

SOCIAL SUSTAINABILITY IN THE SUPPLY CHAIN OF INDIAN MANUFACTURING INDUSTRIES

Ph. D THESIS

by

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INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE - 247667, INDIA
OCTOBER, 2015**

**SOCIAL SUSTAINABILITY IN THE SUPPLY
CHAIN OF INDIAN MANUFACTURING
INDUSTRIES**

A THESIS

*Submitted in partial fulfilment of the
requirements for the award of the degree
of*

DOCTOR OF PHILOSOPHY

in

MANAGEMENT STUDIES

by

MANI.V



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OCTOBER, 2015**

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CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in this thesis entitled “**SOCIAL SUSTAINABILITY IN THE SUPPLY CHAIN OF INDIAN MANUFACTURING INDUSTRIES**” in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy and submitted in the Department of Management Studies, Indian Institute of Technology, Roorkee is an authentic record of my own work carried out during the period from July 2013 to October 2015 under the supervision of Dr. Rajat Agrawal, Assistant Professor, Department of Management Studies, Indian Institute of Technology, Roorkee, India.

The matter presented in this thesis has not been submitted by me for the award of any other degree of this or any other Institute.

(MANI.V)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date: 31/ 12 /2015

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Supervisor

The Ph.D. Viva-Voce Examination of **Mr. Mani V**, Research Scholar, has been held on **31/12/2015**

Chairman, SRC

Signature of External Examiner

This is to certify that the student has made all the corrections in the thesis

Signature of Supervisor(s)

Head of the Department/Chairman

ABSTRACT

In the wake of the emerging social issues in the developing countries, research on social sustainability has gained importance for both the academics and the practitioners. Although there are a number of studies of social sustainability in the supply chain, they are either supplier-related or manufacturer-related and predominately address the CSR issues, referring to the internal stakeholders. This research integrates the literature on the supplier, manufacturer and customer responsibility to propose a new concept, that is, supply chain social sustainability (SCSS), which addresses the social issues within the overall supply chain.

The research was conducted in three broad steps. First, an extensive literature review was carried out through online databases, including Scopus, EBSCO Business Source Premier, Emerald and Elsevier, Taylor and Francis, Springer, Wiley, and Inderscience, using keywords such as social sustainability, sustainability, social sustainability and supply chain, social sustainability and operations, and manufacturing sustainability, to identify the key social sustainability dimensions available in the literature.

At the same time, in-depth interviews were conducted with supply chain managers. The interviews pointed to various social sustainability issues prevailing in the Indian manufacturing supply chain, and gave insights into how social sustainability can be managed and what can be the possible outcomes of adopting such practices in the supply chain. In addition, an expert panel was constituted to identify the social sustainability dimensions and their measures suitable to the Indian context. An initial questionnaire was designed using the measures identified by the expert panel.

To check the suitability of the questionnaire, pilot tests were conducted with the practitioners, which suggested some changes, including some ambiguous words and phrases that needed to be altered. The questionnaire was finalised after deleting, rewording and rephrasing some scale items and the final questionnaire with 59 scale items, along with a write up on social sustainability, was mailed to 1200 manufacturing companies, randomly selected from the Prowess database (<https://prowess.cmie.com>) using two criteria: one, the company should have revenues exceeding 100 billion, and second, the company should have been operating for at least ten years in India.

The first phase yielded 300 usable surveys, with which the exploratory factor analysis (EFA) was performed. The results suggested six dimensions measuring social sustainability with required reliability and validity, and the second phase survey was conducted with the refined scale items.

In the second phase, 1400 companies were picked up randomly with the above criteria from Prowess and mailed the questionnaire. This yielded 450 usable responses.

In the third phase, the first order confirmatory factor analysis (CFA) was performed to test the psychometric properties of the constructs (measurement model). The results showed that the model was fit with the required reliability and validity. In addition, the second order factor analysis was performed to find out social sustainability as the second order latent construct. The results suggested six underlying social dimensions to measure social sustainability, namely equity, safety, philanthropy, health and welfare, human rights and ethics.

In order to validate the second order measurement model, efficacy testing and predictive validity tests were performed. The tests suggested six social dimensions with 20- item scale with adequate reliability and validity. Finally, the structural equation modelling (SEM) was performed with the constructs of social sustainability, supply chain performance, supplier performance, operational performance and customer performance. The statistical analysis suggested that the model was fit with the required validity.

