

Social Sustainable Supply Chain Practices Evidence From the Indian Manufacturing Sector: An Empirical Study

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ABSTRACT

Due to consistent surge strength in the form of legislations as well as a part of corporate social responsibility, companies in emerging economies like India need to synchronize. This is possible by implementing the concept of social sustainability in supply chain business activities. This paper investigated key factors influencing the adoption of social sustainability in supply chain activities of Indian manufacturing sector as a social development perspective. The present study covered literature review on sustainable supply chain covering social perspectives as well-chosen Indian manufacturing companies to investigate social perspectives. Social sustainability issues among Indian manufacturing companies using a structured questionnaire were investigated. Using the convenience sampling, 155 responses were collected as part of data collection and performed factor analysis, analysis of variance (ANOVA), and correlation to investigate and accomplish the research objectives. This paper investigated and found the following factors influencing the enactment of social sustainability in supply chain activities of Indian manufacturing sector as a social development perspective: community, safety, product responsibility, sustainable business opportunities. This study also investigated the relationship among different identified social sustainability practices in supply chain activities of manufacturing companies. The author has also proposed “house of social sustainable supply chain management practices” for Indian manufacturing sector. This paper proposed social sustainable factors to be implemented across the supply chain of the Indian manufacturing sector as it has been strong, pragmatic, and pertinent and can be conformed to by the organization with minimal changes in their prevailing work structure.

KEYWORDS

ANOVA and Correlation, Factor Analysis, Manufacturing, Social Sustainability, Supply Chain, Sustainability

1. INTRODUCTION

As world is shrinking due to climate change, majority of industries including manufacturing as well as service oriented are making a drift in their business activities by incorporating the concept of social sustainability. Health and well being, nutrition, shelter education and cultural expression are essential priorities of a human being to live happily. “Sustainable development is defined as the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs”, (World Commission on Environment and Development, 1987, also known as the Brundtland Commission). According to Phillip Sutton, “social sustainability is not “about”

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the integration of ecological, social and economic issues, nor is it “about” widespread”. Elkington (1997) conceptualized the expression ‘triple bottom line’ which has been adopted by majority of companies globally a method of corporate reporting that addresses environmental, social and economic perspective. However, the Global Reporting Initiative (GRI, established in 1997) has disclosed that GRI reporting on environmental index covering social performance is sparse and uncertain by organizations. Similar view by Western Australian Council of Social Services (WACOSS) that environmental economic issues are densely addressed however social aspects slipped from sustainability agenda. Linton et al. (2007) argues that legislations were adopted worldwide over a short span to phase out chemicals that effect ozone layer. Sikdar argues that prominent role of social, environmental, and economic aspects. According to him, sustainability is “a wise balance among economic development, environmental stewardship, and social equity” Sikdar (2003). Hutchins & Sutherland (2008) view of TBL approach embedded by economic, social and environmental dimensions acknowledged as three pillars of sustainability. However, limited studies directed on practice or implementation of social sustainability across the supply chain management of Indian manufacturing industries and implications are based on survey, statistical results, our research fixate using survey results proposed a house of for social sustainable supply chain management practices for Indian manufacturing sector a unique view. We developed scale items and measures for social sustainability.

1.1 Background

Internationally reputed manufacturing companies are inclined towards the concept of sustainability, which became a core practice in their business process. Their business processes are designed by considering 3P model i.e Profit, People and Planet. India popularized by majority of multinational companies to start their manufacturing companies. As Indian human power is available at low cost and attractive government swadeshi movement MAKE IN INDIA is attracting both domestic and international market players. This movement shall affect the activities of supply chain management thus companies should redesign by integrating the concept of sustainability in the supply chain management. Thus, the sustainable supply chain management practices shall lead to secured standard of living. To understand the effect of one of the dimension of sustainability i.e Social issue in managing supply chain is a rationale for this study. Government of India is in indicative direction for eco friendly products and processes which can only be possible by integrating the concept of sustainability in manufacturing process. As Ocampo & Clark (2017), suggested an exclusive manufacturing strategic framework using concept of sustainability, internal and external competitive functions will create new business opportunities. Qin et al., (2016) suggest four research directions covering sustainability, sustainable development, ethics, business ethics, and stakeholders. Morais et al.,(2018) recommended fundamental idea of social sustainable supply chain practices among company’s by architectural partnership using information sharing among different supply chain entities. Kaur & Sharma (2017) argues that decision making associated with social sustainability committed better frameworks for organizational preference. Thus, this research aim is to observe link between the literature on sustainable supply chain management practices and combined profits by evaluating sustainable supply chain practices: a social development perspective in Indian manufacturing Industries. Carter & Rogers (2008) made a foundation for the sustainable supply chain management (SSCM) framework.

The objectives of this research work are:

1. To find the factors influencing the adoption of social sustainability in supply chain activities of Indian manufacturing sector as a social development perspective.
2. To investigate the relationship among identified social sustainable supply chain management practices in Indian manufacturing sector.

To achieve the research objectives which have framed from exhaustive literature review. We framed a hypotheses relevance to research objectives, conducted a survey using structured questionnaire in ninety-six manufacturing companies focusing on, social sustainability issues across their supply chains.

This paper is organized as follows. In first section introduction followed by literature review on, social sustainability issues concerning supply chains, manufacturing sector. In Second section, discussed the research design, third section discussed results and discussion from the statistical analysis. Finally, presented the conclusions & managerial implications of the research work.

