Green Supply Chain Management Initiatives:A Perspective of Pakistani Automobile Industry

Noor Hyder

BBA, Lahore School of Economics

ABSTRACT

The rising interest in ecofriendly sustainability and green issues is obvious among investigators and professionals in the supply chain field. This study emphasis on examining and empirically evaluating the implementation of Green Supply Chain Management (GSCM) practices in the Pakistani automobile industry. A questionnaire-based survey was conducted to validate these green practices and performance outcomes. The survey gathered 25 complete replies from Pakistani automobile organizations, forming the basis for practical analysis. The independent variables for this present study were: Green Product Development and Design Practices, Green Purchasing Practices, Green Production Practices and use of Cleaner Technologies, Green Management Practices, Green Logistics Practices, Green Marketing Practices; while the dependent variable was Environmental Performance Outcome. Descriptive statistics were considered to assess the current status of GSCM practices. Furthermore, multiple regression analysis was also conducted to understand the impact of existing GSCM practices on anticipated organizational performance outcomes. The study's findings indicate that environmental performance exhibit improvement with the adoption of GSCM practices.

Keywords: Green Supply Chain Management, Green Practices, Environmental Performance Outcome, Automobile Sector.

INTRODUCTION

Sustainable supplychain management has gained popularity and received attention of stakeholders from different industries and from ruling bodies(Luthra, Garg, & Abid, 2015). Sustainable supply chain not only includes the element of profit and loss but also considers social and environmental dimensions (Carter & Rogers, 2008; Luthra, Garg, & Abid, 2015).The focus on protecting environment has shifted from the operational or organizational level to supply chain level (Preuss, 2000).Social awareness and new rules regarding waste management are compelling businesses to reassess their supply chains with respect to social, economic and environmental factors(Luthra, Garg, & Abid, 2015). In today's world, the current issue which firms are facing is associated to green supplychain management, which has a linkage between internal and external business environment (Sarkis, 2003).

Different departments of an organization are responsible to guarantee financial, operational and environmental excellence in product designing, product development, business operations and marketing activities. The research department is not only responsible to study on consumer behavior or increasing productivity but also to develop or introduce new methods of production which are cost effective, environment friendly and beneficial to all stakeholders. The research results play a vital role in policy

and strategy development (Andrade, 2020). An attempt has been made in this paper to identify and analyze the green supply chain practices in automobile sector of Pakistan.

Similarly, (Ali, Bukhsh, & Yasin, 2019)stated that campaigns should be launched to aware people regarding environmental degradation. Government should intervene or mediatewith industrial and residential sectors to adapt green technology. The rise in air pollution and considering the greenhouse effect, emission-free zones should be set up and EV's (electric vehicles) should be encouraged (Chan, 1993). In 2004, about 68 percent out of 250 global firms published sustainability reports along with financial statements, which included environmental, economic and social issues (Carter & Rogers, 2008). Approximately 80 percent of these report discussed supply chain related problems.

Today, Green supplychain management is receiving attention from secondary sector (manufacturing) because environmental issues have become serious and cannot be ignored in today's businesses practices (Luthra, Garg, & Haleem, 2014). The increasing awareness on environmental sustainability, firms has started to think and act green, without compromising on their business objectives and strategies (Rusli, Abd Rahman, & Ho, 2012). Multi-tier sustainable supplychain has already been implemented in food and apparel industry in Pakistan (Siddiqui, 2021). To make policies and strategies which are environment friendly and profitable for firms, decisions should be made thoroughly as they would have an impact on internal and external allegations on the management of an organization (Sarkis, 2003). In today's business environment, green supply chain management has appeared as an important organizational strategy (Luthra, Garg, & Haleem, 2014). Green supplychain management is introduced as a new and most important organizational strategy in business environment which includes multiple processes like green raw materials, green manufacturing and green transportation to improve environment (Luthra, Garg, & Haleem, 2014).

