

Barriers and Their Relative Importance to the Adoption of Green Supply Chain Management in Indian Context

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Abstract

Green Supply Chain Management (GSCM) has received growing attention in the last few years. GSCM is the summing up of green purchasing, green manufacturing, green packing and green distribution and marketing. Almost all type of industries such as Automobile Industries (Four-Wheeler & Two-Wheeler) and General Manufacturing Industries are setting up their own manufacturing plants in competitive Indian market. Due to public awareness, economic, environmental or legislative reasons, the requirement of GSCM has increased. The aim of present work is to identify different barriers and their relative importance to implement GSCM in Indian Manufacturing Industries

It is observed from the study that “Lack of necessary tools, management skills and knowledge” is the most critical barrier to the implementation of GSCM in case of Two-Wheeler Automobile Industries and

General Manufacturing Industries whereas in case of Four-Wheeler Automobile Industries “Inability to adopt adequate environment treatment measures” is the most critical barrier. The results on the basis of survey shows that Four-Wheeler Automobile Industries are facing more number of barriers to the adoption of GSCM as compare to Two-Wheeler Automobile Industries and General Manufacturing Industries.

Key words: Green Supply Chain Management, Barriers, Correlation, Green Manufacturing

1 Introduction

Barriers are the main obstacles which prevents the implementation of Green Supply Chain Management in manufacturing industries. The concept of Green Supply Chain Management was first proposed by the Manufacturing Research Consortium (MRC) of Michigan State

University in the U.S. in 1996, for comprehensively considering environmental impacts and resources optimization of manufacturing supply chains. Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment. Environmental supply chain management consists of the purchasing function's involvement in activities that include reduction, recycling, reuse and the substitution of materials. GSCM has a range from green purchasing to integrated supply chains starting from suppliers, to manufacturer, to customer and reverse logistics, which is closing the loop. Closing the loop consists of forward chain and reverse chain in supply chain activities. Based on previous literature, GSCM encompassed several practices that have widely discussed including internal environmental management, green purchasing, customer environmental collaboration, and reverse logistics. With the adopting GSCM in manufacturer's business operation, it can cope with the pressures from customers, buyers, communities and government regulators who have increasing environmental concern. However, continuous innovation is also needed as

important solution to meet those surrounding pressures.

The GSCM system is continuously growing. To solve the certain problem during the operation of GSCM, decision makers should consider a variety of factors. First of all, product is the central factor of GSCM. The product has a typical lifecycle includes four stages: introduction, growth, maturity and decline. At each stage, the operation of GSCM will be affected to some extent and the whole operation of GSCM has its own lifecycle which includes purchase, production, marketing, packaging and reverse logistics. At each stage, the operation will focus on different performance factors. Government influential policies are important to the adoption of GSCM. Customer desire for low prices, customer demand is the key for organizations to adopt GSCM. Competitive pressures and market uncertainty also plays a vital role.

2. Literature Review

The purpose of literature review is to provide background information on the issues to be considered in this paper and to emphasize the relevance of the present paper.

2.1 In Global Context

Rogers, D.S. [9], they studied that “Lack of Information Technology Implementation” is one of the important barrier in implementing GSCM. Lack of Information Technology Implementation means non implementation of Information Technology resources like computers, internet etc. which results in slow, ineffective and improper communication in industries. Scupola, A. [10], studied that “Lack of Government support systems” is very critical barrier to the adoption of GSCM in manufacturing industries. Lack of Government support systems means Government is not making industry friendly policies toward GSCM and not giving special benefits to those organizations which are implementing GSCM. Zhu, Q.[14], According to them the major barrier of GSCM is lack of awareness of customers about the benefits of green products. Customer demands become most crucial type of external pressure. Customer’s awareness means if customer demands green products; the company has to change technology and organization for innovative green products. But in developing nations like India, due to unawareness of customers towards green product benefits, Manufacturing Industries are producing non

green products. Robert Klassen [8], According to them Companies has felt both internal and external barriers that are economic and political. While external barriers include issues such as legislation, corporate citizenship and green customers, internal barriers include increasing revenues and utilizing limited resources in an optimal fashion. Hosseini, A. [4], studied that “Resistance to Technology advancement adoption” is a crucial barrier to adopt GSCM in manufacturing industries. Manufacturing industries are not doing advancements in machinery and equipments to improve the products.

