ROLE OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN IMPROVING SOCIAL PERFORMANCE IN INDIAN AUTOMOBILE INDUSTRY

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Abstract: Concerned with environmental sustainability, most organizations have started to go green in their functions and are adopting green supply technology in order to provide more benefits to their business operations, supplier**s,** customers as well as society at large. That is why social concern while greening the supply chain management has become very important issue mainly in Automobile Industry for obvious reasons as it is considered to be one of the biggest sources of pollution. Therefore, this study specifically aims at understanding the role of Green Supply Chain Practices (GSCP) in improving Social Performance in Indian Automobile Industry. A survey based on previous exploratory research and literature review was sent out to supply chain managers in Indian automobile companies. A model of the inter-relationships between antecedents and outcomes of green supply chain practices was tested via Structural equation modeling through Partial Least Squares (PLS). The objective was to identify relationship between the enabler (green supply chain practices), and the outcome (social performance). The results showed that the green supply chain practices do improve the social performance and hence the outcome of this study will motivate Automobile Industry to take different measures to implement Green Supply Management Practices more intensely.

Keywords: Green Supply Chain Practices, Social Performance, Indian Automobile Industry.

Introduction:

Green Supply Chain Management:

There are various activities which are included under the supply chain such as movement of products from the raw material stage to the end user, people advocating for the business process have realized that productivity of the firm can be increased only by maintaining and managing relationship, information, material flow across the border of the enterprise. In other words "SCM is the management that integrates physical flow of goods and related information, from procurement to final consumption, enhancing customer, and economic value" [1].

Nimawat and Namdev (2012) defined GSCM as Green purchasing + Green manufacturing/ materials management + Green Distribution / marketing + Reverse logistics [2]. (Srivastava, 2007) defined GSCM as integrating environmental considerations into SCM including product and service design, procurement, manufacturing processes, distribution, and end-of-life management of the product to achieve sustainable competitive advantage [3]. Environmental supply chain management consists of those functions during purchasing activity which will reduce the substitution of material and encourage and recycling and reuse. This will require monitoring and improving the environmental performance in the supply chain. The main agenda in present context is to increase the level of consumption which is environmentally responsible and producing the product to recover environmental quality, reduce poverty and to contribute towards economic growth, subsequently increasing the level of health, working conditions, and sustainability. As *Vachon and Klassen (2006)* pointed out that complex and long supply chains are not energy efficient as they pose a potential threat to the environment due to excessive use of waste material which results in heat emission [4]. For modern enterprises the concept of Green SCM is gaining more and more attention and also becoming the part of initiative of Corporate Social Responsibility (CSR) [5] . The concept of green supply chain management is also referred as Environmental Supply Chain Management (ESCM) or Responsible Supply Chain Management (RSCM), which is an rising paradigm and incorporates the environmental consideration within traditional SCM [6]. As a consequence the combination of environment and sustainability within supply chain management

agenda has gained immense importance [7]. Further reverse logistics in the recent business environment is hugely dependent on an organized, well planned system that functions to reduce wastage [8].

Green Supply Chain Management Practices (GSCP): The term 'GSCP' refers to a variety of activities performed by an organization that helps minimize the impact on the environment [4,9]. In recent years the idea is to integrate the green process into the existing supply chain structure processes, metrics, and best practices that not only improve the environmental performance but also add value to the business [10]. Process of combination of environmental and sustainability concerns within supply chain management has itself evolved into a separate and growing field, having a varied set of labels namely: sustainable supply network management, supply chain environmental management, green purchasing and procurement, environmental purchasing, green logistics, environmental logistics and sustainable supply chains [11]. Much of the literature in this area has utilized a variety of measures that are typically self-reported, from a single source, and focus on either environmental or social sustainability separately [12]. The practical evidence concerning its importance arises from recent studies that show the prevalence of managing the greening of supply chains responsibly and how it remains one of the biggest sustainability challenges of organizations [13,14].
Ravi and Shankar (2005) have identified five strong barriers in context with the auto industry: lack of awareness of reverse logistics, lack of commitment by the top management, problems with product quality, lack of strategic planning and financial constraints[15]. But still there are various measures that can be adopted for the successful implementation of green supply chain management. Green supply chain practices are not easy to put into practice in India due to their compound nature, need of a better coordination, resource necessities and lack of motivation on the part of organizations. Thereby it is realized that in order to successfully implement the GSCM practices, a strong keenness along with the right approach on the part of employees and organization as a whole is required.