When Pakistan came into being, it was the 13th most populous country in the world, the population problem has worsened since independence (Afzal, 2009). Pakistan lacks in ecology and environmental degradation is becoming a challenge for businesses and human (Yousaf, Ali, Aziz, & Sarwar, 2022). Research article (Afzal, 2009) has confirmed that Pakistan has the highest birth and fertility rate, which is an alarming situation and requires immediate actions. Just like food, clothes and shelter; cars are also a need or necessity of life not only in Pakistan but all around the world. The population of metropolitan is much higher than other cities on Pakistan, this might be due to infrastructure investment or migrations; this has resulted into long traffic jams and delays in traffic movements (Shirwani, Gulzar, Asim, Umair, & Al-Rashid, 2020).

This research paper is an effort to consider the supply chain practices of automobile industry in Pakistan. Previously, scarce work has been done on the context of green supplychain in Pakistan, particularly in automotive industry.

Problem statement

The automobile sector of Pakistan is manufacturing vehicles with the same technology and technique from the last 30 years. These older techniques of assembling the automobiles are responsible for the air pollution which causes breathing problems(Siddiqui, 2021).The foremost concern of today's businesses aremainlyrelated towards the protection of the environment.The emissions caused by factories and vehicles are the main sources of environmental pollution like global warming and acid rain (Kumar & Chandrakar, 2012).The environment is deteriorating each day due to the usage of non-renewable energy resources, especially in developing countries like Pakistan (Shirwani, Gulzar, Asim, Umair, & Al-

Rashid, 2020). Moreover;about 65 percent of urbanization is expected to be occur in emergingnations, by 2050 (Ali, Bukhsh, & Yasin, 2019).As compare to the population growth rate, the number of provisions (sewerage, infrastructure, education, medication centers) in urban cities are limited(Ali, Bukhsh, & Yasin, 2019).In order to cater,these environmental issues, firms should adopt new technology while investing in research to redesign of processes to achieve the sustainable development(Nidumolu, Prahalad, & Rangaswami, 2009).

Fossil fuel resources are depleting over the passage of time and vehicles using normal (gasoline) combustion engine is causing damage to environment and harmful to health, thus resulting in loss(Siddiqui, 2021).Pakistan is dependent on fossil fuels as its dominant source of energy (Mirza, Ahmad, Harijan, & Majeed, 2009).There is an estimation that 80-85 percent of energy are attained from fossil fuels (Rashedi, et al., 2022). Pakistan's energy requirements are huge because of continuous population growth (Saghir, et al., 2019).Urbanization is another factor for increase in number of cars (Ali, Bukhsh, & Yasin, 2019). It was suggested (Ali, Bukhsh, & Yasin, 2019) that public transportation should be promoted to reduce vehicular emissions; however, new technology and new production methods or introduction of EVs or hybrids could also reduce or eliminate emissions.

Green Supply Chain Management is an emerging trend in recent years for the emerging nations. The main purpose of this paper is to investigate the green practices in automobile sector of Pakistan and its impact on performance. This paper would be very helpful to all stakeholders because that will aid them in developing the strategies and also the auto policies.

Literature Review
Green Product Development

A product development is a whole process of creating or renewing a product for a market. Green product development is also a similar process but includes element of saving environment, resources for future generations.(Albino, 2009) defines this concept as a process of developing a product with a minimal environmental impact, use of renewable resources is encouraged and toxic materials are avoided.Phrases like: "Eco designs", "Producer responsibility" and "Design for Environment" are becoming popular in businesses environment. In 2006 (Hu & Hsu, 2006) identified "Product Recycling" as a prime dimension of GSCM using fuzzy analytic hierarchy approach along with Product lifecycle management.

One of the approaches to green product development is LCA (lifecycle management analysis). (Lamming & Hampson, 1996; Mumtaz, Ali, Petrillo, & Felice, 2018; Albino, 2009) discussed the use of waste management and product stewardship, to improve productivity and to execute environment friendly policy.

3M was the first to improve resource productivity among all competitors. They use water-base solutions to save environment, shorten delivery time, lowering costs and to gain competitive advantage (Porter & Van der Linde, 1995).

Green Purchasing Practices

(Lippmann, 1999)recommended that having a good relationship with customers and suppliers is essential to implement GSCM practices properly. Standards like, buying recycled or reuse raw material to fulfill environmental objectives can only be carried out if supplier's objective are aligned with the business objectives. (Bowen, Cousins, Lamming, & Faruk, 2006) suggested that Greening Process,

which is related to suppliers and recycling is essential to contribute towards GSCM practices. Moreover, (Albino, 2009) encouraged(EPR) extended producer responsibility policy, should be implemented on original producer of the product, which is to improve design and material to enhance reusability and recyclability.

