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Effect of Green SCM on Firm's Performance: A Study of Pakistani Oil and Gas Industry

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Abstract

The aim of the present study was to identify and investigate the impact of green SCM on firm's performance. In line with the objectives, quantitative research techniques have been applied for measuting the impact of reverse logistics, environmental design, and green purchasing on firm's performance. Survey method through self- administrated questionnaire was used for collection of data from the employees working in supply chain departments of various Oil and Gas companies. For data analysis different statistical techniques were applied such as reliability analysis, demographic analysis, descriptive stats, correlation, and regression. Results suggested strong and significant impact of reverse logistics, environment design, green purchasing on firm's performance. Future directions of research have also been discussed.

Keywords: Reverses Logistic, Environment design, Green Purchasing, Green SCM, Firm's Performance

Introduction

For last couple of decades, general public, customers and government regulatory authorities has been agitated about global warming and the adverse impacts of non-environment friendly products and services on the environment which has been produced by the manufacturing companies (Khan & Qianli, 2017). Managers in every organization have realized that in this competitive era, there has been a large and growing environmental risk existing in the SCM (Dubey et al., 2015). Green solutions have traditionally been thought of as "end-of-pipe" or "conventional control" solutions, in which a corporation seeks to mitigate its current negative environmental consequences rather than taking proactive steps to embrace procedures that produce little environmental harm. Considering difficulties inside corporations may not always provide a whole picture; for example, bad environmental practices by small suppliers might harm the reputation of major enterprises in the SCM (Roehrich et al., 2017).

To reduce the origin of waste which causes negative impact on environment throughout SCM, many organizations have now started to adopt the externally-oriented approaches towards green initiatives. This incorporates multiple organizations both from downstream and upstream towards green supply chain (Marhamati & Azizi, 2017). Companies that pursue green practices produced several benefits such as cost saving due to reduced energy usage, recycled material and can build a good image in the eye of customer as customers are now more concerned about the ways, companies carry out their operations (Khan et al., 2017). Development of environment friendly operations and products mostly driven by general public pressure, customer pressure, government regulations, and some economic benefits which organization gain with the positive image in the eye of customers by incorporating eco-friendly activities throughout supply chain processes. Previous studies conducted on green SCM have motivated companies to adopt green initiatives and play their role towards environment friendly practices in the service and manufacturing sector (Kirchoff et al., 2016). Prior studies on green initiatives have shown that most of the organizations pursue or implement green processes in their supply chain because of government regulations or make a good image socially that they are towards eco-friendly operations so that they can attract more customers and also to reduce expenses by utilizing resources efficiently through waste reduction (Munawwar, 2016). Government regulations can compel organizations to play their role towards environment friendly operations by installing new and advance technology which causes less emission of carbon dioxide and reduces

adverse effects on environment throughout supply chain. Incorporating green initiatives throughout the supply chain operations involves many processes from identification of cost associated with the green processes, finding opportunities of cost reduction, minimizing the impact of operations on the environment to continuous improvement in the process of mitigating the adverse impacts on the environment by gaining the market share, and enhancing firm performance (Dubey et al., 2015).

