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IMPACT OF BARRIERS IN GREEN SUPPLY CHAIN PRACTICES ON THE RELATIONSHIP BETWEEN GREEN SUPPLY CHAIN MANAGEMENT AND THE FIRM'S PERFORMANCE- IN THE CONTEXT OF PAKISTAN

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Abstract

The purpose of this study is to analyze the impact of GSCM practices on firms' economical, operational, and environmental performance with the moderating effect of barriers in the context of Pakistan. Such topics are rarely discussed by different supply chain authors in Pakistan. Researchers have given much importance to green supply chain management as it helps to lower the negative environmental impacts and also helps companies to grow economically. This study is based on the experts' opinions and literature review that we added from various past kinds of research from different countries related to green supply chains and barriers to their implementation. So this study will contribute to green supply chain research in the future and it will also provide direction to experts to identify barriers to the adoption of green practices by Pakistani firms. It also contributes to the literature by combining the important variables of GSCM practices, firm performance and Barriers. This study also suggests some measures in the literature review to mitigate barriers to the adoption of green practices. In future, the researchers can conduct studies specifically for one industry to make this research more specific. In this study, we assessed all the variables together further studies can take individual independent or dependent variables for deep insight. In this study, we used qualitative and quantitative research methods and collected data that supports our proposed hypothesis. The result of this study tells that green practices are highly significant to the firm's performance and barriers negatively impact this relationship.

Keywords: Green Supply Chain Management (GSCM), Green procurement (GP), Green manufacturing (GM), Green distribution (GD), Green logistics (GL), Barriers

Introduction

Green Supply chain practices lead to various economic, environmental, and operational benefits. Growing competition, pressure and challenges for the improvement of operational, economic and environmental performance lead the countries to implement GSCM. (Lin et al., 2011) By adopting green practices firms can achieve competitive advantage giants companies Suzuki, Honda, and Toyota have been adopting green practices and In Pakistan Unilever, Procter & Gamble, Engro etc. are implementing green practices and technologies and achieving positive impacts on their organizations. General Motors invested 2.5 billion in acquiring green practices (Gleim et al., 2013). Manufacturing firms have been improving their operational performance by using green practices and reducing the negative effects of their operations on the environment (Zhu et al., 2013).

In various studies, it is found that measuring the performance of the supply chain after adopting green practices helps a firm to monitor and control its performance (Azevedo et al., 2011). According to a researcher, it is the most important part to be monitored because it is important to have information about the cost incurred, efficiency increased or decreased and generating revenues (Zhu & Sarkis, 2004). The green supply chain is an innovative technology that reduces emission of hazardous pollutants, waste packaging material, toxic elements of materials and other pollutions (Rao, 2006) (Srivastava, 2007). The implementation of GSCM practices with the combination of other management practices helps companies to improve their environmental performance (Testa & Iraldo, 2010). Evaluating the operational performance helps to get informed about the competitive priorities for the company's operations like, quality control and customer satisfaction (Azevedo et al., 2011).GSCM is an emerging and has become an important innovative practice that leads an organization to make such strategies which help to earn higher profit and market share by reducing the environmental risks and negative impacts of their activities, moreover, it helps to increase their ecological efficiency (van Hoek, 1999). GSCM is not all about eco-friendly, but it is also about good business sense, creating value for the business and earning higher profits (Amemba et al., 2013).

Companies in developing countries are less motivated due to a lack of awareness to adopt GSCM practices in their business operations. there are lots of obstacles to implementing green practices (Ahmed et al., 2018). There is an insufficient investigation in developing countries and companies hesitate to adopt green practices that have effects on economic performance (Geng et al., 2017; Teixeira et al., 2016). Companies should investigate those barriers and put efforts to remove them for adopting GSCM practices (Govindan et al., 2014a).

Significance of this study

This study highlights some of the green practices and their relation to a firm's environmental, operational and economic performance and barriers to the implementation of these practices in Pakistan. The main aim is to identify the difficulties that are faced in implementing GSCM practices in Pakistan as compared to developed countries.