2.2 In Indian Context

Kannan, G. [6], they studied that “Supplier Reluctance to change towards GSCM” is one of the critical barrier to implement GSCM. Supplier reluctance to change towards GSCM means not involvement of the suppliers in design process and technology, which affects overall performance of whole chain. The manufacturers cannot produce green products unless they work together with suppliers. Alkhidir, T. [1], they studied that “Cost Implications” is an important barrier to the implementation of GSCM. The initial investment requirement by green methodologies such as green design, green

manufacturing, green labeling of packing etc. are too high. Mudgal, R.K. [7] According to them “Market Competition and Uncertainty” is a crucial barrier to adopt GSCM in manufacturing industries. Market Competition and Uncertainty is very high due to global competitiveness, and varying customer’s requirements. Ashish Kumar Bhateja [2], In their research, they studied the various barriers of the Green Supply Chain processes of the various Indian Manufacturing Industries. The major six activities of the supply chain; namely Green Sourcing & Procurement, Green Manufacturing, Green Warehousing, Green Distribution, Green Packaging, Green Transportation were covered throughout their research. Sunil Luthra [11], they have identified various barriers and contextual relationships among the identified barriers. They classify barriers based upon dependence and driving power with the help of MICMAC analysis. Sunil Luthra [12], According to them GSCM have drawn an attention of researchers and practitioners at micro and macro level. They identified various important barriers to implement Green Supply Chain Management relevant to Indian manufacturing industry. Kamalakanta Muduli [5], the aim of their study was to identify barriers that prevent

GSCM implementation in Indian mining industries. They identified four major barriers based on a detailed analysis of relevant literature. They did a statistical test which implies that the four barriers, ‘information gap’, ‘lack of social concerns’, ‘poor legislation’ and ‘capacity constraints’ were valid. The validated GSCM barriers, in their research can help organizations to identify the weaker areas in their organization needing improvement for effective GSCM implementation.

3. Research Methodology

Based on literature review the various barriers are identified which are more important to the adoption of GSCM in Indian manufacturing industries especially automobile i.e. two wheeler and four wheeler, and General Manufacturing Industries. Table 1 is shown list of various barriers which are more crucial for adoption of GSCM.

The survey methodology through a questionnaire is used for study. The main objective of survey is to find the main Barriers to the adoption of GSCM for Indian Manufacturing Industries. The questions were selected on the gap identified in literature. Data is collected through the questionnaire survey. The questionnaire was administered in 80 industries in the northern

region of India. The database of 80 manufacturing industries located in northern part of India has been extracted from industrial directories. This is having name of the company, their location and postal address. The numbers of employee in surveyed industry are more than 100. In

Indian scenario, major Manufacturing Industries are Automobile Manufacturing Industries i.e. Two Wheeler Automobile Industries, Four Wheeler Automobile Industries and General Manufacturing Industries. These sectors are included in the present study.

Table 1:List of various barriers to the adoption of GSCM

S. No.	Barriers
1.	Lack of necessary tools, management skills and knowledge (B1)
2.	Lack of management commitment (B2)
3.	Loose government Legislation (B3)
4.	Increment in overall cost or financial burden (B4)
5.	Incompatibility with different management & manufacturing systems (B5)
6.	Lack of research & empirical studies (B6)
7.	Need of development of new analytical tools & models (B7)
8.	Lack of awareness in companies (B8)
9.	Inadequate coordination between different departments (B9)
10.	Inability to adopt adequate environment treatment measures (B10)
11.	Lack of customer's, supplier's & shareholder's awareness (B11)

Based on literature review questionnaire was designed. Questions are related to company profile, number of employee, degree of importance given to the barriers by company. The questionnaire contained 11 questions, based on the Barriers to the adoption of GSCM for Indian manufacturing industries. Data is collected through a postal survey from northern Indian industries.

3.1 Profile of Respondent

After the phone calls, email and remainder, out of 80 sent questionnaires, 26 filled responses have been received from the industries, which give response rate 32.5%. From the filled responses 12(46.15%) were from quality control department manager, Seven (26.92%) were factory/plant manager and Seven (26.92%) were general manager.

