

DRIVERS OF GREEN SUPPLY CHAIN MANAGEMENT AND THEIR IMPLEMENTATION IN PAKISTAN



Thesis Submitted to

The Superior College, Lahore

In Partial Fulfillment of the
Requirement for the Degree of

Masters in Business Administration

By

Mohsin Hassan

Roll No: MBAT-F14-001

Session: 2014 to 2016

The Superior College (Weekend Program), Lahore

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DEDICATION

I dedicated this thesis to my parents, especially my mother who is no longer with us but enabled me in her life time to get a good education and I would like to dedicate this to my teachers at Superior University who guided and mentored me in the past 2 years. It has truly been a learning experience and one that I will remember for the rest of my life.

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Thank You

Mohsin Hassan

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Abstract

Purpose

The purpose of the study is to look at the factors involved in driving GSCM across the world and then study their application or status in the Pakistani supply chain scenario.

Design/methodology/approach

A quantitative approach was taken to conduct the study under the positivist epistemology paradigm. A self-administered questionnaire was used to collect the data from 73 respondents from 14 companies. In order to check the validity of the data collected, CronBach Alphas test was applied to the data along with KMO Bartlett's to test for sampling adequacy. After that Principal component analysis was used with varimax rotation and finally regression was applied to the data to determine the effect of each variable on the others.

Findings

It was found through research that all the drivers of GSCM are co-related with each other in a significant way. This means practically implementing only one would not have that significant of an impact on the firm performance but they have to be implemented together. The study also found that most of the Pakistani organizations implementing GSCM in their work feel they have a direct impact on the firm performance. The study also found that the phenomenon of GSCM in Pakistan is still growing and not all companies or respondents were aware of it or implementing it.

Limitations

The research was limited due to the relatively small sample size of the study.

Chapter 1. Introduction

1.1 Background

Human consumption and emissions have grown significantly over the years. In specific, at the turn of the 19th century, the industrial revolution brought about a change that meant ever growing emissions and consumption. As technology continued to advance, it continued creating comfort for its creators i.e. the human race. What was not known over this period of continued advancement, was the effect of this revolution on the natural eco-balance. As CO₂ emissions soared, temperatures across the globe started getting higher and higher while all the time, natural resources kept on depleting. This included greenhouse gases being emitted from all types of vehicles including cars, bikes, planes, to chemical emissions from things like fertilizers, factories, waste and so on.

By the mid of the 20th century, scientist finally started realizing the fact that the fragile eco-system of the planet had its limitations. Limitations which had to be kept in mind (Whiteman, Walker, & Perego, 2013). In 1981 it was first reported that the Ozone Layer was being damaged due to the constant emissions of greenhouse gases and subsequent reports after 1981 only became more frequent. Once this trend got going, governments and organizations started making organized and deliberate efforts as part of their environmental and social engagement to cut down on emissions (Khavul & Bruton, 2013). Now it is one trend that is being openly adopted by various organizations to not only ensure a sustainable future but additionally, organizations are working towards it because of government incentives, customer satisfaction, financial performance, competitive advantage and other factors.

Environmental consciousness is now centered at the heart of organizations. With diminishing natural resources, manufacturers and makers are constantly looking to reuse and recycle and lessen their impact (González & González, 2005). This has also enabled green initiatives to become more common and more sustainable. While spending is still required, the cost of it is much less than the cost of what companies will have to pay if they do not make a shift to sustainability. Consumers on the other hand have also become more aware of their own impact on this and are furthering the adoption.

1.2 Problem Statement

1.2.1 Research Gap:

In context of going green, the world had made extended strides in lessening their environmental impact as concerns about global warming and natural resource depletion came to light. Companies seeking to improve environmental performance, need to start procedures and programs based on EMS (environmental management system) and switch to cleaner production practice (Jabbour, Frascareli, & Jabbour, 2015). Green practices have shown to through empirical data in some cases to have a positive effect on various factors like regulatory pressure, good human resource and government support. However, the complexity involved in GSCM practices has made it difficult for companies to adopt it openly (Kuei, Madu, Chow, & Chen, 2015). It has also been proven that collaboration with raw material producers and suppliers through greening initiatives proves financially beneficial (Schmidt, Foerstl, & Schaltenbrand, 2017). Additionally, greening efforts also payoff in terms of reduced inventory, increase recovery of assets through reverse logistics (Geng, Mansouri, & Aktas, 2017).

Green supply chain was a fairly unimportant factor at the turn of this century but now as awareness has grown, it has become of the most important challenges. Companies now look at it as a sources of competitive advantage (Chiu & Hsieh, 2016). Not only that, it is critical in the future perspective as well, since it ensures the sustainability of limited natural resources on which businesses and consumers rely (Kirchoff, Tate, & Mollenkopf, 2016). Greening when applied in isolation is not useful. The efforts need to be spread across the supply chain (Tseng, Tan, & Chiu, 2016). Similarly, researcher have drawn a direct relation between GSCM and performance in a way that is impossible to disentangle or separate (Chin, Tat, & Sulaiman, 2015). According to studies (Rehman, Seth, & Shrivastava, 2016) and (Bai, Sarkis, & Dou, 2015), it has become critical for organizations to go green because of external pressures like those from regulations, governments, competitors and in certain cases, even customer. Thus the evolution of green practices has coincided with the evolution of overall manufacturing environment. (Khaksar, Abbasnejad, Esmaeili, & Tamošaitienė, 2016)

Some companies realized early on that bringing efficiency to their operations in terms of how they consume power, how they manage waste, how they procure material results in overall cost reduction (Wallace & Omachar, 2016). And to keep it relevant to managers for adoption and for them to allocate resources to GSCM, the perceived potential of economic benefits is key (Kirchoff et al., 2016). More recently in fact, organizations are looking to expand these greening efforts to their supply chain partners as well, to seek further sustainability. (Grekova, Calantone, Bremmers, & Trienekens, 2016). In this scenario, large organizations play the most critical role as they are selling to dozens if not hundreds of small businesses who are then selling to thousands of customers. On the flip side, the larger organizations also stand to benefit most since implementing GSCM means reduction in inefficiencies like pollution and waste (Hoskin, 2011).

Under the burden of proof that the with the entire world moving towards greening of supply chains and helping reduce the impact of human consumption on the environment, this study aims to find out, if Pakistani organizations are also taking any effective measures in this direction.

1.2.2 Rationale

Through this paper an attempt is being made to study the factors involved in driving GSCM across the world and then study their application or status in the Pakistani supply chain scenario. It has become necessary to do so because Pakistan is a country which is most affected by the environmental changes. We are now a country where natural resources like water are becoming scarce. A country where excessive logging has meant deforestation to an extent that only 2% of the country is covered in forests as compared to the minimum of 10% as recommended by United Nations. Similarly, lately we have seen consistent smog in various cities for days on end again due to excessive greenhouse emission. In this scenario, it is pertinent that we study and find out what efforts are being made to lessen our environmental impact and if organizations are aware of GSCM and its drivers.

1.3 Significance of the study

The study is of significance in 3 ways:

1.3.1 Researchers:

Firstly, it will give direction to future researchers who can work on more complex models of GSCM and dive deeper in to the context or comparisons of it. This research will be the first stepping stone toward GSCM introduction in to the Pakistani arena. As of right now, there are hardly any relevant studies within the Pakistani market.

1.3.2 Practitioners

Secondly, it will give the Pakistani manufacturer or supply chain managers insights in to international practices related to GSCM and how they can leverage those for improved environmental impact and organizational performance. With this study they will be introduced to the basic elements of GSCM and will get to know in detail how they affect organizational performance.