Research Objectives

1. To evaluate the impact of GSCM practices on firm performance.
2. To identify significant barriers to adopting GSCM practices in Pakistan.

Research Questions

1. What are the impacts of GSCM practices on the performance of firms?
2. What are the barriers to implementing GSCM practices?

Literature Review

Green Supply Chain Management

(Handfield et al., 1997) Defined GSCM is a set of activities for environmental

management principles to the whole customer order cycle, from product design to product distribution. GSCM is an integration of environmental thinking with supply chain management that is not only required from the product design till the delivery to the customer but till the end of the product life cycle after it has been used (Srivastava, 2007).

1. ***Green Supply Chain Management Practices***

- ***Green Procurement***

As per past research on procurement, it can be classified into the following categories. (1) To adjust the demand for greener products on the supply side. (e.g., Eco-design products) (2) Supplier selection that can provide greener products in a greener manner (e.g. waste reduction, ISO certification) and (3) collaboration with supplier for the improvement in GSCM performance (e.g. joint planning activities) (Blome et al., 2014).

- ***Green Manufacturing***

Green Manufacturing involves planning and control of manufacturing activities, reducing the use of energy, waste and misuse of materials during the manufacturing process (Liu et al., 2012). Green manufacturing means a production process that includes the use of green material that efficiently reduces the negative effects on the environment (Ghazilla et al., 2015). Green Manufacturing includes redesigning, recycling, reusing, remanufacturing, reducing and recovering (Rehman et al., 2016).

- ***Green Distribution:***

Green distribution is an important function that impacts green supply chain performance it includes practices that help to reduce the negative impact on the environment and minimizes waste while shipping a product (Gao et al., 2009). Green distribution impacts the usage of fuel while a product is shipped to another location, the speed of operations related to transportation and packaging features such as weight, shape and material (Sarkis, 2003).

- ***Green Logistics***

Green logistics means environmentally friendly transportation and distribution. Green fuels contain low sulfur content and substitute fuels like liquid and natural gas. Green logistics concerns environmental and employee health and safety during transportation activities(Enarsson, 1998; Salimifard et al., n.d.)

2. **Supply Chain Performance**

- **Economic Performance**

Economic performance means the potential of the firm's production activities to minimize costs related to purchasing of materials, energy consumption, waste management and disposal of waste that influence the environment. (Zhu et al., 2008). Economic performance can be measured as the cost of operating hours and holding inventory, efficiency as the ratio between operating expenditures and sales revenue and environmental cost which includes the cost of waste management and fines or penalty costs (Azevedo et al., 2011).

- ***Operational Performance***

In this era where GSCM is evolving, firms should operate efficiently and effectively to deal with constantly changing environmental challenges to improve their operational performance (Slack et al., 2004). Operational performance is an outcome of the firm's internal operation like rate of productivity, product quality delivered to customers and level of customer satisfaction (Yu et al., 2014). Operational performance can be measured as operational cost, quality, flexibility and delivery (Abdallah & Al-Ghwayeen, 2019a). Moreover, these four measures are selected because these are mostly discussed in the literature and most important ones to be discussed in the research on operational performance in the supply chain (Yu et al., 2014).

- ***Environmental Performance***

Environmental performance relates to the outcome of an organization's strategic activities which includes the management of

negative effects on the environment (Walls et al., 2012). It also identifies the positive results of GSCM practices on the internal or external environment of a firm (Eltayeb et al., 2011). In recent years, environmental performance gives a competitive advantage and also helps to achieve sustainability in organizational performance (Ulubeyli, 2013). Environmental performance measures found from various existing literature, include minimum pollutants emission in the air, energy usage, hazardous material disposal impacts the quality of soil and water and also meeting the environmental requirements (Abdallah & Al-Ghwayeen, 2019b).