The results suggested that social sustainability in the supply chain significantly impacted the supply chain performance, supplier performance and operational performance. However, customer performance did not show any significant relationship with the supply chain performance.

For the purpose of clarity, simplicity and convenience, the thesis has been organised as follows.

The first chapter “**Introduction**” presents an overview of the prevailing social sustainability issues in the supply chain of the Indian manufacturing industry and discusses the need for social sustainability research.

The second chapter “**Literature Review**” carries out a detailed review of the literature available in the field of social sustainability and its practice so far. This chapter also identifies the performance measures related to the supply chain, suppliers, customers, and operations. In addition, it also uncovers the research gaps in the literature and formulates the research hypotheses.

The third chapter “**Methodology**” presents the detailed research design comprising both qualitative and quantitative methods. This chapter discusses the research hypotheses and the methods to test these hypotheses. In addition, it gives an overview of the questionnaire design and data collection method, sample size and tools used for analysis.

The fourth chapter “**Results and Analysis**” presents the various statistical tools used, followed by a comprehensive analysis of the results using these. It also presents an overview of the results of the confirmatory factor analysis and structural equation modelling, with convergent and discriminate validity.

The fifth chapter “**Discussion**” presents the detailed outcome of the research contributions and elaborates on social sustainability and its relationship with the supply chain performance, operational performance, supplier performance and customer performance. The various proposed hypotheses and the research outcomes have been compared.

The sixth chapter “**Conclusions, Implications, Future Directions**” discusses in detail the conclusions arrived at in this research and examines its limitations and managerial implications, also suggesting the future research directions.

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With profound gratitude, love and devotion, I dedicate this thesis to my family.

Dated: October, 2015

(Mani.V)

LIST OF PUBLICATIONS

Journal publications

1. Mani, V., Agrawal, R., & Sharma, V. (2014). Supplier selection using social sustainability: AHP based approach in India. *International Strategic Management Review* (Elsevier), 2(2), 98-112.
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CHAPTER-1

INTRODUCTION

1.1 Introduction to social sustainability

The importance of sustainability in manufacturing has been a matter of discussion for decades. Earlier, the corporations primarily focused on fast-paced production and innovative technologies. But now the focus has changed to sustainable manufacturing because of the increased awareness of the limited resources, coupled with strict regulations and the need for voluntary corporate actions, to meet the stakeholders' requirements. Sustainability is defined as 'the development that meets the needs of today without compromising the ability to serve the future generations' (WCED, 1987).

Although sustainability encompasses three dimensions, that is, environmental, economic and social, due to the much more apparent threat of climate change and global warming, it was the environmental dimension that received most of the attention for over a decade (Carter and Easton, 2011; Winter and Knemeyer, 2013). However, increasing stakeholder awareness of the issues of safety, health, equity and living conditions, has, of late, brought the focus on socially sustainable manufacturing and business practices, in addition to the environmental sustainability. As more and more companies commit themselves to sustainability and the CSR policies, there is increasing pressure on them to consider the social impact of their business operations throughout the supply chain. The United Nations Human Development Index (HDI) measures the income disparity, education level, mortality rate, and such other parameters in various countries and ranks them accordingly. The majority of the developing countries have been consistently rated poorly on the HDI because of the social issues, and this has also been acting as a motivating factor for them to improve upon the performance of their social sustainability activities.

There are measures, such as Sarbanes-Oxley Act, Dow Jones's Economic Index (1896), as well as mandatory financial reporting, to ensure the economic sustainability of the corporations. Similarly, there has been a sizeable research on the environmental aspects of sustainability in the supply chain (Bhattacharya et al., 2014; Dubey and Bag, 2013; Seuring and Muller, 2008a). However, very little has been done for social sustainability in the supply chain because of the complex human issues involved in it. Yet, research to study the inter-relationship among the economic, environmental and social dimensions is integral to the concept of sustainability (Elkington, 1997).

It is essential to characterise the interactions among these dimensions to understand the overall impact on the future generations. Although social sustainability is included in, and considered an integral part of sustainability, the attention given to it, so far, has rarely been anywhere near that given to the economic and environmental concerns (Seuring and Muller, 2008b). The Global Reporting Initiative (GRI, established in 1997) reports that social performance occurs infrequently and inconsistently across organisations. This has been echoed by a recent study by the Western Australian Council of Social Services (WACOSS), saying that, ‘while there has been considerable work done on the environmental and economic aspects, the social has tended to fall off the sustainability agenda’.

