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## A STUDY ON DRIVERS FOR GREEN SUPPLY CHAIN MANAGEMENT (GSCM) IN CHEMICAL INDUSTRIES: WITH REFERENCE TO GUJARAT REGION

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### ABSTRACT

*As the world becomes increasingly concerned with green and sustainability issues, Industries, organizations and governments are gradually moving towards more sustainable business practices - and India is no exception. Indian Industries are also becoming environmental conscious and many Industries are working towards the environment friendly part of business. Green Supply Chain Management has emerged as a key concept and approach for the organizations to become environmentally sustainable. The purpose of this paper is to study and explore the factors that drive the Chemical Industries in Gujarat Region to implement Green Supply Chain Management Initiatives. The study is based upon the data collected from the 331 Large and Medium Size Chemical Industries in Gujarat. The study suggested eight factors which are majorly motivating or influencing these Industries to implement the Green Supply Chain Management initiatives. The eight factors on Green Supply Chain Management Drivers/ Pressures are labeled as Vertical Channel Partners, Environmental Regulations, Society, Expected Business Benefits, Top Management Support & Corporate Values, Competitors' Practices, Organizational Factors and International Environmental Agreements. The results of this paper provide the insights into why Chemical Industries adopt Green Supply Chain Management Initiatives and also provides policy makers and managers with a list of drivers that can be used as directions for setting up appropriate policies to encourage firms to adopt Green Supply Chain Management.*

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### KEYWORDS

Chemical Industries, Environment Management, Green Supply Chain Management, Gujarat, Sustainability.

### INTRODUCTION

The accelerating growth and development of industries, businesses and expansion of human societies across the world has resulted in many environmental problems and issues like global warming, soil erosions, depletion of natural resources, depletion of the ozone layer, biological imbalance etc. At the same time the public's awareness has also increased drastically related to environmental concerns through the various channels of communication. Eco-consciousness among consumers is gaining momentum and they are increasingly incorporating environment-friendly products into their lives. With the increase in pressures for environmental sustainability, it is expected that the organizations have to implement strategies and practices which can reduce the environmental impacts of their products and other activities including operations, procurements, transportations etc. (Lewis and Gretsakis, 2001; Sarkis, 1995, 2001). Several organizations responded to this by implementing various green or environmental systems such as cleaner production, adoption ISO 14001 Certification, Environmental Management System, etc. The go green practices are expanded to many departments within organization, including supply chain. Recent International agreements and regulations like RoHS, WEEE etc requires organizations to extend their environmental practices along their supply chains. As a result, the concept of Green Supply Chain Management (GSCM) has been evolved and emerged strongly which integrates environmental consciousness into the supply chain management. GSCM concept has been increasingly accepted and practiced by the many forward thinking organizations (Zhu & Sarkis, 2004). As rapidly the demands of managerial practice have extended, so must the theoretical frame of Operations Management.

Recent decades have seen a growth in research related to the environmental and social concerns associated with industrial supply chains. Green supply chain management (GSCM) was emerging in the last few years. This idea covers every stage in manufacturing from the first to the last stage of life cycle, i.e. from product design to recycle. Not only Manufacturing Organizations, instead GSCM can also be used to other business sectors such as government, education and services. But it is very crucial and important for the Chemical industries to implement the green Supply Chain Management practices to reduce their continuously increasing effect on the environment. The chemical industry in India is fragmented and dispersed. It is Multi product and multifaceted – which really makes it complex and a challenging task to address sustainability issues. The sector has been labeled to be one of the most polluting industries. But still the sustainability issues are yet to come in widespread manner on Indian industries in general and chemical industry in particular. This calls for the research in chemical industries for GSCM practices and is thus being undertaken as the topic for the research study with a special focus on chemical industries in Gujarat state. To contribute to, this paper proposes a more detailed analysis that focuses specifically on drivers or the pressures acting as the motivator for the implementation of GSCM Practices in Chemical Industries. Initially in this paper, we introduce current environmental awareness, practices in general. Research findings are then discussed and evaluated. The paper concludes with the implications and suggestions in light of the findings.

