Effect of green supply chain management practice implementation on company image performance

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*Abstract***:** *Globalization has lead the manufacturing companies all round the world to realize the importance of GSCM practice implementation, as it improves the environmental performance, and economic performance of the company hence improving companies image. Such companies provide environmental friendly products to their consumers. This study has studied the effect of green supply chain management practice implementation effect on company image by collecting the data from 60 ISO 14001 certified manufacturing companies of Gujarat. Data was analyzed using SPSS version 17. The relationships proposed in the Research framework was tested using Co-relation, Regression and Anova, between Company image and five green supply chain management practices identified from the literature review namely Internal environmental management, green purchasing, customer cooperation, Green manufacturing, Green design and investment recovery. Multiple regression model was developed and used to establish the effect of GSCM on Company Image Performance. ANOVA test was used to determine the statistical significance of the relationship between the variables. The results were presented using tables. The study established that GSCM has positive effect on Company Image performance. The study therefore recommends that managements of manufacturing companies adopt GSCM practices in their supply chain operations on proactive basis. The study suggests that further studies should be conducted in product specific or sector specific manufacturing companies to know which practices exactly should be adopted to improve their company image. Further studies should also be conducted to relate GSCM with individual aspects of performance such as Economic, Environmental and Social Performance. Results show that there is a positive and significant relationship between GSCM implementation and Company image which implies that GSCM implementation improves company image in the long run and hence gives it a competitive edge over its competitors.*

*Keywords***: Green supply chain management, Company Image, manufacturing**

Introduction: The global issues like global warming and increased environmental pollutions are causing great hazards to the health of the people all around the world. Manufacturing companies being the main polluters of the environment are facing serious and constant pressures from the Government and customers to reduce the negative impact of these companies on environment. People have become aware about the negative impact on environment and want the companies to adopt means and ways to provide greener products to them; and this can be made possible only if the companies start adopting green practices throughout their supply chain in their manufacturing processes. Realizing the importance of GSCM implementation for their long term sustainability and the pressure faced by them from various stakeholders , Manufacturing organizations have begun to implement green supply chain management (GSCM) practices in response to customer demand for products and services that are environmentally sustainable and that are created through environmentally sustainable practices and in response to governmental environmental regulations (Murray, 2000; Green et al., 1998)[1].Some of the earlier researches have shown that GSCM practice implementation has lead to improved environmental and economic performance(Zhu and Sarkis :2006)[2].Few researchers have also found a positive relationship between GSCM practice implementation and Companies competitive advantage and improved company image, but very little focus has been given to find the impact on these two performance measure and hence requires more empirical evidence, Hence this is the study which investigate the relationship between GSCM practice implementation and the company image performance specially in the Indian context.

This study focuses mainly on five green practices commonly practiced in manufacturing companies in India and their relationship with company image performance, as improved company image provides a competitive edge over its competitors.

RESEARCH STATEMENT
Gujarat is an industrially developed state of India and is a hub for many large manufacturing companies with ISO 14001 certification. This study aims to identify the various green practices practiced by these companies and what is their relationship with company image performance.

HYPOTHESIS
There is a relationship between GSCM practice adoption and company image performance.
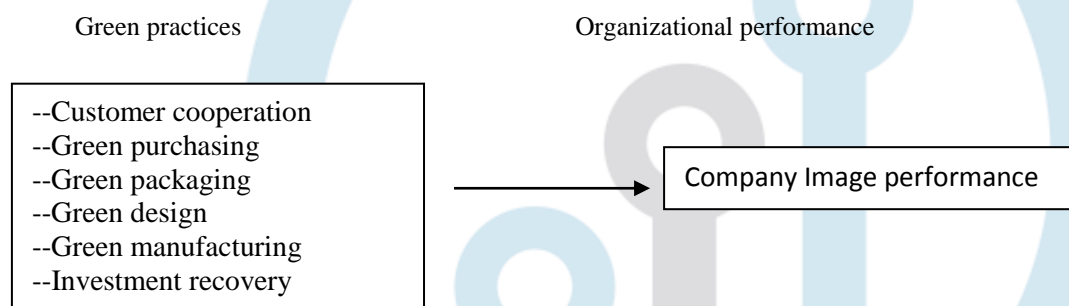
Objective of the study:
OBJECTIVES
1. To identify the green practices adopted by of Indian manufacturing companies.
2. To know the relationship between various green practices and company image performance.