Indian Automobile Industry: The Current Scenario: The Indian automobile industry is one of the biggest automobile industries in the world with an annual production of 21.48 million vehicles in financial year 2013-14 [16](Society of Indian automobile Manufacturers 2015*)*.The automobile industry accounts for 22 per cent of the country's manufacturing gross domestic product (GDP) (SIAM, 2015)[16]. By 2050, the country is expected to top the world in car volumes with approximately 611 million vehicles on the nation's roads [17]. The automotive industry is mainly dominated by the two wheeler segment with its 81 percent market share which is mainly owned by the young and middle class population. However, the automotive industry is showing the great interest in rural markets and trying to explore it which has further aided to the growth of this sector. The overall market share of the passenger Vehicle is 13 percent [18] . Corporate social performance (CSP) has become the focal point for the automotive industry as the common public has become more alarmed about the social and environmental issues and what organizations are giving back to society from their profit.

In the near future there is huge expectation from India for the growth in exports as it is prominent auto exporter. Overall automobiles exports have grown by 1.91 percent, in March-April 2016. Additionally, Government of India took several initiatives and major players in the automobile industry and it is expected that India will become a leader in 2W and four wheeler (4W) market in the world by the year 2020. The increasing criticism of the automobiles as the single largest source of pollution has put tremendous pressure on companies to upgrade their technology to increase the efficiency and use better emission control devices but also to incorporate green measures in their supply chain networks [19].

Owing to the growing concern of the environment issues, a leading group of companies in the automobile industry including Mahindra , Honda ,Yamaha Hyundai Motors, Toyota, and BMW have adopted "green" standards in their Supply Chain Management. Saad and Patel (2006) argued that Indian automobile sector is not implementing the philosophy of supply chain in its true sense.[20] Some of the problems with the Indian automobile sector may be classified as: large number of auto assemblers, low-technological capability, poor quality, lack of reliability in terms of delivery, large number of players in automobile sectors, small capacity of auto-ancillary firms, lack of availability of components, and lack of strong partnership among partners in the supply chain [21].

By the end of the year 2016-26, Automotive Mission Plan may be announced formally and it is also expected that ten year road map will be provided. Recently at Society of Indian Automobile Manufacturers (SIAM)'s 55th Annual Conference(2015)[16], Government of India and Society of Indian Automobile Manufacturers provided a brief overview of the new Automotive Mission Plan which appears to recognize the need for auto and auto

component manufacturers to move from plain vanilla manufacturing to building design and engineering capabilities.

Theoretical Development and Hypotheses Formulation: There has been increasing necessity to conduct programs that include social and environmental issues for the businesses to sustain . Thanks to the implementation of the idea of green supply chain, companies can lower costs, better manage risk, generate new sources of income and increase value of their brands [22]. Suering and Muller (2008) asserted that a substantial gap in the current research was that, 'an integrated perspective is required for future research where social issues in particular and the interrelation of the three dimensions (financial, social and environmental) need to be investigated much further [12].

Overall positive impact on community, culture, societies and environment is brought by the many corporate in which they are operating. The basics of the Corporate Social Responsibilty lie in the fact that corporates are also responsible to address social issues apart from not only the public theory. The concept of Corporate Social Responsibility is management in nature which is integration of environmental and social concerns for many companies during their business operation and their interaction with stakeholders. It is known that firm-level Corporate Social Performance can generate improvements in sustainability whose benefits accrue primarily to the organization itself [23], but those same improvements may also attract customers who seek to work with suppliers with strong sustainability credentials [24,25]. Implementing this pattern along an entire supply chain by linking suppliers and customers who jointly recognize the value of sustainability initiatives, and delivering these benefits to consumers, gives rise to what Carter and Rogers (2008) refer to as 'Green supply chain management'[26].

The literature analysis shows that companies do not use the probable green supply chain management. Thus, it can be claimed that the stage of supply chain combination is a critical determinant in the development of socially responsible actions. Progress is still to be done towards better understanding of the relationship between the green supply chain practices and the social performance. The objective thereby is to explore the literature linking the two variables further to understand the nature of relationship between GSCM Practices and Social Performance.