2. REVIEW OF LITERATURE

A structured literature review has been conducted using key words: sustainability, sustainable supply chain, reverse logistics, sustainable manufacturing, and green supply in management, social sustainability, and green supplier development Sahu et al., 2017a,b,c,d,e;2018a,b.

The search has been conducted on science direct, emerald insight, springer link and referred international conferences. Relevant papers have been considered for review that has been published during last five years. However, the most significant papers in terms of technical content were considered. In developing economies like India concept of social sustainability is emerging. In supply chain activities, labor, human rights issues, supplier development as a social perspective is challenging for Indian manufacturing Industries. This work identified social sustainability performance indicators, factors influencing the social sustainability to be implemented in Indian manufacturing industries. This research finding be used as a manifesto to implement the concept of social sustainability among Indian manufacturing sector in the domain of supply chain.

2.1. Social issues in Sustainable Supply Chain Management

Social sustainability covers societal issues: inequality, gender discrimination, poverty, diversity, wages and education. These societal issues are addressed differently in developed and developing economies (Table 1). Due to cheaply available skilled labor, cost tradeoffs, economic, geographical conditions in processing different products social sustainability drawn special attention. Health and safety issues, child and bonded labor, living conditions, housing and equity problems have expanded the debate of social sustainability in the supply chain. Mani et al. (2015) work focused on comparison of social sustainability business practices which led selected Indian companies to different approaches to sustainability. Santoro et al. (2018) for social change need of social innovation using actors and processes leads to growing ideas.

2.2. Background for Hypothetical Framework

Husted & Allen (2000), Hemingway (2005) & Strong (1997) conceptualized integrating ethical principles in supply chain practices as socially responsible practice. Waste disposal influenced by inferential effect of transformation process inputs (Handfield et al., 2004), prioritizing superior environmental friendly technologies in supply chains by organizations Sarkis (1998), Sarkis (2003) (Enderle 2004), Robert (2003). Companies and their partners focus on societal issues in supply chain Martela (2005). Environmental consciousness performance influenced by have been observed by few researchers empirically, Pujari et al., (2003) Prothero & McDonagh(1992), Pujari & Wright(1996^a,1999^b)Environmental consciousness orientation by firms lead to enhancement of product stewardship programs Barrett (1993).Thus discussion lead to formulate *Hypothesis:1 There is a positive relation between product stewardship and social responsibility.*

Handfield et al. (2002) argue that companies focusing on environmental performance are supposed to focus on their suppliers environmental consciousness, optimizing cost of waste in their production process. Hervani et al., (2005) suggested companies should focus on integrating, innovating green technologies, processes and materials for optimizing the waste as part of environmental performance enhancement. Thus *Hypothesis: 2 Green technologies affect new products and new processes is framed.*

Table 1. Some relevant studies on social issues in sustainable supply chain management

Author (s)/Year	Findings/Significant Contribution
Carter & Easton (2011)	Social sustainability was widely adopted than Corporate social responsibility.
Andersen & Skjoett-Larsen (2009), Halldorsson <i>et al.</i> , (2009)	CSR role to advocate social and ethical issues of human beings and the environment.
Salam (2009)	Social responsibility cultures: Individual values, and people oriented organizational culture are the most powerful aspects.
Ansett (2007)	Labor standards, assurance programmes, stakeholder engagement strategies CSR framework.
Kopling <i>et al.</i> , (2007)	Potentials aspects for integration in the business process: environmental and social standard systems.
Lopez <i>et al.</i> , (2007)	CSR and certain accounting indicators significant difference observed in performance, which is negative among European firms.
Seuring & Muller (2008)	Life cycle based standards for sustainable products, customers and stake holders are external triggers.
Maloni & Brown (2006)	CSR applications/ framework of supply chain covering animal welfare, biotechnology, environment, fair trade, health, safety, labour and human rights.
Reniers <i>et al.</i> , (2010)	Collaboration initiatives in creating sustainable chemical industrial parks
Leire & Mont(2010)	Socially responsible purchasing process/ social issues: Internal policies, purchasing criteria assurance practices, managing supplier relations.
Hutchins & Sutherland (2008)	Supplier selection in supply chain is influenced by decision making and social sustainability.
Ashby <i>et al.</i> , (2012)	Social sustianability in the supply chain is the response how to address the social issues in supply chain.
Maignan & Ralston (2002)	Socially responsible buying (SRB) enacting social sustainability in supply chain.
Drumwright (1994)	Proposed key reasons for SRB
Whooley (2004)	Pointed out that employee satisfaction is a key driver of sustainability in the supply chains.
Jones <i>et al.</i> , (2007)	Organizations focused on building brand image, competitiveness by creating charitable foundations, donations for the under privileged
Orlitzky <i>et al.</i> (2003)	Accounting based measures have special attention in corporate social performance.
Carter & Jennings (2004)	Community, work place, safety and human rights are key factors in purchasing function in supply chains.
Emmelhainz & Adams (1999)	Human rights issues led to social sustainability.
Campbell-Lendrum & Corvalan (2007)	Economic perspective: health of corporations, economy and level of competition using social responsible.
Gupta (2007)	Human rights and labor standards lead to success in Indian Companies due to incorporation of social sustainability.
Sarkis <i>et al.</i> , (2010)	Reverse logistics processes have significant effect on social sustainability in the supply chain.
Vachon & Mao (2008)	Labor, employment and gender as social sustainability indicators based on study in Canada.
Lu <i>et al.</i> , (2012)	Socially responsible supplier development; buyer influence, ethical behavior of seller influencing buyers.
Seuring (2013)	Social dimension of sustainability insufficient.
Brandenburg <i>et al.</i> ,(2014)	Modelling approach to analyze social sustainability in SC.
Ortas & Moneva (2014)	To analyze the instrumentality of CSR using social and environmental performance concepts
Meixell & Luoma (2015)	Social sustainability influencers: employee and NGOs environmental sustainability influencers: external stakeholders (i.e. government, final customers).
Brown (1996), Carter <i>et al.</i> ,(2000) Carter (2004), Vachon & Klassen (2006), Koplin <i>et al.</i> , (2007)	Social workplace safety, employee well-being, ethical sourcing, purchasing social responsibility, and social responsibility buying
Nawrocka & parker (2009)	NGOs require companies to address supply chain related environmental and social problems.
Venkatraman, (1989), Pagell & Wu, (2009), Kroes & Ghosh (2010)	Social orientation the extent to which a firm is proactive and committed to positive employee and communal priorities in its decision making.
Hutchins & Sutherland (2008)	Firms become socially legitimate within communities by involvement in funding, philanthropic donations and educational opportunities.