### LITERATURE REVIEW

The green supply chain management was first systematically put forwarded by the manufacturing research association (MRC) of Michigan State University. This association engaged in a research of "Environmental Responsible for Manufacturing (ERM)" and proposed the concept of green supply chain management in 1996, which was defined as a "based on green manufacturing theory and supply chain management technology, involving suppliers, manufacturers, distributors

and consumers, to minimize the impact to environment and maximize the resource efficiency during the whole process of product's material acquisition, processing, packing, transportation, use and scrap. Adding the 'green' concept to the 'supply chain' concept adds a new paradigm where the supply chain will have a direct relation to the environment (Srivastava, 2007).

Green supply chain management (GSCM) has become an important research focus. It is owing to the growing pressure from governments, institutions, and consumers. In recent years the topic of Green Supply Chain Management (GSCM) has received growing attention and has become an increasingly popular research area. Interdisciplinary research has integrated the efforts of management, engineering and social sciences to investigate and research the issues relevant to green supply chain management. Previous researchers have approached GSCM from diverse disciplinary and various different angles. These include diverse areas such as re-engineering, management, logistics, network analysis, and GSCM performance measurement (Sarkis, 2003). These approaches have a different view on the field of GSCM and therefore define it in different ways. Since the field still in its emergent stage, an extensive literature review was done on the discipline and underlying topics that are nurturing this emerging academic and practice field (e.g., supply chain management, sustainability and environmental operational initiatives, green designing, green manufacturing, reverse logistics, etc.). There are many corporate and industrial environmental philosophies and practices that are closely linked to and support green supply chain management that have also been a focus of significant research, practice, and application. As a new environmental approach, GSCM is considered as an environmental innovation and the Literature on Green Supply Chain Management has been growing and evolving double folded as the more and more organizations and researchers have realized that the management of environmental programmes does not end at the boundaries of the organization.

Literature review on GSCM reveals that there are several researches that involved green, environmental or sustainable concepts to traditional supply chain management, and extended GSCM issues included GSCM practices, definitions and decision framework (e.g. Sarkis, 2003; Zhu & Sarkis, 2004; Hervani, Helm and Sarkis, 2005). However, most above studies emphasized reduction, remanufacturing, recycling in product design, process design, green manufacturing practices, and green procurement. The contents of green supply chain management related papers include either Case-based and conceptual-based papers with lack of the theoretical application in wider literature on supply chain management or including environmental aspects are dominant issues in these papers. Other issues and integrative debates of sustainable aspects are neglected; these papers emphasize technical issues of solving specific environmental problems such as introducing greener or cleaner production and related managerial systems or measures. The research in Green Supply Chain Management addresses a variety of issues ranging from organizational research and practice in GSCM (Geffen and Rothenberg, 2000; Hall, 2001; Theyal, 2001; Zsidisin and siferd, 2001) to models of evaluation of GSCM practices and technology (Faruk et al, 2002; Handfield et al.,2002; Sarkis,2003)