3. Barriers to Green supply chain management Implementation

- ***Outsourcing***

When firms go to outsource their activities there main issue is that suppliers' have their traditional mindsets, and interests in the whole supply chain members (Mudgal et al., 2010; Sarkar & Mohapatra, 2006) so which creates a hurdle to collaborate with them taking a step for environmental activities which means there is lacking environmental partnerships with suppliers (Hamner, 2006; Wolf & Seuring, 2010). Regulatory bodies like the government don't impose restrictions on industrial sectors to adopt eco-friendly activities (Khidir & Zailani, n.d.). Moreover, policymakers face difficulties to find sustainable and develop sustainable consumption techniques (Tseng et al., 2019). According to (Blok et al., 2015) government should design some incentive programs for the industries instead of just implementing laws and rules to motivate them for adopting green practices (O'Brien & Li, 1999).

- ***Knowledge***

Not having sufficient knowledge is another important barrier to adopting green supply chain management practices. As most industries are not aware of the importance of reverse logistics (Mudgal et al., 2010; Ravi & Shankar, 2005) which is a part of green practices. Firms don't understand the advantages of environmental performance(Revell & Rutherfoord, 2003; Walker et al., 2008). Provide training to the employees or supply chain partners in pollution prevention (Mudgal et al., 2010; Ravi & Shankar, 2005; Revell & Rutherfoord, 2003; Theyel, 2000). There is also a lack of environmental knowledge in an organization about laws, rules or regulations and their activity's effects on the environment (Shen & Tam, 2002).

- ***Financial***

Finance is an important role in Green supply chain management implementation and has many constraints (Hervani et al., 2005; Khidir & Zailani, n.d.; Ravi & Shankar, 2005). Moreover, if firms plan to implement such strategies and they don't have sufficient financial resources so, they face difficulties in acquiring loans from banks (Govindan et al., 2014b). GSCM practice implementation needs different procedures, high technologies (Mudgal et al., 2010) and eco-designs this requires heavy financial investment. As cost is incurred in adopting green technologies manufacturing industries face difficulties in achieving their green objectives. cost of disposing of harmful products is a hindrance to adopting green practices (Govindan et al., 2014b).

- ***Technological***

Firms usually avoid spending on green supply chain practices to prevent huge monetary losses, failure of green products and also losing competitive advantage (Rao & Holt, 2005), (Perron, 2005) and (Revell & Rutherfoord, 2003). Technical expertise is no such capability to design a product that can prevent the environment from pollutants and fulfil environmental requirements (Revell & Rutherfoord, 2003). Similarly, lack of technical experts to design a technology that can help to reduce the consumption of energy/fuels or resources (Perron, 2005).

- ***Involvement and support***

There are no such institutions for courses or consultancy to provide training in different

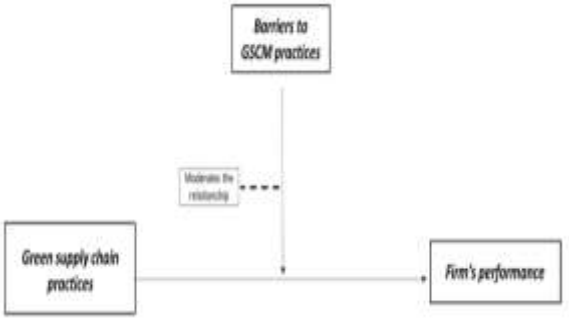
industries about how to implement Green supply chain management practices (Carter & Dresner, 2001). There is less involvement from the customer side as well, customers are not aware to use the green product (Lorek & Spangenberg, 2014). Demand from the customer is a critical pressure for a manufacturer which means if the customer is demanding a green product, then the manufacturer has to produce it by changing technology and procedures to green practices (Luthra et al., 2011). In the United States consumers are willing to pay more for eco-friendly products than the manufacturers (Lamming & Hampson, 1996). The investment that needs to be incurred in adopting green practices relies on the decision of management's attitude. GSCM requires a drastic change in the mindset (Sarkar & Mohapatra, 2006). It is not easy to change the traditional mindset and interest of the supplier in this way it is a barrier that suppliers usually hesitate to adopt change and implement GSCM practices (Luthra et al., 2011). In one more study, it is said that during the supplier selection procedures firms usually set the lowest price criteria for sourcing, so the suppliers who are working on green standards are not considered by the firms (Kusaba et al., 2011). Less involvement of regulatory bodies like the absence of organized certification systems demotivates the professionals to find the best green materials and processes (Akadiri, 2015).