Facts regarding Green attributes of a product can be determined through either Product Description, Consumer Organizations or Verified Eco-labels. International Organization for Standardization has developed three (3) types of labels: ISO Type 1, ISO Type 2 and ISO Type 3; to distinguish less environment friendly products with more environment friendly products (Albino, 2009). Examples of eco-labels are Energy Star, Green Seal and WEEE (Lee & Huang, 2011).

Green Production Practices and use of Cleaner Technologies

This variable will consider environment friendly production processes. Cleaner production is also known as Pollution prevention (p2). Cleaner production concept is related to Internalization of business operations, as responsibilities are shared among all operational levels: new production strategies are developed like use of renewable energy and environment friendly technologies (Baas, 1995).

These are strategies to avoid risks. Human and environmental risks can be reducedby improving technology and production technique, by reducing the quantity of emissions and wastes (Baas, 1995). The use of by-products to save material and increase productivity was discussed in 1995 (Porter & Van der Linde, 1995; Albino, 2009).

Experiment was carried out to prove how green production could save environment and costs. (Huisingh, 1989)Powder paints were introduced instead of buying thermal combustion facility for solvent-based paints, firm saved around 23 lac Swedish krona, thus environment was saved from harmful gases.

Government or Environment protecting bodies (regulatory authorities) could play a vital role in protecting environment by forcing manufacturing businesses to adopt cleaner production technologies. Ciba-Geigy Corporation was forced to use less harmful chemical agent in dye and were refused to release waste (toxic product) in waste water stream of Toms River; (Porter & Van der Linde, 1995) that production facility was eventually closed.

Green Management Practices

Green management practices are significant to attain superior performance. These economic and environmental oriented practices consists of a business policy and efforts of the management team to minimize negative impact on natural environment (Venus, 2011). Product development is the initial stage to work on green practices but I believe a strong management, having full knowledge of GSCM and Green Marketing is a prime element for implementation of green practices. (Lippmann, 1999; Mumtaz, Ali, Petrillo, & Felice, 2018) suggested that to adopt green product development approach; senior level leadership, GSCM policies, supplier meetings along with their evaluation is essential. Nowadays, it is evident that many business organizations are paying attention to save environment by adopting green management practices to eliminate negative impact on environment (Babiak & Trendafilova, 2010).

Research results of (Toke, Gupta, & Dandekar, 2012) proved that involvement of top level (senior level) management is necessary and important motivating factor for successful implementation of GSCM practices. (Zhu, Sarkis, & Geng, 2005) argued that involvement of not only senior management but

middle-level managers is also important for successful implementation of GSCM practices in corporate culture. Organizations which consider green management in their operations, usually initiate pleasant relationship between their social environment (Babiak & Trendafilova, 2010).

Green Logistics Practices

Distribution of goods in a sustainable way while considering environmental and social factors can be define as green logistics practices. Green logistics practices include developing strategies to reduce energy usage and waste in transportation (Sbihi & Eglese, 2010).Moreover, these practices also include, measuring impact of different transportation strategies, eliminating waste, minimizing the use of energy and resources (Stolka, 2014). Logistics or transportation is most important and visible element in supply chain, which is also responsible for nitrogen oxides, sulfur dioxide and particulate matter (fine dust) emissions (Dekker, Bloemhof, & Mallidis, 2012). Sustainable environment policy of a business impacts transportation throughout supply chain (Sergio, J, & Javier , 2011; Wu & C, 1995).It was concluded that green transportation has a significant influence on operational performance of a firm (Raut, et al., 2019). It was argued that despite the fact that organizational factors are significant for an organization but logistics manager should also consider technological factor while developing strategies (Stolka, 2014). Another study was conducted in 2021, which concluded that green logistics practices further refine financial and social performance, along with competition (Mensah & Tang). Due to large number of environmental issues, businesses are struggling to develop or introduce sustainable transportation methods (Stolka, 2014). Table 1 defines the general factors affecting green logistics(Stolka, 2014).

| Factors affecting Green Logistics |
| --- |
| Clean Vehicles |
| Multimodal |
| Shipment |
| Freight |
| Consolidation |
| Road |
| Traffic |
| Infrastructure |
| Home Delivery |