### **GSCM DRIVERS/PRESSURES FOR ADOPTION**

Going through the available literature it has been revealed that the pressures and drivers for adoption of environmental practices arise from a number of external and internal stakeholders. The literature has identified a number of potential stakeholders that will influence the organizations to adopt Green Supply Chain Management initiatives and other environmental initiatives. External stakeholders affecting GSCM include customers, suppliers, the community, regulators and non-governmental organizations (Hervani, *et al.*, 2005). According to Hervani, *et al.* (2005), Henriques and Sadorsky (1996) and Hall (2000), as well as other experts, major external stakeholders of GSCM practices are considered to include suppliers, customers and community stakeholders. Through the implementation of GSCM, manufacturers may anticipate benefits such as improvement of a corporation's image, reduction of liability and improvement of business continuity (Sarkis, 2001). GSCM aims to find ways to improve some of the impacts that a company has on the environment. Organizations' Initiatives for environment are often accompanied by cost savings, improved efficiency, and/or profitable customer awareness (Rao, 2005; Srivastava, 2007). Another driver is the higher awareness of environmental problems of consumers, which leads to more demand for companies to balance business performance with environmental issues (Basu Hall, 2001). Pratima Bansal and Kendall Roth, (2000) suggested three basic motivations for ecological responsiveness: competitiveness, legitimation, and ecological responsibility. Customer demands that take a long-term supply chain perspective have a more positive influence on environmental management in contrast to customer requests which involve an unreasonable timeframe (Carter and Dresner, 2001). It has been suggested that suppliers can help to provide valuable ideas used in the implementation of environmental projects, but they generally do not act as a direct driving force (Carter and Dresner, 2001). Customers exert pressure on organizations to engage in environmental supply chain practices (Green *et al.*, 1996). Top management commitment is a key capability in the development of consistent and sustainable programs for cultivating relationships with suppliers (Chen and Paulraj, 2004). Bowen *et al.* (2001) used middle managers to find positive relationships between middle managers' perceptions of corporate environmental proactively and environmental management. Carter *et al.* (1998) concluded that support from mid-level managers is key to successful implementation of EMS practices. Public pressure and stakeholders are causing firms to review their environmental supply practices (Beamon, 1999; Delmas, 2001; Sharma and Vredenburg, 1998) and is most visible from activist campaigners, non-governmental organizations (NGOs) or green pressure groups (Hall, 2001; Trowbridge, 2001). Thus, we can see that there are many potential sources of drivers or pressures which can motivate or drive the Chemical Industries to implement GSCM ranging from Regulations to Customers including competitors, suppliers, NGO, Top Management, Employees, Exports, and International Environmental Agreements etc. Out investigation in this study is to determine the factors or pressures because of which Chemical Industries in Gujarat are drive to adopt and implement the Green Supply Chain Management Practices.

### **NEED & IMPORTANCE OF THE STUDY**

After going through the available literature it was found that very little research has been done in area of Green Supply Chain management practices in chemical industries in India. Even since the chemical industries are more crucial and important for implementing this GSCM to reduce their continuously increasing effect on the environment. This calls for the research in chemical industries for GSCM practices and is thus being undertaken as the topic for the research study with a special focus on chemical industries in Gujarat state. One of the biggest challenges for the companies in 21<sup>st</sup> century is the growing need for integrating environmentally sound choices into supply chain in logistics practices. The chemical industry in India is fragmented and dispersed. It is Multi product and multifaceted – which really makes it complex and a challenging task to address sustainability issues. Diverse products are manufactured, using conventional and semi modern technologies. The sector has been labeled to be one of the most polluting industries. After going through the available literature it was found that very little research has been done in area of Green Supply Chain management practices in chemical industries in India. Even since the chemical industries are more crucial and important for implementing this GSCM to reduce their continuously increasing effect on the environment. This calls for the research in chemical industries for GSCM practices and is thus being undertaken as the topic for the research study with a special focus on chemical industries in Gujarat region.

### **OBJECTIVES OF THE STUDY**

As the focus of the Green supply chain management in Chemical Industries in Gujarat the objectives of the study are envisaged as under.

1. To study the current scenario and current practices and future direction of Green Supply Chain Management activities within the supply chain of the chemical Industries in Gujarat.
2. To identify and investigates the factors leading to the development and adoption of Green Supply Chain supply chain in Chemical Industries in Gujarat.