Further, even social sustainability studies, so far, have discussed and emphasised the legislative, health and safety issues, rather than bringing a comprehensive focus on all the relevant issues. On the other hand, studies are especially scant in the manufacturing supply chain (Seuring and Muller, 2008; Ashby et al., 2012; Hohenstein et al., 2014). In manufacturing, sustainability is measured on the basis of the entire value chain of the corporation and such value chains comprise many individual partners. The sustainability of the entire chain is, thus, dependent on many standalone companies that are integral parts of the corporation’s value chain (Barki, 2013). In other words, the impact of sustainability is not restricted to the manufacturing companies but also extends to their suppliers (Ashby et al., 2012). More recently, many manufacturing companies have developed their supplier capabilities in the developing countries for their low cost advantage. Invariably, the actions and behaviours of these suppliers in the societies they operate in have an impact on the global companies in their own locations (Tybout and Roehm, 2009).

There have been several such incidents reported by the media. One example is the recently reported case of unethical standards followed by some manufacturing companies in China, where the use of melamine adulterated milk, lead-tainted toys, toxic toothpastes, defective tyres and fake medicines have led to 24 million customer settlements (Tybout and Roehm, 2009). In another instance, the unethical action of supplying “expired meat” to McDonald’s by one of its largest meat suppliers severely damaged the image of the company and resulted in the suspension of its burger products in China as well as the US (CBS News, 2012). More recently, Wal-Mart’s most preferred “shrimp” was found to be procured from a Thailand-based supplier whose facilities lacked the basic living conditions for the workers, and were marred by the issues of health and hygiene, and poor wages (HRW report, 2012).

1.2 Social issues and Indian manufacturing supply chain

In India too there have been several popular media reports and stories concerning social sustainability issues that include child and bonded labour, diversity, ethics and gender discrimination, resulting in product recalls by the manufacturing units (Ministry of Labour, 2014). Thus, one of biggest corporate houses in the country, Tata, was censured by the World Bank for its inability to address the working condition issues in its coffee supply chain (World Bank, 2014). A number of child and bonded labourers have been rescued from the manufacturing facilities in Sivakasi and Tripur in Tamil Nadu, and a few parts of Utter Pradesh (Ministry of Labour, 2014). The Nobel Laureate Khailash Satyarthi's efforts have been instrumental in rescuing and rehabilitating many child and bonded labourers from the manufacturing setups in India. Further, media reports routinely pour in about women's safety issues at the work place.

Recently, Food and Drug Administration (FDA) initiated action against the leading pharmaceutical major Ranbaxy for not complying with the safety measures (CGMP) in its manufacturing facilities in India. Its investigations revealed mismanagement of the social issues, including safety, ethical standards and working conditions in the supply chain involving manufacturing facilities, and suppliers or customers in the value chain (FDA, 2014). Similarly, there has been sharp public criticism of Nike, Adidas, and Sainsbury for their failure in regulating the working conditions in their suppliers' establishments (Emmelhainz and Adams, 1999; Barton, 2007).

Very recently in India, the leading packaged food manufacturer, Nestle, was on fire for its noodles brand "Maggi". The Food Safety and Standards Authority of India (FSSAI) found it with lead content beyond the permissible limit for consumption, resulting in a ban on the brand and consumer outrage. The investigations showed that the problems were related to not only the safety of the product but also the alleged unethical practices of misleading the customers with "no added MSG" information on the packets while the product still contained MSG beyond permissible limits. As a result, the product has been recalled from across India and the Nestle brand image has been tarnished. Moreover, it has affected the company's revenues to the tune of 3.6 billion (BBC, 2014).

Similarly, Mylan Inc, whose supplier Agila pharmaceuticals initiated a nationwide recall on February 13, 2014, of its Etomidate Injection 2 Mg/MI - 10 MI and 20 MI due to the presence of small black particles in the individual vials, identified these as paper shipper labels. It is notable

that intravenous administration of particulate matter may lead to the impairment of microcirculation, phlebitis, infection, embolism and subsequent infarction (Mylan, 2014).

All these were supplier, manufacturer or customer related problems, and yet their consequences impacted the companies the most. This implies that the corporations need to recognise the supply chain related social issues as a strategically important concern. Such incidents not only tarnish the image of the buyer company, they also affect their financial performance. Most importantly, most of the developing countries are still plagued with child labour, gender inequality, poverty, health problems, and the lack of awareness of social sustainability measures on the part of the companies tends to perpetuate these.

