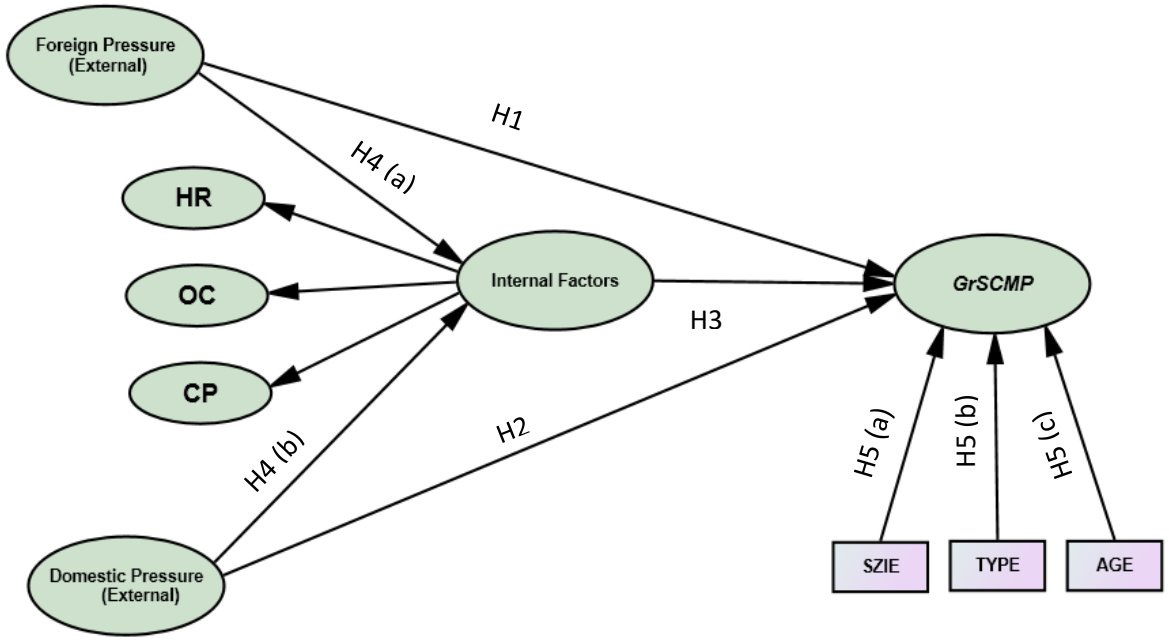


Figure 5. Structural equation model of GrSCM and their determinant factors

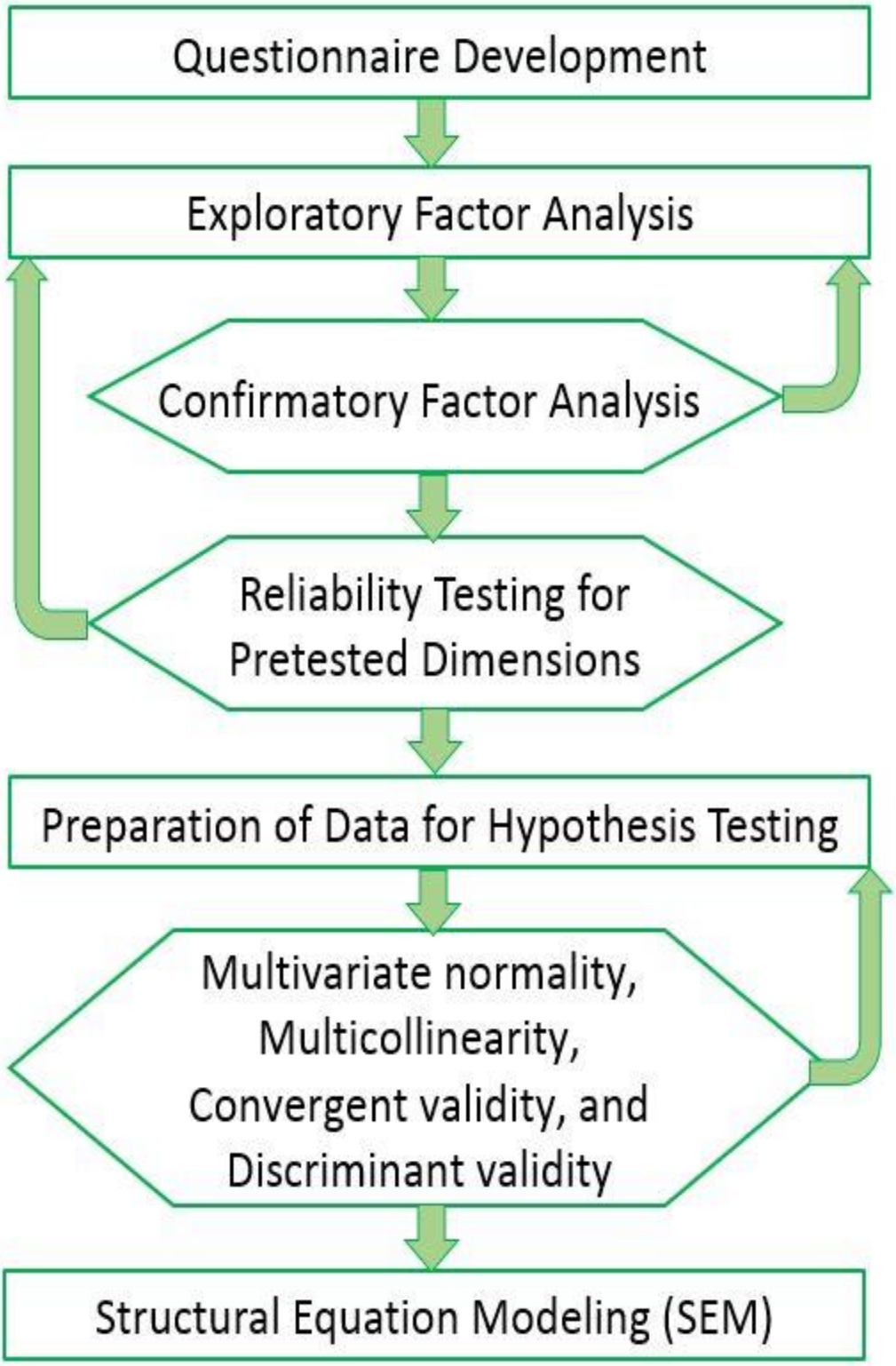


Figure 6. Summary of the methodology

4.1. Questionnaire Development and Data Collection

In order to collect data, the development of questionnaire to measure GrSCM practices adopted by SMEs in Pakistan, and their determinant factors was the first step. The questionnaire is comprised of four sections i.e., first section consists of company's information such as name, size, year in business, and type; the second section consists of questions related to GrSCM practices adopted by SME's or the environmental action taken by SME's in the past two years (current GrSCM practices); and the third section contains the questions related to the importance of internal factors and external pressures (foreign and domestic) for adoption of GrSCM practices.

The dependent variable is GrSCM practices (SMEs overall GrSCM practices) in this study. The degree of GrSCM involvement by any company is difficult to measure. Therefore, it can be signified by a chain of practical action of companies. In the current context of SMEs of Pakistan, twenty-two items are identified to measure overall level of GrSCM practices of SME's. Thus section "A" of the questionnaire will consist of twenty-two items which capture GrSCM actions taken by a respondent's organization based on opinion of industrial experts, academicians, and from past literature of Zsidisin & Hendrick (1998); Walton, et al. (1998); Young & Kielkiewicz-Young, (2001); Rao, (2002); Sarkis (2003); Zhu, et al. (2005); Handfield, et al. (2005); Rao (2007); Liu, et al., (2011); Liu, et al. (2012); and R. P. Mohanty & A. Prakash (2013). The questionnaires will be answered by agreeing with the statements regarding the environmental action taken by the respondent's organization by means of a five-point Likert scale, where 1= not considering the activity at all, 2=planning to consider it, 3=considering it currently, 4=starting/partially implementation, and 5=implementing successfully.

For the independent variables as shown in the analytical framework in Figure 6, the external pressure is conceptualized as foreign pressure external (FP(E)), and domestic pressure

external (DP(E)). Whereas internal factors to adopt GrSCM activities are categories into human resource (HR), organizational culture (OC), and cost pressure (CP). Therefore section "B" of the survey will consist of eighteen items capturing the external pressure and internal factors grounded on different sources from past literature such as, Daily and Huang (2001); (Q. H. Zhu & Sarkis, 2006)); Zhu, Sarkis, Cordeiro, & Lai (2007); Sarkis, Gonzale-Toree, & Belarmino-Diaz (2010); Liu, et al. (2012); (Mohanty & Prakash, 2014)3); and(Chien, 2014). The questions will be answered by rating the degree of importance and strength of each factor in respect to stakeholder pressures for adopting GrSCM practices by means of a five-point Likert scale where 1 = not at all; 2 = a little bit; 3 = to some degree; 4 = strong; 5 = very strong.

The data collection process by using the survey will be arranged in two stages. The questionnaires for the first stage will only contain section "A". The responses will be used to identify factors of GrSCM practices. The data for this study will be collected from SMEs sector of Pakistan specifically Karachi, Islamabad, and Lahore. The targeted respondents will be mangers (middle or higher). Following earlier studies such as Zhus, Sarkis and Lai (2006), and cater et al (1998). Generally, it is believed that information required for this type of study is very specific and will only be given by specific people in the organization, therefore sampling in this study will be purposive non-probability. The data collection will be administrated through three steps as follows:

a) Pilot test: In order to refine the questionnaires, the pilot testing will be performed, with industrial experts and the people having sound knowledge of SC management.

b) Convenience sampling (stage 1): For the first stage of the survey for this study the data will be collected through convenience sampling from Islamabad and surrounding areas. GrSCM Factor will be extracted by conducting exploratory factor analysis.

c) Random sampling (stage 2): A complete survey including all sections such as the pretested dimensions, and with measures for the internal and external factors will be collected by the respondents from Karachi, Islamabad, Hattar, and Lahore Pakistan. The stage two survey will be independent of the stage one survey with no overlapping of samples for the two surveys. The survey will be purposely non-probability, as we know that the specific person has the concerned information.

In this study, the data collection process carried out by using web-based data collection method. As stated by Sheehan and Hoy (1997), the internet based surveys are used due to flexibility of user's response, cost efficiency, and privacy. The favored respondents identified have following qualities:

a. Familiarity of strategic SC management processes and practices.

b. An understanding of SC management boundary-spanning aspects.

c. Knowledge of culture and corporate green approaches.

d. Familiarity of major competitors and their conduct.

Given the above desired qualities of respondents, the ideal potential survey participants targeted in the study were senior supply chain executives. The contribution of potential participants was also included from operations, logistics and purchasing executives' due to limited number of senior SC executives.