### **RESEARCH METHODOLOGY**

#### **INSTRUMENT DEVELOPMENT**

The data used in this study consist of questionnaire responses from the Managers of Environment, Health and Safety (EHS) departments or Environment Management Representatives (EMR) and other equivalent departments at various Chemical Industries in Gujarat. The study combines issues related to the environment (green issues) with others supply chain functions. Therefore, the appropriate person from which the required data could be obtained should ideally have knowledge about both aspects. The questionnaire contains the section including 30 items affecting the implementation of Green Supply Chain

Management Practices which are the drivers or motivators for Industries for GSCM implementation based upon the number of sources from the literature and initial information inputs from the Industry Experts. Questions were answered using a five-point Likert type scale of level of agreement (e.g. 1 = Strongly Disagree to 5 = Strongly Agree).

#### DATA COLLECTION AND SAMPLE CHARACTERISTICS

The data collected was administered through three steps:

1. *Pilot test.* A pilot test was conducted to test and refine the questionnaire. A total of 28 valid responses were collected in the pilot test. Based on the suggestions from respondents, minor modifications were made to the questionnaire.
2. *Convenience Sampling.* There exists a large but finite population of small medium and large chemical industries in Gujarat. But only finite population of Large and Medium size Chemical Industries in Gujarat are considered to be surveyed. Sample size calculation performed with consideration of Finite Population correction factor with  $N = 2052$ ,  $n = 384$ ,  $p = 0.5$ ,  $q = 0.5$ , Confidence level = 95%,  $\alpha = +$  or  $-$  5% gives  $n = 324$  as sample size.
3. *Random Surveys.* To avoid the biases associated with the convenience sampling, we also conducted some random surveys through regular postal mail and e-mail followed by the telephone calls. The target Chemical Industries are from the list of Chemical Industries available. Out of total 1000 Questionnaires mailed, a total of 331 usable chemical industries responses were received (a 33.1 percent response rate). Responses from the two groups early from the convenience sampling and the late from the more of random survey were compared using  $t$ -tests. The test results indicated that in all items no statistical differences existed between the mean scores of the early and late respondents at the 5 percent level of confidence. Thus we had used full data set of 331 responses. Table I shows the distribution of respondent Chemical Industries in terms of Size, ISO Certifications and organization types.

TABLE I: DISTRIBUTION OF SURVEY RESPONDENT CHEMICAL INDUSTRIES BY OWNERSHIP, ISO 14001 CERTIFICATION, SIZE AND EMS

Particulars	Total	Percentage (%)
<i>Ownership Category (Total)</i>	<b>331</b>	<b>100</b>
State Owned	53	16.01
Private	272	82.17
Proprietor	6	1.81
<i>ISO 14001</i>	<b>331</b>	<b>100</b>
Certified	215	64.95
Not Certified	116	35.04
<i>EMS</i>	<b>331</b>	<b>100</b>
Having EMS	204	61.63
Not having EMS	127	38.37
<i>Size</i>	<b>331</b>	<b>100</b>
Medium-Size	178	53.77
Large-Size	153	46.22

#### FACTOR ANALYSIS

An exploratory factor analysis was conducted to derive groupings of Green Supply Chain Management (GSCM) Drivers/Pressures which motivates the Chemical Industries of Gujarat State for the implementing the GSCM Practices from the survey data. The result of the KMO & Bartlett's Test of Sphericity is 0.000, which meets the criteria of value lower than 0.05 in order for the Factor Analysis to be considered appropriate. Furthermore, the result of the KMO Measure of Sampling Adequacy is 0.785, which exceeds the minimum value of 0.6 for good factor analysis. Factors were extracted using maximum likelihood method, followed by varimax rotation. The Kaiser criterion (eigen values > 1) was employed for further analysis. This factor analysis empirically grouped the scale items of GSCM Drivers/Pressures into 8 factors as predicted, refer Table II. Factors have eigen value more than 1 for each of the 8 factors extracted, consisting of 30 variables. The eight GSCM Drivers / Pressure factors explain 89.45% of their inherent variance is explained by these eight factors.