Social Performance (The Dependent Variable): The Social Performance Standard includes committed clauses on social impact and baseline assessments, Labour human/labour management system, Human rights protection, employee welfare, Supply management and Local community communication. Our Social Performance management framework helps us provide assurance that business units meet the requirements of the standard [25].

The social dimension of sustainability concerns the impacts an organization has on the social systems within which it operates. The GRI Social Performance Indicators identify key Performance Aspects surrounding labor practices, human rights, society, and product responsibility.

Human Rights: There is growing global consensus that organizations have the responsibility to respect human rights. Human rights Performance Indicators require organizations to report on the extent to which processes have been implemented, on incidents of human rights violations and on changes in the stakeholders' ability to enjoy and exercise their human rights, occurring during the reporting period. Among the human rights issues included are non discrimination, gender equality, freedom of association, collective bargaining, child labor, forced and compulsory labor, and indigenous rights. The international legal framework for human rights is comprised of a body of law made up of treaties, conventions, declarations and other instruments. The corner stone of human rights is the International Bill of Rights which is formed by three instruments: the Universal Declaration of Human Rights (1948); the International Covenant on Civil and Political Rights (1966); and the International Covenant on Economic, Social and Cultural Rights (1966).

Labor Practices and Decent Work: The specific aspects under the category of Labor Practices are based on internationally recognized universal standards, including. The International Labor Organization Tripartite Declaration Concerning Multinational Enterprises and Social Policy (in particular the eight core Conventions of the International Labor Organization)and the Organization for Economic Cooperation and Development Guidelines for Multinational Enterprises, should be the primary reference points for the employment,

Labor/Management Relations; Occupational Health and Safety; Training and Education; Diversity and Equal Opportunity; and Equal remuneration for women and men.

Product Responsibility: Product Responsibility Performance Indicators address the aspects of a reporting organization's products and services that directly affect customers, namely, health and safety, information and labeling, marketing, and privacy. These aspects are chiefly covered through disclosure on internal procedures and the extent to which these procedures are not complied with the following Management Approach items with reference to the Product Responsibility Aspects:Customer Health and Safety; Product and Service Labeling; Marketing Communications; Customer Privacy; and Compliance.

Society: Society Performance Indicators focus attention on the impacts organizations have on the local communities in which they operate, and disclosing how the risks that may arise from interactions with other social institutions are managed and mediated. In particular, information is sought on the risks associated with bribery and corruption, undue influence in public policy-making, and monopoly practices. Community members have individual rights based on: Universal Declaration of Human Rights; International Covenant on Civil and Political Rights; International Covenant on Economic, Social and Cultural Rights; and Declaration on the Right to Development

Green Supply Chain Management Practices (GSCP) In Indian Automobile Industry (The Independent Variable): The Indian Automobile industry has witnessed major changes during the past few years in terms of supply chain. Singh et al. (2004) observed that after liberalization, many global automobile manufacturers have established manufacturing bases or international purchase centers in India. This has increased the competition among the automobile firms, prompting them to be innovative in order to lower the costs, enhance quality, and improve level of their supply chains [27]. Automobile manufacturing involves hundreds of parts from many suppliers; supply chain management is a critical area in operations management of the industry and a decisive factor for the success or survival of the auto makers [28].

With a decisively important impact on operational efficiency, supply chain management of the auto industry becomes one of the core elements for the survival or success of the very industry [29]. Moreover relatively the auto industry takes the center stage and becomes a dominant challenge for the future [30]. As the green energy today is in the undeveloped stage of the life cycle, therefore, the auto industry straddles both mature and immature industries and requires a new, innovative, and creative design for the supply chain management [28].

Whereas in contrast, regarding the scope of the analysis conducted on GSCP by Zhu et al. (2008b) and Sarkis et al. (2010), it is argued that the scope of GSCP is broader and covers both internal (i.e. intra-organizational) and external (i.e. inter-organizational) practices. Environmental management systems and investment recovery may be considered as internal practices; whereas green purchasing and co-operation with customers for green packaging may be classified as external practices [31,9].