Table 2

Critical green practices and determinant factors

A: GrSCM Activities		
Green Supply Chain Management Practices (GrSCM)	**Practices**	**Description**
	GrP-1	Processes to comply with emission standards
	GrP-2	Processes to reduce solid wastes
	GrP-3	Processes to reduce water use
	GrP-4	Processes to reduce air emissions
	GrP-5	Processes to reduce noise
	GrP-6	Use of environmental friendly raw materials
	GrP-7	Cleaner technology processes to make savings
	GrP-8	Use of waste of other companies
	GrP-9	Recycling of materials internal to the company
	GrP-10	Use of remanufacturing
	GrP-11	Choosing suppliers by environmental criteria
	GrP-12	Recovery of the end-of-life products
	GrP-13	Urging supplier(s) to take environmental actions
	GrP-14	Environmental improvement of packaging
	GrP-15	Informing customers on environmental friendly products
	GrP-16	Eco-labelling
	GrP-17	Considering environmental criteria in to the product designing
	GrP-18	Cooperation with supplier for environmental objectives
	GrP-19	Substitution of environmentally questionable material
	GrP-20	Use of environmental friendly source of energy
	GrP-21	Cleaner production audit
	Grp-22	Environment friendly transportation

Table 2. *Critical green practices and determinant factors (continued)*

Foreign Pressures (external)	FP1	International environmental laws and regulations
	FP2	Foreign Customers
	FP3	Foreign Competitors
Domestic Pressures (external)	DP1	Domestic environmental laws and regulations
	DP2	Government environment policy
	DP3	Domestic Customer
	DP4	Domestics Competitors
	DP5	Neighboring communities/NGO's
Internal Factors (HR)	IHR1	Team Work
	IHR2	Employees education level
	IHR2	Recurrence of internal environment training
Internal Factors (Org-Culture)	IOC1	Companies Environmental mission
	IOC2	Degree of support from top mangers
	IOC3	Cross-functional cooperation for environment al improvements
Cost Pressure	CP1	Hazardous material disposal cost
	CP2	Cost of environmentally friendly goods
	CP3	Cost of environmentally friendly packages
	CP4	Potential liability associated with hazardous material disposal
Control Variables	SIZE	Company size
	TYPE	Type
	AGE	Age of company (number of year in business)

4.2. Factor Analysis and Displaying Data

The software used for statistical analysis will be SPSS. The exploratory factor analysis (EFA) will be conducted to explore factors of GrSCM practices by using "principal component

analysis method" followed by "varimax rotation" to check how much variance will be explained by these factors. The Kaiser criterion (eigenvalues>1) will be employed along with scree plots to retain factors. In the process to access the reliability of the responses a reliability test will also be performed by calculating Cronbach's alpha coefficient. We will also check for sampling adequacy by calculating Kaiser –Mayer –Olkin value.

4.3. Confirmatory Factor Analysis

We know that pretesting is important when a measure/scale has been developed in order to ensure statistical behavior of items as expected if not they may be deleted or refined. The methodology used will be building confirmatory factor analysis (CFA) by using "maximum likelihood" technique by means of AMOS software on the foundation of factors extracted by principal axis factoring using varimax rotation on survey data of GrSCM. The CFA will be used judge how observed variables load on a single factor. This is important to ensure whether or not each sub-scale (dimension) loaded on a single factor highly.

4.4. Reliability Testing for Pretested Dimensions

The external pressure (i.e. FP (E), DP (E), the internal factors (OC, HR, CP), and the pretested dimensions will be included in final survey. The reliability analysis will be performed and then data will be prepared for hypothesis testing, the Pearson correlation will be calculated to show the association between overall GrSCM practices and their determinants (external and internal).

4.5. Structural Equation Modeling

The powerful statistical tool known as "Structural equation modeling" (SEM) will be employed for data analysis, the SEM simultaneously pool structural model known as path analysis

and measurement model known as confirmatory analysis (Garver and Mentzer, 1999). SEM is capable of handling multiple relations simultaneously and efficiently. The path model shown in figure 6 identifies two exogenous latent variables foreign pressure and domestic pressure. Whereas the endogenous latent variables are internal factors, GrSCM practices, and three observed control variables. The hypothesized relationships of variables are shown in figure 5.

CHAPTER 5. DATA ANALYSIS

The section 5 includes the results of measurement, and hypothesized model. In order to assess the initial survey entities a pre-test was incorporated before the main test to decide is there any modification in measurement or procedural required. The main test was conducting by using data collect by refined instrument. The results in this section contain descriptive statistics review, validity and reliability of constructs, distribution of data, modifications made to develop final measurement model and complete model testing and hypothesis testing by applying SEM technique by using SPSS 22 and AMOS 18.

5.1. Pilot Test

In order to refine the questionnaires, pilot testing was performed. The pilot testing carried out during two regular classes of structural equation modeling and quantitative research at NDSU. The exercise was also carried out with academicians and industrial experts on environment & supply chain management to pre-test the survey, by probing the relevancy and clarity of survey items. During pilot testing we received 20 complete responses, based on the recommendations from participants, changes were incorporated by re-wording and including a few more GrSCM practices in the first stage data collection process. As explained in section 4.1 the process for data collection is two stage process. Initial stage includes only GrSCM practices having 22 statements (see table 3) catering green practices by using a web based survey instrument and was launched in July 2015.

Table 3

Items of stage one survey

A: GrSCM Activities		
Green Supply Chain Management Practices (GrSCM)	**Practices**	**Description**
	GrP-1	Use of remanufacturing
	GrP-2	Recovery of the end-of-life products
	GrP-3	Choosing suppliers by environmental criteria
	GrP-4	Use of waste of other companies
	GrP-5	Urging supplier(s) to take environmental actions
	GrP-6	Processes to reduce noise
	GrP-7	Processes to comply with emission standards
	GrP-8	Use of environmental friendly raw materials
	GrP-9	Processes to reduce solid waste
	GrP-10	Processes to reduce water use
	GrP-11	Processes to reduce air emissions
	GrP-12	Recycling of waste materials internal to the company
	GrP-13	Informing consumers on environmentally friendly products
	GrP-14	Environmental improvement of packaging
	GrP-15	Savings from cleaner technology processes
	GrP-16	Cooperation with supplier(s) for environmental objectives
	GrP-17	Eco-labelling
	GrP-18	Considering environmental criteria in to product design
	GrP-19	Substitution of environmentally questionable material
	GrP-20	Use of environmental friendly source(s) of energy
	GrP-21	Cleaner production audit
	GrP-22	Environment friendly transportation

The personalized email was sent to potential participants, resulting in 89 responses received over a period of two months after sending e-mails to 300 SMEs. Out of these only 50 respondents fully completed the survey and the rest of responses were incomplete. After two reminders, the response rate was 16.6%. Therefore, third party called DATA was involved to collect the data for this study. The data was collected from Islamabad and its surroundings for first stage, 250 SMEs were contacted and 120 completed surveys were received, and subsequently used for the first stage analysis for identifying GrSCM factors, a 48 % response rate.

5.2. Exploratory Factor Analysis

An EFA by means of "principal component" extraction with "varimax rotation" was applied to examine data collected in first stage of GrSCM practices. This technique is very useful in reducing the number of variables by classifying into latent construct and identifying clear variable structure in a construct. EFA elucidating the variation between variables by mean of less variables called factors, this is also known as condensing of information. EFA was done using SPSS 22.

As a first step towards EFA, we calculated the communalities. Communality means that a common factor explains the variance of observed variable. The influence of underlying construct considered strong if the value is high, if the communality is low, such as <0.50, it indicates there may be too few factors extracted or unreliable variables. The initial analysis revealed low communalities for the practices "GrP11", GrP5", and "Grp6"; consequently, these variables were dropped and we got the communality values shown in table 4.

Table 4

Communalities

Practices	**Initial**	**Extraction**
GrP2	1.000	.630
GrP3	1.000	.651
GrP7	1.000	.566
GrP8	1.000	.695
GrP9	1.000	.673
GrP10	1.000	.557
GrP12	1.000	.584
GrP13	1.000	.603
GrP14	1.000	.657
GrP15	1.000	.664
GrP16	1.000	.708
GrP17	1.000	.560
GrP1	1.000	.670
GrP4	1.000	.502

The method used for extracting factors was principal component analysis followed by using the varimax rotation criteria. The Eigen values together with scree plots were used to retain factors. Eigen value >1 determine which factor to retain. EFA uncovered a three-factor structure as shown in table 5, they explain 62 percent inherent variation in the measurement structure. In total, the share of first factor is 36.82 percent, the second factor capture 14.25 percent, and the third factor accounts for 11.22 percent in total. For evaluating factors in EFA, we followed the rule of thumb known as “60/40”, this means that every factor should load at least 0.60 or above on one factor and less than 0.40 on every other factor.

Table 5

Rotated component matrix of factor analysis

GrSCM Practices	Component		
	1	2	3
GrP16	.833	.014	.119
GrP15	.744	.244	.224
GrP17	.699	-.162	.212
GrP14	.696	.325	.261
GrP13	.646	.429	.041
GrP12	.635	.422	-.049
GrP8	.075	.829	.038
GrP9	-.009	.812	.117
GrP7	.226	.713	.079
GrP10	.253	.690	.130
GrP1	.035	-.070	.815
GrP2	.059	.051	.790
GrP3	.318	.232	.704
GrP4	.274	.242	.607

We have also verified the factor extraction graphically by generating the scree plot as shown in figure 7. The plot uses the Eigen values associated with each factor extracted, against each factor.

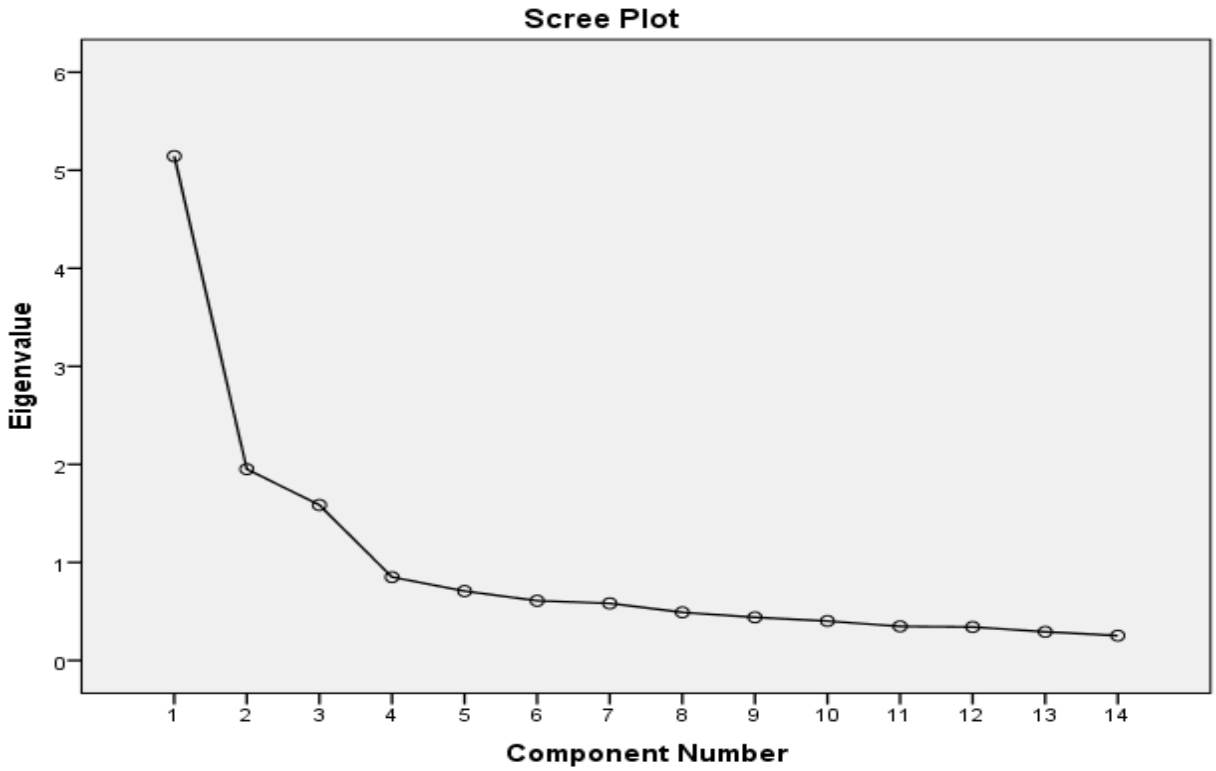


Figure 7. Scree plot

The factors extracted using EFA suggest the following practices as factor one: GrP12, GrP13, GrP14, GrP15, GrP16, and GrP17. Similarly factor two includes GrP7, GrP8, GrP9, and GrP10, whereas GrP1, GrP2, GrP3, and GrP4 are under factor three (see table 6). The Cronbach's (α) alpha was measured to assess each group reliability. The established values by Nunnally (1978) is 0.70 to demonstrate the internal consistency of the scale as shown in table 6. The criteria for demonstrating internal consistency is considered terrific if $\alpha \geq 0.9$, good for $0.7 \leq \alpha < 0.9$, acceptable for $0.6 \leq \alpha < 0.7$, weak for $0.5 \leq \alpha < 0.6$, and unacceptable for $\alpha < 0.5$ (Flynn, Schroeder, & Sakakibara, 1994; George & Mallery, 2003; Hair, Anderson, Tatham, & William, 1998; Kline, 1999). Therefore, the values we calculated in this case are good as shown in table 6.