1.3.3 Policy Makers

Lastly, this research should also serve as a basic reminder to policy makers on the significance of why GSCM is critical to adopt, especially in a country like Pakistan which is fast becoming a resources hungry yet resource scarce country. It should serve as a insight in to the fact that the developed world has long moved to GSCM and if Pakistani policy makers are to follow suit, they need to quickly realize the importance of GSCM and start directly their efforts towards better sustainability policies.

1.4 Research Aim & Objectives

1.4.1 Aim of Research:

The aim of this research is to determine what progress has been made in Pakistan towards Green supply chain management and to give it further direction through a detailed study of various organizations.

1.4.2 Objectives:

The objectives of the research are as follows:

- Give a thorough analysis of how GSCM affects performance of an organizations
- To cover as many tangible and intangible effects of GSCM on organization performance
- Study whether the concepts of GSCM exists in Pakistani industry
- Provide recommendation on how GSCM can be good for the Pakistani industry
- Make a case for GSCM for Pakistan and provide future research direction

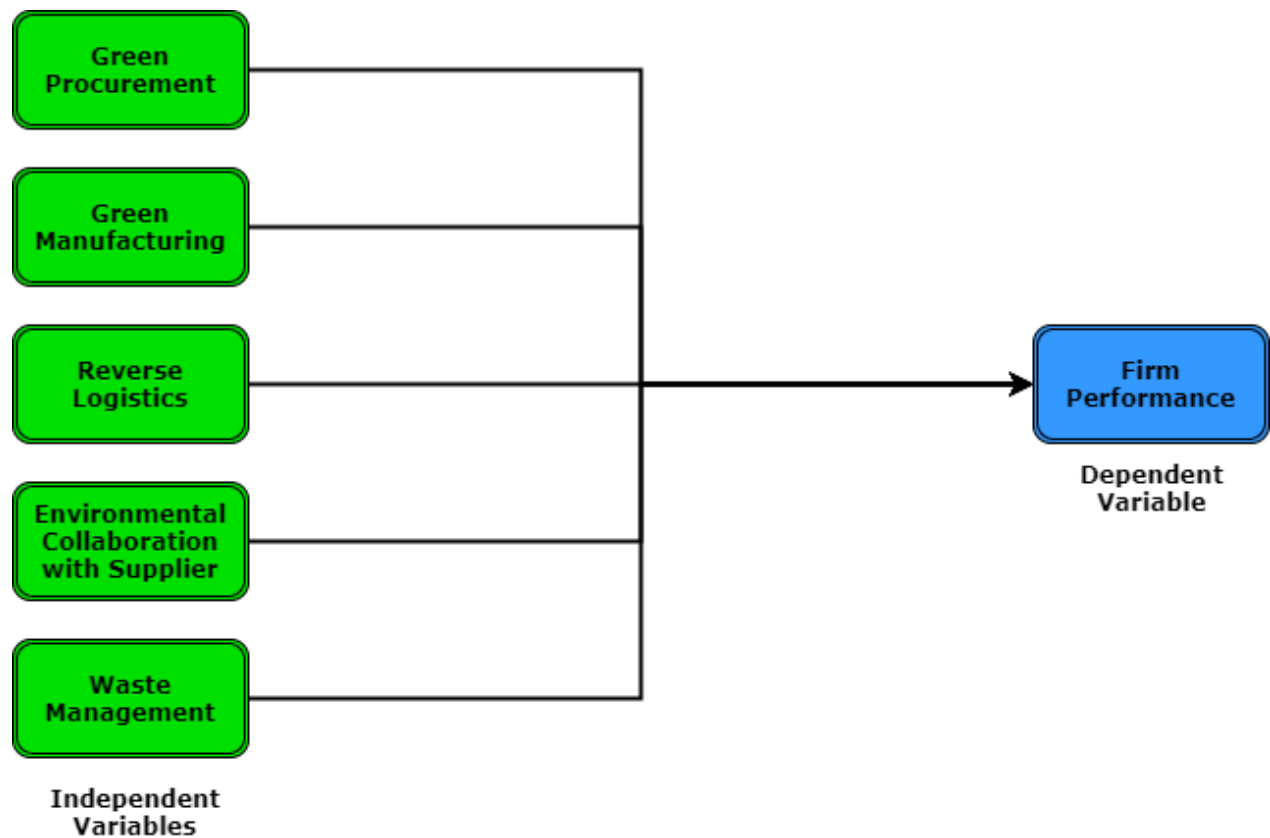
1.5 Research Hypothesis

Research hypothesis for this study will be as follows:

Hypothesis:

- H1. GSCM has an effect on firm performance
- H2. Green procurement has an effect on firm performance
- H3. Green manufacturing has an effect on firm performance
- H4. Reverse logistics has an effect on firm performance
- H5. Environmental collaboration with suppliers has an effect on firm performance
- H6. Waste Management has an effect on firm performance
- H7. GSCM has no effect on firm performance
- H8. Green procurement has no effect on firm performance
- H9. Green manufacturing has no effect on firm performance
- H10. Reverse logistics has no effect on firm performance
- H11. Environmental collaboration with suppliers has no effect on firm performance
- H12. Waste Management has no effect on firm performance

1.5.1 Research Model



1.6 Structure of the study

The structure of the study is divided into 6 chapters primarily. It starts with the *1. Introduction* to the topic, which includes the background, the problem statement and covers why this study is being done along with the hypothesis and final objectives of the study. *2. Literature review* covers an extensive study of the material already available related to the topic and what information it provides. *3. Methodology* covers what approaches have been used to conduct the research and what tools have been utilized along with the population. *4. Results and findings* talks about what revelations have been made by the collection and interpretation of the data with regards to the topic. *5. Discussion*, covers a fairly detailed discussion on the findings with various contexts and finally *6. Conclusion*, talks about the limitations of the research, the final derivative of the research and suggest future directions to researchers, managers and policy makers.

Chapter 2. Literature Review

For the context to be set for this research, of course the first important thing to do would be to determine what GSCM and its drivers. The initial portion of the literature review will therefore explain what GSCM is and what has driven firms globally to adopt Green Supply chain Management practices. The second portion of the literature review will look at whether the greening of supply chain management for this study actually do have a positive impact on company performance or not. This should clarify the current standing of GSCM driver and how they affect the performance indicators, whether tangible or non-tangible, of an organization.

2.1 GSCM: A collection of definitions and factors

In recent years, the 'Greening of Businesses' has meant that sustainability is being applied to numerous functions of the organization. Supply chains similarly are being looked at in a way where they can be leveraged to be more sustainable. In a study Srivastava (2007) defined Green Supply Chain Management as incorporation of environmental thinking into functions of supply chain management, including designing of products, procurement of material, processes of manufacturing, logistical processes and end-of-life management. Alternatively it was also defined as a combination of the activities that include designing of products, all stages of manufacturing, complete aspects of distribution and of reverse logistics (Sarkis J. , 2003).

In a completely fresh perspective Kumar and Putnam (2008) flipped the "*cradle to grave*" model of supply chains which was dominant earlier and suggested, it is now called "*cradle to cradle*", which signifies that the product must return to the origin, that is, the manufacturer, so it can be reused or properly disposed of. In a much simpler perspective though, Torielli et al. (2011), defined Green Supply Chain Management as the coming together of both environmental practices and SCM practice in a proven way to reduce a company's impact on the environment while improving business performance.