Wolters (2003), Contracting out labor in SC links among majority of companies to take leverage of small labor wages as a common business practice. Ciliberti et al., (2008), as part of CSR practice implementation across supply chain activities companies are integrating suppliers representative to enhance allegiance and motivation. JSW Steel Sustainability Report 2014-15 suggests high integrity of code of conduct by suppliers in practicing better work conditions, human rights, environment, and safety as part of social sustainability practice. Supply chain audits focus on EHS, labor, human rights and societal impact aspects. A report by UN global compact.org recommend superior transport framework is decisive aspect for socio-economic development, prosperous supply chains and goods dynamism. Thus *Hypothesis: 3 Community care affect safety health issues of laborers & transporters and surrounding community is emerged.*

Concurrent engineering as foundation capability as part of new product improvement is being sourced to suppliers by majority of organizations. Prahalad & Hamel (1990), Ragatz et al., (2002) Organizations are prioritizing to avoid suppliers who are not practicing environmental compliance seriously to make their supply chains resilient (Klassen & Whybark, 1999). Kyoto protocol enactment leads to strict implementation of green concept. Walley & Whitehead, (1994). Typical environmental management system (EMS) application movement of organization's practice effect on natural environment Coglianese & Nash, (2001). Thus *Hypothesis: 4 Cleaner development mechanism effects new processes, new products and carbon trading is framed.*

Fuhr & Lederer (2009), CDM as remarkable practice among emerging economies as part of carbon disclosure administration covering zero emissions, trading emissions Schreurs (2008). Contrarily Schneider (2007), contend that CDM is counteract structure no significant effect on emission contraction. Schneider et al.,(2008) Clean Development Mechanism (CDM) is playing a key role in the market structure to understand adjustment in emissions based actions among developed economies for prospective agreement. Wara & Victor (2008) CDM market does not reflect actual emission reductions practically in developing economies. Thus, *Hypothesis: 5 Practice of cleaner development mechanism leads to carbon trading, Hypothesis: 6 There is a relationship between CDM and Product innovation practices as a social sustainable perspective among supply chain activities are framed.*

Panigrahi & Sahu (2018) choice of environmentally culpable products come from green methods, less GHG emissions processes, use of eco-friendly raw materials, recycling, recovering end of life products. Lema & Lema (2012), propose that the emphasis on technology transfer, global collaboration at local level innovation these changes minimize the rise of environmental complications especially greenhouse gas emissions. Altenburg & Pegels (2012). Foreign technology transfer and regional innovation are predominantly interdependent and synonymous Fu et al., (2011), Lall (1993). Thus the literature backdrop lead to *Hypothesis: 7 there is relationship between Carbon trading and Product innovation practices as a social sustainable perspective among supply chain activities.*

Suppliers are integrated in the core manufacturing processes for devising innovations thus materializing new technologies resulting in cost reduction and new product development. Handfield et al., (1999), Tseng et al., (2015), top five criterion are "green design, corporate sustainability, strategic planning for environmental management, supplier cost reduction initiatives and market share". Environmental sustainability emerges from company's compliance, agreement with company's vision. Porter & Vander Linde (1995). Thus, *Hypothesis: 8 there is a strong relationship between green technology and Product innovation practices as a social sustainable perspective among supply chain activities is contemplated.*

Poist (1989), Andersen & Skjoett Larsen (2009) and Sureeyatanapas et al. (2015) advice that supply chain managers should consider formal training and skill enhancement as part of education also covering safety, health and hygiene. Thus *Hypothesis: 10 there is a strong relation between Livelihood and safety & health issues as a social sustainable perspective among supply chain activities is submitted.*