Table 6

Factor loading, variance and cronbach alpha for each factor

Factors	Factor loading	% Variance	Cronbach's Alpha (α)
Factor 1: Proactive environment management (PEM)		36.820	.849
GrP16: Use of environmental friendly source of energy	.833		
GrP15: Cooperation with supplier for environmental objectives	.744		
GrP17: Cleaner production audit	.699		
GrP14: Cleaner technology processes to make savings	.696		
Gr13: Environmental improvement of packaging	.646		
GrP12: Informing consumers on environmental-friendly products	.635		
Factor 2: Compliance Greening (CG)		14.245	.807
GrP8: Processes to reduce solid wastes	.829		
GrP9: Processes to reduce water use	.812		
GrP7: Use of environmental friendly raw materials	.713		
GrP10: Processes to reduce air emissions	.690		
Factor 3: Ecological Greening (EG)		11.217	.762
GrP1: Use of remanufacturing	.815		
GrP2: Recovery of the end-of-life products	.790		
GrP3: Choosing suppliers by environmental criteria	.704		
GrP4: Use of waste of other companies	.607		

The "Kaiser-Meyer-Olkin" measure of sampling appropriateness is calculated as 0.84. The degree of common variance among the fourteen variables is meritorious, meaning that the factor extracted will account for a substantial amount of variance. This value is considered excellent, as the minimum acceptable value established by Anand Prakash, Mohanty, Kumar, and Kallurkar (2011) is 0.5.

The “Bartlett’s test of sphericity” was also conducted. The null hypothesis states that “the inter-correlation matrix comes from a population in which the variables are non-collinear (an identity matrix)”. The result from this study shows that we will reject the null hypothesis meaning that “the sample inter-correlation matrix did not come from a population in which the inter-correlation matrix is an identity matrix”. Therefore, it is sufficient for stating that the matrix did not suffer from multicollinearity or singularity.

The first factor we extracted was categorized as “Proactive environment management” and includes the variables “Use of environmental friendly source of energy”, “Cooperation with supplier for environmental objectives”, “Cleaner production audit”, “Cleaner technology processes to make savings”, “Environmental improvement of packaging”, and “Informing consumers on environmental-friendly products”. The second factor labeled “Compliance Greening” included the variables “Processes to reduce solid wastes”, “Processes to reduce water use”, “Use of environmental friendly raw materials”, and “Processes to reduce air emissions”. The final variable labeled “Ecological Greening” included the variables “Use of remanufacturing”, “Recovery of the end-of-life products”, “Choosing suppliers by environmental criteria”, and “Use of waste of other companies” as shown in table 7.

To improve the legitimacy of the content after EFA, the factors explored were assessed by expert from academia and agreed on three sub constructs equating proactive environment management (PEM), compliance greening (CG), and ecological greening (EG) as a measure of GrSCM practices as shown in table 6.

5.3. Launching of Second Stage Data Collection

An independent random survey for subsequent stage data collection was initiated. The survey included the pre-tested dimensions of GrSCM from stage one as shown in table 6, along

with determinant factors. The internal factors comprised of Team work, employees education level, and recurrence of internal environment training were classified as human resources (HR); companies environmental mission, degree of support from s, and cross-functional cooperation for environmental improvement were classified as organization culture; Hazardous material disposal cost , cost of environmentally friendly goods, cost of environmentally friendly packages, and potential liability for disposal of hazardous material were classified as cost pressure. The survey also included the external factors comprised of international environmental laws and regulations, foreign customers, and foreign competitors classified as external pressure foreign; domestic environmental laws and regulations, government environment policy, domestic customers, domestic competitors, and neighboring communities classified as external pressure domestic. In addition, classification questions such as company size, type, and age were included, as shown table 7.

Table 7

Items included in second stage survey with pre-tested GrSCM dimensions

Foreign Pressures (external)	FP1	International environmental laws and regulations
	FP2	Foreign Customers
	FP3	Foreign Competitors
Domestic Pressures (external)	DP1	Domestic environmental laws and regulations
	DP2	Government environment policy
	DP3	Domestic Customer
	DP4	Domestics Competitors
	DP5	Neighboring communities/NGO's
Internal Factors (HR)	IHR1	Team Work
	IHR2	Employees education level
	IHR3	Recurrence of internal environment training
Internal Factors (Org-Culture)	IOC1	Companies Environmental mission
	IOC2	Degree of support from top mangers
	IOC3	Cross-functional cooperation for environment al improvements
Cost Pressure	ICP1	Hazardous material disposal cost
	ICP2	Cost of environmentally friendly goods
	ICP3	Cost of environmentally friendly packages
	ICP4	potential liability associated with hazardous material disposal
Control Variables	SIZE	Company size
	TYPE	Type
	AGE	Age of company (number of years in business)

5.4. Operationalizing the Variables

For operationalizing the dependent variable, in the current context of Pakistan to gauge the current level of GrSCM of SMEs three factors were identified GrSCM as shown in tables 3-6. GrSCM was measured by a series of practical activities by SMEs as shown in table 7. The five-point Likert scale used to collect the data regarding the environmental action taken by their organization on a scale of 1-5 where 1= not considering the activity at all, 2=planning to consider it, 3=considering it currently, 4=starting/partially implementation, and 5= implementing successfully.

A Likert scale with five points was used to operationalize the independent variables. Each item with respect to external pressure foreign, external pressure domestic, and internal factor comprised of human resource (HR), organization culture (OC), and cost pressure (CP), to what extent the manager felt pressure or the degree of importance for adopting GrSCM practices, where 1 = not at all; 2 = a little bit; 3 = to some degree; 4 = strong; and 5 = very strong. For adoption of GrSCM these factors considered as very important determinates/or motives. The external pressure foreign were included international environmental laws and regulations, foreign customers, and foreign competitors; the external pressure domestic included domestic environmental laws and regulations, government environment policy, and domestic competitors. Whereas the internal factor consisted of three variables HR, OC, and CP, each variable is made up of different items such as HR consisted of team work, employees educational, and recurrence internal training on training; OC consisting of company environmental mission, amount of support from executives , and cooperation among different functions for improving environment ; CP consisting of "Hazardous material disposal cost" , "cost of environmental friendly goods", "cost associated with environment friendly packages", and "potential liability for disposal of hazardous material" as

shown in table 7. In the SEM model, the internal factor was measured as a second order by using HR, OC, and CP.

The control variables included in the survey were size, type, age, and the industrial sector. It is vastly believed that the industrial structure commands these activities. As explained in institutional theory that with in the same industry the phenomena called “mimetic isomorphism” mean that the tendency of an organization to model their practices imitate on another successful organization’s because they consider it as beneficial/or to enhance legitimacy, the variations in practices also reduce by this phenomena (DiMaggio & Powell, 2000). Organizational size was controlled because the bigger companies often have additional financial resources on their disposal to handle green issues. According to Hettige, Huq, Pargal, and Wheeler (1996), bigger companies are anticipated as having more tendency to be involved in revolutionary environmental practices, due to greater public scrutiny.

The size of the company was operationalized by using SMEDA’s definition “A manufacturing company with less than 50 full-time employees and productive assets of Rs30 million, a service provider with less than 50 workers and productive assets of Rs20 million and a trader with less than 20 employees and productive assets of Rs20 million were considered small enterprise, and recorded as 1, and a manufacturing unit with 51-250 employees and productive assets worth Rs30-100 million, a service provider with 51-250 workers and productive assets of Rs20-50 million and a trader with 21-50 employees and productive assets of Rs20-50 million were considered medium enterprises” and recorded as 2 (1= Small-sized, and 2 = Medium-sized). The type of company was operationalized as 1=Non-Manufacturing and 2= Manufacturing; whereas the age of company was calculated by taking the mean of the age data and then operationalizing as 1 if it was less than the mean value and 2 otherwise.

We adopted the purposive nonprobability sampling technique, only specific people know the survey information required. A random survey was carried out in Pakistan mainly in the Karachi, Islamabad, Lahore, and Hattar industrial areas. The total number of organizations contacted through personal visit by DATA was 450, with 220 questionnaires being completed, a response rate of 48.88 %. After carefully analyzing each completed questionnaire and eliminating overlapping in samples, 200 were retained for analysis and reliability testing was carried out for GrSCM factors as shown in table 8.

Table 8

Reliability analysis

Dimension	**Cronbach alpha (α)**
Proactive environment management (PEM)	0 .85
Compliance greening (CG)	0.81
Ecological greening (EG)	0.76

The reliability analysis shows that the alpha for all three factors PEM, CG, and EG, is well above the cutoff of 0.70. Therefore, the reliability for the factors using second stage data is very good.

5.5. Descriptive Statistics

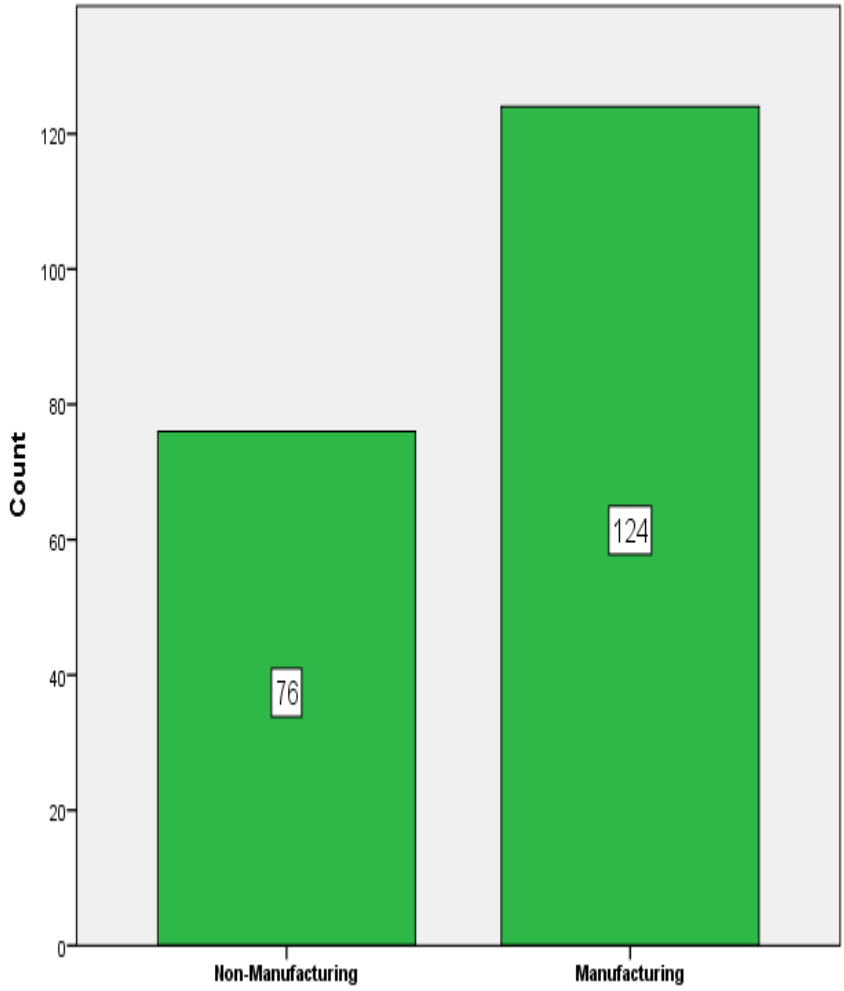


Figure 8. Sample type

The overall independent sample size is 200, and was comprised of 50 % small-size companies and 50 % medium-sized companies. We have also categorized companies on the basis of their operations as manufacturing and non-manufacturing, in this sample size we have 62 % of companies categorized as manufacturing and 38 % as non- manufacturing as shown in figure 8.