Green Marketing Practices

It is also known as environmental marketing and ecological marketing. Marketing is an act of selling goods and services. Green marketing is an act of selling and promoting goods and services which are believed to be environmentally safe. Very little research is done on green marketing practices in the past (Fuentes , 2014). A firms' objective is not only to produce or assemble a product but also sell it. As public and government are concerned about environmental issue, green marketing is becoming an important factor to remain competitive and profitable for firms (Lee & Huang, 2011). As discussed above that number of resources are limited with respect to needs of the customers, green marketing activities ensures the best use of insufficient resources while implementing on business strategies and objectives. Asian industries are trying to adopt green marketing practices but due to lack of knowledge, a wide gap in implementation of these practices is present (Mishra & Sharma, 2014). Green marketing has strengthened over traditional marketing, in recent years (Mayakkannan, 2019).

Marketing consists of several activities like 4Ps, Promotion etc. Firms can use green marketing activities to promote their product, however some firms don't use it as marketing purposes. An example is Coca Cola, which in environmentally committed organization but does not use this to increase sales or attract customers due to the element of Corporate Social Responsibility (Mishra & Sharma, 2014). In 2022, green marketing was summarized and explained under four dimensions: product development, market development, satisfying the needs of customers and green communication. Which is also called advertising(García-Salirrosas & Rondon-Eusebio, 2022).

Environmental Performance Outcomes

Industrialization is the cause of environmental pollution in Pakistan (Mumtaz, Ali, Petrillo, & Felice, 2018). Previously, businesses success or economic performance was dependent through the creation of wealth; however, in todays world, this has changed to social and environmental factors(Carter & Rogers, 2008). GSCM is essential in influencing firms to achieve sustainability performance and to regulate supply chain activities for environmental performance(Chin, Tat, & Sulaiman, 2015).