2.2 GSCM in the current day and age

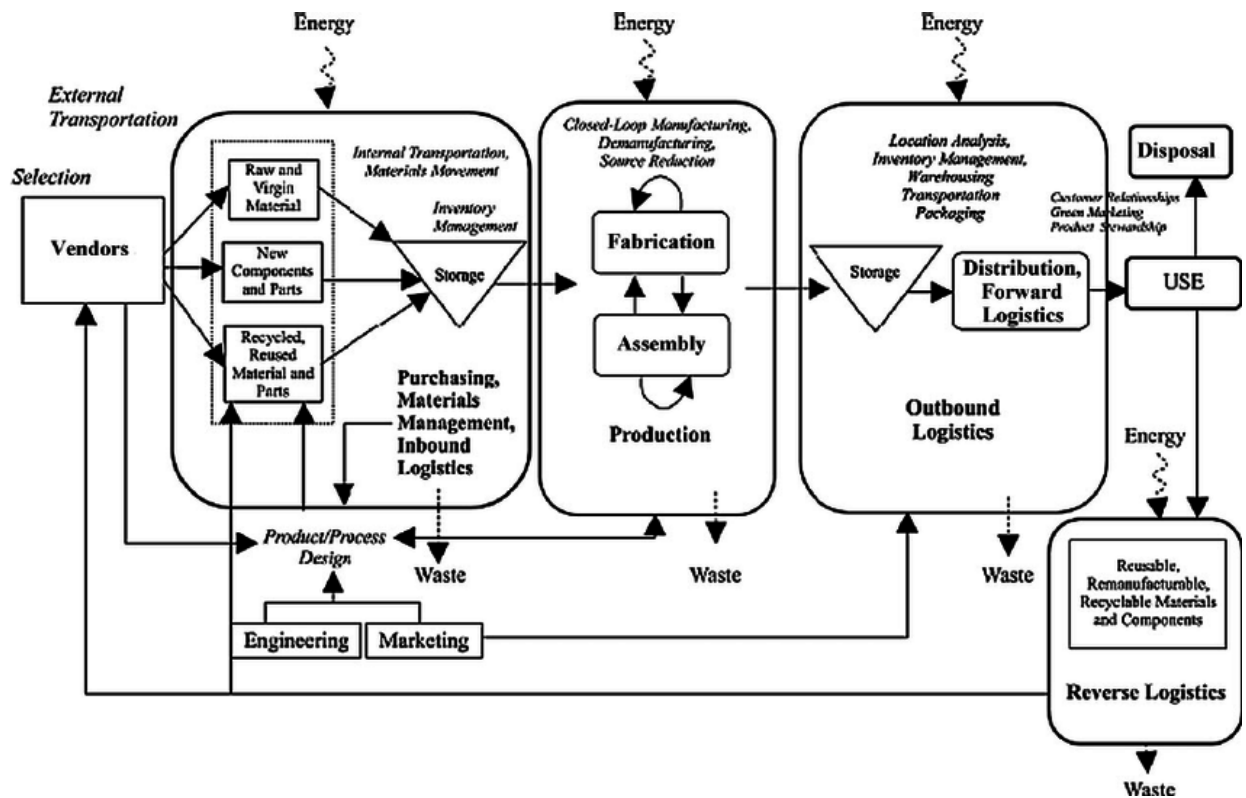
Strategic decision on why or when to adopt Green supply chain practices vary from industry to industry and from country to country. For example Mutingi (2013) documented that firms adopt GSCM because of external pressures, in specific due to legislation or tough environmental laws. These views were echoed in (Hongthong et al., 2015) as well who claim through their study that, the threat of strict law enforcement was a leading factor that resulted in companies improving their environmental performance along with economic and intangible performance also improving. Their study however did not consider organizational culture aspects.

Although it is true that some countries have gotten tougher on the environmental laws, it is surely not the only driver of going green. There are other factors that also motivate businesses to improve their environmental footprints and boost their effectiveness in the marketplace. For example, (Bowen, Cousins, Lamming, & Faruk, 2001) claims potential drivers of green supply chain can be: a more proactive approach to strategic purchasing along with developing the supply capabilities based on the firm's environmental management. The existing literature has classified these GSCM practices into green purchasing, green production, investment recovery, reverse logistics, and supplier and customer collaboration (Chien & Shih, 2007). In other approaches like that of Lo (2014), the research asserts that what drives organizations to be green can be either external or internal forces which may include, support from upper level management, firm reputation or brand image and overall cost reduction. Another set of researchers (Walker, Di Sisto, & McBain, 2008) found a similar relation of drivers and also claimed that drivers and barriers of Green supply chain can be internal or external. Their study was based on public schools, however the drivers they found were similar to the ones mentioned earlier i.e. Internal drivers include: value champions and cost reduction, whereas external drivers include: regulations, customers, competitors and society.

Even in more recent studies like (Ali, Bentley, Cao, & Habib, 2017) researcher assert that drivers may come from inside the organization and are called ID or internal drivers or they may come from outside the organization and be called ED or external drivers. The drivers mention in this

study are similar or the same as suggested earlier for instance, government, environmental agencies, market forces and customer expectations. Similarly (Tan, Zailani, Tan, & Shaharudin, 2016) is another recent study that suggests that the three drivers of green supply chain management in the form of regulations, society and customers could influence firms in their adoption of GSCM practices. The study also suggests GSCM is gaining popularity in the under developed world regions through external pressure from the developed regions of the world. Since a lot of the developed world either has its products manufactured in under developed countries, which also goes to show a buyer supplier relationship to the drivers of supply chain. The study done by Large and Thomsen (2011) approaches this same issue of identifying the drivers of supply chain management from a very different angle. It views it the context of building organizational capabilities. For example, it says that green supply management capabilities and the strategic level of the purchasing department are key drivers of adoption of GSCM in a company. So it looks at the capability of internal units and key resources as drivers of supply chain management. It also looks at the level of environmental commitment, and in turn how deeply the companies assess their suppliers and to what degree they collaborate with them to ensure they also go green as a driver for GSCM.

In another study (Firouzabadi, Olfat, & Khodaverdi, 2010) also described the main groups of internal and external drivers of green supply chain management. The theme seems familiar to what is cited earlier. They also claims that the leading practices include factors stemming from within the organizational, pressure from regulations, pressure from customers, competitors strategy, society and suppliers as well. This also shows the cradle to cradle theory cited earlier as given by (Kumar & Putnam, 2008) is very relevant since GSCM has to encompass all roles with the supply chain. Environmental management requires significant spending and large scale changes to manufacturing processes in order to reduce carbon footprints, waste output and energy consumption or switch to renewable sources of energy (Albertini, 2013). Keeping this in mind, it is no surprise that it was also found that downstream organizations in a supply chain adopt greening due to external pressures rather than need. (Schmidt et al., 2017).



Hervani, A. A. (2005). Performance measurement for green supply chain management. *Benchmarking: An international journal*, 12(4), 330-353.

As can be seen in the diagram above, the same factors or drivers are repeated. This includes reverse logistics, production, design and supplier integration. Through this diagram the researchers have shown that Green supply chain management is concentrated effort that spans throughout the supply chain function. Starting from the design of the products from the engineering and marketing effort that actually build the product, leading on the role of suppliers who deliver material that is to be utilized in the manufacturing of the product and the key role the suppliers are going to play in GSCM. From there it moves on to storage which is not a key part of the GSCM drivers as of right now and moves in to production. Production as you know is the part of the supply chain which creates the most waste during the life cycle of the product. Thus it is an integral area for the production part of supply chain to be as green as possible. From there the product finally moves in to distribution function and moved out to the consumer. Here again, the key role is played by reverse logistics which helps the company in collecting waste and disposing of it in a manner that is best for the environment. With the drivers of Green supply chain

Management now well established, we will move on to the second part of the literature review and discuss the effects of selected GSCM drivers on company performance.

2.2.1 Factors involved in GSCM

With the evolution of greener technologies, environment friendly operations are continuously being improved. In this scenario, the factors involved in GSCM are also evolving and even changing. Therefore it is difficult to pin them all down as the everlasting factors of GSCM. However, in various studies, a few common elements or themes can be seen. They are as follows:

- **Green Procurement**
- **Green Manufacturing**
- **Reverse Logistics**
- **Environmental Collaboration (Suppliers)**
- **Waste Management**

It is pertinent to discuss each of these elements briefly to try and introduce the reader to them. With the basics the reader should be able to comprehend the overall theme that this research paper is trying to follow.