Zhu et al. (2007a) and Gonzalez et al. (2008) tested GSCP in the automobile industry, while Zhu and Sarkis (2004) and Zhu et al. (2007b) conducted the study across several sectors.[32-35] According to Tate et al. (2010), the emphasis on various activities may vary depending on the type of industry as well as size and geographic location[36]. Zhang et al. (1997), Zhu and Deshmukh (2003) and Diwekar and Shastri (2010) focused on green design as an important practice while,[37-39]. Wong et al. (2005) and Kim et al. (2007) felt that it was repairable inventory [40,41] and for Guide (2000), it is production planning and control for remanufacturing [42]. The focus was on green manufacturing and product recovery for Guide et al. (1996) and Gungor and Gupta (1998)[43,44] whereas El Tayeb et al. (2010) felt that it is green purchasing [45]. One of the most inclusive scale for classifying GSCP has been given by Zhu and Sarkis (2004) and Zhu et al. (2008b) [34,31]. GSCP is finally classified by various authors into five main categories that are: customer cooperation, eco-design, green purchasing, green purchasing and internal environmental management.

Cooperation with Customers (IV1): Cooperation with customers requires working with customers to design cleaner production processes that produce environmentally sustainable products with green packaging [46]. Thereby the following hypothesis is offered:
H_1: Cooperation with Customers positively impacts the Social Performance of Automobile Industry

Eco-Design (IV2): Eco-design requires that manufacturers design products that minimize consumption of materials and energy, that facilitate the reuse, recycle, and recovery of component materials and parts, and that avoid or reduce the use of hazardous products within the manufacturing process [46].
Thus, the following hypotheses may be tested:
H_2: Focus on Eco-design as a supply chain practice enhances Social Performance of Automobile Industry

Green Purchasing (IV3): Green purchasing focuses on cooperating with suppliers for the purpose of developing products that are environmentally sustainable [46,47].
Thus the following may be hypothesized:
H_3: If the Automobile Industry focuses on Green Purchasing Practices, it may increase the Social Performance of the Industry.

Investment Recovery (IV4): Investment recovery requires the sale of excess inventories, scrap and used materials, and excess capital equipment [46].
This leads to the formation of the following hypotheses:
H_4: Investment Recovery augments the Social Performance of Automobile Industry

Internal Environment Management (IV5): Internal environmental management is the practice of developing green supply chain management as a strategic organizational imperative through commitment and support of the imperative from senior and mid-level managers [46].
Thus the following hypotheses may be formulated:
H_5: Internal Environment Management Practices increase the Social Performance of Automobile Industry

Research Framework: The final research framework is presented below (Fig.1). This work examines how 5 key green supply chain management practices (i.e. Cooperation with customers, Eco-design, Green Purchasing, Investment recovery and Internal Environment Management) impact the Social Performance.

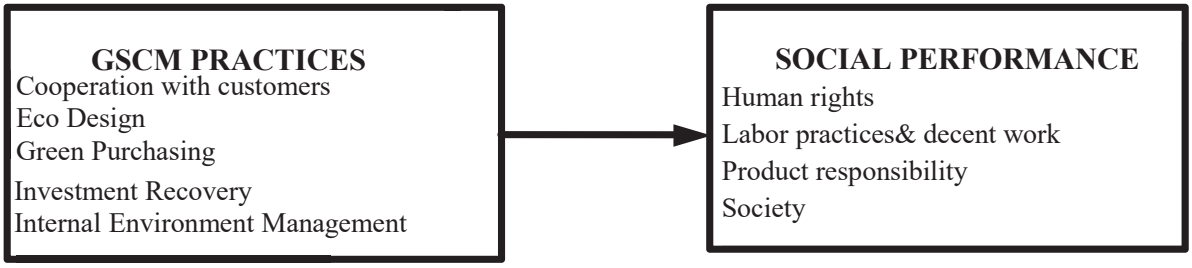

Fig. 1

The questions were answered using a five point scale (1= not considering to 5 = carrying out fully). Questions to measure GSCM practices have been formed using the scale given by [34]. The scale of GSCM practices include internal environmental management, green purchasing, customer cooperation with environmental concerns, eco-design and investment recovery. The scale for 23 questions on Social Performance is taken from [48] Global Reporting Initiative (GRI). Social dimension has further been subcategorized into four attributes as human rights (8 questions), labor practices & decent work (5 questions), product responsibility (5 questions) and finally society (5 questions). Each GRI dimension and sub-dimension is composed of several indicators describing specific activities of social performance.

A large scale sample was used to assess the reliability and validity of above questionnaire. The responses were taken from 95 supply chain managers through a structured questionnaire survey across India.