Theoretical Framework
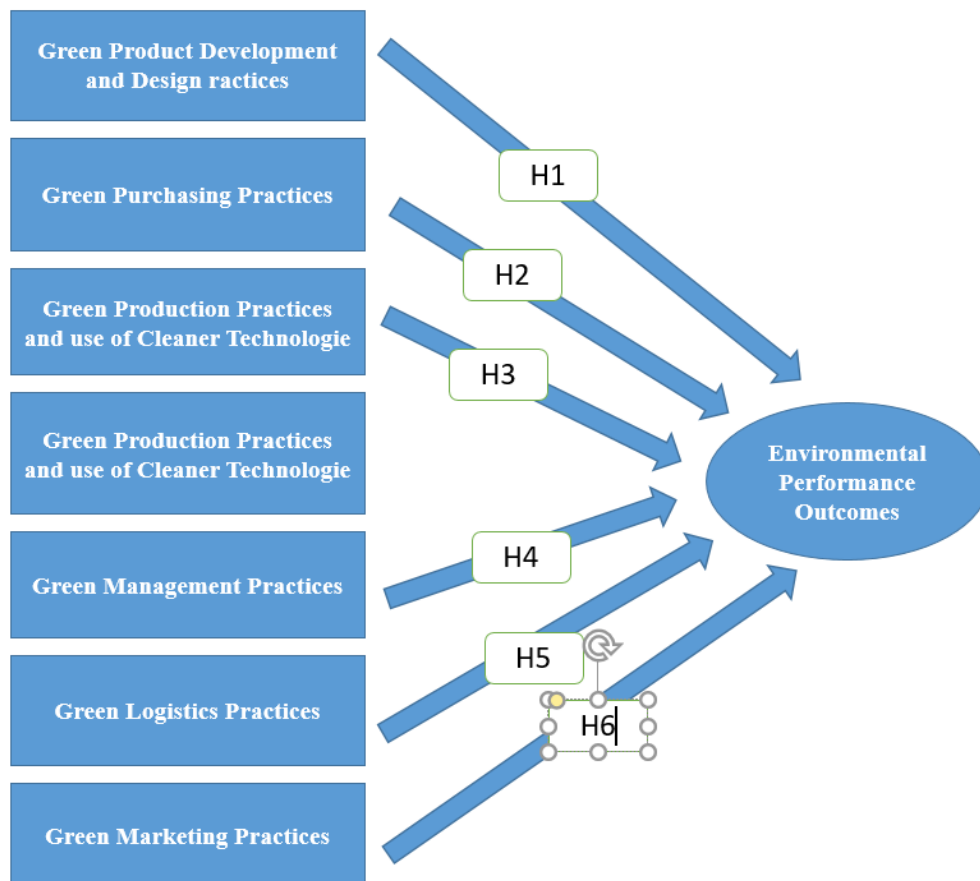
HYPOTHESIS

- H1: Green Product Development and Design Practices has a significant relationship with Environmental Performance Outcomes.
- H2: Green Purchasing Practices has a significant relationship with Environmental Performance Outcomes.

- H3: Green Production Practices and use of Cleaner Technologies has a significant relationship with Environmental Performance Outcomes.
- H4: Green Management Practices has a significant relationship with Environmental Performance Outcomes.
- H5: Green Logistics Practices has a significant relationship with Environmental Performance Outcomes.
- H6: Green Marketing Practices has a significant relationship with Environmental Performance Outcomes.

Methodology

Questionnaire based survey was used to examine the current green practices in automobile sector of Pakistan. Primary data was collected through questionnaire and data was analyzed through SPSS software(Amir & Asad, 2018). Questionnaire contains two section(Luthra, Garg, & Abid, 2015). The first section contains questions related to demographics and to record the general information of respondents. The second section of questionnaire contains several questions to measure the green practices along with their expected outcome. A five (5) point Likert scale (1 = not considering it, 2 = planning to consider, 3 = considering it currently, 4 = initiating implementation and 5 = implementing successfully) questions for independent variables in second section were evaluated through regression analysis. Whereas, the Likert scale for measuring dependent variables was (1 = not at all, 2 = a little bit, 3 = to some extent, 4 = relatively significant and 5 = significant).

Different automobile manufacturers and assemblers were contacted and visited. The top and middle level managers of automobile sector were targeted for sampling purpose. Around 80 questionnaires were sent to managers of different automobile companies. After several email reminders, 40 questionnaires were received, however 15 were incomplete and these were discarded. Out of 80, 25 questionnaires were considered usable and response rate of 31 percent is acceptable (Eltayeb, Zailani, & Ramayah, 2011).

Results

The most significant part of research is data analysis as trends, relationships and hypothesis are tested. This section will deal with the interpretation of primary data, which was collected using questionnaire and processed through SPSS software.

The first section of questionnaire concludes the demographic attributes of respondents. Out of 25 respondents, majority (60 percent) were males. Significant amount of respondents was married and aged, greater than 30. Moreover, most of the respondents (60 percent) were wither graduates or post graduates.

Results of hypothesis

H1: Green Product Development and Design Practices has a significant relationship with Environmental Performance Outcomes.

Regression analysis is used to determine the strength between Environmental Performance Outcome and Green Product Development and Design Practices. The value of R, in regression analysis shows the correlation between Green Product Development and Design Practices, and Economic Performance Outcome, which is 0.504, thus, these variables are positively correlated, as illustrated in Table 2. Value of R-square is 0.254 which indicates moderate relationship between variables, Green Product Development and Design Practices has a 25.4 percent impact on Environmental Performance Outcome.

Furthermore, the F-value is illustrated in Table 3, which is 7.5, whereas the Level of Significance is less than 0.05, this hypothesis is accepted. These 2 variables are also directly proportional, as value of Beta is 0.483, which claims that if 1 unit of Green Product Development and Design Practices are increased, the Environmental Performance Outcome will increase by 48.3 percent.

H2: Green Purchasing Practices has a significant relationship with Environmental Performance Outcomes.

Regression analysis is a strong statistical method to examine the relationship of variables, in research. The dependent variable is Environmental Performance Outcome, whereas Green Purchasing Practices is the independent variable. According to Table 2, the value of R is 0.573, which describes a positive relationship between variables. Value of R-Square is 0.328. As R-Square value is less than 0.5, it indicates moderate relationship, which can be explained as: Green Purchasing Practices and Design Practices has a 32.8 percent impact on Environmental Performance Outcome.