RESEARCH METHODOLOGY:

This research is a mixed method in nature, having both qualitative and quantitative approaches. The area of interest of this study is GSCM. This is exploratory research that will help to identify the reasons for not adopting green practices in the context of Pakistan. The technique used to process and drives the result is a Partial least squares-structural equation modelling or PLS-SEM.

Theoretical Framework:

The independent variables of this study are "GSCM practices" containing determinants of green procurement, green manufacturing, green distribution and green logistics, another is the dependent variable "the firm's performance" which contains economical, operational, and environmental performance and a moderator is taken as "barriers in implementing GSCM practices" having items outsourcing, technology. Knowledge, finances and involvement & support which is the focus of this study.



Hypotheses development:

H1a: Green procurement is positively related to a firm's Economical, operational and environmental performance.

H1b: Green manufacturing is positively related to a firm's Economical, operational and environmental performance.

H1c: Green distribution is positively related to a firm's Economical, operational and environmental performance.

H1d: Green logistics is positively related to a firm's Economical, operational and environmental performance.

H2a: Barriers to a Green supply chain negatively impact Green procurement and a firm's Economical, operational, and environmental performance.

H2b: Barriers to Green supply chain negatively impact Green manufacturing and a firm's Economical, operational, and environmental performance.

H2c: Barriers to a Green supply chain negatively impact Green distribution and a firm's Economical, operational, and environmental performance.

H2d: Barriers to a Green supply chain negatively impact Green logistics and a firm's Economical, operational, and environmental performance.

Measures and Sampling

This study is conducted in Pakistan. The target population of this study are supply chain specialists. The questionnaires were sent to different supply chain specialists to collect reliable data. The sample size was assumed through the Random Sampling technique which was 200 as suggested by experts suggest to have a sample size between 100 to 200 to get unbiased result for your research (Wong, 2013) and SMART was used to test the research model (Hair et al., 2019). T=The response rate was 80% which is quite reliable and good for extracting a conclusion

The respondents of this research are mostly employed in manufacturing firms. The highest rate of response is from the employees experienced less than 5 years and work in middle management.

RESULTS AND ANALYSIS:

Measurement Model

Factor loadings represent that how much the items of a construct are representing it. Factor loadings that are closer to the 1 consider as good values (Hair et al., 2019). The model testing of this study shows all the values in the range of 0.6 to 0.8 that are acceptable (Hair et al., 2019). Few values are less than 0.7 but closer to it.

	Factor loadings
B2 <- B	0.785
B4 <- B	0.788
B5 <- B	0.640
B6 <- B	0.701
B7 <- B	0.779
B8 <- B	0.803
GD2 <- GD	1.000
GD3 <- FP	0.842
GL2 <- FP	0.790
GL3 <- GL	1.000
GM2 <- GM	1.000
GM3 <- FP	0.846
GM4 <- FP	0.741
GP1 <- GP	1.000
GP2 <- FP	0.670
GP3 <- FP	0.660
B x GM -> B x GM	1.000
B x GD -> B x GD	1.000
B x GP -> B x GP	1.000
B x GL -> B x GL	1.000

Table 1: Factor Loadings

Fornell & larger suggested three different ways to check the reliability and validity of the construct (Fornell & Larcker, 1981). For **consistent reliability** values of Cronbach's alpha are used. The values should be more than 0.6 (Hair et al., 2019) which is significant and our data analysis shows Cronbach's alpha values are larger than 0.845 and 0.853 which is highly significant (Wong, 2013). **The convergent validity** is analysed from the average variance extracted AVE and it must be more than 0.5 (Hair et al., 2019) which shows good reliability among variables and we found that the AVE values are 0.565 and 0.580 of each latent variable. **Composite reliability** should be more than 0.7 (Hair et al., 2019) and our data analysis shows values greater than 0.7.