Green Procurement

Green Procurement refers to a purchasing method, where products and/or services are selected or procured by looking at how much adverse environmental impact and human impact they have. Obviously in such a method, the products or services chosen are the ones that have the least amount of impact (González-Benito, 2016). Green procurement is not a one off activity. It is a continuous effort that extends from start to finish.

Green Manufacturing

According to an academic definition, green manufacturing can be defined as “A process or system which has a minimal, nonexistent, or negative impact on the environment. A definition adapted from one proposed by the U.S. Department of Commerce has sustainable manufacturing as “the creation of manufacturing products that use materials and processes that minimize negative

environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound” (Dornfeld D. , Yuan, Diaz, Zhang, & Vijayaraghavan, 2013).

Environmental Collaboration (Suppliers)

As described earlier, since GSCM requires involvement throughout the SCM function, that means the even the suppliers have to be part of the Greening effort. Environmental co-operation refers to not only to suppliers but co-operation with customers, government bodies or other agents that are trying to help with reduction of environmental impact. It also refers to opportunities where supply chain partners can leverage each other’s resources along with experience and knowledge to work towards sustainability (Grekova et al., 2016).

Reverse Logistics

Reverse logistics is all about the “Cradle to Cradle” or back to the origin ideology that was referenced earlier from Kumar and Putnam (2008). As we produce products, we leave behind a trail of components from them that are considered waste. Reverse logistics is about dealing with those parts and bringing them back to the point of origin so they can be recycled and reused. This ensures that the company does not have to invest excessively in making new bottles to ship their product every cycle and it also means that their environmental impact is low.

Waste Management

The last factor here is waste management. It is a factor which is closely related to reverse logistics as well. Waste management refers to practices where disposable parts of a product are collected or replaced. Depending on the option, they are put to a proper mechanism of being eliminated in a way that ensures no harmful effects are seen on the environment or the users or replaced by a product which is more environmentally friendly.

2.3 Effect of GSCM drivers on company performance

In this part of the literature review, we are going to look at all the information that is available and shows what kind of effect GSCM drivers have on a company’s performance. This information has been gathered from various sources and provides multiple viewpoints on the effect of GSCM on performance. Earlier GSCM researches have extensively scrutinized whether or not it pays to move towards greening. While you can find studies in vast numbers, their findings are still

fragmented and somewhat ambiguous. While researchers look in to the relation between GSCM and performance, the jury is still out on whether there is a relation or not. To make this study more efficient, we will divided this section in to 3 parts, GSCM and Corporate Performance:

With the rise in concerns over global warming, the importance of green practices has been elevated and now are considered a direct reflection on a firm's competitive position. A number of studies have tried to identify the possible consequences of greening the supply chain. Some of the recent indication of no directly relatable relationship between adoption of green supply chain management and organizational performance can be found in (Hongthong et al., 2015) and (Sarkis Z. W., 2013). The studies claims that although there is a relation between GSCM practices and company performance, it is so negligible that it cannot be cited as a reason for adoption of GSCM practices on a large scale in an organization despite having a positive relation. Then in another study (Lee, Tae, & Choi, 2012) the researchers out rightly denied any relation between GSCM and organizational performance. They used responses from a survey questionnaire from a list of 223 respondents of SMEs in the electronic industry in Korea. Based on those responses the authors could not find any direct relation. Although the sample size was sufficient the researchers did mention as a limitation their generalization of the findings which was primarily based on the Korean electronics industry (De Giovanni & Vinzi, 2012) and (Esfahbodi, Zhang, & Watson, 2016) also concluded the same based on their research and claim that environmental performance of an organization does not in any way lead to better financial performance inside a company albeit environmental collaboration does show a marginal relationship. Again the study was limited to one country and could not be generalized. A similar finding was put forth in (Huang, Tan, & Dong, 2012) too but they too were limited to the Chinese SME arena.

If we take a look at some early studies in to the effects of GSCM, we note that inconsistent results were reported by many researchers. Like in the study (González & González, 2005) that sought to prove through empirical data, the relation between being green and business performance. Though the study showed results but the authors used the respondent's perception to answer the question at hand rather than concrete measurements of performance. (Link & Naveh, 2006) is a more structured study that tried to gauge the impact of the ISO 14001 standards on corporate performance. ISO 14001 is the environmental management system which companies can attain

through implementation of green practices and standards. This study too found that implementing the ISO standard had no significant proof of improving business performance. On the other hand, they also noted that it had not adverse effect of performance either.

By going through these studies, it would appear that the studies which were conducted early on or on basis of perception and even those on universal standards seem to show no relationship between the greening of supply chains and performance of an organization. As is the case in any new field of studies, early researches tend to provide such results which can be due to limitations of the understanding of the topic at that point in time. Through research like (Wagner, Van, Azomahou, & Wehrmeyer, 2002) which looked at the European paper industry and what greening efforts there meant for organizations, the research in this case found a uniform negative relation between sustainability measures and performance. The study also argued that stringent implementation of rules and regulations may not have the desired effect either. The study was limited in its scope however to one industry that was already heavily influenced by strict government measures. In a study of the American automobile aftermarket industry another study (Richey, Chen, Genchev, & Daugherty, 2005) concluded that internally driven reverse logistics programs which are a greening efforts, had a negative impact on the financial performance of the company. This was mainly attributed to the fact that setting up a reverse logistics program would incur a large cost to the organization. The study was limited in its scope though as the American aftermarket auto industry is huge but the data was selected from a fairly small population of 118 respondents only. Secondly, it was limited to one industry.

One more study that came across as comprehensive was (Montabon, Sroufe, & Narasimhan, 2007). This study is being considered comprehensive since it empirically examined the relation between practices for environmental management and the performance of an organization. Through the study, the researchers concluded that environmental practices have a negative effect on Return on Investment. This study also however, found that environmental practices had a large variety and they could have positive results on other organizational performance indicators. So the study was able to establish a negative effect in only one indicator but could not establish it as an overall understanding. Another study (Large & Thomsen, 2011), studied another factor of GSCM in specific. The study took green purchasing through cooperation with suppliers and studied

it against purchasing performance as one of the indicators of organizational performance. The study was based on survey questionnaires and through the assessment of collected data, researchers found a negative relation between the aforementioned variables. Although the results seem sound, the study is reliant of self-reported data and feedback. It would have been better if the researchers could have linked the results more directly to performance indicators like ROI, financial performance.

So far we see that early studies either showed no relation or a negative relation between GSCM practices and company performance. In more recent studies however, this seems to change. Let us start off with a study that included 159 supply chain managers. In a survey based study (Green, Zelbst, Meacham, & Bhadauria, 2012) the researchers explored the relationship between GSCM initiatives and their related performance outcomes. Through this study it was established that green practices have various positive effect on performance indicators e.g. according to the study green purchasing significantly effects economic performance but not environmental performance. Also according to the study, the role of eco-design had no clear cut impact on performance. As compared to this, customer collaboration impacted environmental performance but not economic performance.

Another study (Daugherty, Autry, & Ellinger, 2011) looked in to whether there is a payoff for firms that assign resources to reverse logistics. The study found that firms which commit management resources to reverse logistics, do significantly better in day to day operations which leads to better performance as well. Eventually, the achievement of reverse logistics goals results in better financial performance as well for a company according to the study.

A recent study (Diabat, Khodaverdi, & Olfat, 2013) to explore the relationship between GSCM initiatives in a company and their link to performance outcomes used a survey questionnaire to find out what people in the industry and academic circles thought of the same. The study concluded that certain GSCM practices like: eco-friendly design and reverse logistics do positively impact economic performance and thus can lead to better corporate performance.