Turning towards the Table 3, the F-value is 10.74 whereas the Significance is less than 0.05, this respective hypothesis is accepted. The value of Beta is 0.663, which means that 1 unit rise in Green Purchasing Practices will rise the Environmental Performance Outcome by 66.3 percent.

H3: Green Production Practices and use of Cleaner Technologies has a significant relationship with Environmental Performance Outcomes.

Regression is the functional relationship between two variables and of the two variables one may represent cause and the other may represent effect. For this hypothesis, Green Production Practices and use of Cleaner Technologies is the independent variable, however the dependent variable is Environmental Performance Outcome. In Table 2, the value of R is 0.487 which describes a practical relationship between these 2 variables. R-Square is less than 0.5, i.e. 0.237, it shows weak relationship, such as, Green Production Practices and use of Cleaner Technologies has a 23.7 percent impact on Environmental Performance Outcome.

On the other hand, the F-value is 6.84, with Significance of 0.16. As F-Value is greater than 1 and Significance is not less than 0.05, this particular hypothesis is rejected. Moreover, the beta is 0.461 which indicates that 1-unit expansion in Green Production Practices and use of Cleaner Technologies will rise the Environmental Performance Outcome by 46.1 percent.

H4: Green Management Practices has a significant relationship with Environmental Performance Outcomes.

Regression analysis examines the influence of independent variables on dependent variable. The independent variable in this hypothesis is Green Management Practices while Environmental Performance Outcomes is the dependent variable. The model summary is explained in Table 2 the value of R is 0.65 which means that these variables are positively correlated. R-Square is 0.422, which reflects a moderate relationship. In other words, Green Management Practices has an impact factor of 42.2 percent on Environmental Performance Outcome.

As illustrated in Table 3, the F-value is 16.08 whereas the Significance is 0.001, this hypothesis is accepted. The beta is 0.928, which means that if 1 unit of Green Management Practices is increased, the Environmental Performance Outcome will increase by 92.8 percent.

H5: Green Logistics Practices has a significant relationship with Environmental Performance Outcomes.

Regression analysis is used to determine the strength between Environmental Performance Outcome and Green Logistics Practices. 0.546 is R-value in Table 2, which proves that both variables are positively correlated. Both variables experience weak relationship as R-Square is 0.298, which means that Green Logistics Practices has an impact factor of 29.8 percent on Environmental Performance Outcome.

In table 3, the Beta is 0.5, which can be define as increase of 1 unit in Green Logistics Practices will increase Environmental Performance Outcome by 50 percent. On the other hand, the F-value is greater than 1, while the Significance is less than 0.05, thus this hypothesis is accepted.

H6: Green Marketing Practices has a significant relationship with Environmental Performance Outcomes.

Regression analysis is done in order to estimate the effect of some explanatory variable on the dependent variable. In this hypothesis, the independent variable is Green Marketing Practices, while dependent variable is Environmental Performance Outcome. The R-value, exemplified in Table 2, is 0.392. Since, this value is positive, both variables are positively correlated. The R-Square is 0.154 which encapsulates that Green Marketing Practices has an impact of 15.4 percent on Environmental Performance Outcome.

In table 3, the F-value is Significance is 3.995 and 0.58, respectively. Even though, F-value is greater than 1 but since Significance is not lower than 0.05, this hypothesis is rejected. Beta is 0.322, which means that 1-unit increase in Green Marketing Practices will increase Environmental Performance Outcome by 32.2 percent.

Table 2

MODEL SUMMARY				
Constant	**R**	**R-Square**	**Adjusted R Square**	**Std. Error of the Estimate**
Green Product Development & Design Practices	0.504	0.254	0.22	0.586
Green Purchasing Practices	0.573	0.328	0.298	0.556
Green Production Practices and use of Cleaner Technologies	0.487	0.237	0.203	0.593
Green Management Practices	0.65	0.422	0.396	0.516
Green Logistics Practices	0.546	0.298	0.266	0.569
Green Marketing Practices	0.392	0.154	0.115	0.625

* Dep Var: Environmental Performance Outcome

Table 3

ANOVA & Coefficients				
Constant	**Mean Square**	**F**	**Sig**	**Beta**
Green Product Development & Design Practices	2.58	7.5	0.012	0.483
Green Purchasing Practices	3.33	10.74	0.03	0.663
Green Production Practices and use of Cleaner Technologies	2.41	6.84	0.16	0.461
Green Management Practices	4.289	16.08	0.001	0.928
Green Logistics Practices	3.02	9.32	0.006	0.5
Green Marketing Practices	1.56	3.995	0.58	0.322