Whooley (2004), Maloni & Brown (2006), Clarkson(1995), Strong(1997), McWilliams & Siegel (2001), Guinée et al.,(2011) Macombe et al.,(2013), Sala et al., (2013), Martínez-Blanco et al., (2014) and Chin & Tat (2015) emphasized on safety, diversity, equity, human rights and labour practices as a social issues in relation to sustainability across supply chain. Thus *Hypothesis: 9 There is a strong relation between Education and safety & health issues as a social sustainable perspective among supply chain activities* and *Hypothesis: 11 there is a strong relation between Human rights and safety & health issues as a social sustainable perspective among supply chain activities are framed.*

Empirical studies done using case study and survey from literature are: CSR practices in global supply chains of IKEA as a case study by Andersen & Skjoett-Larsen (2009), theory building for logistics social responsibility Carter & Jennings (2002) & Carter & Jennings (2004), value analysis of organic and fair trade of cocoa industry Hynes et al.,(2012), food supply chains and rural development Marsden et al. (2000), sustainable development through public sector sourcing from SMEs Walker & Preuss (2008) and correlation between green SCM and firm performance Zhu & Sarkis (2004). However, Tardivo et al. (2017) analyzed social innovation through public-private partnership tool, to understand the public interest and competencies and technologies of the private organizations as alliance management aspect.

However, CSR practices have not been stitched in the management control system, and has not been viewed as long term environment strategy.

Hence from social aspect related arguments (Table 1) of SSCM, issues emerged from literature reviews are: people oriented CSR, life cycle based standards, collaboration, information provisions, social responsible purchasing process, first tier suppliers ecological sustainability, supplier selection, strategic purchasing, addressing social issues, socially responsible buying with reasons, employee satisfaction, brand image corporate social responsibility, purchase social responsibility, human rights, labor standards, labor employment, gender, socially responsible supplier development, lack of social dimension, social sustainability measures, economic conditions. We considered the issues emerged from literature review as relevant measures to evaluate social sustainability of a supply chain in Indian manufacturing sector.

3. RESEARCH DESIGN

As data collection is one of the most influential part of empirical research, we have designed a structured questionnaire (see Appendix) using five point Likert scale. The measures/items considered in the questionnaire are from various previous researchers' significant and relevant work (Table 2). To make the designed questionnaire more authentic has been critically examined by four academicians. To ensure the content validity fifteen respondents who are working as middle level managers with job designation as supply chain analysts and operations managers are requested to fill questionnaire. Their responses were thoroughly analyzed and incorporated in questionnaire before administering it. A total of six hundred questionnaires were sent to supply chain managers, operations analysts top and middle-level managers whose job description involves supply chain management and supplier development activities of their companies. Using the convenience sampling one hundred and fifty five responses were collected as part of data collation. The respondents manufacturing industries covered seven states of Republic India Viz., Uttarakhand, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka, Tamil Nadu and Chhattisgarh. The data was collected from respondents in three months.

To understand the response behavior and before doing final analysis of data, pilot testing was done using first fifty responses. Table 3 the mode of data collection has been presented data collection has been done using Google spreadsheet as web link, e-mail, and personal interaction with respondents. Ninety - six manufacturing companies participated in this study with response rate of 25.83%. The reliability of the entire measure is found to be acceptable. The statistical technique factor analysis was performed with the help of SPSS 17.0 to accomplish research design. There were one hundred

Table 2. Scale items and measures for social sustainability

Measures	Source
Safety and health issues of employees, Safety and health issues of surrounding community. Safety and health issues of laborers and transporters, Livelihood.	Carter & Jennings (2000), Ciliberti et al. (2008), Rajak & Vinodh (2015), Amaral & La Rovere (2003), Sharma & Vredenburg (1998), Halme et al. (2004), Baumann & Genoulaz (2014), Diabat et al. (2014), Ahia & Searcy (2015), Honeyman & Goodman (1991), Jamieson (2004), Neumayer & De Soysa (2007), Pearson (2007), Preuss (2009), Hutchins & Sutherland (2008), Tate et al. (2010).
Human Rights	Chow & Chen (2012), Kleindorfer et al. (2005), Awaysheh & Klassen (2010), Sancha et al. (2015), Geibler et al. (2006), Collins et al. (2007).
Education, Vocational training	Poist (1989), Andersen & Skjoett-Larsen (2009), Sureeyatanapas et al. (2015).
Product stewardship, Product responsibility	Lair & Wong (2012), Snir EM (2001), Reinhardt (1998), Lamming & Hampson (1996).
Disaster relief, Community care	Van Wassenhove (2006), Christopher & Tatham (2011), Scholten et al. (2010), Cozzolino et al. (2012),
New products, New processes	Teisl et al. (2002), Plas & Erdmenger (2000), Lamprecht (1997), Bojarski et al. (2009), Baumann & Tillman (2004), Freeman et al. (1992).
Cleaner development mechanism, Carbon trading	Kyoto Protocol (2007), Nordhaus (2007), Birol (2007), International Energy Agency (2006), (2009) Sarkis (2006), Srivastava (2007).
Green technology	Dekker et al. (2004), Flapper et al. (2005), Gupta & Lambert (2007), Madu (2000).

and fifty five usable responses for the analysis. The accuracy of the data entry was checked by two independent individuals. Content validity has been thoroughly analyzed.