Addressing these social issues has acquired a sort of urgency in the developing countries, more so in India, as the country tries to improve its image in the manufacturing sector with the call for “make in India” by its government. The Indian manufacturing industry is one of the fastest growing among the developing nations, and India has been ranked the 4th most preferred manufacturing destination in terms of competitiveness in the world (Deloitte, 2013). India’s manufacturing sector contributes 15-16% to the country’s GDP, and the National Manufacturing Competitive Council (NMCC) has set the objective of increasing it to 25% within a decade, creating 100 million jobs (NMCCR, 2013). This research is, therefore, highly relevant because of the government’s commitment to improve the competitiveness of the Indian manufacturing industries through various measures. Through manufacturing, the Government of India is attempting to address the pressing issues of creation of employment, spread of education, and improvement in the overall standard of living. In pursuit of this, the Manufacturing Competitive Council (NMCCR, 2013) has identified several enablers to manufacturing competitiveness, sustainability being one of them. The government’s financial market regulator, Stock Exchange Board of India (SEBI), has mandated all the listed companies to comply with and publish business responsibility report (BRR), in addition to their financial reporting requirements. This reinforces the government’s efforts in the direction of sustainability and emphasises its importance. However, according to the Global Reporting Initiative’s report, titled ‘Mumbai declaration on sustainable reporting for sustainable development’, still only 80 organisations comply with the sustainability reporting norms in India (GRI, 2014). The Global Reporting Initiative is an international independent standards organisation that helps businesses, governments and other organisations to understand and communicate their impact on issues such as climate change, human rights and

corruption. Founded in 1997, GRI is a non-profit organisation with its Secretariat at Amsterdam, the Netherlands. GRI has formulated one of the world's most widely used standards for sustainability reporting, also known as ecological footprint reporting, environmental social governance (ESG) reporting, triple bottom line (TBL) reporting, and corporate social responsibility (CSR) reporting.

In addition, the report also specifies the sustainability measures in Indian organisations owing to many issues, and suggests a series of guidelines for the adoption of sustainability. This shows that social sustainability has not been a priority for the Indian manufacturing sector and research on social sustainability is yet to gain momentum. Hence, it is imperative even for the companies to pay a greater attention to the sustainability measures, especially social sustainability measures, to attain manufacturing competitiveness and have a strategic advantage. As mentioned above, most of the developing countries are still plagued by child labour, gender inequality, poverty, health problems, and such other issues, because of the lack of awareness of social sustainability measures on the part of the companies sourcing from these countries. This is not surprising as social sustainability, especially in the manufacturing supply chain, remains the least explored area of sustainability (Ashby et al., 2012; Hohenstein et al., 2014), and even the few studies available are either based on case studies or use analytical models (Martínez-Jurado and Moyano-Fuentes, 2014, Ashby et al., 2012; Soni et al., 2013, 2014; Yawar and Seuring, 2015).

1.3 Need for social sustainability study in India

There are few useful studies in the literature on supply chain social sustainability in the Indian context, and even these predominantly address supplier selection and overall sustainability of the firms (Kumar et al., 2014; Mani et al., 2014; Bhattacharya et al., 2014). These studies are more analytical and case study based, concentrating on either the upstream or the downstream part of the supply chain in a standalone manner. As such, they do not address the whole gamut of social sustainability issues in the supply chain. To the best of our knowledge, the research on social sustainability in the supply chain of the Indian manufacturing industry is scant. Therefore, there is a gap in the literature related to social sustainability in the manufacturing industry. Though there are such studies in the global context (Carter and Jennings, 2000, 2002, 2004; Ciliberti et al., 2008; Andersen and Larsen, 2009; Lu et al., 2012), the studies specific to India are hard to find. This research is one of the early attempts to explore supply chain social sustainability in a more comprehensive manner.

In the literature, concerns for managing social issues in the supply chain typically fall under social sustainability. One common perspective to understand the supply chain social sustainability is the resource based view that conceptualises social sustainability as the way the companies nurture and maintain their human resources, which cannot be easily imitated by the competitors and, thus, possessing such resources gives the companies a strategic advantage (Barney, 1986, 1991). Further, the majority of the social issues have usually been addressed under the CSR activities (Hutchins and Sutherland, 2008), and the research on sustainability in operations and supply chain management is merely an extension of CSR in the form of purchasing social responsibility (PSR) (Carter and Jennings, 2000) and logistical social responsibility (LSR) (Ciliberti et al., 2008). A few others have extended this literature by introducing the term “socially responsible supplier development” (SRSD) (Lu et al., 2012). However, most others consider corporate social responsibility synonymous with social sustainability (Hutchins and Sutherland, 2008).