Another study which gets cited by most researcher working on GSCM and performance measurement is (Zhu, Sarkis, & Geng, 2005). In this study the researchers looked at 186 manufacturing firms in the Chinese automotive industry and established that organizations that had higher levels of GSCM adoption, had better environmental and economic performance. This also had to do with the fact that these companies were exporting most of their equipment to countries which had strict environmental control and thus buyers were willing to pay more. In a similar study (Liang & Chang, 2008) it was revealed through a survey of 120+ Chinese SME's that adoption of GSCM was associated to a performance boost for companies.

In another study (Zailani, Eltayeb, Hsu, & Choon, 2012) researchers in order to make the results more reliable went only to ISO 14001 certified organizations in Malaysia. They also gathered their data through surveys and their findings mimic those of (Zhu et al., 2005) and (Green et al., 2012). The study also indicates that regulations on environmental practices play a positive role in environmental performance of Malaysian companies.

A very recent study (Jabbour et al., 2015) also concluded that eco-design directly affected environmental performance of a company while collaboration with customers improved operational performance for a company. In a different study of the Japanese corporate sector (Nakao, Amano, Matsumura, Genba, & Nakano, 2007) looked at GSCM performance as reported by the companies under Japanese law and then compared them to their organizational performance. The study found a positive relation between economic performance and GSCM practices. They also concluded that GSCM practices and organizational performance have a two way relationship but this has only come about recently.

A fairly old study also came to light during this literature review which had to be included due to the sheer magnitude of it. Through another study (King & Lenox, 2001), researcher carried out a study encompassing over 650 manufacturer in the United States. Their main goal was to gauge whether environmental performance of these companies had any financial impact on their performance. They did this by measuring the amount of emissions each manufacturer had as compared to the industry standards and then compared the financial performance with relation to it. They found that the manufacturers with lowest emissions had the best financial performances.

Another study (López, Molina, & Claver, 2009), looked at whether early adoption or rather proactive approach to GSCM adoption had any role to play in the firm's performance at all. The findings of the study support a proactive approach in adoption GSCM to lessen the environmental impact of a company. Early environmental management in turn will help in environmental performance which leads to a competitive advantage for a company. This competitive advantage could be in the form of tax breaks or through differentiation. The study (Kung, Huang, & Cheng, 2012) reported similar findings from the Taiwanese manufacturing industry.

In a study that specifically studied the cement sector of Iran (Khaksaret al., 2016), it was found that green procurement or suppliers along with green innovations in operations had a significantly positive impact on the environmental performance of the company. This further had a positive impact on the competitive advantage of a company, giving it an edge in various performance indicator. While a couple of studies (Zhu et al., 2005) claim that Greening any phase of the supply chain have a positive relationship with the environmental and financial performance by way of cost reduction, increased market share and profit (Chien & Shih, 2007). In a recent study however, (Schmidt et al., 2017), it was found that although GSCM has a direct relation with a company's overall performance, it was noted that the effect is most noticed in the upstream parts of the supply chain. The upstream off course refers to the functions like procurement, design and manufacturing. The study also says that organizations which are downstream in a supply chain stand to gain the least out of greening efforts while spending the most resources.

In another study researchers found that the relationship between GSCM practices and firm performance is strong and significant. They suggest that although the initial transition cost of Green Supply Chain Management requires high initial investments, their perceived benefits which can include saving energy, reducing waste and increasing operational efficiency, fully compensate the cost being spent to go green. Additionally they suggest, that greening helps with creating better company image with the customers. Greening efforts also payoff in terms of reduced inventory, increase recovery of assets through reverse logistics. (Geng et al., 2017).

Chapter 3. Methodology

In this chapter of the study, the detailed methodology that will be used to carry out the research will be explained. It is important that before we get to the methods used, a detailed explanation is given of the various methods of research available to a researcher.

We start off with the characteristics of research. Over the centuries of research, different researchers came up with different methods of conducting a research. While some thought that research would be more grounded if it was directly related to the way things actually exist, others thought it would be better to seek what constitutes real knowledge and what is the relation of the seeker to what is being sought. Here are the most common introductions of each:

3.1 Research Paradigms

Positivism: The philosophy of Positivism is in direct co-relation with that of objectivism. Positivism is a kind of philosophical approach, in which a research uses an objective i.e. an impartial, unbiased and detached interpretation to a research question (Cooper & Schindler, 2001). Researchers using this approach or paradigm of research are looking to collect data from big social samples. The data being collected in this case is always general and never focused or specific. Through this approach, researchers play a role of observers and they collect their empirical data through experiments. (Easterby, Thorpe, & Lowe, 2006). Through this approach and the availability of a large set of data, the researcher can give results and findings without letting his own beliefs or biases get in the way.

Interpretivism: Interpretivism can be referred to as the stark opposition to positivism. In an interpretivist approach, the researcher is allowed to give his own beliefs as part of the study and thus include his justifications regarding a particular research issue (Easterby et al., 2006). Researcher using the Interpretivism approach focus on finding data that can be substantiated through data. As mentioned earlier, this is an approach which is opposite to positivism thus in this approach, the researchers use a small sample to evaluate the topic but they go into detail of the data collected from the small sample to form an opinion (Kasi, 2009).

Realism: As the name suggests, this paradigm focuses in the reality and beliefs that already exists in the environment. This philosophical approach uses two methods: One is direct reality and the second is critical realism. Direct reality refers to what an individual feels, sees, hear, etc. In critical realism, individuals argue about their experiences of a particular situation (McMurray, 2004).

Pragmatism: This research philosophy is a combination of positivism and realism. Pragmatism asserts that any theory that proves itself more successful in predicting and controlling our world than its rivals can be considered to be nearer the truth.

3.2 Research Philosophies

Epistemology: can be defined as the study of knowledge and justified belief. It concerns the researcher with questions like what are the necessary and sufficient conditions of knowledge. In what form does the knowledge exist? What limits is the knowledge bound to? What sources is it collected from? As the study of justified belief, epistemology aims to find out about challenges and matters that affect the development of knowledge and how that knowledge is distributed.

Ontology: can be defined as the study of existence beyond what can be seen. It concerns the researcher with question like what is the nature of reality. Ontology asks abstract questions, which may seem useless in terms of a grounded research but for many centuries, philosophers and Sufis have used an ontological approach to study existence, to study self-awareness. In some ways it tries to combine what cannot be seen to what can be seen.

“Ontology embodies what is, while epistemology tries to understand what it means to know. Epistemology provides a philosophical background for deciding what kinds of knowledge are legitimate and adequate.”
(Gray, 2013)

Based on the definitions of each, it will be practical to use epistemological approach to conduct research and use positivism as the paradigm for this study. That would mean that the research will be based in **Positivist Epistemology**, therefore, assumes that only “facts” derived from the scientific method can make legitimate knowledge claims. It also assumes the researcher is separate from and not affecting the outcomes of research.

3.3 Research Approach

3.3.1 Deductive reasoning

Reasoning is a logical approach to ascertain a fact. Deductive reasoning, is one kind of reasoning which approaches any problem in general sense and then through a logical approach narrows it down to specifics. In this type of reasoning, if an assumption or hypothesis is true for a broader group or class of things in general, then it is true for all members of that group or class in specific. For example: All athletes go to the gym. Mohsin is an athlete. Therefore, Mohsin goes to the gym. This type of reasoning is based on 'premises' which need to be true in order for the conclusion or finding to turn out true. Deductive reasoning allows them to apply the theories to specific situations.

3.3.2 Inductive reasoning

Inductive reasoning is the opposite of deductive reasoning. As understood then, inductive reasoning starts from specific observations and from there it draw broad generalizations. "In inductive inference, we go from the specific to the general. We make many observations, discern a pattern, make a generalization, and infer an explanation or a theory".