Table 9

Statistical summary of GrSCM practices

GrSCM activities	Observations	Mean	SD	Minimum	Maximum
EG: Ecological greening	200	3.10	.88	1.00	5.00
GrP1	200	2.98	1.16	1.00	5.00
GrP2	200	3.16	1.08	1.00	5.00
GrP3	200	3.21	1.21	1.00	5.00
GrP4	200	3.00	1.14	1.00	5.00
CG: Compliance greening	200	2.97	1.00	1.00	5.00
GrP7	200	3.14	1.15	1.00	5.00
GrP8	200	2.76	1.28	1.00	5.00
GrP9	200	2.78	1.31	1.00	5.00
GrP10	200	3.20	1.26	1.00	5.00
PEM: Proactive environment management	200	3.32	.91	1.00	5.00
Gr12	200	3.11	1.16	1.00	5.00
GrP13	200	3.16	1.10	1.00	5.00
GrP14	200	3.30	1.18	1.00	5.00
GrP15	200	3.52	1.21	1.00	5.00
GrP16	200	3.53	1.22	1.00	5.00
$(_{GrSCM})$ Overall level of GrSCM practices	200	3.13	.72	1.00	5.00

The statistical summary of GrSCM practices are presented in Table 9. The average score of GrSCM activities is 3.13 (see table 9), indicating that GrSCM practices implementation in Pakistani SMEs are still at a very initial phase. Among all the activities PEM have high score of ranging from 3.53 to 3.11, indicating that the surveyed firms have started to implement PEM activities to reasonable extend. This also suggest that the SMEs in Pakistan are more inclined towards proactive management rather than reactive environment management. Whereas CG averaged 2.78 to 3.20, and EG averaged 2.98 to 3.21. The lowest average was achieved by GrP8 (process to reduce solid waste) at 2.76, similarly the second lowest average was obtained by GrP9

(process to reduce water use) at 2.78. The results indicating that the compliance is at lower attend, therefore more compliance enforcement by different entities are need of the hour.

The study area selected for this research is considered developed compared to the other regions of Pakistan, so the results may vary for other regions. Moreover, the survey of GrSCM practices was conducted to attain information regarding individual business needs, benefits and perspectives. For most Pakistani SMEs, the GrSCM is a new concept and that in turn requires more time to understand the strategic cooperation and importance with other supply chain members. If companies could bond together with a shared strategy on environmental issues and businesses GrSCM practices could flourish rapidly in this sector.

5.6. Confirmatory Factor Analysis

In hypothesized structure, the CFA was employed to determine how well the latent variables reflected by measurement items and observed variables. While developing the measures, pretesting should be performed in order to certify that the items in the measurement scale are statistically behaving as expected; if not, they may be refined or deleted accordingly. According to Anderson and Gerbing (1988), there are three objectives of measurement model for all latent variables i.e. Unidimensionality check, gauging psychometric properties, and checking the validity. Furthermore, Anderson and Gerbing (1982), stated that the confirmatory factor analysis with in SEM can tolerate construct validity interpretation strictly and rigorously. I model testing there are two stages. The initial measures the overall model fit and the subsequent stage inspects the individual parameter estimates. According to Marsh, Balla, and McDonald (1988), the following fit indicators are considered ideal because they are relatively independent of the size of the sample, easy to interpret, and very clear-cut and flexible in their valuation complex models .

a. The comparative fit index (CFI): This is the most important criteria used in assessing the fitness of a model, it is an agreed incremental fit index which equates base model with existing model fit supposing uncorrelated latent variables in the model. The value for CFI ranges from 0 to 1. As stated by Medsker, Williams, and Holahan (1994), CFI tells us the percentage of covariation in the data that can be reproduced by the model. The larger the value the better is the model fit, generally 0.90 is considered a good fit.

b. Standardized root mean square residual (SRMR): This is an absolute measure of fit. The standardized difference between predicted, and observed correlations is called SRMR (Kirchoff, 2011). Generally, a value of SRMR ≤ 0.10 mean a good fit.

c. The root mean square error of approximation (RMSEA): RMSEA tends to favor model with more parameters since it adds in no penalty for model intricacy. Statistically RMSEA ≤ 0.05, point to a good fit; ≤ 0.08, acceptable fit; and > 0.10 a poor fit. Moreover, Medsker et al. (1994) argued that acceptable values of RMSEA are between 0.05 and 0.08.

d. The chi-Square ($\chi 2$ or CMIN): CMIN suitable degree estimation model indicates the observed variance and covariance pattern data corresponding to an absolute measure. A $\chi 2$ difference test is often used as a test measurement invariance across group's measure. A non-significant chi square (OLS > 0.05) suggests a good fit, whereas a significant one suggests a poor fit. The chi square almost always turns out to be significant due to sensitivity, especially for sample sizes 200 and above observations. Alternatively, researchers suggested to go by the chi square ratio, the

recommended value is as high as 5 indicates a reasonable fit , as advocates by Hair et al. (1998), the ratios below the range of 5 are considered sufficient.

5.6.1. Testing first-order CFA model

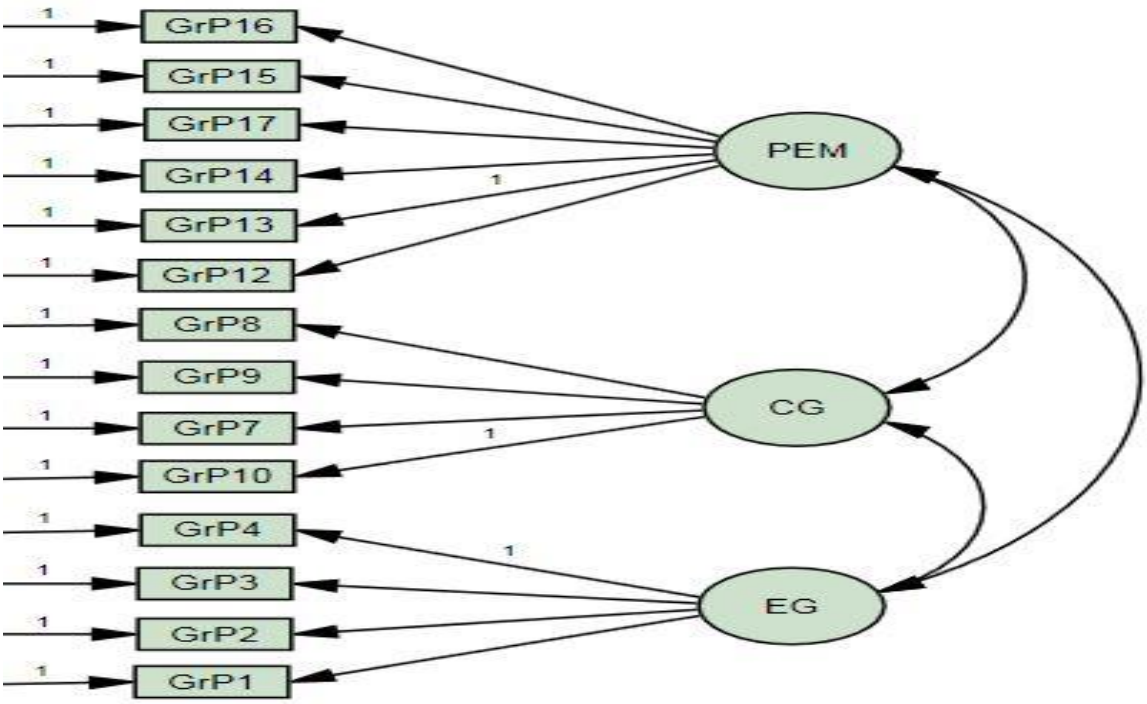


Figure 9. First order factor measurement model of GrSCM practices

In the previous discussion, PEM, CG, and EG were itemized as GrSCM practices adoption factors. The factors PEM, CG, and EG are correlated in n the first-order model for measurement of GrSCM practices implementation as shown in Fig 9. Alternatively, the measurement model of GrSCM practices adoption can be operationalized and modeled as second order and is governed by higher order factor as argued by Q. H. Zhu et al. (2008).

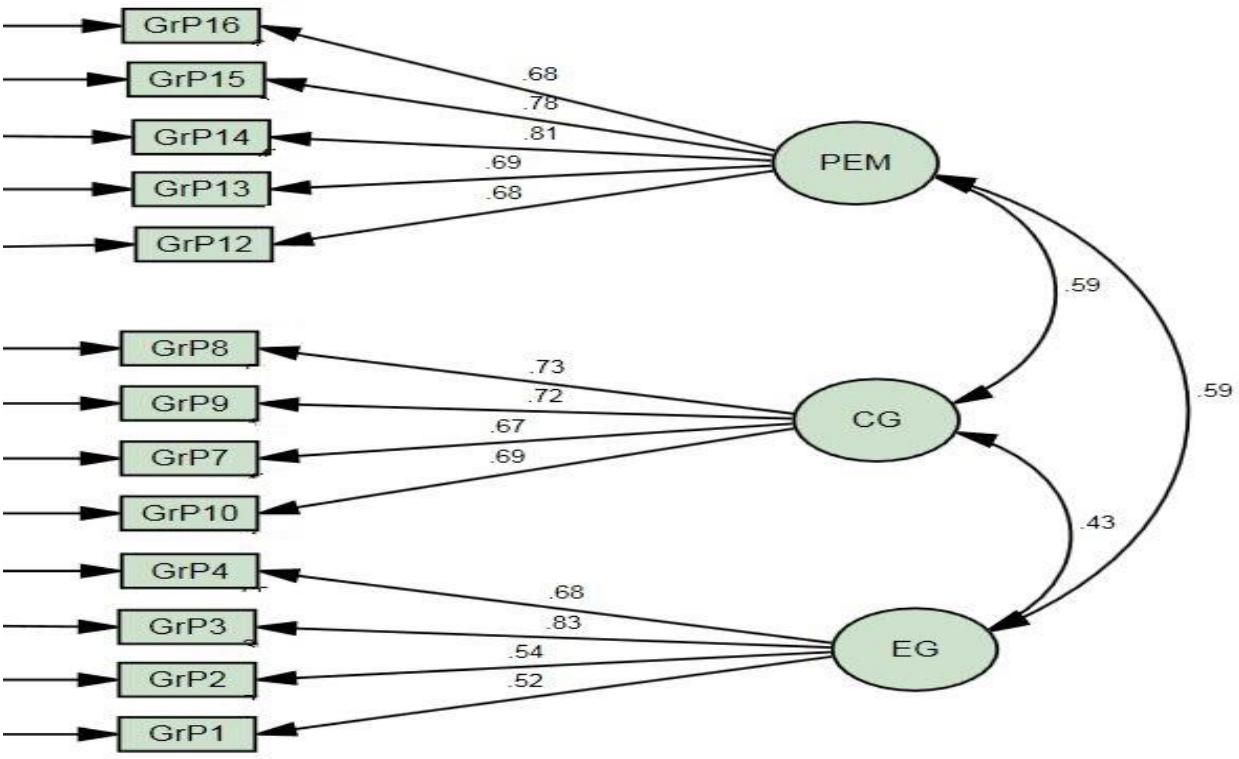


Figure 10. Results of first order factor measurement model

The model with first-order to analyze the GrSCM construct (see Fig. 9). The factors PEM, CG, and EG in the model are correlated. To run a standard CFA, model each latent variable needs a scale, which was done by using the method known as unit loading identification (ULI) constraint. In the first-order model, for the estimation purpose all indicators were unidimensional on each factor. We have used the maximum likelihood method. The individual parameter estimation was statistically significant for all indicators as shown in Fig 10.

More over the practical significance, known as salience turned out significant as all indicators have absolute magnitude more than 0.30 as shown in figure 12. More over the CFI is 0.94 which is well above the acceptable criteria of greater than or equal to 0.90, the RMSEA is 0.073 which is also in the acceptable range, less than or equal to 0.08, and the SRMR is 0.06 which

shows a good fit. Although the chi square statistic is significant, the Chi square ratio of 2.06 is in the range of less than 5 as suggested by researchers, indicating a reasonable fit (Hair et al, 1998). Therefore, we can infer that overall model fitness very good and the results supports the measurement model of GrSCM practices adoption as first order construct.