While there is still a debate on what constitutes social sustainability, the available literature is restricted to the buyer-supplier level (Awaysheh and Klassen, 2010; Gimenez and Tachizawa, 2012). All the research is either focused on manufacturer sustainability or supplier sustainability or both, in a standalone manner. But the relevance of the social issues is not confined to the suppliers and manufacturers; it also extends to the customers, consumers and the society which the company operates in (Mani et al., 2015b). Thus, social issues become relevant to the entire supply chain because of the involvement of multiple stakeholders who directly affect the buying firm’s reputation (Hoejmose et al., 2014; Roberts, 2003). A few recent studies, for example, that of Miao et al. (2015), discussed the importance of the supplier, customer, manufacturer and society in adopting the social sustainability measures in the logistics supply chain. However, his research examined “how” social sustainability can be adopted by identifying antecedents in China, ignoring the “what” aspect of sustainability. Yet another research by Lu et al. (2012) explored socially responsible supplier development (SRSD) and how the ethical issues can be addressed by implementing the CSR activities in the suppliers’ establishments.

Thus, to the best of our knowledge, the literature on social sustainability focusing on all three stages of the supply chain in a comprehensive manner is scant. On the other hand, the progressive stakeholders today (both internal and external) are holding the firms accountable for the social

issues in their supply chains, and forcing them to behave in a socially responsible manner (Klassen and Vereecke, 2012). Thus, a comprehensive research on social sustainability in the supply chain focussing on all three aspects of it is the need of the hour. Especially in India, social sustainability in the supply chain remains the least explored field of sustainability (GRI, 2014). Hence, there is a need to understand the social issues in the country and find out how these issues can be measured in the supply chain. Further, in the current understanding of social sustainability in the supply chain, the literature offers very few guidelines on how the corporations can enhance their overall performance by enhancing their supply chain sustainability measures covering all three stages of the supply chain. The literature, as mentioned earlier, mostly discusses the sustainability measures pertaining to either the suppliers or the manufactures in a standalone fashion. These measures revolve around the CSR aspects, trying to find out how the CSR can be integrated with the supply chain. However, social sustainability should be looked at from a much broader perspective, in terms of addressing the social issues not only in the suppliers', manufacturers' and customers' establishments, but also in the society as a whole which the company operates in (Wood, 1991). This points to the necessity of addressing the social sustainability measures at all the stages of the supply chain (Hutchinson and Sutherland, 2008).

In addition to this, the social issues vary from country to country and from one supply chain domain to the other, because social values evolve over a period of time in the context of the particular societies. As mentioned earlier, the literature on social sustainability pertaining to India is scant, which remains the least explored area of sustainability over the past two decades (Ashby et al., 2012; Seuring and Muller, 2008b). To fill this void, we have made a novel attempt to identify various social issues by integrating all the three stages in a comprehensive manner so as to lead to the overall social sustainability in the supply chain. We expect that implementing these social measures in the supply chain by the firms will improve the social performance of the supply chain involving all three stages and, in turn, would lead to the social sustainability of the firm itself.