(Annexure A)

(Annexure A)

Discriminant validity is calculated using the Fornell-Larkar criterion and Heterotrait-Monotrait Ratio (HTMT). In HTMT ratio method the ratio should be less than 0.80 or 0.90 but also according to (Alarcón & Sánchez, n.d.) if HTMT < 1 the proposed hypothesis can be accepted.

Calculation of this research shows that our HTMT ratios in table 4 are less than 1 so the proposed hypothesis of this study is accepted some with high significant values.

(Annexure A)

Structural Model

Collinearity is identified using an approach of Variance Inflation Factor (VIF).

This approach shows the rate of variance for every coefficient of variable. VIF has values from 1 to 5 where 1 shows no collinearity, values between 1-5 moderate collinearity and if the value is greater than 5 than it indicates the high collinearity (Hair et al., 2019). In the collected data the values of VIF in table 6 are mostly exactly 1 or less than 3, which is good.

MODEL FIT		
	Acceptable range	Estimated model
SRMR	<0.80	0.085
NFI	>0.90	0.921

Table 7 Model fit

Items	VIF
B2	2.089
B4	2.128
B5	1.597
B6	1.585
B7	1.968
B8	2.118
GD2	1
GD3	2.403
GL2	2.233
GL3	1
GM2	1
GM3	2.728
GM4	1.826
GP1	1
GP2	1.726
GP3	1.465
B x GM	1
B x GD	1
B x GP	1
B x GL	1

Table 6: Collinearity (VIF)

Regression analysis also used to test the acceptance and rejection of proposed hypothesis. It tells the relationship between variables. In this study the independent variable is GSCM practices and dependent variable is firm performance. r-squared value if the value is between 0.75 to 0.89 can be considered as moderate (Hair et al., 2019). Following table 5 is showing r- square value 0.850 or 85% which is moderately explaining the variance between variables.

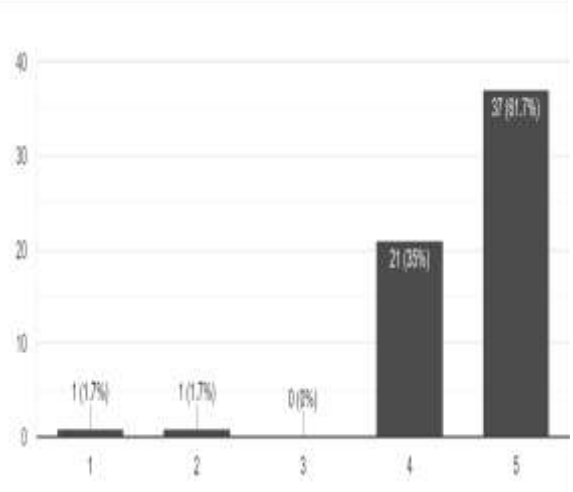
R-SQUARE		
	R-square	R-square adjusted
F	0.85	0.84
P		2

Table 5 Regression analysis

In this study with the help of structured equation model we test the fit between research models. This test was done to check the direct or indirect impacts between the variables of the constructs in the model. Our model testing shows that in table 7 we have minor deviations in the values of SRMR and NFI from the range of acceptance which means that model is not perfect but have moderate fit values.

Hypothesis Testing:

For hypothesis testing the researcher have used the bootstrapping technique. To test the acceptance and rejection of the proposed hypothesis of this study T-value and P-value is examined through bootstrapping



technique. T- values that are greater than 1.96 (Wong, 2013) are acceptable and P-values less than 0.05 are significant (Hair et al., 2019).

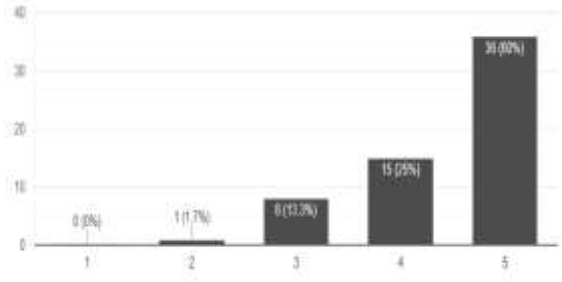
Our results show all proposed hypotheses are accepted. Shown in Table 8

(Annexure D)

Analysing above mentioned results we can see in table 9 that **all the alternative or null hypotheses are rejected** because the p-values are less than the significance level, so our sample data is favourable to the alternative hypothesis which represents that green practices have a positive impact on the performance of a firm while all the barriers hurt green practices and firm performance.