Literature Review

Based on the definition in extant literature, green supply chain management is related to production of wide range which begins with the designing of a product and may ends with recycling of a product or destroying it. Green supply chain management practices are similar to the normal product lifecycle in which during production, a product moves through all stages until completion of whole life cycle (Seman et al., 2012). Green supply chain is to protect the resources that get wasted while acquiring raw materials for the purpose of manufacturing and wasted during supply of products to the final consumers. Green SCM helps in coping with environmental issues which takes place in delivering of goods and services to the final consumers. In addition to that, it also assists in recycling products into raw materials through remanufacturing, reusing, and reprocessing. Green practices are considered as interchangeable with sustainability. Firm may get involve in performing activities that helps in decreasing the adverse impacts on the environment caused by the product and services' life cycle. which begins with the stage of designing, followed by the acquiring of raw materials, then followed by consumption of products and disposal of products (Roehrich et al., 2017). However, there are some initiatives such as end-of-pipeline green solution and firm-specific which are very beneficial for the environment, that has been evolved as green supply chain concepts, but they are not widely spread. Higher cost and uncertain returns are associated with initiatives of green supply chain. Firms have to tackle with the issues regarding lack of capabilities, expertise and resources for green supply chain. In addition to that, firms have to sort out the relationship complexities associated with green supply chain (Marhamati & Azizi, 2017). Researchers and scholars have not conducted must of research regarding the literature of green supply chain as the novelty of this literature remains yet to be disclosed. Various initiatives such as organizational practices, technology and practices, and prescriptive models has been addressed within the literature of green supply chain management. Reverse logistics is a green initiative that company takes, and it is all about a product flowing back from the customer to the manufacturer and explains the concept of recycling process of a product. Reverse logistics is further divided into several activities such as reusing, sorting, inspection, and product collection (Ananda et al., 2018).

Green purchasing is assuring the item purchased by the customers must have several ecological attributes such as recyclability, reusability and nontoxic materials. In addition to that, green purchasing also addresses the environmental issues such as minimization of waste composed of hazardous materials, waste reduction, substitution of materials through appropriate raw materials sourcing (Jaynat & Tiwari, 2017). Environmental goals are achieved through the involvement of suppliers. Companies that have been active in participating towards the safety of environment have increased the management of suppliers' performances towards the betterment of environment. Such companies have been actively involved in purchasing raw materials that are environment friendly and focusing on having suppliers that provide such ecofriendly raw materials. In addition to that, companies have also been using manufacturing processes that are environment friendly to manufacture products. For instance, Code of Conduct in the Electronic Industry has been the major guideline that promotes the concept of green purchasing in Industry of Electronics. Companies such as Matsushita and Sony that has been amongst the leading Malaysian multinational corporations have focused highly on implication of green procurement policies and building relationship with suppliers to eliminate the adverse environmental hazards (Manohar & Kumar, 2016). Provision of advices towards improving their performance by the firms to the suppliers and evaluating the performances of suppliers towards the environment has been considered as green purchasing. ISO 14001 has been an environmental management certification that is set as the standard by organization who has concerned about environment, as this standard encourages suppliers of the firms to be ecofriendly. In their study, significant relationship amongst supplier and manufacturer has been maintained through green supply chain management which is considered as an emerging concept. Government of Malaysia has set standards and policies to encourage business communities performing within the premises of Malaysia in holding seminars for suppliers regarding awareness about the environment. Business

communities and organizations can build environmental teams that show their dedication towards guiding suppliers to put their effort to develop initiatives concerning environmental development. Such teams will be visiting suppliers' facility frequently to guide them and provide recommendations in setting up of environmental programs (Kirchoff et al., 2016).

Green SCM and Performance of the firms

Adaptation of green supply chain initiatives by the organizations is encouraged through various motivators. Research by the researchers in the past regarding this literature has helped in identifying some of significant drivers that results in motivating organizations to adopt environmental initiatives. Existence of these drivers has been due to the pressure exerted by both external and internal stakeholders such as suppliers, customers, government, communities and employees. Such drivers are also originated due to moral values and organizational culture (Khan et al., 2017). Organization tend to adopt green supply chains due to these motivators and adaptation of green supply chain management by the organizations due to these motivators have been a multidimensional concept, as it is eventually resulting in improving firm performance. Recent studies concerning to this literature has successfully explained the impact that drivers of green supply chain have on influencing the initiatives taken by the organizations towards green supply chain management (Marhamati & Azizi, 2017). Green supply chain initiatives are encouraged by the motivators, as these drivers play a significant role in influencing organizations to adopt practices that are favorable for the environment as well as helpful in improving firm performance. This study has provided a theoretical model to explain the relationship between green supply chain initiatives and firm performance (Munawwar, 2016).