LITERATURE REVIEW

The 'greening' here refers to everything that is ecologically thought (Svensson, (2007)[3]. GSCM means to integrate the environmental criteria into SCM (Srivastava: 2007)[4]. Mudgal et al. (2009[5] also refers that "greening the supply chain is considered as a process of integration of the environmental values into supply chain". This leads us to the simple definition of green supply chain management (GSCM) by adding "green" to the supply chain management practices. It can be defined as "green procurement+ green manufacturing+ green distribution+ reverse logistics" (Sekshan et al, (2010)[6] ,Sarkis (1995)[7]. The ultimate purpose is to eliminate or minimize waste(energy, emissions, and chemical/hazardous, solid wastes) along the supply chain (Hervani et al (2005)[8].GSCM has been quoted by many researchers as an emerging approach to balance both economic and environmental performance of organizations (Zhu & Sarkis (2004)[9]. The key practices worth noting from the previous research work are the concepts of green design, green operations, reverse logistics, waste management and Green manufacturing (Guide & Srivastava, (1998)[10]; Srivastava, (2007)[11].Many researchers have identified four kinds of GSCM practices, including internal environmental management, external environmental management, investment recovery and eco-design (Zhu et al.,(2007)[12] and later adopted by Ninlawan et al.,(2010)[13]. Tritos Lasirihongthong et.al (2013) [14] studied the relationship between GSCM practices and Eco.P, Env.P and Intangible performance i.e company image and found a positive relationship between the two. Subarata Mitra et.al (2013)[15] also studied the relationship between GSCM practices and economic performance ,competitiveness and company Image and found positive relationship. To take it further this study tries to find the relationship between GSCM adoption and company image performance. Based on the literature following research framework was developed.

RESEARCH FRAMEWORK

Green Practices Organizational Performance

Green practices   Organizational performance

RESEARCH METHODOLOGY

The study focused on the GSCM practices and their impact on company image performance in Indian manufacturing industries. Based on the literature review the instrument was developed to measure GSCM practices and company image performance with some alteration with expert consultations. The instrument was tested for reliability and validity. Total of thirty two factors were identified as green practices based on the studies of (Zhu , Sarkis and Kee-Hung Lai (2011)[16]. Ninlawan (2010) [17] , and Tritos Lasirihongthong, Keach-ChoonTan, Dotun Adebanjo (2010)[18] . We conducted principal component analysis to confirm the groupings of GSCM practices, which resulted into seven GSCM practice factors. Similarly total of three variables were identified as company image performance indicators based on Subarata Mitra &Partha Priya Datta(2013)[19]. The instrument used for the study consists of three parts, Part 1: The company profile that documented the demographics of the industry type, organization size, turnover, products manufactured. Part 2: The Green practices adopted in the companies. on a five point scale to indicate the extent in which each item was practiced in the organization. Part 3: The effect of GSCM practice implementation on company image performance were captured on a five point scale. The Reliability is tested by the Cronbach's alpha values which were all above the acceptable value of .7. The list of the items for the Green practice factors and company image performance items with their mean values, standard deviations, factor scores, KMO, variance explained by each factor and their alpha values are shown in table 1.

Table 1:

Factor analysis of green supply chain practices and performance

Sr. No.	Green supply chain practices & performance	Mean values	Std. Deviation	Factor loadings	Variance explained	Cronbach's Alpha values	KMO
1.	**Customer Cooperation (CC)**				52.613	0.881	.788 Sig.000
1.1	Cooperation with customer for cleaner production (CC-1)	4.15	.799	.837			
1.2	Cooperation with Customers for	4.13	.892	.778			

	Green Packaging (CC-2)						
1.3	Cooperation with customers for eco design (CC-3	3.98	.911	.777			
1.4	Cooperation with Customers for Environmental procurement (CC-4)	4.20	.798	.739			
1.5	Cooperation with Customers for using less energy during Transportation (CC-5)	4.23	.767	.737			
1.6	Recovers or sells access Inventories / material (CC-6)	4.13	.873	.719			
1.7	Integrated production with recovery (CC-7)	4.10	.986	.677			
1.8	Design of the product is to reduce waste and cost (CC-8)	4.50	.597	.635			
2	**Green purchasing: (GPu)**				75.068	0.832	0.667 Sig.000
2.1	Environmental Audit for suppliers for Internal Management (GPu-1)	4.18	.983	.916			
2.2	Second Tier Supplier Environmental Friendly Practice Evaluation (GPu-2)	3.70	.979	.892			
2.3	Procurement from ISO 14001 Certified Suppliers (GPu-3)	4.08	.979	.785			
3	**Green design (GD)**				64.668	.815	0.761 Sig.000
3.1	Design of the product is with easy and quick dis-assembly	4.30	.156	.853			
3.2	Design of the Parts of the product is for extended use, easy repair & increased efficiency	4.35	.137	.846			