Data Analysis and Results: The research model of Fig.1 of the inter-relationships between green supply chain practices and corporate social performance was tested via Structural equation modeling through Partial Least Squares (PLS). It assesses the psychometric properties of the measurement model, and estimates the parameters of the structural model. This tool enables the simultaneous analysis of up to 200 indicator variables, allowing the examination of extensive interactions among moderator and latent predictor variable indicators [49].

The objective was to identify relationship between the enablers (cooperation with customers, eco design, green purchasing, investment recovery and internal environment management) and the outcome (social performance).

During the process of evaluating a PLS-SEM model, both the outer and inner models were examined [50]. To do so, relationships between the constructs and their indicators were assessed. The analysis was conducted step wise to understand the impact of GSCP on social performance.

The Measurement Model: The model was first tested for the reliability and validity for its constructs. Table 1 represents the result of reliability.

Table 1: AVE, Composite Reliability and Cronbach Alpha for GSCP with Social Performance

	AVE	Composite Reliability	Cronbach Alpha
CC	0.8692	0.9522	0.9252
ED	0.799	0.9226	0.8744
GP	0.8022	0.9419	0.9176
IR	0.7756	0.9119	0.8561
IEM	0.6562	0.938	0.9233
Social Performance	0.7019	0.9037	0.8576

The data indicates that the measures are robust in terms of their internal consistency reliability as indexed by the composite reliability. The composite reliabilities of the different measures range from 0.90 to 0.95, which exceed the recommended threshold value of 0.70 [51]. In addition, consistent with the guidelines of Fornell and Larcker *(1981),* the average variance extracted (AVE) for each measure exceeded 0.50, indicating convergent validity for all constructs [52].
Table 2 reports the results of testing the discriminant validity of the measure scales.

Table 2: Discriminant Validity

	1	2	3	4	5	6
CC	**.9323**					
ED	0.6806	**.8938**				
GP	0.727	0.7782	**.8956**			
IR	0.6798	0.8088	0.7709	**.8806**		
IEM	0.6611	0.7464	0.8174	0.691	**.8100**	
Social Performance	0.5947	0.6938	0.7066	0.76	0.6773	**.8377**

The elements in the matrix diagonals, representing the square roots of the AVEs, are greater in all cases than the off-diagonal elements in their corresponding row and column, supporting the discriminant validity of our scale.

The Structural Model: In order to test the hypothesized relationships between variables, structural equation modeling was employed using *Smart PLS 2.0.*

The Figure 2 summarizes the results of the PLS analysis including path coefficients (β), path significant (p-value) and variance explained (R^2). All statistical tests were assessed at 5 percent level of significance using two-tailed t-tests. The results for the structural model indicate that the 63 percent of the variance in Social Performance is explained by the model.

Hypothesis H_1 states that Cooperation with Customers positively impacts the Social Performance of Automobile Industry. Fig. 2 shows that the hypothesized path for H1 was not significant ($\beta = 0.028$, $p < 0.05$). Thus hypothesis H_1 was not supported.

Hypothesis H_2 explores if focus on Eco-design as a supply chain practice enhances Social Performance of Automobile Industry. Fig. 2 shows that the hypothesized path for H_2 was significant ($\beta = 0.130$, $p < 0.05$). Thus hypothesis H_2 was supported.