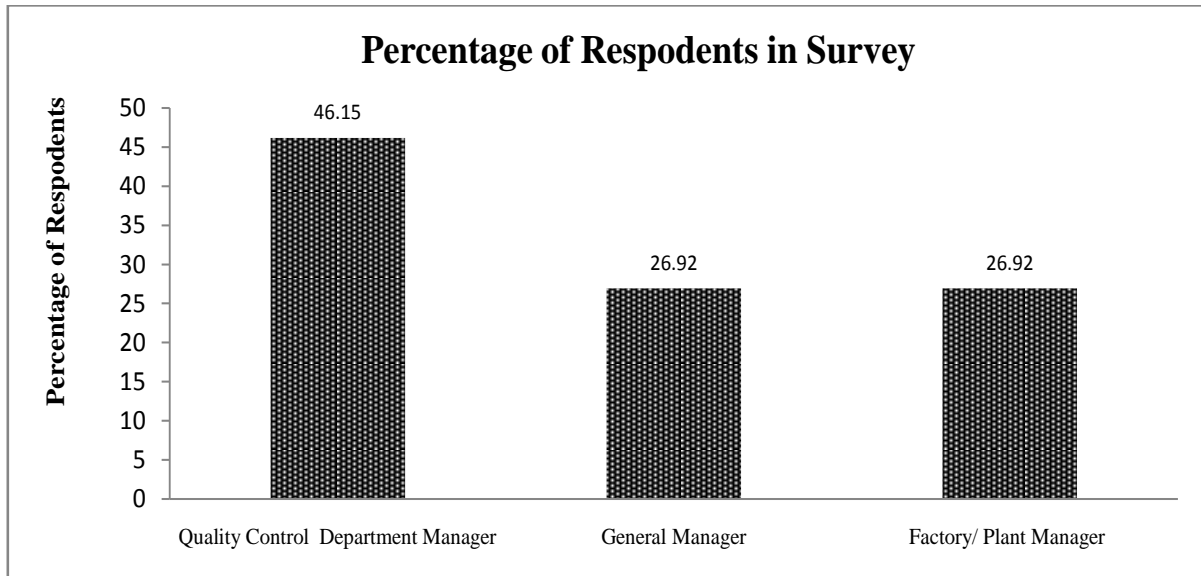


Figure 1 Percentage of various Respondents during the survey

4. Observation and Analysis of Collected Data

The responses of various manufacturing industries such as Two Wheeler Automobile Industries, Four Wheeler Automobile Industries and General Manufacturing Industries were collected. The data has been analyzed by statistical package for the social sciences (SPSS) software. Quantitative tools have been used for the analysis of collected data. Quantitative tools include descriptive statistic, reliability analysis and correlation analysis.

The table 2 shows that in Overall Manufacturing sectors, Inability to adopt adequate environment treatment measures (B10) is the most critical barrier to the adoption of GSCM which is having the

mean score value 3.74 and Loose government Legislation (B3) is the less critical barrier and having the mean score value 3.00. Therefore more stress is required on the Inability to adopt adequate environment treatment measures in the implementation of GSCM in case of Overall Manufacturing sector. Loose government Legislation has given less importance to adopt GSCM practices.

From table 3 it has been analyzed that in case of Four Wheeler Automobile Industries barriers “Inability to adopt adequate environment treatment measures” (B10) and “Lack of management commitment” (B2) is most important Barriers in Four Wheeler Automobile Industries for the implementation of GSCM, whereas barriers, “Lack of awareness in companies” (B8) and

Table 2: Descriptive Statistics Sector wise for Barriers.

Barriers	Four Wheeler		Two Wheeler		General		Overall	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
B1	3.00(10)	1.47	3.83(1)	1.17	3.75(1)	0.71	3.52(2)	1.22
B2	3.46(2)	1.56	2.83(6)	0.75	3.13(7)	1.25	3.44(4)	1.31
B3	3.15(9)	1.41	2.50(9)	1.05	2.75(10)	1.17	3.15(11)	1.26
B4	3.46(3)	1.20	2.67(7)	1.21	3.13(8)	0.64	3.44(5)	1.01
B5	3.38(4)	1.04	3.00(4)	0.89	2.75(11)	0.71	3.41(7)	1.01
B6	3.23(7)	1.24	3.17(2)	0.75	3.25(3)	0.71	3.41(8)	1.19
B7	3.31(6)	1.11	2.00(11)	0.89	3.25(4)	1.04	3.19(10)	1.08
B8	3.00(11)	1.00	2.50(10)	1.05	3.25(5)	1.04	3.26(9)	0.98
B9	3.23(8)	1.48	3.00(5)	1.41	3.63(2)	0.92	3.48(3)	1.05
B10	3.54(1)	1.05	3.17(3)	1.17	3.25(6)	0.71	3.74(1)	1.02
B11	3.38(5)	1.20	2.67(8)	1.21	3.13(9)	1.36	3.44(6)	1.15
Sector statistics	3.28	1.25	2.85	1.05	3.20	0.93	3.08	1.11