5.6.2. Testing second-order CFA model

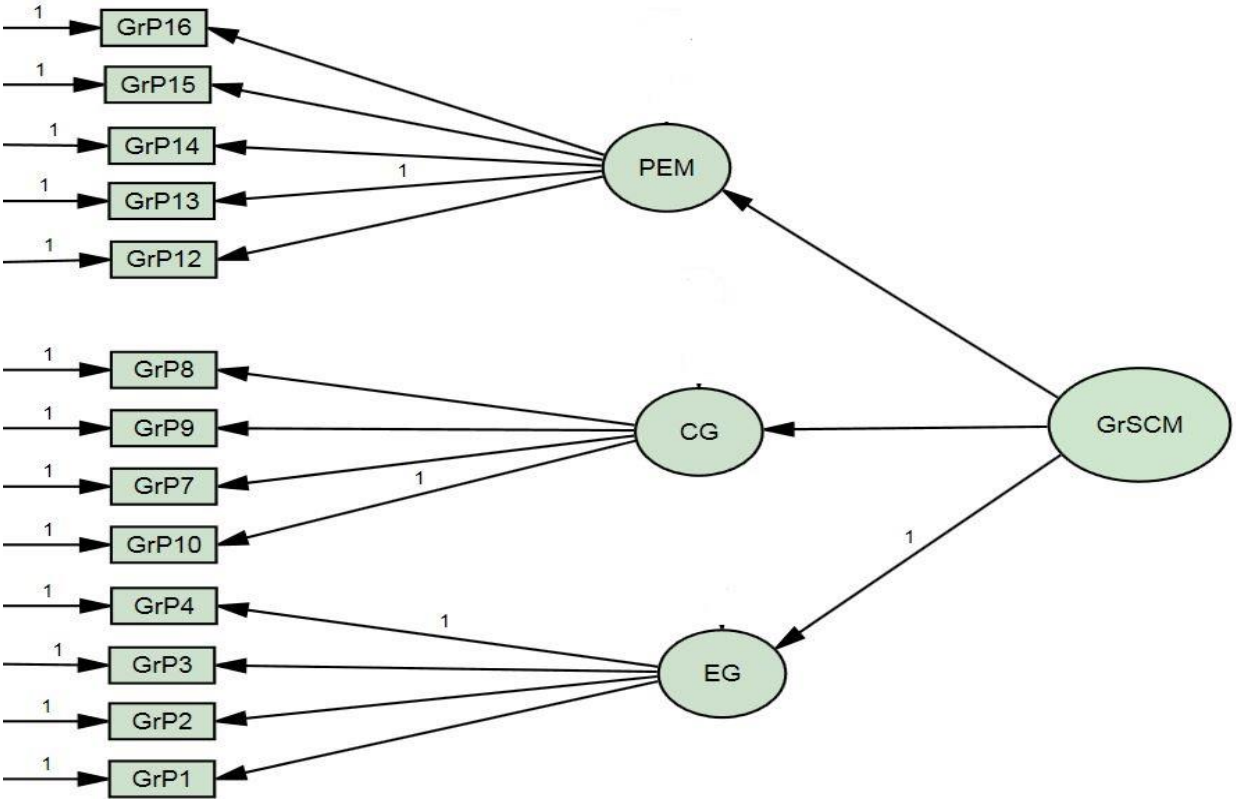
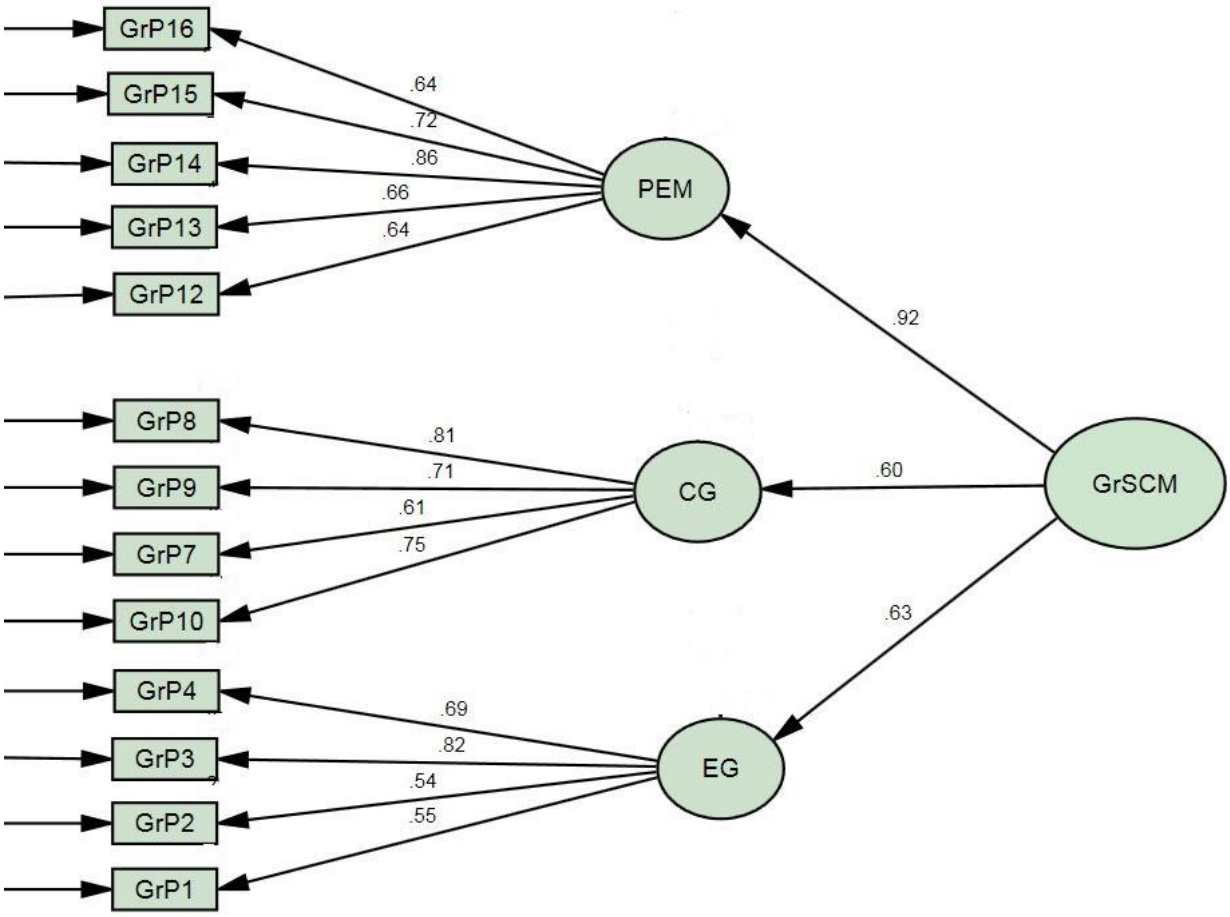


Figure 11. Second order factor measurement model of GrSCM practices

Second-order model testing was operationalized as shown in Fig 11. The association between PEM, CG, and EG govern by higher-order latent factor known as GrSCM. The second-order model produces very good results as compared to the first order model (see Fig. 12).



Chi square = 85.197 (p<0.003) CFI = 0.97
Standardized RMR= = 0.06 RMSEA= 0.05

Figure 12. Results of Second order factor measurement Model

The CFI for this model is 0.97, shows a very good fit. RMSEA for this model is 0.05 which is significantly improved from the previous model and also indicates very good fit, and the SRMR is 0.06 which also indicates a good fit. The chi square in this case turns out to be significant again and the Chi square ratio (CMIN/DF) is 2.

All "goodness of fit indices" shows model with the second order when the factors are controlled by a common underlying factor is improved in terms of measuring GrSCM practices adoption as compare to model with first order and align with previous research by Q. H. Zhu et al. (2008). The later model has lower SRMR, strong CFI well above the cutoff 0.90, and with RMSEA

meeting the strict benchmark of 0.05. Over all path analysis of GrSCM construct in the second-order model shows the coefficient estimates (λ) of PEM, CG, and EG are statistical significate. The loading between adoption GrSCM practices and PEM is 0.92, for path between GrSCM and CG is 0.60, and 0.63 for EG (see table 10). Therefore, measuring the level of involvement/or implementation of GrSCM practices can be adequately conceptualized in this study as second-order multidimensional construct, comprising of PEM, CG, and EG. The results are align with Q. H. Zhu et al. (2008) confirming the measurement of GrSCM practice adoption can be analyzed as second order, but in case of SMEs of Pakistan we have fewer dimensions. Table 5 summarizes the final loadings for each sub-scale, and 14 items were retained with final loadings > 0.50.

Table 10

Confirmatory factor analysis results

Practices	**Factors**	**Loadings**	**Factor loading on GrSCM**
GrP13: Environmental improvement of packaging	***Factor 1: Proactive environment management (PEM)***	.66	0.92
GrP14: Cleaner technology processes to make savings		.86	
GrP15: Cooperation with supplier for environmental objectives		.72	
GrP16: Use of environmental friendly source of energy		.64	
GrP12: Informing consumers on environmental-friendly products		.64	
GrP10: Processes to reduce air emissions	***Factor 2: Compliance Greening (CG)***	.75	0.60
GrP7: Use of environmental friendly raw materials		.61	
GrP9: Processes to reduce water use		.71	
GrP8: Processes to reduce solid wastes		.81	
GrP4: Use of waste of other companies	***Factor 3: Ecological Greening (EG)***	.69	0.63
GrP3: Choosing suppliers by environmental criteria		.82	
GrP2: Recovery of the end-of-life products		.54	
GrP1: Use of remanufacturing		.55	

5.7. Factor Confirmation

Before our model introduction and hypothesis testing, we inspect the measurement properties, and validity of the latent constructs in this study (Qinghua Zhu, Sarkis, Cordeiro, & Lai, 2007). To validate the measurement constructs of determinate variables of GrSCM practices

we employed CFA using AMOS. CFA were conducted separately in our SEM model with two sets of constructs. For independent variables, the external pressures (i.e., foreign pressure external (FPE), domestic pressure external (DPE)), and Internal factors (i.e., Human resources (HR), Organization culture (OC), and Cost Pressure (CP)).