Findings and discussion:

The result reveals that all hypotheses are accepted that we proposed in our study. According to the data that was collected from different supply chain participants, it was found that less than 50% of companies In Pakistan are not adopting even not planning to adopt green practices due to different barriers to adoption.



Conclusion:

The reason to conduct this study is to contribute with other researchers to help manufacturing firms in identifying the barriers and overcome them to adopt green practices for better manufacturing. In barriers we found that experts highly agreed with the statement that there is a lack of training among employees about green practices then they are in the support of the statement of a lack of involvement of employees, customers and partners also creates hurdles for adopting green practices.

Limitations and Implications

In this study, we consider a few barriers that are mostly found in Pakistani organization culture, but more barriers can be identified and could be added to this study. This study will only contribute to the research of countries like Pakistan where GSCM practices are not being adopted by the firms due to various barriers.

Theoretically, this study will contribute in several ways, as it contributes to the literature of many studies as various barriers are identified and mentioned in it. This study will provide further direction for the researchers to identify more barriers and to spread awareness by identifying the core difficulties that Pakistani firms are facing in implementing green practices. The supply chain managers can also benefit from this study by better understanding the hurdles in practising green activities.

Recommendations:

This study has several limitations but still it can be helpful in future research to identify more about barriers to GSCM. In this study, only a few barriers were investigated from the vast literature review but continuing with this study more barriers can be identified, after a few years circumstances will get changed so considering those other factors this research can take a new direction. This study is general for all manufacturing industries in Pakistan it can be specified for each type of firm in manufacturing industries.

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(Annexure A)

Table 2: CONSTRUCT RELIABILITY & VALIDITY

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
B	0.845	0.853	0.886	0.565
FP	0.853	0.863	0.892	0.58

(Annexure B)

Table 3: DISCRIMINANT VALIDITY- HTMT RATIO

	B	FP	GD	GL	GM	GP	B x GM	B x GL	B x GP	B x GD
B										
FP	0.875									
GD	0.724	0.729								
GL	0.543	0.691	0.548							
GM	0.534	0.674	0.551	0.529						
GP	0.659	0.699	0.487	0.293	0.382					
B X GM	0.737	0.845	0.636	0.624	0.609	0.424				
B X GL	0.777	0.875	0.666	0.633	0.635	0.44	0.983			
B X GP	0.877	0.768	0.642	0.508	0.498	0.68	0.839	0.829		
B X GD	0.828	0.876	0.665	0.639	0.621	0.533	0.974	0.983	0.894	

(Annexure C)

Table 4: DISCRIMINANT VALIDITY- FORNELL & LACKER CRIETRIA

	B	FP	GD	GL	GM	GP
B	0.762					
FP	0.758	0.762				
GD	0.674	0.676	1.000			
GL	0.502	0.643	0.548	1.000		
GM	0.495	0.616	0.551	0.529	1.000	
GP	0.605	0.649	0.487	0.293	0.382	1.000

(Annexure D)

Hypotheses	Path coefficient	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Results	Null Hypothesis
H1a:GD -> FP	0.006	0.052	2.768	0.006	Accepted	Rejected
H1b:GL -> FP	0.189	0.04	7.232	0.000	Accepted	Rejected
H1c:GM -> FP	0.008	0.028	5.176	0.000	Accepted	Rejected
H1d:GP -> FP	0.501	0.072	4.894	0.000	Accepted	Rejected
H2a: B x GM -> FP	0.125	0.037	2.241	0.025	Accepted	Rejected
H2b: B x GL -> FP	0.308	0.046	3.662	0.000	Accepted	Rejected
H2c: B x GD -> FP	0.132	0.045	3.004	0.003	Accepted	Rejected
H2d: B x GP -> FP	0.263	0.025	3.597	0.000	Accepted	Rejected