Yang et al., (2013) investigated the factors by taking the sample from Taiwan's electrical industries. The results shown thtat there has been four critical factors which assist managers in using green SCM practices (Yang et al., 2013). From 1994 to 2007, authors have collected 191 published papers for proposing a model that defines sustainable supply chain management drivers. There have been external drivers for sustainable supply chain management. These drivers could be from stakeholders, customers, and government. These drivers result in pressurizing the companies and such pressure is moved on to the suppliers which eventually results in influencing the companies (Ananda et al., 2018). Organizations adopt practices such as reverse logistics and environmental designing of product, due to pressure exerted by drivers such as cultural cognitive pressure, normative pressure and institutional pressure in order to improve their productivity and performance (Marhamati & Azizi, 2017).

Green Purchasing

Green purchasing is assuring the item purchased by the customers must have several ecological attributes such as recyclability, reusability and nontoxic materials. In addition to that, green purchasing also addresses the environmental issues such as minimization of waste composed of hazardous materials, waste reduction, substitution of materials through appropriate raw materials sourcing (Jaynat & Tiwari, 2017). Environmental goals are achieved through the involvement of suppliers. Companies that have been active in participating towards the safety of environment have increased the management of suppliers' performances towards the betterment of environment. Such companies have been actively involved in purchasing raw materials that are environment friendly and focusing on having suppliers that provide such ecofriendly raw materials. In addition to that, companies have also been using manufacturing processes that are environment friendly to manufacture products. For instance, Code of Conduct in the Electronic Industry has been the major guideline that promotes the concept of green purchasing in Industry of Electronics. Companies such as Matsushita and Sony that has been amongst the leading Malaysian multinational corporations have focused highly on implication of green procurement policies and building relationship with suppliers to eliminate the adverse environmental hazards (Manohar & Kumar, 2016). Provision of advices towards improving their performance by the firms to the suppliers and evaluating the performances of suppliers towards the environment has been considered as green purchasing. ISO 14001 has been an environmental management certification that is set as the standard by organization who has concerned about environment, as this standard encourages suppliers of the firms to be ecofriendly. In their study, significant relationship amongst supplier and manufacturer has been maintained through green supply chain management which is considered as an emerging concept. Government of Malaysia has set standards and policies to encourage business communities performing within the premises of Malaysia in holding seminars for suppliers regarding awareness about the environment. Business

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Design for the Environment

To reduce the impact of products on environment during their life cycle is considered as design for the environment. Initially, the focus was primarily on bringing technical improvements within the processes and products that can be undertaken with the aim of reducing environmental costs (Roehrich et al., 2017). In addition to that, organizations that have been committed towards actively participating in protecting the environment has recognized the critical importance of developing a healthy relationship with suppliers, consumers, regulatory authorities, government authorities to design for environment as it is recognized as a vital portion of green supply chain initiatives. An external socio-cultural, normative and coercive pressure which is imposed on the organizations is considered as a vital pre-requisite for initiation towards design for the environment. Cross-functional cooperation between different units both internally and externally proves the success factor of design for environment. In an emerging economy like Malaysia, pressure exerted on the government by international regulatory authority has imposed the government to ensure business firms to get involved in design for environment while performing their functions and operations (Marhamati & Azizi, 2017). Malaysian economy facilitates the large electronics and electrical manufacturers belonging to Japanese and US markets. Although, firms working within the Malaysia has to follow the strict legislations imposed by the international regularities in a same way as it has been imposed in Japan and USA. These compliance issues ranging from product assessment in terms of life cycle, reducing the consumption of energy and material and ensuring the material use for the packaging has not been reusable, but most of the contents used during processes must be recyclable. For instance, with reference to the program introduced for producing efficiency in production of energy and products that are recyclable and hazard free by Hewlett-Packard. In accordance with developments of Nokia corporation, a design has been prepared for an environmental program which ensures production of products that does not contain any restricted material, consumption requires less energy, and products must be high recyclable (Jaynat & Tiwari, 2017). Referring to the developments of Dell Corporation, a program for environmental program has been designed to manufacture products that are energy efficient and helps to promote the concept of reuse, upgradeability and recycling (Ananda et al., 2018).