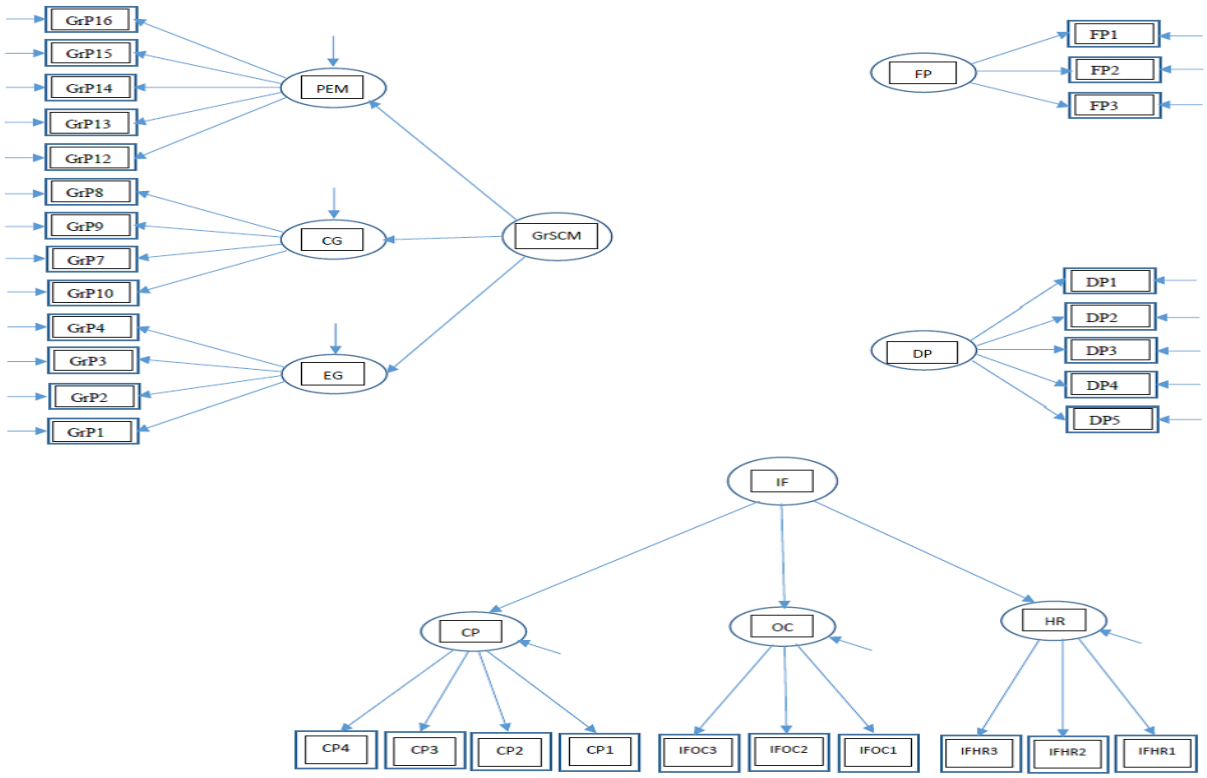
Table 11

CFA results of determinate variables

	Standardized loadings	**Standard error**	**C.R**
External pressure structure (χ^2=23.55; df=12; χ^2 /df=1.96; CFI=0.98; RMSEA=0.070; SRMR=0.03)			
Foreign Pressure (external)	(α=0.80)		
FP1	0.75	-	-
FP2	0.73	0.09	9.41***
FP3	0.79	0.12	7.45***
Domestic Pressure (external)	(α=0.84)		
DP1	0.69	-	-
DP2	0.67	0.09	10.14***
DP3	0.7	0.11	8.49***
DP4	0.52	0.12	6.33***
DP5	0.75	0.13	8.51***
Internal factors structure (χ^2=66.01; df=26; χ^2 /df=2.53; CFI=0.96; RMSEA=0.08; SRMR=0.05)			
Internal factor (HR)	(α=0.78)		
IFHR1	0.76	-	-
IFHR2	0.65	0.09	8.56***
IFHR3	0.81	0.10	10.23***
Internal factor (OC)	(α=0.75)		
IFOC1	0.70	0.10	8.87***
IFOC2	0.61	0.11	5.13***
IFOC3	0.76	-	-
Internal factor (CP)	(α=0.90)		
IFCP1	0.90	-	-
IFCP2	0.84	0.068	14.22***
IFCP3	0.74	0.07	11.80***
IFCP4	0.72	0.07	11.72***
Internal factors structure (second order)			
(χ^2=52.14; df=27; χ^2 /df=1.93; CFI=0.98; RMSEA=0.06; SRMR=0.04)			
HR	0.87	0.11	8.34***
OC	0.98	-	-
CP	0.75	0.11	7.68***

Significance level, *P, 0.05; **P, 0.01; ***P, 0.001)

All the measurement items loaded into each factor and the corresponding factors were allowed to correlate. Table 11 summarized the CFA results, each item loading to its corresponding factor is high and statistically significant (i.e. significant critical ratio greater than 2.58). The items loading is high as 0.92, and low as 0.45, and all fit indices are also fall into acceptable criteria (see table 11). Therefore, this analysis support that the latent construct (i.e. DP, FP, and IF) achieved Unidimensionality, the convergent validity, and measurement properties substantiate for of all the construct in our study.



Note: For aesthetic purpose covariance lines are not shown.

Figure 13. SEM model with reflective dimensions

Churchill Jr (1979), argued that the model with multi-item scale reduces the measurement error, improve the reliability and validity, and allows more variability among the survey participants. Figure 15 shows the latent construct of both first order and second along with measurement items. Before running the SEM model, we check the general assumptions of the model (a). Multivariate normality (b). Multicollinearity (c) convergent and discriminant validity (d) sample size (e) positive definiteness.

5.8. Multivariate Normality

Multivariate normality was assessed using Mahalanobis distance by using SPSS 22. The Mahalanobis distance test estimates the distance in the multidimensional space of each observation from the centroid, or the mean center of the observations. Any value greater than the Mahalanobis critical value considered as outlier and should be removed before analysis. In this case, no outliers were found.

5.9. Multicollinearity

In statistics, multicollinearity (also collinearity) is a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. In this situation, a small change in the data or model may lead to erratic changes in coefficient estimates. Within the sample data set, multicollinearity only affects predictor's calculations and does not reduce the reliability or predictive power of the model. To detect for multicollinearity in a model many researchers propose a proper detection of multicollinearity by calculating the variance inflation factor (VIF).

$$\text{Tolerance} = 1\text{-}R_j^2,$$

$$\text{VIF} = 1/\text{tolerance}$$

Where R_j^2 is the coefficient of determination of a regression of explanators j on all the other explanators. Violating the assumption requires collinearity tolerance <0.10 and VIF > 10, or in other words tolerance of less than 0.10 and VIF greater than 10 indicate multicollinearity. We calculated both collinearity statistics by using SPSS 22 as shown in table 12.

Table 12

Collinearity statistics

	Tolerance	**VIF**
FP1	.399	2.509
FP2	.378	2.648
FP3	.528	1.893
DP1	.372	2.688
DP2	.465	2.153
DP3	.374	2.677
DP4	.394	2.536
DP5	.409	2.447
IFHR1	.421	2.373
IFHR2	.434	2.302
IFHR3	.446	2.241
IFOC1	.494	2.025
IFOC2	.478	2.092
IFOC3	.457	2.188
CP1	.285	3.505
CP2	.302	3.316
CP3	.274	3.654
CP4	.300	3.337

Moreover, our model is positive definitive since the determinant of the correlation matrix we calculated is not equal to zero.

5.10. Convergent Validity

The demonstration of convergent validity can be accomplished when the items substantially loaded on the construct they are supposed to measure in the model. The metric used for convergent validity is the items standardized loadings on their corresponding construct. Garver and Mentzer (1999), set out the reasonable convergent validity benchmarks as a statistically significant loading ≥ 0.70. Moreover, as stated by Kirchoff (2011), maintaining the theoretical legitimacy of measurement model the loading of 0.50 and 0.40 are considered acceptable. The convergent validity is also determined by calculating average variance (AVE). The value of AVE > 0.50 considered as the cutoff for convergent validity. In addition to that, the composite reliability (CR) > 0.70. The AVE and CR are calculated by using the formula shown in table 13, the λ is factor loading (standardized) and δ is error variance (Hair, Black, Babin, Anderson, & Tatham, 2006).

Table 13

Convergent validity

	FP	DP	IF	CP	OC	HR	GrSCM
AVE= $\sum((\lambda i)^2 /N)$ Value >0.5	0.569	0.513	0.551	0.692	0.501	0.551	0.566
CR= $\sum \frac{(\lambda i)^2}{(\sum(\lambda i)^2+\sum \delta)}$ Value >0.7	0.80	0.840	0.784	0.900	0.712	0.784	0.794
Convergent Validity	Certified	Certified	Certified	Certified	Certified	Certified	Certified

5.11. Discriminant Validity

The discriminant validity analysis is required to endorse that items intended to quantity different construct surely gauging different constructs (Kirchoff, 2011). Despite high correlation between certain constructs pairs, items from two different scales should not converge too closely, and items should not load on one variable those destine the discrimination among different variables. If such problems exist, then model should be synthesized prudently in order to check if model should be separated or combined (Garver & Mentzer, 1999). The convergent validity can be established by comparing pairwise AVE with correlation squared of different construct in the model. In order to compare the AVE of a construct or dimension to the common variance between all possible pairs of constructs, when the AVE of a construct surpasses common variance with other constructs, this discriminant validity conservative test is supported (Fornell and Larcker, 1981). A pair wise AVE are compared by factor correlation squared, and established the discriminant validity for all factors as shown in table 14.

Table 14

Discriminant validity

Pairs	Factor Correlation	Correlation Squared	AVE1 AVE2 (AVEs should be > r^2		Discriminant Validity
GrSCM<-->FP(E)	0.407	0.165	0.566	0.569	Confirmed
GrSCM<-->DP(E)	0.632	0.399	0.566	0.513	Confirmed
GrSCM<-->IF	0.556	0.309	0.566	0.551	Confirmed
FP(E)<-->DP(E)	0.660	0.435	0.569	0.513	Confirmed
FP(E)<-->IF	0.479	0.229	0.569	0.551	Confirmed
DP(E)<-->IF	0.610	0.372	0.513	0.551	Confirmed

5.12. Modification Indices

The review of modification indices of the measurement model has been performed in the priori model for each item. According to Anderson & Gerbing (1998), a low modification indices are desired for unidimensional variables. Keeping all other parameters constant, the expected free parameter estimate and change in the expected value of chi-square have been observed by modification indices (MI) (Garver & Mentzer, 1999). In the priori model the evaluation of MI shows a large value for many items. After careful review of all items MI, convergent and discriminant validity, and reliability the final measurement was conceptualized that is with aligned with theory and resulted in a better fit then priorie model (see fig 14).

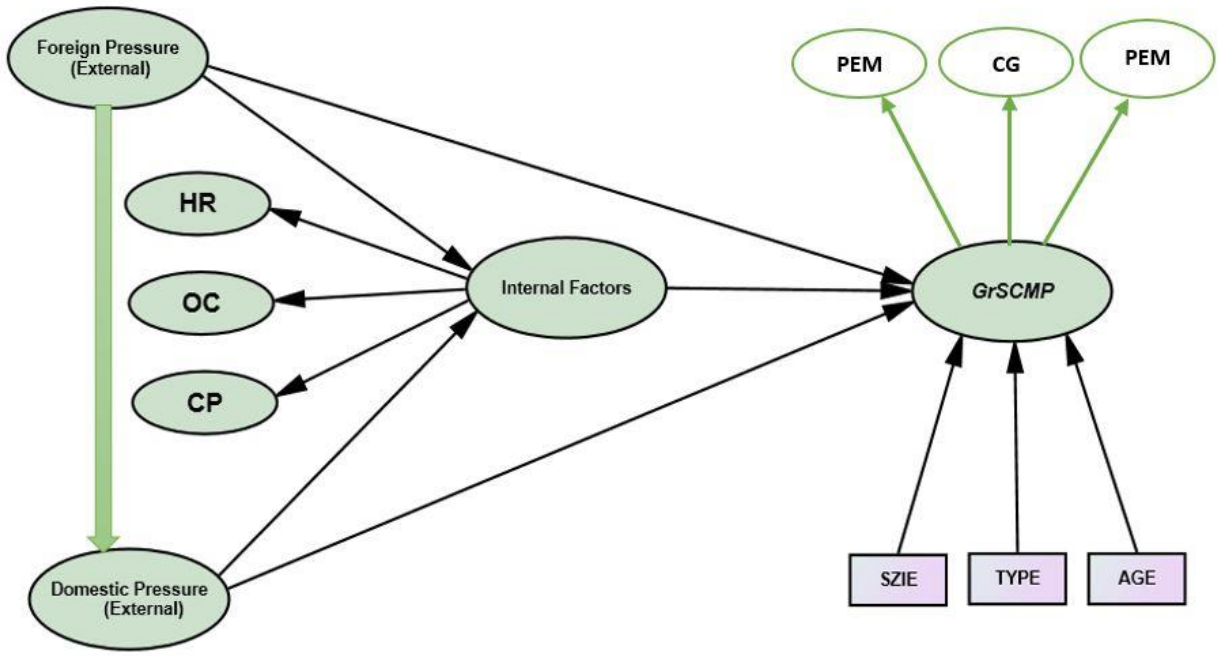
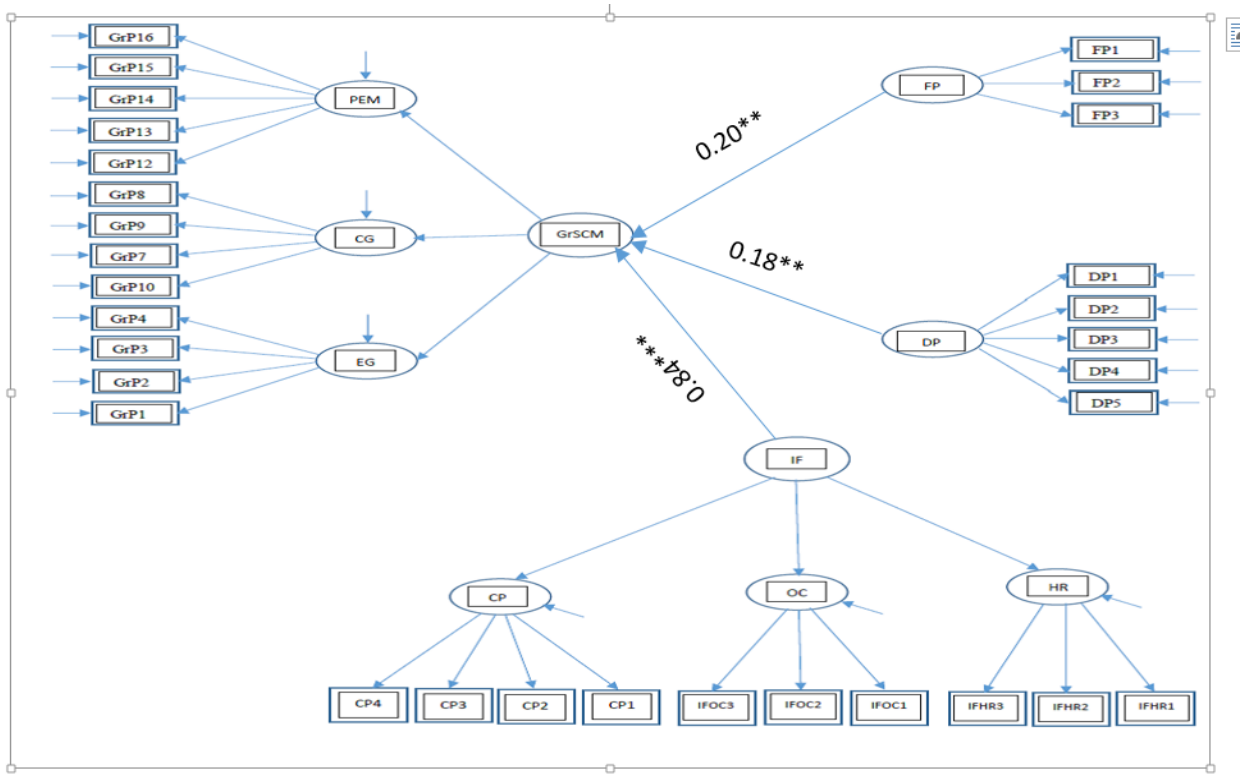