TABLE II: ROTATED FACTOR MATRIX<sup>A</sup> ON GSCM DRIVERS/PRESSURES

ITEMS	Component							
	1	2	3	4	5	6	7	8
Our Supplier's advances in developing environmentally friendly goods motivate us to adopt green supply chain initiatives.	.928							
The downstream network/s (from Manufacturer to end customer) of supply chain is forcing/motivating my organization to participate in their green supply chain initiatives.	.884							
My organization's major customers would reject the products if they contain hazardous elements or materials.	.879							
My organization expects to receive special recognition from its major customers for the adoption of green supply chain initiatives.	.728							
Through adopting green supply chain initiatives, my organization tries to reduce the threat from the complaints of consumer associations/Customer forums.	.609						.504	
The upstream network/s (from Suppliers' supplier to manufacturer) of supply chain is forcing/motivating my organization to participate in their green supply chain initiatives.	.579	.474			.513			
Through adopting green supply chain initiatives, my organization tries to reduce the threat of current or future government environmental legislations.		.850						
Through adopting green supply chain initiatives, my organization tries to avoid the threat of current or future government environmental legislations.		.745						
There are frequent government inspections or audits in my organization to ensure that the organization is in compliance with environmental laws and regulations.		.670						
Through adopting green supply chain initiatives, my organization tries to reduce the complaints from Domestic Pollution Control Boards.		.637	.491					.351
My organization believes that it our social responsibility to minimize the negative effects on the environment in all its operations.	.544		.948					
It is important for my organization to consider the societal well being in all of its operations and supply chain activities.			.933					
My organization pays considerable attention to the reaction of the society to its action and activities.			.884					
In order to reduce the public's perceived risks associated with the organization, my organization implement GSCM initiatives.			.615			.567		
Increase on new business opportunities avenues after GSCM implementation motivates my organization to implement it.				.940				
Expected business benefits from after Green supply Chain Management Practices in organization encourages/motivates organization to implement GSCM.	.412	.356		.726				
There is a general belief in chemical industries that green supply chain initiatives have benefits that outweigh their costs in long run.				.716	.561			
My organization's Top management is committed towards Green supply chain initiatives implementation in organization.					.773			
The constant support from organization senior managers and top managers for GSCM initiatives encourage for its implementation.	.483				.735			
My organization's Strategic plans induced to make it a Green supply chain management efficient organization.			.388		.659			
Protecting the environment is a central corporate value in my organization.				.437	.598	.368		
Green supply chain initiatives are generally considered in chemical industries as having considerable competitive benefits.						.843		
Big organization/players and Competitors in chemical industries adopt green supply chain initiatives which motivate my organization to implement GSCM.	.390					.750		
My organization's capabilities of investment for green investments support the implementation of GSCM in organization.							.781	
My organization's quick adapting capability towards transformations supports the GSCM implementation in organization.	.475						.700	
Cross Functional Cooperation from the employees form the various departments for environmental improvements supports GSCM implementation.							.636	
Financial incentives offered by International organizations (United Nations) are significant motivators for my organization to adopt green supply chain initiatives.								.885
Environmental regulations in export countries (as RoHS, REACH.etc.) induced my organization to adopt green supply chain initiatives.			.365			.417		.703

Note: Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 16 iterations.

The eight factors on GSCM Drivers / Pressures are here labeled as Vertical Channel Partners, Environmental Regulations, Society, Expected Business Benefits, Top Management Support & Corporate Values, Competitors' Practices, Organizational Factors & International Environmental Agreements. Further analysis confirms the reliability of these eight factors with Cronbach's alpha, of 0.904, 0.823, 0.714, 0.761, 0.668, only two variables, 0.871 & only two variables respectively, for each group. The factor analysis is done here as per the guidelines by Hair et al (2005).All Cranach's alpha values are well above the limit of 0.6 established by Hair et al 2005; pp.118 which ensures that the constructs' are internally consistent and reliable. Items for each factor on Green Supply Chain Management (GSCM) Drivers / Pressures, as well as other descriptive data, including means, standard deviations are shown in Table III.