4. RESULTS AND DISCUSSION

The completed questionnaires were entered into SPSS. The accuracy of the data entry was checked by two independent individuals. Analysis has been done using SPSS and the flow of analysis in four steps as follows considering the survey responses first demographic presentation– to understand industry wise response rate (Figure 1); second descriptive statistics to record respondents priority using the questionnaire administered, third factor analysis to determine the factors influencing social performance as sustainability indicators and business opportunity development finally, testing of hypothesis using ANOVA & Pearson Correlation. Similar work has been covered by Gopal &

Table 3. Summary of mode of data collection

Number of questionnaires sent	Number of usable responses	Mode of respondent's reach			Response rate (%)
		Google spreadsheet as web link	Email	Personal	
600	155	51	39	65	25.83

Thakkar (2015), but their work was restricted to automobile industry in Indian context considering, environmental, social performance with economic performance.

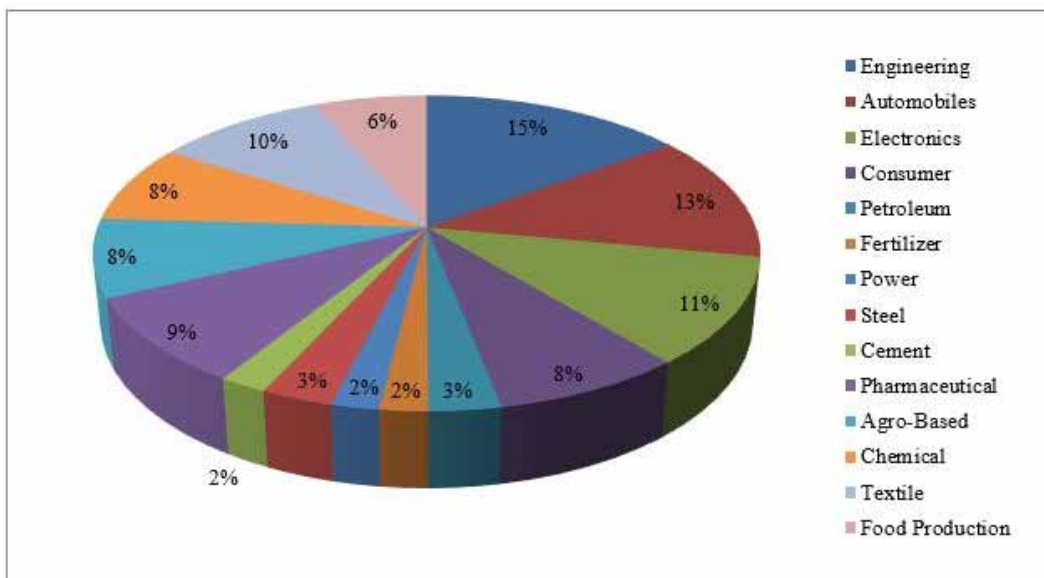
Rainy et al., (2012) work focused on similar line but focusing on social responsible supplier construct development. Carter & Jennings (2000), catalogued dimensions: diversity, philanthropy, safety and human rights in suppliers and their relationship to supply chain social sustainability. We explored similar study but focusing more on social sustainable supply chain management practices in Indian manufacturing sector. Our present work endorses Jorgensen & Knudsen (2006), Hutchins & Sutherland (2008), Lu et al.,(2012) and Chow & Chen(2012), who assorted dimension covering health and safety, labor rights, and human rights practices as social aspect from buyers’ perspective only. But our work focused on entities involved in supply chain as a social sustainability perspective covering health, safety, labor, human rights, education, livelihood, cleaner development mechanism, green technology and carbon trading as Social sustainable supply chain management practices as well as business opportunity development factors in Indian manufacturing sector.

The companies of our sample covered a wide range of industries that we have grouped into 14 categories based on Centre for Monitoring Indian Economy (CMIE) prowess database covering engineering, automobiles, petroleum, fertilizer, power, electronics, pharmaceutical, steel, cement, consumer, textile and food production others. Among categorized companies respondents from engineering industry 15%, power industry 2%, steel 3% and automobiles 13%, petroleum 3%, consumer 8%, pharmaceutical 9%, agro based industries 8%, textile 10%, electronics 11%, cement 2%, chemical 8%, food production s 6% As core activities of supply chain ubiquitous among all the above industry classification we have chosen respondents from these industries in our study.

4.1 Statistical Analysis

According to Lessler & Kalsbeek (1992), non response bias has to be minimized in empirical research using survey as one of the tool. During the process of questionnaire administration for this work, responses of those who returned early are compared with those respondents who returned late to determine statistical differences. The large scale -responses are divided into two groups i.e one group as early respondents comprising of forty seven responses, second group as late respondents of one

Figure 1. Industry wise response rate



hundred and eight respondents. Duration between the responses between the groups is one month. However, Dillman (2000) argues that the research that utilizes multiple contacts with the respondents followed to maximize response rate.

It is evidence from inter-item analysis (Table 4) that there is no significance level smaller than 0.05. F-test shows that there is no momentous distinction among early respondents and late respondents which are statistically proven. Thus, further data analysis has been done.

Table 4. Summary of Inter-Item analysis

Items considered from the scale	Early mean	Late mean	F-value	Significance
Social sustainability & business opportunity developments	4.03	3.9	0.745	0.393

(Source: SPSS Output)

4.2. Factors of the Measure

According to Netemeyer et al., (2003) to validate the reliability of questionnaire assessment should be done by analyzing using the concept of uni-dimensionality of proposed construct. In analyzing the uni-dimensionality principle component analysis method shall give accurate results. Eigen value “greater than one” precedent applied to test uni-dimensionality in which number of Eigen values are greater than one and are equal to number of factors. Thus, principal component analysis on the data of this study proved that the reduced proposed factors are uni-dimensional as each factor has only one eigen value of its value more than one. In Table 6 Eigen values, percentage variance explained by all variables on each proposed factor, and their factor loadings are shown.