Even if all of the premises are true in a statement, inductive reasoning allows for the conclusion to be false. Here's an example: "Harold is a grandfather. Harold is bald. Therefore, all grandfathers are bald." The conclusion does not follow logically from the statements. Inductive reasoning has its place in the scientific method. Scientists use it to form hypotheses and theories.

3.3.3 Chosen Approach

Since such a study is not done and we are moving from specific drivers and a specific field to ascertain generalizations of an entire country, we will use '**Inductive Reasoning**' for this research.

3.4 Research Methods

3.4.1 Quantitative

As suggested by the name, this approach uses a quantifiable approach to determine facts. Quantitative research method is used when the researcher is concerned with discovering facts about a certain phenomenon as it exists in the world. It assumes that the reality of this phenomenon is fixed and thus measurable. Therefore this approach collects data through measuring things. Off course that also means that the data is analyzed through numerical comparison and reported as statistics. Quantitative approach has been adopted by many researchers in the field including Lee et al. (2012), who examined factors affecting GSCM implementation and business performance using a quantitative approach. Similarly the study (Hongthong et al., 2015) quantitatively, explored the adoption of proactive and reactive green practices and their impact on the tangible and intangible performance dimensions of the firm. The work (Diabat et al., 2013) was also based on a quantitative approach where, as cited earlier, the researchers reached out to 50 industry and academic experts. Exactly in the same way, (Liang & Chang, 2008) and (Zhu et al., 2005), examined the influence of GSCM practices on different performance dimensions within SMEs and manufacturing firms as stated earlier.

3.4.2 Qualitative

Qualitative method is concerned with understanding human behavior. It approaches the topic from the perspective of the respondent. It is more concerned with opinion rather than facts and it is because of this reason that it assumes a dynamic and negotiable reality of the subject matter. The data is collected based on observations and opinions and interpreted in a similar way. Off course that also means that the data is reported in a narrative.

3.4.3 Mix Method

As the name suggests, this method can approach the subject matter using both qualitative and quantitative techniques depending on what seems more reasonable to draw a conclusion. As per (Creswell, 2013), in mixed method researchers gathers knowledge about the subject on practical grounds. In mixed method, the data is collected simultaneously or sequentially to comprehend and evaluate the research problem.

3.4.4 Chosen Method

Given the logical nature of the study which suggests a model with relationship between green supply chain practices and firm performance that requires justification using practical data, a **Quantitative approach** shall be adopted in this study in the first instance using a survey questionnaire to obtain necessary data categorical data needed for the testing.

A qualitative approach may only be used if it is required to gather additional information using interviews with key respondents.

3.5 Research Design

3.5.1 Population

The research primarily concerns firms with an established supply chain. Companies that have been working with supply chains at the advance level and are in a positions to take next level approaches in improving supply chains or work towards sustainability. Since the study is supposed to be focused on Pakistan, we are going to assume all companies that have established supply chains as our population.

3.5.2 Sampling Frame

Since there is no concrete data available on which Pakistan based or Pakistani organizations are working towards sustainability, send out questionnaires to supply chain, procurement, logistics, manufacturing, directors, managers, assistant manager to collect data for as many manufacturing organizations as possible to gather as much data as possible on the research topic from as many respondents as possible.

3.5.3 Sampling Technique

Again, since there is no concrete data already available on GSCM practices within Pakistan, we are going to use **Stratified Random Sampling** and approach as many manufacturing companies as possible from our population sample.

3.5.4 Sampling Size

Vogt (2007) defines sampling as "a process that encompasses the selection of a smaller group from a larger group and studying the smaller group in order to learn about the larger group. The smaller group in this case is the sample and the larger group is the population. In the case of this study, manufacturing firms operating within Lahore were selected as the population. Since the manufacturing industry is by far the largest resource user and emissions producer (Zhu, Sarkis, & Geng, 2005) it was the ideal industry to look at. Other researchers have previously looked at the manufacturing industry as well like (Green, Zelbst, Meacham, & Bhadauria, 2012) with similar dependent and independent variables. (Zhu et al., 2005) also examined the impact of GSCM practices on different performance indicators of a similar population in China. In another study (Zailani, Eltayeb, Hsu, & Choon, 2012) researchers in order to make the results more reliable went only to ISO 14001 certified organizations in Malaysia. They also gathered their data through surveys and their findings mimic those of (Zhu et al., 2005) and (Green et al., 2012).

The survey was sent across to companies out of which 14 companies responded to the survey. At an average, 5 responses were received from each company with a total of 73 responses received from the approached sampling frame.

3.5.5 Data Collection Instrument

Data was collected through a questionnaire which was emailed to the respondents along with a digital link of the questionnaire made on google docs. The questionnaire adopted for this research required responses that can be quantified and consequently statistically tested using a statistical software package.

The questionnaire was divided into 5 sections. Each section covered one of the components of GSCM i.e. Green Procurement, Green Manufacturing, Reverse Logistics, Environmental Collaboration (Suppliers), Waste Management. Additionally one question asks whether the respondents feel that the GSCM efforts in their company (if any) affect overall performance or not.

3.5.6 Data Accuracy (Validity & Reliability)

As for data accuracy, that is being ensured by sending the survey to the decision makers of the supply chains in the organization. This ensures firsthand knowledge from those who are heading any related initiatives in GSCM. It also ensures that the respondents are much more likely to understand the direction and need of the research along with understanding its topic.

3.5.7 Data Analysis

For data analysis the recommended pattern of first checking data reliability with Cronbach Alpha along with the co-relation of the variable constructs followed by Principal Component Analysis via KMO Bartlett's test using the Varimax method to check validity of the construct. The data analysis is tailed off with the multiple regression analysis.

3.5.8 Ethical Considerations

The research is very straight forward and as such is not clouded by any sort of ethical considerations. The only factor that needs to be ethically considered here is the confidentiality of information being received from each respondent. As some respondents maybe from competing firms, it is critical that the information they have shared is not given to any other respondent. One other ethical aspect perhaps could be to not indulge the respondent too long as they are all from mid-level management to senior management.

Chapter 4. Results

The first order of business in interpreting the results is to check the reliability of the data collected. To check this Cronbach Alpha was used on elements of each variable.

4.1 Reliability Tests for Independent Variables

Reliability of Measurement Procurement: Table 4.1

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.603	.606	5

Table 4.1. shows the values of Cronbach's Alpha value for the elements of the procurement variable. Although a value of 0.7 or greater is considered a reliable value. A value below 0.7 is considered questionable but can still be used as it is not ruled out completely as unreliable. So as we see in this table and that the Cronbach Alpha value is 0.603. Our value as below the required 0.7 but it is still high enough to be considered reliable in this case.

Reliability of Measurement Manufacturing: Table 4.2

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.760	.760	5

Table 2. shows the reliability value of the construct of manufacturing. The value stands at 0.760 which means that the reliability for the data collected is healthy and can be used to draw further conclusions.

Reliability of Measurement Environmental Collaboration with supplier: Table 4.3

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.783	.787	7

Table 3. reports the reliability value of the construct of environmental collaboration with supplier. The value stands at 0.783 proving that the construct data possesses high reliability and will be consistent if used in drawing conclusions.

Reliability of Reverse logistics: Table 4.4

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.704	.703	5

Table 4. reports the reliability value of the construct of Reverse logistics. As the value stands at 0.704, it proves that the 4th construct also has consistently reliable data and will be consistent if used in drawing conclusions.

Reliability of Waste Management: Table 4.5

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.704	.705	5

Table 5. reports the reliability value of the construct of Waste Management. As the value stands at 0.704, it proves that the 5th construct too has consistently reliable data. With this we can

conclude that each multi item construct possess high reliability which shall give weight to our results and findings along with helping in making recommendations.

4.2 Reliability Tests for Dependent Variable

The research model has one dependent variable which is Firm performance. It was measured by 5 constructs, one each to measure the effect of each independent variable on it. The reliability value for this is 0.899 which is very high and means this data is also highly reliable.