TABLE III: DESCRIPTIVE STATISTICS ON GSCM DRIVERS / PRESSURES

Items	Mean	SD
<b>Vertical Channel Partners (VCP)</b>	3.94	.76
Our Supplier's advances in developing environmentally friendly goods motivate us to adopt green supply chain initiatives.	4.27	.78
The downstream network/s (from Manufacturer to end customer) of supply chain is forcing/motivating my organization to participate in their green supply chain initiatives.	4.02	.74
My organization's major customers would reject the products if they contain hazardous elements or materials.	4.12	.92
My organization expects to receive special recognition from its major customers for the adoption of green supply chain initiatives.	4.32	.79
Through adopting green supply chain initiatives, my organization tries to reduce the threat from the complaints of consumer associations/Customer forums.	3.44	.98
The upstream network/s (from Suppliers' supplier to manufacturer) of supply chain is forcing/motivating my organization to participate in their green supply chain initiatives.	3.50	1.24
<b>Environmental Regulations (ER)</b>	3.60	.51
Through adopting green supply chain initiatives, my organization tries to reduce the threat of current or future government environmental legislations.	3.26	1.03
Through adopting green supply chain initiatives, my organization tries to avoid the threat of current or future government environmental legislations.	3.85	1.06
There are frequent government inspections or audits in my organization to ensure that the organization is in compliance with environmental laws and regulations.	3.81	.88
Through adopting green supply chain initiatives, my organization tries to reduce the complaints from Domestic Pollution Control Boards.	3.47	1.29
<b>Society (Soc.)</b>	3.73	.69
My organization believes that it our social responsibility to minimize the negative effects on the environment in all its operations.	3.94	1.12
It is important for my organization to consider the societal well being in all of its operations and supply chain activities.	3.64	.94
My organization pays considerable attention to the reaction of the society to its action and activities.	3.66	.85
In order to reduce the public's perceived risks associated with the organization, my organization implement GSCM initiatives.	3.68	.83
<b>Expected Business Benefits (EBB)</b>	3.34	.54
Increase on new business opportunities avenues after GSCM implementation motivates my organization to implement it.	3.35	1.12
Expected business benefits from after Green supply Chain Management Practices in organization encourages/motivates organization to implement GSCM.	3.76	.92
There is a general belief in chemical industries that green supply chain initiatives have benefits that outweigh their costs in long run.	2.91	1.34
<b>Top Management Support &amp; Corporate Values (TMS &amp; CV)</b>	3.07	.49
My organization's Top management is committed towards Green supply chain initiatives implementation in organization.	2.61	1.26
The constant support from organization senior managers and top managers for GSCM initiatives encourage for its implementation.	3.63	.77
My organization's Strategic plans induced to make it a Green supply chain management efficient organization.	2.09	.88
Protecting the environment is a central corporate value in my organization.	3.96	.68
<b>Competitors' Practices (CP)</b>	4.50	.51
Green supply chain initiatives are generally considered in chemical industries as having considerable competitive benefits.	4.77	.47
Big organization/players and Competitors in chemical industries adopt green supply chain initiatives which motivate my organization to implement GSCM.	4.23	.68
<b>Organizational Factors (OF)</b>	3.93	.49
My organization's capabilities of investment for green investments support the implementation of GSCM in organization.	3.55	.79
My organization's quick adapting capability towards transformations supports the GSCM implementation in organization.	3.60	.72
Cross Functional Cooperation from the employees form the various departments for environmental improvements supports GSCM implementation.	4.64	.77
<b>International Environmental Agreements (IEA)</b>	3.91	.43
Financial incentives offered by International organizations (United Nations) are significant motivators for my organization to adopt green supply chain initiatives.	3.26	.84
Environmental regulations in export countries (as RoHS, REACH.etc.) induced my organization to adopt green supply chain initiatives.	4.56	.75