4.3 Factors Influencing Social Performance as Sustainability Indicators

Four factors out of eighteen items are extracted through FA and are named as community, safety, and product responsibility. All factors are statistically valid within acceptable level in terms of reliability and KMO and Cronbach’s alpha (Table 5).

From Table 6 first factor community (Disaster relief, vocational training, social accountability) having the eigen value is 6.930 which should be more than 1 and percentage of variance is 38.497 which should be not less than 35%. For the second factor: safety (safety and health issues of employees, safety and health issues of community, safety and health issues of labourers and transporters) third factor product responsibility (green technology & product stewardship) fourth factor: sustainable business opportunities (new products, new processes, cleaner development mechanism, carbon trading) eigen value more than one. From Table 6 and 7, factors emerged under social performance as sustainability indicators and business opportunity development has been established. Thus, the factors influencing

Table 5. KMO, Bartlett’s test and Cronbach’s alpha test result

Social sustainability and opportunity developments	
KMO statistics	0.809
Bartlett’s Test Significance	0.000
Cronbach’s Alpha	0.896

(Source: SPSS Output)

Table 6. Factors emerged under social performance as sustainability indicators and business opportunity development

Factors	Items	Eigen Value	% of Variance	Factor Loading
Community	DR	6.930	38.497	0.81
	VT			0.80
	SA			0.70
Safety	SHIE	2.363	13.127	0.63
	SHISC			0.70
	SHILT			0.76
Product responsibility	GT	1.370	7.614	0.66
	PS			0.34
Sustainable buisness oppurtunities	NPROD	1.301	7.230	0.82
	NPROC			0.77
	CDM			0.77
	CT			0.81

(Source: SPSS Output)

Table 7. Final results of measurement validation of social performance as sustainability indicators and business opportunity development

Scale Name	Variable Name	CITC
Social performance business opportunity development.	Safety and health issues of employees	0.546
	Safety and health issues of labourers' and transporters	0.669
	Cleaner Development Mechanism	0.434
	Safety and health issues of surrounding community	0.642
	Product responsibility	0.597
	Green Technology	0.426
	Education	0.571
	Human rights	0.692
	Patient care	0.497
	Disaster Relief	0.710
	Vocational Training	0.461
	Community care	0.625
	New Processes	0.429
	Social Accountability	0.770
	Livelihood	0.636
Product stewardship	0.530	
Cronbach's alpha: 0.896 KMO (Measure of sampling adequacy) 0.809 Bartlett's test of sphericity χ^2 : 999 Significance level (000)		

(Source: SPSS Output)

Table 8. Testing of Hypotheses using Analysis of Variance (ANOVA)

Null Hypotheses	F _{actual}	P-Value	F _{Critical}	Inference
H ₀₁ : There is a negative relation between product stewardship and social accountability	26.62	0.001	5.19	Null hypothesis rejected
H ₀₂ : Green technology does not affect new products and new processes.	31.84	0.0000	3.47	Null hypothesis rejected
H ₀₃ : Community care does not affect safety health issues of laborers & transporters and surrounding community.	51.73	0.0000	3.47	Null hypothesis rejected
H ₀₄ : Cleaner development mechanism does not affect new processes, new products and carbon trading.	45.05	0.0000	3.05	Null hypothesis rejected
H ₀₅ : Practice of cleaner development mechanism does not influence carbon trading.	18.48	0.003375	5.19	Null hypothesis rejected

Condition: $F_{actual} > F_{Critical}$
 (Source: SPSS)

the sustainable supply chain management practices as a social development in Indian manufacturing sector are community, safety, product responsibility and sustainable business opportunities.

The null hypothesis (refer Table 8) was tested employing single factor F- ratio, Analysis of Variance [ANOVA] on supposition of the mediation variance of the sample is normally distributed at 95% confidence interval. This was a two - tail test with a sampling error of 5%. This is parametric test and hence opportune to measure variables with ordinal or nominal scales with three or more set of rankings. The Spearman's Coefficient of correlation (r) was used to measure the degree of association between the pair of rankings N objects.

Similar research methodologies, cross sectional design, statistical techniques: factor analysis, ANOVA and correlation are used by Aragon-Correa (1998), Henriques & Sadorsky (1999), Buysse & Verbeke (2003),Cespedes-Lorente, et al. (2003), Henriques & Sharma (2005), Rivera-Camino (2007), Murillo-Luna, et al.(2008),Belz & Schmidt Riediger (2010), Darnall et al.(2010),Vazquez-Brust & Liston-Heyes(2010). From table: 11 it is evidence that all the hypotheses framed in this study have been accepted, as p-values for each hypothesis is acceptable limit. Thus, from hypothetical framework managerial insights to the supply chain managers are concept of product stewardship should be considered during product development as well as process development. Absence of product stewardship practices lead to negative implications on society. Concept of green technologies has drawn global attention as a sustainable perspective, which should be incorporated during development phase of new products and new processes. As well as people's perspective, community care has to be considered as a social sustainability perspectives and planning all the transformation processes in manufacturing activity so that no adverse affect on safety health issues of laborers & transporters and surrounding community which results in social sustainable business practice.