Designing a product begins with the concept of product lifecycle. Eco designing also knows as green designing focused mainly on the design that is conscious to the environment as well as assessment or analysis of life cycle. For product designing, a team responsible for designing the product must be focused on changing their raw materials while the process of manufacturing is in process as raw materials used must be less toxic and highly friendly towards the environment (Geng et al., 2017). Green designing is also recognized as design for the environment. For instance, hybrid car has been a famous example of a green product. Due to decrease in petroleum supply and increase in demand, automobile manufacturers tend to restructure and redesign an engine that consumes fuel of less quantity. Hybrid car has become an evolutionary design for the environment which has been highly appreciated by the society. Manufacturers must use fewer and lighter materials for manufacturing of an automobile suitable to the green design. During product designing, manufacturers require high level of cooperation with the suppliers (Yang et al., 2013). Design for the environment is brought into consideration by the manufacturing companies and their suppliers. In the study, authors have shared couple of examples for cooperation between suppliers and manufacturers on the agenda of successful green supply (Dubey et al., 2015).

Reverse Logistics

Reverse logistics has been categorized as activities that are performed to recover discarded products which might include shipping materials, packaging, backhauling of raw materials to the central point where these can be remanufactured or recycled. Logistics professionals are required to handle the mechanism of reverse logistics as their significant attention is vital to do so (Fong et al., 2019). Firms having the desires to perform business at international level must be dealing with backhauls for handling the waste packaging and also to sort out the issues related to the satisfaction from recoverable products. Pressure from the competitors have been forcing most of the business firms

being part of US economy towards adoption of these practices (Manohar & Kumar, 2016). Although, environmental issues have not been a serious threat till now, but with respect to the expectations, environmental issues will soon become a significant threat with the increase in competition and passing of more stringent regulations (Saad & Siddiqui, 2019).

In Germany, there has been a law for transportation packaging which enforces manufacturers to take-back all strapping, cardboard boxes, pallets, and stretched and shrink wrapping which could be utilized for protection of products while shipping is in process. Additionally, prohibition of land filling products such as electronics and major customer appliances has been necessary (Munawwar, 2016). Netherland and Germany have been the countries which prohibits all business firms working within their countries to ship waste to such countries which still allows the land filling. European countries other than these have been planning to adopt same legislation in the near future. In USA, landfills have been continuously reaching maximum capacity, as congress of US have continuously been working to make manufacturers pursue the legislation on remanufacturing and recycling (Hsu et al., 2013). Referring to the reports within the study of (Council of Logistics Management), reverse logistics is affected by three major issues. These issues are planning for the flow of materials, structure of the network, and routing and materials' classification (Kirchoff et al., 2016).

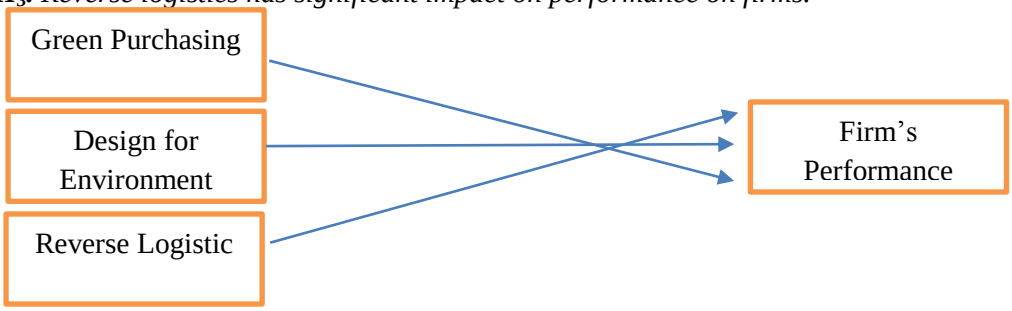
There are certain drivers that plays encouragement role in encouraging firms towards adaptation of green supply chain initiatives. Such initiatives taken by the firms result in reflecting the pressures exerted by most of the stakeholders such as community, government, suppliers, customers, investors and employees (Laosirihongthong et al., 2013). Another source of encouragement for the firms to adopt such initiatives has been the moral desire and organizational culture. Response of organizations towards the pressure exerted by multiple institutions has been defined by the institutional theory. Firms that has been proactively involved in their business tends to compete with the well-being and economic health in addition to the striving for scarce customers and resources (Green et al., 2012). Majority of scholars have agreed to the fact that organizations face immense pressure in adapting to institutional environment and staying consistent to it. Organizations have to keep their operations with respect to the standards set by environmental institutionalization (Roehrich et al., 2017).