3.3	Design of product is for re-use ,re-cycle ,recovery of material and component parts	4.22	.154	.759			
3.4	Identifies, Collects and distributes products and parts that will be re-cyclable and re-usable	3.93	.130	.754			
4	**Green manufacturing (GM)**				67.606	0.743	0.679 Sig.000
4.1	Design of Products is for Reduced Consumption of material/energy or Bio-degradable material l(GM-1)	4.27	.821	.857			
4.2	Design of product is to support regulation (GM-2)	4.55	.565	.827			
4.3	Design of Products is to avoid or reduce use of hazardous material in products & their manufacturing process (GM-3)	4.25	.856	.781			
5	**Investment recovery: (IR)**				60.914	0.675	0.660 Sig.000
5.1	Sells scrape and used materials (IR-1)	4.38	.846	.800			
5.2	Sells Access capital equipment (IR-2)	3.95	1.111	.793			
5.3	Applies reverse Logistics in Stock Planning (IR-3)	3.85	1.039	.747			
6	**Internal environmental management(IEM))**				20.103%	.933	.732 Sig.000
6.1	Total quality environment management	4.32	.722	.878			
6.2	Cross functional cooperation for environment	4.21	.701	.855			
6.3	Environment compliance and	4.10	.688	.806			

	auditing programs						
6.4	GSCM Environment system Exists	3.98	.672	.799			
6.5	Support from midlevel managers forGSCM implementation	3.87	.669	.769			
6.6	Commitment from senior managers for GSCM implementation	3.71	.662	.767			
6.7	Eco labeling of the products	3.62	.655	.631			
7	**Reverse Logistics**				7.314%	.793	.711 sig.000
7.1	Recycling (the process of collecting, disassembling, separating, and processing used products into recycled products and materials)	4.32	,872	.707			
7.2	Integrated production with recovery	4.28	.711	.637			
7.3	Remanufacturing (the process of collecting a used product and replacing defective or outdated parts with new or renovated parts	3.98	.698	.629			
7.4	Minimized use of packaging material by collecting used packaging .	3.83	.656	.569			
7.5	Reuse (the process of collecting used products, and distributing or selling them)	3.78	.632	.531			
8	**Company Image Performance**				5.715138	0.687	7.731 0.000
8.1	Started Reaping Long Term benefits	4.10	.722	0.733376			
8.2	Enhance Corporate Image	3.98	.710	0.672273			

8.3	Innovation in Product and Process Design.	3.71	.698	0.585216			

Table.2. *Co-Relations between Green Practices and Company Image.*

Factors	IEM	CC	GPU	GD	GM	RL	IR	COM. IM
IEM	1							
CC	.328*	1						
GPU	.544**	.103	1					
GD	.279*	.255*	.312*	1				
GM	.364**	.291*	.299**	.484**	1			
RL	.404**	.550**	.073	.165	.234	1		
IR	.356**	.151	.308*	.344**	.224	.205	1	
COM.IM.	.428**	.430**	.184	.235	.115	.381**	.093	1

Significant at *p< 0.05,**p < 0.01.

Here IEM=internal Environment management, CC=Customer Cooperation, GPU=Green Purchasing, GD=Green Design, GM=Green Manufacturing, RL=Reverse logistics, IR=Investment Recovery, COM.IM.=Company Image.
Co-relation table suggests a positive relation between IEM , CC,RL green practices and company Image.

Table 3 shows the results of multiple regression analysis using competitiveness performance analysis as dependent variables and GSCM practices as independent variables. It also shows the size of standardized regression coefficients beta (β), coefficients of determination (R2) t-value and the f ratios for the fitted models. The result shows the results of multiple regression analysis using company image performance analysis as dependent variables and GSCM practices as independent variables .It also shows the size of standardized regression coefficients beta (β), coefficients of determination R2) t-value and the f ratios for the fitted models. The result shows that company image performance is explained by the regression model as evident from R2 value is 0.315.The model shows that 31.5%of the variations in the company image Performance is explained using GSCM practices. The p-value is less than 0.05 which shows that model is valid for using linear regression. The p-value is less than 0.05 which means that null hypothesis is rejected and there exists the relationship between company image performance and GSCM practices implementation. The regression co-efficient shows GSCM practices are having capacity to predict company image performance and extent of contribution power. Customer cooperation (CC) are statistically significant with the p-value less than 0.05, so at 5% significance level of significance. Thus null hypothesis is rejected and alternative hypothesis is accepted. It is important to understand the effect on company image as that can be attributed to green supply chain management practices so far. From the findings, the equation for the regression model can be given by:

$Y = 2.470 + .374X1 + 304.X 2 + -023.X3 + .174 X4 +.-174X5 +. 051X6+.-.111 X7$ + error term
Where; Y – company image Performance
$β0$ - Constant
$β1 – β7$ - Regression coefficients
X1- Internal environment management
X2 –Customer cooperation
X3 – Green purchasing
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X4 – Green design
X5 –Green manufacturing
X6-- Reverse logistics
X7 –Investment recovery
e --Error term

In order to test for multicollinearity problem among variables, variance inflation factor (VIF) and tolerance were applied. The multicollinearity statistics showed that the tolerance indicator for IEM, CC,GPU,GD,GM,RL and IR were greater than 0.1, and their VIF values were less than 10. The result indicated that no multicollinearity problem had occurred (Ott &Longnecker, 2001)[20] .The results showed that IEM (p=0.021), CC(p=0.037),GPU (=0.872), GD (p=0..217) GM (p=0.214) ,RL =(.727),and IR(p=.394) does not affect the company image performance of the firms. Based on the table, it indicated that the most important GSCM practices that affected the company image performance to some extent were IEM, and CC, whereas GP, GM, IR were found to be negatively related to company image. However, GPU, GD, GM, RL, and IR were not found to be significantly related to company image performance.

Table.3. *Model summary for green supply chain management practices and company image performance*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	Df2	Sig. F Change
1	.561a	.315	.222	.51650	.315	3.411	7	52	.004

a. Predictors: (Constant), Investment recovery (IR), Customer cooperation (CC), Green manufacturing (GM),Green purchasing (GP), Green design (GD), Reverse logistics (RL), Internal environment management (IEM).
b. Dependent Variable: Company Image Performance (COM.IM.P)

Table.4. *Anova table for green supply chain management practices and company image performance*

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	6.370	7	.910	3.411	.004a
Residual	13.873	52	.267		
Total	20.243	59			

a. Predictors: (Constant), Investment recovery (IR), Customer cooperation (CC), Green manufacturing (GM),Green purchasing (GP), Green design (GD), Reverse logistics (RL), Internal environment management (IEM).
b. Dependent Variable: Company Image Performance (COM.IM.P)

Table-5. *Beta coefficients for green supply chain management practices and company image performance*

Model	Unstandardized Coefficients	Standardized Coefficients					
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	2.470	.626		3.943	.000		
CC	.269	.125	.304	2.143	.037*	.654	1.530
GPu	-.016	.100	-.023	.162	.872	.635	1.575
GD	.111	.089	.174	1,250	.217	.682	1,467
GM	-.165	.131	-.174	-1.259	.214	.692	1.445
IR	.083	.096	.111	.859	.394	.794	1.259
RL	.040	.113	.051	.351	.727	.618	1.618
IEM	,307	.129	.374	2.385	.021*	.535	1.870

a. Dependent variable: Company Image Performance (COM.IM.P)
Note: Investment recovery(IR), Customer cooperation(CC), Green purchasing (GP), Green design (GD),Green manufacturing (GM), Reverse logistics(RL), Internal environment management(IEM)

CONCLUSIONS
Based on the findings of the study, the following conclusions were made: There is positive relationship between Green Supply Chain Management Practices namely, Customer cooperation ,Green Purchasing, Green packaging, Green Design, Green Manufacturing, and investment recovery and company image Performance. From the regression analysis it was concluded that Green Supply Chain Management practices has a positive effect on company image Performance. Organizations that adopt green supply chain management practices experience cost savings and reduced waste thereby enhancing their company image performance in the eyes of their stakeholders. Practices like customer cooperation and Internal environmental management are positively and significantly related to company image improvement. This result could be attributed to the fact that most manufacturing companies started adoption of green supply chain strategies in the recent past and the effects of these practices may not have fully been realized. The study therefore recommends that other manufacturing companies should consider adopting green supply chain management practices. They should embrace green strategies in their purchasing, manufacturing, packaging, designing cooperating with customers and Investment recovery which will provide a competitive edge over their competitors..

RECOMMENDATIONS FOR FURTHER STUDY
Further Studies can be conducted in Industry specific manufacturing companies, studies relating GSCM with other aspects of performance such as operations, environment which is the very basic purpose of GSCM implementation and social performance can also be explored .Research studies can be conducted to explore other GSCM practices other than green purchasing, green manufacturing, green design customer cooperation, green packaging, investment recovery like green distribution , green marketing, reverse logistics and internal environment practices etc which are the recent developments in the field of GSCM to cover whole of the supply chain to have more effective results on various performance measures.

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