In order to validate framed hypothesis H6, H7, H8, H9, H10 and H11 we performed correlation and regression. Table 9 presents Pearson's correlation in dispersion through selected social sustainable practices in supply chain enterprise. For apprehension of the correlation coefficient, we have examined the coefficient and its associated significant value p. Cleaner development mechanism and product innovation convention show positive correlation (r - value is more than 0.7) for all the measures. Similarly relation between green technology and product innovation practices, correlation coefficient is positive (r-value is more than 0.7) for all measures. Relation between carbon trading and product innovation practices, correlation coefficient is positive (r-value is more than 0.82) for all measures, Relation between education and safety & health practices correlation coefficient is positive (r-value is more than 0.90) for all measures, Relation between livelihood and safety & health practices correlation coefficient is positive (r-value is more than 0.83) for all measures, Relation between

human rights and safety & health practices correlation coefficient is positive (r-value is more than 0.94) for all measures. Thus, H6, H7, H8, H9, H10 and H11 are accepted. Thus, this discussion leads to accomplishing second objective of this research.

From Table 10, descriptive statistics of social sustainability performance indicators & business opportunity and development are presented. From descriptive statistics proposed house for social development in supply chains with strategic pillars for implementing the concept of social sustainability as a social development landscape (Figure 2). Firstly, it has been observed that safety health issues of laborer, employees, and transporters as antecedence among respondents as a roof of proposed house for Social development. Thus, manufacturing companies are focusing on human life to recognize the company's social identity leading to improve the quality of life of employee as well as people who are involved in company's business activities as a people perspective. Secondly, company's cleaner

Table 9. Testing of hypothesis H6, H7, H8, H9, H10 and H11 using Pearson correlation

Cleaner Development Mechanism (CDM)	Product Innovation practices	Pearson correlation
	Product Stewardship (PS)	0.74
	Product Responsibility (PR)	1.00
	New Products (NP)	0.93
	New Processes (NPS);	0.86
Green Technology	Product Stewardship (PS);	0.74
	Product Responsibility (PR);	0.96
	New Products (NP);	0.92
	New Processes (NPS);	0.85
Carbon Trading	Product Stewardship (PS);	0.82
	Product Responsibility (PR);	0.96
	New Products (NP);	0.94
	New Processes (NPS);	0.92
Education	Safety & Health Practices	Pearson correlation
	Vocational Training (VT)	0.98
	Safety and health issues of community (SHIC)	0.96
	Safety and health issues of laborers and transporters (SHILT)	0.97
	Safety and health issues of employees (SHIE)	0.94
Livelihood	Vocational Training (VT)	0.97
	Safety and health issues of community (SHIC)	0.94
	Safety and health issues of labourers and transporters (SHILT)	0.88
	Safety and health issues of employees (SHIE)	0.83
Human Rights	Vocational Training (VT)	0.98
	Safety and health issues of community (SHIC)	0.94
	Safety and health issues of labourers and transporters (SHILT)	0.98
	Safety and health issues of employees (SHIE)	0.94

** Correlation is significant at 0.01 level.

development mechanism, product responsibility and green technologies which are part of business opportunity development as right side wall of proposed house for social development. Thirdly, education, human rights and patient care as a social sustainability indicators giving preference to societal needs in improving the literacy rate as well as healthcare of society as a middle room of proposed house for social development. Fourth, as global responsibility, carbon trading, disaster relief, vocational training, community care and new processes are left side wall of proposed house for social development. Finally: social accountability, new products, livelihood & product stewardship are the foundation layer of proposed house for social development. Thus, proposed house for social development was supported from work of Teuteberg & Wittstruck (2010), who proposed the ‘‘House of Sustainable Supply Chain’’. Thematic Qualitative studies by Sodhi & Tang (2017) suggested ‘4P’ model as it suggests that pressure and partnerships influence practices, which in turn impact performance in social sustainability of supply chain. Franceschelli et al. (2018) suggested sustainability elements for sustainable business model Osterwalder model.

4.3. Theoretical Contribution

The study identified the expansion of social sustainable supply chain management practices endorsed among Indian manufacturing companies is inadequate. Thus, the study appended considerable knowledge in this area and provide a base for future researchers. The study identifies the clout of each type of social sustainability issues as sustainable supply chain management practices against the organization presence as a socially sustainable supply chain performance. This summated to the body of knowledge about the value and importance of sustainable supply chain management practices to the organization and society at generous as a corporate social responsibility. This study pursuit

Table 10. Descriptive statistics of social sustainability performance indicators and business opportunity and development

Item	Mean	S.D
Safety and health issues of employees	4.41	0.635
Safety and health issues of laborers and transporters	4.29	0.739
Cleaner development mechanism	4.16	0.689
Safety and health issues of surrounding community	4.12	0.875
Product responsibility	4.11	0.811
Green technology	4.04	0.774
Education	4.04	0.882
Human rights	4.02	0.938
Patient care	4.01	0.911
Carbon trading	3.98	0.99
Disaster relief	3.97	0.943
Vocational training	3.96	0.848
Community care	3.96	1.009
New processes	3.93	0.859
Social accountability	3.89	0.835
New products	3.89	0.859
Livelihood	3.87	0.934
Product stewardship	3.68	0.948

Figure 2. Proposed house for social sustainable supply chain management practices for Indian Manufacturing Sector



to assimilate Resource Base View (RBV) theory in deriving the metaphysical framework. Thus, the study supplement theories from sustainable supply chain management perspective.