Based on the above literature and further conceptualization the following hypotheses of the study have been formulated as follows:

H_1. *Green purchasing has positive impact on performance of firms.*

H_2. *Design for the environment has significant impact on performance of firms.*

H_3. *Reverse logistics has significant impact on performance on firms.*



Methodology

Study Design

The study is correlation in nature, since it is intended to identify the relationship of green supply chain management related variable on firm performance. positivisim research philosophy was adopted, deductive method applied and used questionnaire technique for collection of data (Kumar, 2019). Structured questionnaire distributed amongst the employees of the organizations operating in Pakistan.

Population

In this study, companies operating within oil and gas industry of Pakistan excluding marketing companies have been the sector chosen to explore the relationship between green supply chain (green purchasing, design for the environment, and reverse logistics) and firm performance. Excluding the oil and gas marketing companies the organizations targeted for data collection include Oil and Gas Development Company limited (OGDCL), Attock Group, Govt Holdings Private Limited (GHPL),

Mari Petroleum Limited (MPL), and Pakistan Petroleum Limited (PPL), Weatherford, Schlumberger, Paksitan Refinery Limited, Pak Arab Refinery Company Limited etc. Whereas, organizations working in oil and gas industry of Pakistan excluding the marketing companies have been considered as the population of this study.

Sample Size

Based on Morgan's Table, a sample of 48 Organizations working in the oil and gas industry of Pakistan excluding the marketing companies have been finalized to represent entire population. The Sample size was finalized by using the Morgan's Table (Krejcie & Morgan, 1970).

Results

Reliability

Table 1 :

Reliability Statistics

Variables	Cronbash's Alpha	No of Items
Green Purchasin	.867	8
Design for the Environment	.895	8
Reverse Logistic	.899	8
Firm Performance	.884	8

Demographic Analysis

Demographic analysis revealed the background information of the respondents. Table is showing that out of 250 respondents 160 were male and 90 were females. Designation wise analysis shown in below mentioned table where 23 Managers took part in the study. Moreover, Asstt Managers were 55, Ops Managers are 84, and Procurement Officers were 88. Further, the table included experience wise analysis which shows that 116 respondents reported that they have more than 10 years experience.

Table 2: ***Demographics***

Demographics		Frequencies	Percentages
Gender	Male	160	64
	Female	90	36
Position	Manager	23	9
	A Manager	55	22
	OM	84	34
	Procurement Officer	88	35
Experience	Less than 5 years	22	9
	5 to 10 years	112	45
	More than 10 years	116	46

Table 3: ***Descriptive Statistics***

	N	Minimum	Maximum	Mean	S. D
GP	48	1.63	3.75	2.7526	.54425
DE	48	1.63	3.63	2.7891	.55970
RL	48	1.75	3.88	2.7865	.50789
FP	48	1.50	4.63	3.2943	.76209
Valid N (listwise)	48				

Correlation

Table 4: ***Correlation Analysis***

Variables	1	2	3	4
Green Purchasing	1			
Environment	.414**	1		
Reverse Logistics	.633**	.567**	1	
Firm Performance	.663**	.624**	.667**	1

The association between green purchasing and company performance is significant at the 0.01 level, with a magnitude of.663** and a positive direction, as seen in the table above. The association between environmental design and company performance, on the other hand, is considerable, with a magnitude of.624** and a positive direction. Furthermore, the association between reverse logistics and company performance is statistically significant at the 0.01 level, with a magnitude of.667** and is positive.