Figure 14. Revised theoretical model of GrSCM practices and determinant factors

5.13. Hypothesis Testing

The initial stage for preparing theoretical model for testing is the purification process for the measurement model followed by the hypothesis testing in ultimate structural model. The

ultimate model for this study shown in Figure 14 is identical to proposed model in Figure 5 with two concessions: GrSCM practices have three dimensions (i.e. PEM, CG, and EG) and there is a new path from foreign pressures to domestic pressures.



Significance: (*P, 0.05; **P, 0.01;***P, 0.001)

Figure 15. Result of direct connection model

The relationships between GrSCM and all three constructs in the direct relationship model as shown in figure 17 (i.e. internal factor, foreign pressure, and domestic pressure) is statistically significant. Association among GrSCM and Internal factor was strongest at the 0.001 level, while the relationships with both foreign pressure, and domestic pressure are significant at the 0.01 level (see fig 15).

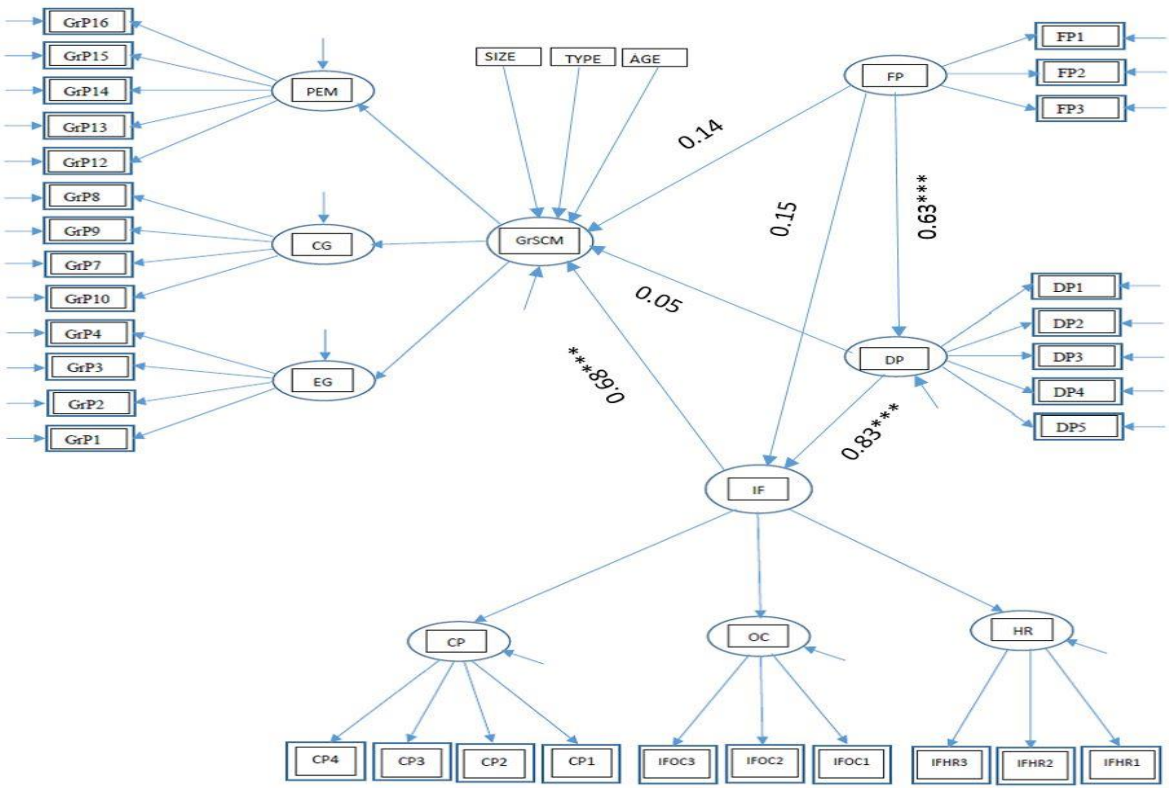
5.13.1. Mediation

For testing mediation, the following conditions must be satisfied by the variables in hypothesized relationships:

a. The explanatory variable should affect the dependent variable.
b. The mediator should have significant relationship with explanators.
c. There should be a significant association between mediator and dependent variable.
d. After regulating the mediator, the influence of explanators on dependent variable must minimized.

In a hypothesized model if all of the above conditioned fulfilled and in the manifestation of mediator the relationship of independent variable becomes in-significant then this is called complete mediation, additionally with the same condition if the if relationship of independent and dependent remains significant then this is called partial mediation. Moreover if there is noncompliance of any of these condition then we can conclude that there is no mediation (Baron & Kenny, 1986; Tepper, Shafer, Meredith, & Marsh, 1996).

The exploration of mediation can be done by various techniques such 1) correlation statistics 2) hierarchical regression as discussed by da Silveira and Arkader (2007), and Ho, Duffy, and Shih (2001). According to Hopwood (2007), the drawback of using regression for testing mediation is snags in demonstrating causation and possible reverse causation due to measurement error in the mediator scores. In order to rectify these problems SEM has been recommended. SEM diminishes the measurement error to address the problem through the application of latent variables. As stated by Hopwood (2007), when testing for mediation latent characteristics of SEM also mitigate the apprehensions of method effects may be tangled with real fundamental results.



Significance: (*P, 0.05; **P, 0.01; ***P, 0.001)

Chi square = 829.11 (p<0.001) CMIN/DF=1.78
CFI = 0.90 SRMR= = 0.09 RMSEA= 0.06

Figure 16. Final SEM (with reflective dimensions and indicators)

5.14. Discussion of Results

According to Hays, Marshall, Wang, and Sherbourne (1994), SEM allows series of observed items to be connected to the factors or latent variables directly or indirectly. The Maximum Likelihood (ML) method is used for SEM analysis with AMOS 18. ML allows universal correction of suggested model over miscellaneous statistics that are fixed for non-normality assumptions. As depicted in Figure 18, all the test for fit indices including chi-squared ratio were performed. The result all of complete model are very healthy, therefore it can be argued that the suggested SEM able to elucidate the covariance of the sample correctly. Two SEM models are

suggested to judge mediation in this study. The direct association between exogenous and endogenous variables are being tested by the first model as shown in Figure 15. Whereas all possible connections between latent variables were incorporated in the final model (see fig 16). The direct effect relationship between foreign and domestic pressures with GrSCM practices is significant at the 0.01 level, whereas the relationships between internal factors and GrSCM is statistically significant at the 0.001 level (see fig 15).

The results from a final SEM with all possible relationships are shown in Figure 16, depicting that the relationships of foreign and domestic pressures with adoption of GrSCM turn out statistically insignificant after introducing mediating variable. Moreover, the indirect relationship between foreign pressures (FP), domestic pressures (DP) through internal factor (IF) with adoption GrSCM practices were significant and showing that the relationship is completely mediated by IF. In the full model (see fig 16) after introducing the indirect paths, the significances of foreign pressure and domestic pressure on adoption GrSCM practices are significantly reduced or removed. Whereas the indirect paths between FP and DP, DP and IF, and IF and GrSCM turn out to be statistically significant and very strong (see fig 16). In addition to that there exist significant positive control of Type of SMEs in the relationship of external and internal pressure with adoption of GrSCM practices. This empirical research permits to comprehend the action and response by SMEs population on greening their SC in general and validate GrSCM factors.

Table 15

Results of direct paths in SEM

Paths			Beta Estimates	S. E	C.R	Results
GrSCM	<---	FP	0.14	0.8	1.55	In-significant
GrSCM	<---	DP	0.03	0.16	0.36	In-significant
DP	<---	FP	0.63	0.06	8.56***	significant
IF	<---	FP	0.15	0.07	-1.89	In-significant
IF	<---	DP	0.83	0.12	7.19***	significant
GrSCM	<---	IF	0.68	0.14	4.44***	significant
GrSCM	<---	SIZE	0.07	0.10	1.17	In-significant
GrSCM	<---	TYPE	0.11	0.10	2.06	significant
GrSCM	<---	AGE	0.004	0.11	0.062	In-significant

Significance: (*P, 0.05; **P, 0.01; ***P, 0.001)

These outcomes indicate that, lack of necessary internal factors is possibly the central cause for the low participation of SMEs in implementing GrSCM practices. The level of competency in HR, lacking the appropriate organization culture to take responsibility of a cleaner environment, and not feeling any internal cost pressure for not adopting appropriate environmental actions such as potential liability associated with hazardous material disposal contribute to their low level of involvement. Therefore, we can draw this conclusion the adoption of green practices by SMEs are not only derived by strong external pressures but the internal factors factor plays vital role in shaping greening of environment. Moreover, this study confirms and validates lower degree of Pakistani SMEs participation in greening of their SC activates can be the cause of lack focus and implementation of domestic pressure and lower level of internal factors.

The test statistic for indirect effect is calculated by the following formulas presented by Sobel (1982).

$$Z= ab/\sqrt{(a^2SE_a^2 + b^2SE_b^2)}$$
$$Z= abc/\sqrt{(a^2SE_a^2 + b^2SE_b^2 + c^2SE_c^2)}$$

Whereas a, b, and c are unstandardized path coefficients and SE is the standard error attached to each regression weight. The result is interpreted as a z-score so that Z>1.96 is significant at 0.05 level, and Z>2.58 is significant at the 0.01 level. Moreover, if all the paths in the chain that make up an indirect effect are statistically significant, then the entire indirect effect is assumed to be significant.

Table 16

Results of indirect paths in SEM

Indirect Paths	**Beta Estimates**	**C.R**	**Results**
GrSCM<---IF<---DP<---FP	0.36	2.017*	significant
GrSCM<---IF<---FP	0.10	1.73	In-significant
GrSCM<---IF<---DP	0.568	3.78**	significant
GrSCM<---DP<---FP	0.0315	0.36	In-significant

Significance: (*P, 0.05; **P, 0.01; ***P, 0.001)

The final model has better fit indices and was acceptable (Chi square = 829.11; CMIN/DF=1.78; CFI = 0.90; SRMR= = 0.09; RMSEA= 0.06). The CFI meets the threshold of 0.90, the chi square/df ratio of 1.78 is in the tolerable range. Moreover, the RMSEA value is 0.06 is also within the acceptable range, as is the SRMR of 0.09.