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

The study delve into some interesting aspects of social sustainable practices in India. First the study revealed that manufacturing companies in India are practicing community based, focusing on safety issues and inclination towards Product responsibility in different phases of manufacturing coordinate with different entities of supply chain as sustainable perspective. Study also found that some of these factors community, safety issues and product responsibility persuade the appropriation of social sustainability among supply chain activities of Indian manufacturing sector as a social development prospect. Thus, the first objective of this research has been accomplished with support of statistical methods used. In this regard, it has been observed that Indian manufacturing companies are effectively engaged in adopting social sustainability issues in their core business process. Disaster relief has been practiced by majority of manufacturing companies, as one of the computer manufacturing companies believes that commitment to society is both a business and philanthropy platform from which they enable others, design innovative products and services, and extended their presence through contributions of technology, money, and expertise. The employees of this company are also supported by mobilizing funds for relief efforts for Gujarat- India, earthquake in past times, which killed thousands of people and left countless others homeless. Survey based work of Jose & Saraf (2013), ninety percent of top 100 companies divulge that reported Corporate Sustainability Initiatives

(CSIs) had promoted code of conduct as well as internal policies. This demonstrates tenacious insistence at the top level of management with deference to governance. However, study recognized some challenging areas, particularly in producing new products and considering livelihood around the manufacturing facility as part of CSR and finally incorporating product stewardship in products being manufactured. The study administers valuable intuition and inclination behind the enactment of social sustainable practices. From empirical evidences, this study provides useful insight on the major gains that shall be achieved by manufacturing companies from social sustainable practices as supply chain perspective. It is evident from this work as an outcome of this study will help supply chain managers in enhancing their understanding towards incorporation of social sustainability practices. Based on some facts, prevailing business environment invites the attention of Ministry of commerce, Ministry of environment forest & climate change (Government of India), not only to review rules and regulations, rather assist organizations and their supply chain networks in actualize social sustainable practices. Lastly, this study identifies valuable progress attained from social sustainable practices in Indian manufacturing companies focusing on supply chain. For example, practice of Sustainable business opportunities. From the descriptive statistics, it has been observed in the current study that under the social sustainability performance indicators and business opportunity development concepts like vocational training, social accountability, and safety issues have been chosen by majority of respondents. However, in business opportunity development factors, companies participated in the survey have given their priority to new products, new processes and green technology. Companies participated in this study are not part of carbon disclosure project which is a voluntary participation and has not yet been enacted as a regulation in developing countries like India.

5.1. List of Abbreviations

ANOVA: Analysis of Variance
GRI: Global Reporting initiatives
WACOSS: Western Australian Council of Social Services
SSCM: Sustainable supply chain management practices
SC: Supply chain
JSW: Jindal South West
CSR: Corporate Social Responsibility
EHS: Environment, Health and Safety
UN: United Nations
EMS: Environmental Management System
CDM: Cleaner Development Mechanism
ETS: Emission trading Scheme
SME: Small and Medium sized Enterprises
SPSS: Statistical Package for Social Scientists
CMIE: Centre for Monitoring Indian Economy
KMO: Kaiser Meyer Olkin
RBV: Resource Base View
CSI: Corporate Sustainability initiatives

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APPENDIX

Profile of the Company

1. Year of establishment _____
2. Nature of ownership:
 - Private
 - Public limited
 - Public sector
3. Does an MNC or foreign company have an equity stake of 50% or more?
 - Yes
 - No
4. No of Employees:
 - 1-99
 - 100-499
 - 500-999
 - Greater than 1000
5. Industry:
 - Engineering
 - Automobiles
 - Petroleum
 - Fertilizer
 - Power
 - Electronics
 - Pharmaceutical
 - Steel
 - Cement
 - Consumer
 - Textiles
 - Agro-based
 - Chemical
 - Others _____

Kindly circle your choice [1/2/3/4/5] about the extent of your agreement with the following social sustainability indicators which your organization involve in as a part of social sustainability.

S. No	Social Sustainability Measures					
1	Patient care	1	2	3	4	5
2	Education	1	2	3	4	5
3	Livelihood	1	2	3	4	5
4	Community care	1	2	3	4	5
5	Disaster Relief	1	2	3	4	5
6	Human Rights	1	2	3	4	5
7	Product Responsibility	1	2	3	4	5
8	Vocational Training	1	2	3	4	5
9	Product Stewardship	1	2	3	4	5
10	Social Accountability	1	2	3	4	5
11	Safety and health issues of employees	1	2	3	4	5
12	Safety and health issues of surrounding community	1	2	3	4	5
13	Safety and health issues of labourers and transporters	1	2	3	4	5

Kindly circle your choice [1/2/3/4/5] about the extent of your agreement with the following as a business opportunity due to the implementation of sustainability practices in your organization as a business development.

S. No	Business opportunity Development					
1	New products	1	2	3	4	5
2	New processes	1	2	3	4	5
3	Green Technology	1	2	3	4	5
4	Cleaner development Mechanism	1	2	3	4	5
5	Carbon trading	1	2	3	4	5

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