## RESULTS AND DISCUSSION

Descriptive statistics of the eight GSCM drivers are shown in Table III. The table reveals that the Chemical Industries are highly drive and motivated by the Vertical Channel Partners (mean = 3.94, SD = 0.76). Vertical Channel Partners includes upstream network/s (from Suppliers' supplier to manufacturer) and the downstream network/s (from Manufacturer to end customer) of supply chain for any organization. Supplier –Manufacturer relationships are considered important in developing a sustainable competitive advantage for the Manufacturer (Sheth and Sharma, 1997; Cannon and Homburg, 2001). Customer- Supplier relationships play a role in the environmental performance of the business activities (Rao and Holt, 2005). The table also reflects that the Chemical Industries are influenced by the various Environmental Regulations (mean = 3.6, SD = 0.51). The Chemical Industries agree, on average, that there are regulatory impositions and inducements on their Industries. Environmental Regulations factor is considered to include domestic environmental regulations and government environmental policies favoring Sustainable/ Environment Friendly/Green business models. This factor includes the variables like environmental Regulations established by the Local or Domestic Government bodies, National level Environmental laws and regulations, norms and legal requirements by Pollution Control Board etc. The third major factor that motivates the Industries to adopt GSCM practices is Society (mean = 3.73, SD = 0.69). This factor includes the variables including the social responsibility of corporate towards environment, the public perceived risks of the corporate towards environment etc. Pressure from the Customers, public and pressure from the various segments of society as a stakeholder are causing firms to review their environmental supply practices (Beamon, 1999; Delmas, 2001; Sharma and Vredenburg, 1998).The analysis also reveals that the industries tend to agree that there expected business benefits (mean = 3.07, SD = 0.49) from the GSCM Practices implementation in their Chemical Industries.

The fifth factor which get derived from the analysis is Top Management Support and Corporate Values (mean = 3.07, SD = 0.49) emphasis placed by the top management on the development of capabilities for the GSCM practices implementation. Top management commitment is a important capability in the development of consistent and sustainable programs for cultivating relationships with suppliers (Chen and Paulraj, 2004). "Competitiveness" (mean = 3.07, SD = 0.49) is defined as the potential for GSCM to improve long-term profitability. It also acts as one of the main influencer for the GSCM implementation in Chemical Industries. The motivation to implement and develop GSCM is to improve the competitiveness of their firm so that they may take a more superior position in the market. Through the implementation of GSCM, manufacturers may anticipate benefits such as improvement of a corporation's image, reduction of liability and improvement of business continuity (Sarkis, 2001). There is a range of different organization related factors (mean = 3.93, SD = 0.49) which influenced industries to motivate the GSCM implementation. Personal commitment of individuals, commitment of middle level managers etc has been found to be positively related to green supply chain management (Green et al., 2000).The another factor that affects majorly the GSCM implementation in the export oriented chemical

industries are International Environmental Agreements (mean = 3.91, SD = 0.43). Although the domestic environmental regulations seem to have a greater and more immediate or significant effect on Green Supply Chain Management practices. Many Chemical Industries specially those who are having their major exports to US, UK and other European Countries are also being influenced by International Environmental Agreements, such as the Climate Change Treaty and the Montreal protocol, RoHS etc.

## IMPLICATIONS AND CONCLUSIONS

From the literature review study it can be seen that most of the Indian organizations including various Chemical Industries have increased the environmental awareness due to regulatory, competitive, and marketing pressures and other drivers. However Green Supply Chain Management is still in its infant stat in India. Only the large and medium organizations have recognized the need of implementing the green supply chain management initiatives others have lagged in the implementation of these principles into practice. This paper is only one of few efforts to investigate Green Supply Chain Management practices in Chemical Industries. Thus, the investigation and its findings are still relatively exploratory. Future research can try out new relationships, including mediating and moderating relationships, that may exist between various items and factors we have identified. A more broadly based random sample study across India would also provide a better picture of these GSCM practices and what is going on throughout India in field of Green Supply Chain Management.

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