The results of this study provide the empirical evidence that the adoption of green practices by SMEs in Pakistan are majorly determined by external factors (i.e. foreign, and domestic pressures) and completely mediated by internal factors, although the greening of SC is in initial phase. The mediation of internal factors established that the implementation of green practices was greatly dependent on SMEs internal business environment such as HR, OC, and CP. In order to positively response foreign and domestic pressure related to environment the internal capacity of SMEs should be enhanced. When there are foreign pressures for adopting green practices, the hypothesis testing found no support for adoption of green practices until and unless domestic pressures are in place. Apart from the importance of internal factors, domestic pressures play a significant motivation for SMEs to adopt green practices in Pakistan. The learning capacity of SMEs can play significantly positive role in transforming the traditional SC in to green SC.

CHAPTER 6. CONCLUSIONS

6.1. Overview

This study set forth to probe the GrSCM practices adopted by SMEs in Pakistan in response to the global greening issue and to explore the determinant factors for adoption of GrSCM practices by identifying and addressing the following gaps in the literature: 1) the dearth of attention on classification of external determinants (factors) into 'foreign pressure' and domestic pressure especially in the SME's sector; 2) "internal factors" including human resources, organization culture , and cost pressure related to GrSCM ; 3) lack of research on the internal factors mediation in the association between domestic and foreign pressures with GrSCM in developing economies, like Pakistan; and 4) the limited literature on GrSCM practices of SMEs in developing economies. Additionally, GrSCM is one of the major themes in recent environmental management studies, very little is known about the factors that encourage GrSCM adoption in SMEs. To close this gap, this study analyzed the influence of several relevant determinants constructs (i.e. foreign pressure, domestic pressure, and internal factors) for adoption of GrSCM.

For this purpose, we explored the green practices adopted by SMEs in Pakistan and found an appropriate construct to measure the level of GrSCM involvement of these SMEs. After careful analysis by exploratory and confirmatory factor analysis we came up with 13 item measurement scale for practitioners to estimate diverse facet of GrSCM adoption by SMEs. The empirical results from exploratory, and confirmatory factor analysis suggested a three-dimension structure (i.e. PEM, CG, and EG) to measure the adoption of GrSCM practices by SMEs in Pakistan. The total number of activities in these dimensions are 13. The SMEs desiring to increase their level of involvement in GrSCM practices need to constantly monitor these three underlying factors (i.e. PEM, CG, EG). Moreover, the measurement scale established in this dissertation can be applied

as a self-diagnostic instrument for identifying the areas in supply chain that requires improvement or additional application.

Furthermore, identifying the determinants of GrSCM practices for SMEs and mediation testing of internal factors in the association of foreign and domestic pressure with the adoption of GrSCM practices were also major parts of this dissertation. This study explored the determinant factors of GrSCM practices adopted by SMEs in Pakistan, the construct of determinant factors was identified with the help of previous studies in the area of GrSCM (de Sousa Jabbour et al., 2013; Mohanty & Prakash, 2014; Q. Zhu, J. Sarkis, & K.-h. Lai, 2012; Q. H. Zhu, J. Sarkis, et al., 2012). The item structures in previous studies for cost pressure (Qinghua Zhu et al., 2007), for human resources (Daily & Huang, 2001), and organization culture led the confirmatory factor analysis, and revealed internal factors as second order measures for the three first order constructs (i.e. HR, OC, and CP). The external actors/pressures were grouped as foreign and domestic pressures (Q. Zhu et al., 2012).

The significant outcome this analysis was that the empirical evidence for mediating role of internal factors and domestic pressures in the hypothesized relationship. As it is evident from results that foreign pressures (FP) were mediated by domestic pressures (DP), and DP are mediated by internal factors. The understanding of the indirect (chain of relationship) from foreign to domestic and to internal factors in adoption of GrSCM is very important. This means that without the presence of domestic pressures SMEs are less likely to adopt GrSCM practices such as domestic competition, domestic environmental laws and regulations, government environmental policy, and neighboring communities playing a major role in transforming environmental actions.

Furthermore, the results of this study specify that internal factors mediate the association among pressure (foreign and domestic) from stakeholders with green practices. These results demonstrate that the adoption of green practices by SMEs in response to external pressure depends on internal factors such as organizational culture, cost pressure, and human resources. Therefore, to positively respond to external pressure the development of SMEs' capacities (tangible and intangible) is deemed very important and without incorporating these internal factors these external pressures may go unheeded. Moreover, the internal factors function as dual role such as the motivator, and required capacity for adopting GrSCM practices. According to (Johansson, 2002), for environmentally friendly design, innovative companies need technical personnel. Moreover, Boks (2006) argued that the by building human resource capacity the chances of implementing green practices in SC significantly increased.

Our examination possibly provides a vital course of action towards promoting GrSCM practices in SMEs of Pakistan. It is indispensable for SMEs to understand the benefits of GrSCM practices, as they are the major contributors to environmental degradation in the country. There is greater need to educate these SMEs on the approaches and advantages of greening their supply chain. The empirical evidence from this research will contribute and support this objective, and it will assist in increasing their motivation to adopt GrSCM practices.

6.2. Contributions

Varadarajan (2003), argued that academic investigation should fill exiting gap in literature, and extend the current body of knowledge for managers and researchers. The results from this study add to existing literature of GrSCM practices, determinates factors for adoption GrSCM practices, and the mediating role of internal factors in SMEs.

6.2.1. Theoretical Suggestions

The study of external pressure as foreign and domestic in the hypothesized model as compared to previous studies, such as Mohanty and Prakash (2014) and X. B. Liu et al. (2012) which did not distinguished pressures as foreign and domestic; and building the second order construct for internal factors to test the mediation in this study add value and a new demission to the current literature on adoption of GrSCM practices by SMEs. In the previous literature, complete empirical testing was lacking. The outcomes furnish the evidence of indirect linkages from foreign pressures to domestic pressure, and from domestic to internal factors to adoption of green practices. The conceptual and quantitative research of GrSCM practice adoption was extended by evidence that SMEs with a competent level of HR, positive OC, and significant CP are more likely to adopt GrSCM practices and are in a better position to respond to external pressure to remain competitive.

6.2.2. Measuring GrSCM as a Second Order Construct with Three First-Order Dimensions

Previously GrSCM practices adoption was measured as a second-order construct with six dimensions: “reverse logistics greening, inbound greening, compliance greening, ecological greening, outbound greening, and technological greening” for micro, small and medium enterprises (R. P. Mohanty & A. Prakash, 2013). Moreover, some suggested a second-order construct with five dimensions: “internal environmental management, green purchasing, cooperation with customers including environmental requirements, eco design, and investment recovery” (Q. H. Zhu & Sarkis, 2004; Q. H. Zhu et al., 2008). This study came up with only three dimensions i.e. proactive environment management, compliance greening, and ecological greening, after the EFA and CFA analysis by using data collect from the SME sector of Pakistan.

The other dimensions as suggested by R. P. Mohanty & A. Prakash (2013), were not confirmed , instead the findings show that many items collapsed onto a single dimension.

6.2.3. Managerial Suggestions

Former studies in the area of green SC management have debated numerous issues. This study adds knowledge by exploring the critical green practices and the vital determinant factors of GrSCM practices adoption in the SME sector of Pakistan, in addition to providing a different construct for operationalizing the GrSCM practices. Policymakers and SC managers can benefit by gauging green practice levels in intra and inter firm SC, this study offers a better understanding and a framework for evaluating their present GrSCM adoption capabilities and initiatives. The confirmation of the mediating role of internal factors in response to external pressure on environmental issues also helps managers to better understand the implementation of a green SC.

Moreover, Hart (1995), argued that a proactive environmental policy pursues the goal of creating value, and gaining competitive advantage by continuous improvement of green performance throughout its operation. Moreover, the preemptive environmental management approach by executives to evaluate the green strategies in their companies SC and enforcing the green strategy, the companies are more likely to gain competitive advantage and realize more monetary benefits.

GrSCM can be seen as a development tool for SMEs to make them structurally healthier and more effective. There is potential to gain competitive advantages by adopting green practices. This study has considered the determining reasons of GrSCM adoption classified as ‘Foreign Pressure’, mostly related to international environmental laws and regulations, foreign customers, and foreign competitors; ‘Domestic Pressures’, mostly related to domestic environmental laws and regulations, government environment policy, domestic customer, domestic competitors, and

NGO's/Neighboring communities; and 'Internal Pressures' as 'HR' comprised of team work, employees education levels , and recurrence of internal environment training; 'OC', comprised of companies environmental mission, amount of support from executives , and cross-functional cooperation for environmental improvement; and 'CP', "cost for disposal of hazardous material", cost of environmentally friendly goods, cost of environmentally friendly packages, and potential liability for disposal of hazardous material". The results demonstrate the low level of GrSCM practices involvement by SMEs in Pakistan can be attributed to a lack of the necessary external and internal pressures. Therefore, there is a need for aggressive implementation of domestic laws and regulations related to the environment. Additionally, managers of SMEs need to become better educated in developing collaborative relationships with regulators, customers (both domestic and international), neighboring communities, and major challengers in the same industry for collective greening. The ability for executing inventive ecological approaches can be boosted by improving internal factors dimensions such as HR, organizational culture, and understanding the cost structure associated with each activity in the SC.

6.3. Limitations and Future Research Directions

The designs and methods used in any research have strengths and weaknesses (McGrath 1982). According to Kirchoff (2011), the generalizability of findings can be maximized by using survey methodology, whereas on the flip side sanity of the context and precision is weaker. Precaution was taken while carrying out this study to make sure that respondent with knowledge and understanding of their position in the firm respond to the questionnaire. Inorder to ensure the applicability and salient for respondent the phrasing of surveys questionaries' prudently edited in both stages i.e. development and after pre-testing.

This research has some key limitations. Firstly, the profundity achieved through Likert-scale survey is limited. This study was incapable to apprehend any supplementary facts that might narrate the under-investigation phenomenon. For instance, to understand the respondent view on other type of GrSCM practices, their opinions on different constraints for adoption of green practices, and how it can benefit their organization would be very interesting. These responses may be very helpful in providing additional material to better understand the construct relationship in theoretical model.

Managers' insight of the GrSCM phenomenon and causes for adoption of green practices were the prime focus of this dissertation. Nevertheless, for complete view it is important to understand and track specific phase evaluation of this phenomenon over the period of time because GrSCM is predominantly a developing concept and executive attitude both in short and long-term may vary significantly.

Moreover, the additional imperative question is how to deliberate the effects of adoption of GrSCM activities. Investigating whether this effect is positive or negative, and how the implementation of green practices brings changes in performance of SMEs, since in this dissertation we are only investigating the implementation of GrSCM practices and their determinants. The study on subsequent performance outcomes may add more value, greater motivation, and understanding the importance of green practices to SMEs. A case study might be best option for conducting this type of research.

Another limitation of this study is construct and sample size. The low online response forced us to collect data through a third party, due to cost factors we had a smaller sample size, but still within the acceptable range for applying SEM. If we had a larger sample size, that could have given us more robust results. Additionally, the study including the respondent from both developed

and developing countries may advance the generalizability, external reliability, and comprehend the true attitudes of managers.

According to DeVellis (1991), the authentication of measurement scale is an ongoing procedure and legitimacy is proven only over a sequence of investigation that advance, improve and test items on multiple countries and companies. Therefore, on instrumentation of adopting GrSCM there exist a wide scope for future research, moreover these measurements can grow and evolve into a lot of new areas assist the building and validation of theories. Additionally, another research direction can be a comparisons study of GrSCM practices adoption between countries, inorder to determine model construct is robust culturally and the measurement scale is a steady fit regardless of different countries. Furthermore, the exploration of the interaction effect of the different construct of external and internal factors on adoption GrSCM practices would be very interesting.

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