Reliability of Firm Performance: Table 4.6

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.899	.900	5

4.3 KMO Measure of Sampling Adequacy

The question used in the study has 5 items on Procurement, 5 on Manufacturing, 7 of Environmental collaboration with suppliers, 5 on Reverse Logistics, 5 on Waste Management and similarly 5 on Firm performance. Responses for all 32 items varies from 1 to 5. Next we will apply factor analysis using PCA with Varimax Rotation to confirm construct validity. Results derived from the KMO test are given below in Table 4.7.

The results shown in the table show that the data collected is adequate to apply factor analysis as values vary from 0.68 to 0.829. As we know values above 0.6 are considered acceptable and from 0.7 they are considered good while values from 0.8 are considered great. This means that the values for KMO prove the adequacy of the data and we can move ahead with the Principal component analysis. The table also shows that the significance value is 0 for all constructs which is below 0.001 meaning there is a positive relation and factor analysis is applicable.

KMO and Bartlett's Test for Independent Variables: Table 4.7

KMO and Bartlett's Test					
Construct	Procurement	Manufacturing	Environmental Collaboration	Reverse Logistics	Waste Management
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.68	0.73	0.829	0.739	0.768
Bartlett's Test of Sphericity	34.863	87.44	126.573	60.003	57.1198
Bartlett's Test of Sphericity Sig.	0	0	0	0	0
Number of Items	5	5	7	5	5

Lastly table 4.8 shows the KMO Test was applied to the Dependent variable of Firm Performance which has 5 items and the KMO achieved is 0.827 making the sample adequate. Also to be noted is the significance value which is smaller than 0.001 which signifies a positive relation.

KMO and Bartlett's Test for Dependent variable: Table 4.8

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.827
Bartlett's Test of Sphericity	Approx. Chi-Square	149.095
	Sig.	.000
	Number of Items	5

4.4 Eigen Values and Variance Explained

Next we look at the Eigen Values for each of the constructs. As a rule we consider the component of a construct that has a value above 1, as the principle component. The same component is used for further analysis. Table 4.9 shows the Eigen values for all constructs. It shows that Procurement explained variance of 39.167% and consists of 5 items. Manufacturing explained variance of 51.214% with 5 items. Environmental collaboration explained variance of 45.248% while consisting of 7 items. Reverse logistics explained variance of 46.199% with 5 items. Waste

management explained variance of 46.334% with 5 items, while Firm performance has a variance explained of 71.510%.

Eigen Values and Total Variance Explained Table 4.9

Construct	Initial Eigenvalues			
	Components	Total	% of Variance	Cumulative %
Procurement	1	1.958	39.167	39.167
Manufacturing	1	2.561	51.214	51.214
Environmental Collaboration	1	3.167	45.248	45.248
Reverse Logistic	1	2.310	46.199	46.199
Waste Management	1	2.317	46.334	46.334
Firm Performance	1	3.575	71.510	71.510

4.5 Co-relation Matrix

Next tests that were run are Correlation analysis for each construct. This will help to confirm a mutual association among the items of each individual construct. The result shows that the value of correlation coefficients for all the items of each construct are correlated with each in a positive way.

The values for co-relation in Procurement vary from **0.088 to .358** while the values for Manufacturing vary from **0.19 to 0.549**. Moving on towards Environmental Collaboration with Suppliers, the co-relation values variate from **0.096 to 0.575** again showing a positive co-relation between the constructs. Up next is Reverse logistics, which varies from a value of **0.188 to 0.459** signifying a positive correlation again. The last independent variable to be measured for correlation is Waste Management and it varies from **0.153 to 0.416**. The independent variable which is Firm Performance varies from **0.597 to 0.737** again showing a positive correlation between the elements of the construct.

Co-relation Matrix for Procurement					
	1	2	3	4	5
Procurement	1.000	.231	.327	.088	.162
Procurement	.231	1.000	.189	.184	.223
Procurement	.327	.189	1.000	.282	.358
Procurement	.088	.184	.282	1.000	.311
Procurement	.162	.223	.358	.311	1.000

Co-relation Matrix for Manufacturing					
	1	2	3	4	5
Manufacturing	1.000	.429	.306	.397	.456
Manufacturing	.429	1.000	.499	.396	.275
Manufacturing	.306	.499	1.000	.549	.190
Manufacturing	.397	.396	.549	1.000	.379
Manufacturing	.456	.275	.190	.379	1.000

Co-relation Matrix for Environmental Collaboration with Supplier							
	1	2	3	4	5	6	7
EC With Sup	1.000	.215	.221	.211	.171	.086	.096
EC With Sup	.215	1.000	.444	.451	.433	.418	.449
EC With Sup	.221	.444	1.000	.266	.295	.468	.486
EC With Sup	.211	.451	.266	1.000	.387	.426	.332
EC With Sup	.171	.433	.295	.387	1.000	.402	.414
EC With Sup	.086	.418	.468	.426	.402	1.000	.575
EC With Sup	.096	.449	.486	.332	.414	.575	1.000

Co-relation Matrix for Reverse Logistics					
	1	2	3	4	5
Reverse Logistics	1.000	.287	.188	.218	.225
Reverse Logistics	.287	1.000	.459	.251	.332
Reverse Logistics	.188	.459	1.000	.387	.419
Reverse Logistics	.218	.251	.387	1.000	.444
Reverse Logistics	.225	.332	.419	.444	1.000

Co-relation Matrix for Waste Management					
	1	2	3	4	5
Waste Manage	1.000	.416	.242	.378	.346
Waste Manage	.416	1.000	.249	.398	.322
Waste Manage	.242	.249	1.000	.324	.153
Waste Manage	.378	.398	.324	1.000	.409
Waste Manage	.346	.322	.153	.409	1.000

Co-relation Matrix for Firm Performance					
	1	2	3	4	5
Firm Perform Procurement	1.000	.707	.593	.633	.640
Firm Perform Manufacture	.707	1.000	.597	.526	.614
Firm Perform Environmental Collaboration	.593	.597	1.000	.672	.737
Firm Perform Reverse Logistic	.633	.526	.672	1.000	.714
Firm Perform Waste Manage	.640	.614	.737	.714	1.000

4.6 Regression Analysis

The regression analysis has been used to determine the effect of each independent variable on the dependent variable which is Firm Performance. In the Table 4.10 it can be seen that all variables show significant positive relation with the dependent variable.

The table shows a significant positive relation between procurement and firm performance ($\beta=0.775$, Sig. $<.000$) with a Adjusted R Square value of 0.594 signifying that any efforts in greening procurement will have a significant impact on the overall company performance. Secondly the results show the most significant relation between manufacturing and firm performance ($\beta=0.798$, Sig. $<.000$) with a Adjusted R Square value of 0.631 again signifying any efforts towards green manufacturing will have a direct impact on firm performance. Next the results show a significant relation between environmental collaboration with suppliers and firm performance ($\beta=0.719$, Sig. $<.000$) with a Adjusted R Square value of 0.511 signifying any efforts towards environmental collaboration will have a direct impact on firm performance but it will not be as high as the first 2 constructs. The next figure shows that Reverse logistics has a positive relation with firm performance but it is the weakest ($\beta=0.706$, Sig. $<.000$) with an Adjusted R Square value of 0.492 showing that Reverse Logistics has the weakest impact on company performance. Lastly we look at Waste Management and the values yet again show a direct positive relation with company performance and is the 3rd highest in terms of significance ($\beta=0.735$, Sig. $<.000$) with an Adjusted R Square value of 0.534 .