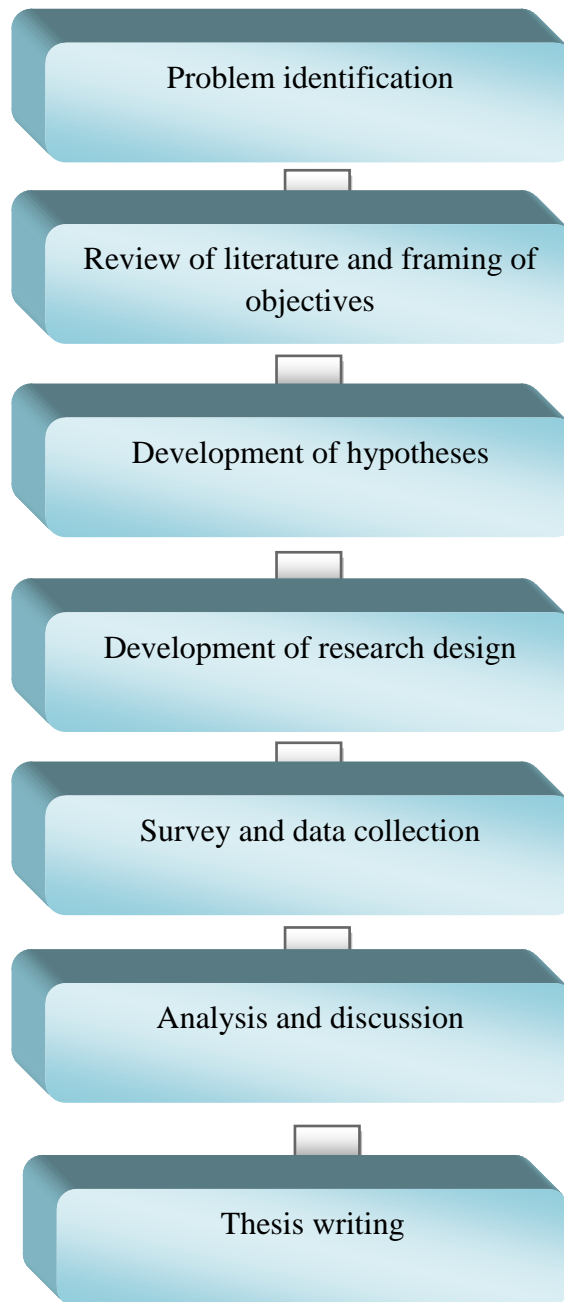
The research contributions are three fold. First, the social issues related to the Indian manufacturing supply chain have been identified. This is an important contribution to theory building in the manufacturing supply chain and operations. Second, the social sustainability and supply chain management literature has been expanded by introducing the term “supply chain

social sustainability” (SCSS) pertaining to India, that could be of much interest to the supply chain managers and policy makers in the area of corporate sustainability. The insights could be very helpful in policy formulation for tackling the real social problems in the supply chain. Third, new social sustainability scales have been developed and validated. The researchers can use the social sustainability measurement scales developed in this research to further test and refine the concept empirically. The supply chain practitioners can also use these scales as an assessment tool to evaluate social sustainability in their supply chains. Given the lack of validation studies on the use of social sustainability measurement tools in the Indian manufacturing Industries, our validation results add to the academic contribution to improve the generalizability of the current social sustainability measurement scales.

In addition, efforts have been made to explore the relationship between social sustainability and the supply chain performance, supplier performance, operational performance and customer performance by validating the scales relevant to these constructs. Finally, through discussion, implications and conclusions have been arrived at. The research process is elaborated in Figure 1.1.

The chapters have been organized into six broad categories including: 1) Introduction; 2) Literature review; 3) Methodology; 4) Results and Analysis; 5) Discussion; 6) Conclusion and future research.

1.1 Steps involved in research process



CHAPTER-2

LITERATURE REVIEW

2.1 Introduction

This chapter carries out a comprehensive review of the background literature pertaining to social sustainability and the ways in which social sustainability in the supply chain has been perceived and practised. The review will act as one of the vital prerequisites for conducting the structural research. A detailed review of the prior research in the related fields not only assists in identifying the research gaps, but also helps in formulating the hypotheses and identifying the independent and dependent variables related to them. The chapter comprises:

- a detailed discussion on the research trends in the field of social sustainability and available models;
- a discussion on the ways in which social sustainability in the supply chain has been perceived and practised;
- identification of the potential areas of research pertaining to social sustainability; and
- development of research questions based on the gaps identified.

2.2 Methodology of the literature review

The literature review has been carried out through an extensive use of the electronic databases, such as Scopus, Science Direct, EBSCO Business Source Premier, Emerald, ProQuest, Taylor and Francis, Springer, and Inderscience, using keywords such as social sustainability, sustainability, supply chain sustainability, sustainability in the supply chain, social responsibility, corporate social responsibility, corporate social responsibility and supply chain, sustainability and supply chain, and social sustainability and manufacturing. The literature surveyed pertains to the period 1950-2013 as the concept of sustainability was first proposed in the 1950s, although social sustainability gained importance only after the publication of the Brundtland Commission (1987) report, followed by the release of Agenda 21 of the Rio Conference (1992).

Overall, the search yielded 523 articles which were carefully screened for duplication, as there were chances of the same articles appearing more than once in different databases. Finally, 154 articles were selected for the review after a thorough screening of their headings, abstracts and methodologies. These articles were considered significant as they dealt directly with social sustainability and social sustainability in the supply chain. The methodology followed for the literature review has been illustrated in the flowchart in Figure 2.1.