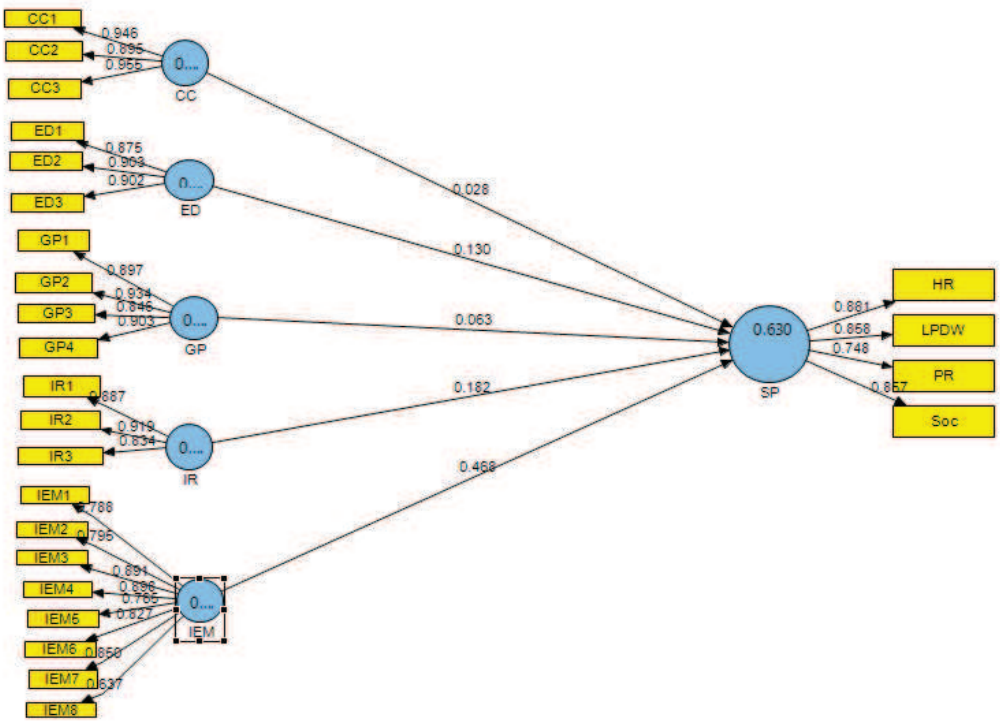

Fig.2: Structural Model

Hypothesis H_3 explores whether the focus of Automobile Industry on Green Purchasing Practices will increase the Social Performance of the Industry. Fig. 2 shows that the hypothesized path for H_3 was not significant (β = 0.063, $p < 0.05$). Thus hypothesis H_3 was not supported.

Hypothesis H_4 suggests that Investment Recovery augments the Social Performance of Automobile Industry. Fig. 2 shows that the hypothesized path for H_4 was significant (β = 0.182, $p < 0.05$). Thus hypothesis H_4 was supported.

Hypothesis H_5 explores whether Internal Environment Management Practices increase the Social Performance of Automobile Industry. Fig. 2 shows that the hypothesized path for H_5 was significant (β = 0.468, $p < 0.001$). Thus hypothesis H_5 was supported.

With three of the five hypotheses supported, the empirical results of the structural model with all hypothesized paths revealed a model with adequate fit.

Conclusion and Discussion: Table 3 presents the hypotheses and outcomes. The 'CONCLUSION' column indicates whether that hypothesis was: (1) supported; (2) not supported.

Table: 3

Hypotheses	Finding	Hypotheses Conclusion
H_1: Cooperation with Customers positively impacts the Social Performance of Automobile Industry	(beta =0.028, p>0.05)	Not supported
H_2: Focus on Eco-design as a supply chain practice enhances Social Performance of Automobile Industry	(beta =0.130, p<0.05)	supported
H_3: If the Automobile Industry focuses on Green Purchasing Practices, it may increase the Social Performance of the Industry	(beta =0.063, p>0.05)	Not supported
H_4: Investment Recovery augments the Social Performance of Automobile Industry	(beta =0.182, p<0.05)	supported
H_5: Internal Environment Management Practices increase the Social Performance of Automobile Industry	(beta =0.468, p<0.0001)	supported

India has a long way to adopt new technologies and new ways which are adopted globally in automotive sector. Present need is to take effective measures in modifying the current Green Supply Chain Management Practices which can be done by including the different performance variables in the implementation of such practices in the organization. On the basis of the above literature, it is understood that although there have been studies to understand the relationship between GSCP and many performance variables such as Economic Performance, Environmental Performance, Social Performance, Operational Performance, Organizational Performance, Strategy Logistics Environment etc. but there has not been much work which may talk about the implication of green supply chain practices on social performance. Thereby, it has been attempted to develop a conceptual model which may discuss the role of implementing the GSCP and further enhancing the positive relationship with social performance. Moreover due to the Green supply chain management's critical role in the automobile industry, there is a need to focus the study in this industry. The positive relationship between the green supply chain practices and the social performance is very encouraging which suggests if the Automobile Industry greens its supply chains, it will enhance its social performance and create a positive image among its suppliers, customers and society at large. However since cooperation with customers and green purchasing practices did not show a positive relationship with social performance, the Industry will have to build confidence with its customers and suppliers. The outcome of this study will motivate Automobile Industry to take different measures to implement Green Supply Management Practices more intensely with a focus on its customers and suppliers while implementing green practices in its supply chain to enhance its social performance.

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