Regression Analysis: Table 4.10

Dependent Variable	Firm Performance				
Independent Variable	Procurement	Manufacturing	Environmental Collab	Reverse Logistic	Waste Management
Adjusted R Square	0.594	0.631	0.511	0.492	0.534
F. Statistics	106.549	124.171	76.115	70.661	83.576
T Ratio	10.322	11.443	8.724	8.406	9.142
Sig.	0.000	0.000	0.000	0.000	0.000
Standardized Beta	0.775	0.798	0.719	0.706	0.735

Chapter 5. Discussion of Results

Hypothesis	Result
H1. GSCM has an effect on firm performance	Supported
H2. Green procurement has an effect on firm performance	Supported
H3. Green manufacturing has an effect on firm performance	Supported
H4. Reverse logistics has an effect on firm performance	Supported
H5. Environmental collaboration with suppliers has an effect on firm performance	Supported
H6. Waste Management has an effect on firm performance	Supported
H7. GSCM has no effect on firm performance	Not Supported
H8. Green procurement has no effect on firm performance	Note Supported
H9. Green manufacturing has no effect on firm performance	Not Supported
H10. Reverse logistics has no effect on firm performance	Not Supported
H11. Environmental collaboration with suppliers has no effect on firm performance	Not Supported
H12. Waste Management has no effect on firm performance	Not Supported

The study found that GSCM practices in Pakistan are not that common although GSCM has an effect on firm performance. It is important to note here that awareness of the core elements of GSCM which were Green Procurement, Green Manufacturing, and Environmental Collaboration with Suppliers, Reverse Logistics and Waste Management is a key assumption. It was assumed that companies practicing GSCM were aware of it and those that were not practicing were also aware of it but not practicing them. This was assumed even if the companies were practicing only one of the disciplines.

With the questionnaires being sent out it was observed that approx. 70% of the respondents were aware of Green supply chain management while the other 30% were not. Awareness served as a key in adoption and implementation of Greening efforts in companies and thus having an effect on the overall performance of the company. It was observed that when Greening efforts were applied in isolation or only in less than 2 disciplines, then the overall effect on firm performance

was not as visible with participants concluding that these did not have any effect on firm performance.

Starting from Green Procurement we notice that there is a significant relation with Green supply chain management ($\beta=0.775$, Sig. $<.000$) and with a 0.594 signifying that any efforts in greening procurement will have a significant impact on the overall company performance. The results are similar to what was found in (Bowen, Cousins, Lamming, & Faruk, 2001). Purchasing products and services that cause minimal adverse environmental impacts can be considered the first step towards greening for any manufacturing company. Since manufacturing requires material input, the greening opportunity of reducing environmental by procuring sustainably is the first step towards this effort. Getting materials that are recyclable, biodegradable or following environmental frameworks implemented by the government or adopted globally can help with earning carbon credits and lessening environmental impact.

Next we look at manufacturing and notice that relation between green manufacturing and firm performance is the strongest ($\beta=0.798$, Sig. $<.000$) with an Adjusted R Square value of 0.631. This signifies that green manufacturing has the most significant impact on company performance as it is where most of the GSCM drivers converge. What that means is manufacturing is affected by procurement, environmental collaboration, reverse logistics and waste management. Green manufacturing is strongly related to Green procurement. This is because when we buy green raw materials for manufacturing, we are lowering the impact on the environment and manufacturing products that will lessen the impact further still as echoed by (Sarkis J. , 2003).

Moving on we look at the results of environmental collaboration with suppliers and firm performance ($\beta=0.719$, Sig. $<.000$) with an Adjusted R Square value of 0.511 signify a high opportunity in affecting firm performance but not as high as the first 2 variables that we have. This is probably due to the fact that external players cannot be easily controlled and to get them to comply with environmental regulations is going to be a constant challenge. (Greko et al.,

2016) reported similar challenges in getting supplier compliance. Suppliers are usually not too large and hence fail to comply to environmental regulations or hardly make an effort towards greening. Due to this most companies also do not keep a check and balance on the environmental impact of their suppliers thus no strong relational outcome can be manufactured here.

The next figure shows that Reverse logistics has a positive relation with firm performance but it is the weakest ($\beta=0.706$, Sig. $<.000$) with an Adjusted R Square value of 0.492 showing that Reverse Logistics has the weakest impact on company performance. This could be because Reverse logistics is the least practiced out of the 5 drivers. Although the study does not delve in to why that is so, but taking a cue from (Richey, Chen, Genchev, & Daugherty, 2005) it can be assumed that it is due to the high cost involved in implementing a reverse logistics plan. Internally driven reverse logistics programs are always expensive which is why the responses show the least amount of interest in the field of Reverse Logistics.

Lastly we look at Waste Management and the values yet again show a direct positive relation with company performance and is the 3rd highest in terms of significance ($\beta=0.735$, Sig. $<.000$) with an Adjusted R Square value of 0.534 . Waste Management is directly linked to reverse logistics as companies try to recover materials they have used in manufacturing or packaging and reuse or recycle them. The concept of Waste Management resonates the concept of Kumar and Putnam (2008) which refers to “Cradle to the Cradle”.

Chapter 6. Conclusion

There are several revealing results that the study shows. The most significant of which is how the drivers of Green supply chain are correlated to each other and play a slightly mediating role with each other in the overall context of greening. This also shows that for greening to actually work, it is best to apply more than one discipline of green supply chain management in to the supply chain of a manufacturing organization to make the results more fruitful. If nothing else, then at least Procurement, Manufacturing and Waste Management which show the highest impact on firm performance should be adopted by companies to reduce their carbon footprint and environmental impact. It was also encouraging to note that approx.70% of the respondents were already aware of what green supply chain management practices and were practically following the guidelines of going green in at least one of the five drivers.

The research also shows that 2 drivers which are environmental collaboration with suppliers and reverse logistics have the weakest link in terms of their implementation and effect on firm performance in Pakistan. This could be because of the costs associated with both as setting up reverse logistics programs and to monitor and control suppliers on certain environmental requirements. That overall cost does not make it a win win situation for manufacturers thus discouraging them from spending cost in greening these 2 disciplines of supply chain.

6.1 Research Implications

6.1.1 Practical

Theoretically speaking, this research gives some insight in to the adoption of green supply chain within the manufacturing sector of Pakistan. It shows what drivers have been adopted, what is working (partially or completely) and what factors are still underdeveloped and need more time and efforts to grow. It also shows how greening can affect the performance of companies that take up this practice.

6.1.2 Policy Makers

Secondly, it gives the Pakistani manufacturer or supply chain managers insights in to global perspective of how Green supply chain management works and what is working in Pakistan. They can see the implications of implementing greener supply chain and challenges that they might face while trying to do so. It should also motivate and encourage them to take holistic steps towards better supply chains and reduce their environmental impacts.

6.1.3 Policy Makers

In the end, this research serves as a basis for policy makers to invest further in to green initiatives for the industry as a whole and manufacturing in specific. It will shed light on how international players are leveraging greening for carbon credits, reducing carbon footprints, optimizing natural resource utilization, curbing natural resource depletion and minimizing waste production in the country. It should also serve as a reminder that we need to adopt these drivers now if we want to be competitive in the future as well as sustainable.

6.1.4 Research Limitations

The research was limited in terms of the industries that were approached and in terms of the partial implementation of Green supply chain management that prevails in Pakistan. That would mean that the data may contain some bias in terms of referral knowledge of GSCM.

6.1.5 Future Research Direction

This research lays the ground work for future researchers in terms of the direction they can take for future researches. This research provides a very basic look in to the green supply chain phenomenon and leaves the ground open for more in depth and extensive researches. Future researchers can take each driver of GSCM in isolation and study it more extensively in various industries, study them in correlation to each other and also study how implementation of these drivers can be enable in a country like Pakistan. One direction would definitely be to approach a much larger sampling size and focus on certain industries which are the most prevalent in the country. That will yield more specific results and this more specific implications in the future.

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