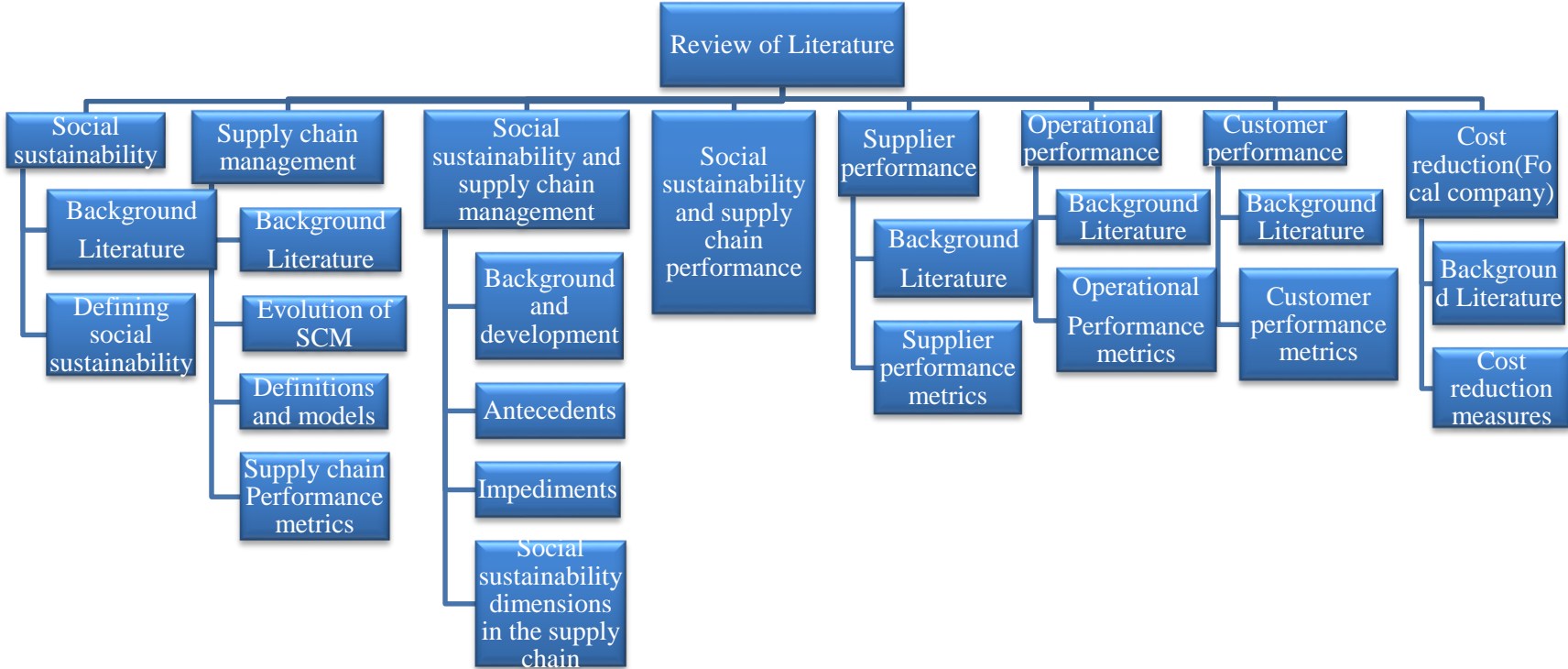
To begin with literature review, the next section discusses the term social sustainability and various definitions associated with it.

2.3 Social sustainability - A background

The sustainability framework, first developed by Carroll (1979), advocates four different responsibilities of the corporates, including economic, legal, ethical, and voluntary or discretionary responsibilities. In an earlier research, Sethi (1975) had introduced a taxonomy in which he had described the social obligations and responsibilities of the corporates, including some voluntary social responsibilities. However, the meaning of sustainability was still ambiguous and this led to a variety of definitions of social sustainability (Bansal, 2005). Nevertheless, most scholars referring to social sustainability draw mainly on the definition of sustainable development given by the Brundtland Commission Report, *Our Common Future*, as ‘development that meets the needs of the present without compromising the ability of the future generations to meet their own needs’ (Bruntland, 1987).

The Brundtland Commission’s definition has an enormous appeal as it holds the possibility of reconciling the people’s needs with the bio-physical environmental management goals through economic development. It captures the essence of a much larger construct that attempts to address both tangible and less tangible necessities of life which, in turn, have been seen to depend on reviving growth; meeting the essential need for jobs; changing the quality of growth in terms of food, energy, water and sanitation; conserving and enhancing the resource base; ensuring a sustainable level of population; reorienting technology and managing risks; and merging the environment and economics with the decision-making process.