Regression Analysis

Table 5 ***Model Summary***

Model	R	R Square	Adjusted R Square	S. E of the Estimate
1	.699[a]	.609	.596	.34421

The simple correlation is indicated by the value of R. According to our R value of 0.722 (72.2%), there is a significant evidence of a high degree of connection between green purchasing, environmental design, and reverse logistics (independent variables) and company performance (dependent variable). Similarly, R2 indicates how much "firm performance" can be explained by "green buying, environmentally conscious design, and reverse logistics." R2 may alternatively be thought of as the proportion of change brought about by the independent variable in the dependent variables. R2 for this study is 0.521 (52.1%), which is quite high.

Model		Coefficients	t	Sig.
		Beta		
1	(Constant)		2.179	.000
	Green_Purchasing	.485	4.042	.000
	Design_For_The_Environment	.699	8.674	.000
	Reverse_Logistics	.134	2.311	.000

Based on the concept, this table indicates the contribution made by independent variable to the dependent variable with certain significance level. In this study, the contribution made by green purchasing is 38.0% with the significance of .000, design for the environment is 55.2% ($p< 0.001$), and reverse logistics is 10.1% ($p< 0.001$).

Findings

Hypothesis 1 The analysis revealed significant impact of green purchasing on firm performance with the magnitude of .663.

Hypothesis 2 In the above mentioned table t= 8.674, so the hypothesis 2 is also supported in the current study.

Hypothesis 3 was 'reverse logistics has positive impact on firm performance (highly significant with the magnitude of .667).

Conclusion

Based on the foregoing findings and conclusions, it can be stated that green SCM has a major beneficial influence on company performance in Pakistan's oil and gas business. In other words, the green supply SCM has a significant impact on the performance of Pakistan's oil and gas companies. As previously stated, the goal of this study was to examine the influence of green supply chain (green purchasing, environmental design, and reverse logistics) on firm performance in Pakistan's oil and gas industry. For data collection, an adaptive structured questionnaire was circulated across firms in Pakistan's oil and gas industry, excluding marketing enterprises, as the influence of each variable was clearly evident in this study. However, to assess the acceptance and rejection of this study's hypotheses, a scale of 5% of the significant level has been established. H1, H2, and H3 have been accepted based on the relevance level. Green purchasing, environmental design, and reverse logistics have a significance level of less than 0.05 for company performance. Choudhary and Seth (2011) looked at the connection between green SCM and company performance. The study also discovered a substantial link. Sarkis et al., (2017) investigated the influence of selected factors on company performance and found results that are similar to those found in this study. H1, H2, and H3 were developed, and they were approved and demonstrated to be significant. Furthermore, the impact of green purchasing, environmental design, and reverse logistics on company performance has been experimentally investigated for demographics such as gender, age, designation, education, and experience, and a positive link has been discovered (Eltayeb & Zailani, 2009). In addition, correlation analysis has shown that green purchasing, environment design, and reverse logistics are positively correlated with firm performance with the magnitude of .500, .592, .522 respectively. Kumar and Chandrakar, (2012) investigated and identified the significant correlatin between sleected variables. Furthermore, regression analysis has revealed a significant relationship between green SCM (environment design, green purchasing, and reverse logistics) and firm performance (Toke at al., 2010). Conclusively, it can be said that green supply chain positively impacts firm performance in oil and gas industry of Pakistan excluding the oil and gas marketing companies.

Future Research Directions

The current study highlights interesting avenues for future researchers such as the similar model can apply in different industry, and also it has been limitisze that the sample size was too small that need to be delimit in future research. Moreover, the current study took only E&P sector for consideration, future study can take other related industries where green SCM practices applied in true manner. Furthermore, the current model can be extended by inclusion of intervening variables such as moderator and mediators. For Mediator innovation management can be used by future studies, as well as, future studies can take collectivism- one of the important culture dimension to see how it impact the overall model.

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