* Dep Var: Environmental Performance Outcome

Table 4		
Summary of Results		
H1	Accepted	
H2	Accepted	
H3	Rejected	
H4	Accepted	
H5	Accepted	
H6	Rejected	

Conclusion

In this present paper, an attempt has been made to conduct an analysis of Green Supply Chain Management practices on automobile sector of Pakistan. From existing literature review of past studies, six practices were identified to carry out this research and to measure impact of these six practices on environment. A well-organized questionnaire was developed to gather primary data. Impact of GSCM practices on Environmental performance was tested using regression analysis.

This is the distinctive study, carried out for the first time in Pakistan to study the current statistics of GSCM practices in automobile sector. Generally, the results of this present study indicates that

automobile sector is in great pressure, due to growing realization of environmental issues by manufacturers and consumers. The results also concluded that environmental performance are related to GSCM practices and could be improved by implementing these practices. Some of the GSCM practices are in initial stage and over the period of time, would improve.

To recapitulate, the framework of this present study provides stronger comprehension of Green Supply Chain Management Issues. Many researches on GSCM practices are conducted in Pakistan (Mumtaz, Ali, Petrillo, & Felice, 2018). I believe, this paper will also be beneficial for broadening research in the field of GSCM and automobile sector of Pakistan.

Recommendations

Further, more study is required for better understanding and implementation of GSCM practices to achieve environmental performance. In present world, GSCM is important research genera, so more independent and mediating variables should be added in this present study for further research. The sample si\e should be increase and more production or manufacturing industries should be selected for sampling purpose.

Appendix A
Questionnaire

Age:
- Less than 18
- 18 – 30
- More than 30

Gender
- Male
- Female

Marital Status
- Single
- Married
- Divorced
- Widowed

Education
- Intermediate
- Graduate
- Post Graduate

		1	2	3	4	5
	Green product development and	Not Considering	Planning to	Considering it Currently	Initiating Implementation	Implementing Successfully

design practices		Consider			
Green product development practices					
Design for environment					
Design for disassembly					
Design for recycling					
Substitution of polluting and hazardous material/ components					
Use of lifecycle analysis to evaluate the environmental friendliness of products and packaging					
Green purchasing practices					
Certification of suppliers/vendors' environmental management system					
Cooperation with suppliers/vendors' for environmental objectives					
Training programs of suppliers/vendors'					
Environmental auditing of suppliers/vendors'					
Collaboration b/w organization and suppliers/vendors to reduce eliminate product environmental impacts					
Motivation for					

environmental friendly suppliers/vendors					
Providing design specification to suppliers that include environmental requirements for purchased items					
Purchasing products that have environmentally friendly attribute (recyclable content, non toxic etc.)					
Green production practices and use of cleaner technologies					
Use of lean/flexible manufacturing					
Use of cleaner technology					
Use of environment friendly materials/components/ products					
Reusing, recycling and remanufacturing of materials					
Reduction in energy consumption					
Reduction in air emissions, liquid and solid wastes					
Green management practices					
Certification to ISO:14001 or any other EMS in organization					

Total quality environment management practices implementation					
Environmental compliance and auditing programs					
Commitment and support for environment friendly practices from top management					
Environmental training and awareness programs for employees					
Reward and incentives for environmental initiatives taken by employees					
Environmental collaboration with customers					
Green logistics practices					
Use of environmental friendly transportation					
Use of environmental friendly distribution					
Reusing of materials or components or products					
Remanufacturing of components or products					
Green marketing practices					
Use of environmental friendly packing of					

the products					
Use of environmental friendly labeling of the products					
Regular voluntary information about management to customers and institutions					
End of life product management					
Sale of excess inventories/materials					
Sale of scrap and used material					

		1	2	3	4	5
Environmental performance outcomes		Not at all	A little bit	To some extent	Relatively significant	Significant
Reduction in air emissions, liquid and solid wastes						
Extent of recycling and reuse						
Decrease in use of harmful/hazardous/materials/ components						

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