“Lack of necessary tools, management skills and knowledge” (B1) are least important barriers. In case of Two Wheeler Automobile Industries “Lack of necessary tools, management skills and knowledge” (B1) and “Lack of research & empirical studies” (B6) is most important Barriers for the implementation of GSCM, whereas barriers, “Lack of awareness in companies” (B8) and “Need of development of new analytical tools & models” (B7) are least important barriers. In case of General Manufacturing Industries “Lack of necessary tools, management skills and

knowledge” (B1) and “Inadequate coordination between different departments” (B9) is most important Barriers for the implementation of GSCM, whereas barriers, “Incompatibility with different management & manufacturing systems” (B5) and “Loose government Legislation” (B3) are least important barriers. In case of Overall Manufacturing Industries Barriers “Inability to adopt adequate environment treatment measures” (B10) and “Lack of necessary tools, management skills and knowledge” (B1) is most important Barriers for the implementation of GSCM, whereas barriers, “Loose government Legislation” (B3) and

Table 4 Correlation for Overall Manufacturing Sectors

Barriers	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
B1	1.00	.63**	.44*	.52**	.48*	.305	.122	.39*	.51**	.48*	.27
B2		1.00	.76**	.46*	.40*	.255	.254	.221	.46*	.44*	.62**
B3			1.00	.41*	.50**	.44*	.51**	.42*	.52**	.64**	.74**
B4				1.00	.43*	.186	.438	.44*	.37	.54**	.55**
B5					1.00	.39*	.46*	.59**	.50**	.51**	.30
B6						1.00	.54**	.33	.45*	.40*	.35
B7							1.00	.58**	.40*	.32	.55**
B8								1.00	.50**	.40*	.31
B9									1.00	.67**	.36
B10										1.00	.64**
B11											1.00

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

“Need of development of new analytical tools & models” (B7) are least important barriers.

Table 3 Most Important Barriers and Least Important Barriers

Sr. No	Automobile sector		General Manufacturing Sectors	Overall (Rank)
	Four Wheeler (Rank)	Two wheeler (Rank)		
Most Important	B10 (1)	B1 (1)	B1(1)	B10 (1)
	B2 (2)	B6 (2)	B9 (2)	B1 (2)
Least Important	B8 (11)	B7 (11)	B5 (11)	B3 (11)
	B1 (10)	B8 (10)	B3 (10)	B7 (10)

Table 3 shows the list most important and least important barriers to adoption of GSCM in automobile sectors especially in

two wheeler and four wheeler and General Manufacturing sectors.

5. Conclusion:

The study of barriers to implement GSCM has become a major concern for Indian Manufacturing Industries. Therefore, efficient policies need to be designed to remove these barriers. In the present work, various barriers to the adoption of GSCM have been studied. From the analysis of the collected data from the Indian Manufacturing Industries i.e. Automobile Industries and General Manufacturing Industries, it is observed that the barrier “Inability to adopt adequate environment treatment measures” is very critical barrier for Four Wheeler Automobile Industries. Due to market competition and

cost implications, organizations try to save cost. Implementing GSCM practices initially involves high investment constraints also lead to resistance to implementing adequate environment treatment measures. In case of Two Wheeler Automobile Industries and General Manufacturing Industries “Lack of necessary tools, management skills and knowledge” is the most critical barrier. From the data analysis, it is observed that the companies are not having too many necessary tools which are essential for the adoption of GSCM. Companies are not having good quality of human resources such as better training or education which will help in implementing Green Supply Chain Management. Quality human resources can provide new ideas for companies, learn new technologies easily, share knowledge with each other and use new technologies to solve problem. However, due to financial constraint; quality of human resources is barrier. It is observed from the data analysis that Four Wheeler Automobile Industries are facing more barriers to the adoption of Green Supply Chain Management as compare to Two Wheeler Automobile Industries and General Manufacturing Industries.

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