Figure 2.1 Flowchart of literature review



However, the Bruntland Commission report emphasises sustainability only in terms of the management of natural resources, not the society, people and culture (Chatterjee and Finger, 1994). Later research, on the other hand, advocates three important aspects of sustainability: environment, long-time focus on environment, and equity (Pearce *et al.*, 1989). For example, Elkin *et al.* (1991) argue that sustainable development also ‘embraces the need for equity’. Similarly, in urban planning circles, sustainability often means the three E’s: Environment, Economy and Equity, without giving much thought to whether equity alone can lead to social sustainability.

Many authors concur with the view that, for an enterprise to be sustainable, it needs to internalise the social costs, grow and maintain capital stocks, foster democracy and enlarge people’s choices, and distribute property rights fairly (Gladwin *et al.*, 1995). The United Nations Conference on Sustainable Development (UNCSD, 1998), in its Agenda 21, specifies promotion of economic growth under economic dimensions (Section 1); creation of productive employment and achieving equality under social dimensions (Section 2); and reduction in the use of natural resources and protection of the natural environment under environmental dimensions (Section 3). It sets an agenda for social development while also considering the inter-relationship between the environment and the social requirements.

Several researchers have shown that, if the basic human needs are not addressed, it is very difficult to meet the environmental sustainability goals, because, in the developing economies, people tend to harm the natural resources to meet their basic needs (Crabtree, 2005). Extensive studies have been conducted on social sustainability by many scholars, notably, Sachs (1999) and Godschalk (2004) who, in their research titled “Social Sustainability and Whole Development”, identify a number of essential elements of social sustainability, including equitable income and access to goods, social homogeneity and services, and employment. In addition, Sachs (1999) also points out the importance of “cultural sustainability” which requires balancing the externally imposed changes with continuity and development from within, and of “political sustainability” based on human rights, democracy, and effective institutional control.

Giving these elements a theoretical basis, Sharma and Ruud (2003) define social sustainability as an ‘ethical code of conduct for human survival and outgrowth that needs to be accomplished in a mutually inclusive and prudent way’. In 2001, the United Nations Division for Sustainable Development (UNSD, 2001) identified and proposed several indicators to measure the progress

Table 2.1 List of criteria, sub-criteria and indicators proposed by UNDSO (2001)

Criteria	Sub criteria	Indicators
Equity	<ul style="list-style-type: none"> • Poverty • Gender equality • Gender discrimination 	<ul style="list-style-type: none"> • Percentage of population living below poverty level • Unemployment rate • Gini index of income inequality • Percentage ratio of average female wage vs male wage • The practice of granting or denying rights of privileges based on gender
Health & Safety	<ul style="list-style-type: none"> • Nutritional Status • Mortality • Sanitation • Drinking Water • Healthcare Delivery • Safety measures provided by corporates 	<ul style="list-style-type: none"> • Children nutritional status • Mortality rate under 5 years old • Population who have adequate sewage facilities (%) • Access to safe drinking water • Access to primary health care facilities • Safety measures undertaken by the company to protect the employees
Wages	<ul style="list-style-type: none"> • Wage standard 	<ul style="list-style-type: none"> • Standard of wages against man hours spent
Education	<ul style="list-style-type: none"> • Literacy Level • Education Level 	<ul style="list-style-type: none"> • Adult literacy ratio • Access to primary education up to 5th STD

Human Rights	<ul style="list-style-type: none"> • Human Rights-Environment 	<ul style="list-style-type: none"> • How human rights are protected (right to associate, speak)
Child and Bonded Labour	<ul style="list-style-type: none"> • Child labour • Bonded labour 	<ul style="list-style-type: none"> • The percentage of child labour employed • Percentage of bonded labour employed
Housing	<ul style="list-style-type: none"> • Living Conditions 	<ul style="list-style-type: none"> • Human and floor ratio • Hygienic conditions
Population	<ul style="list-style-type: none"> • Population change 	<ul style="list-style-type: none"> • Population growth rate • Population of urban formal and informal settlements

Source: Hutchins and Sutherland (2008)

towards sustainability. Subsequently, The UNDSO established framework of themes and sub-themes, classifying the indicators first by primary dimension of sustainability, i.e. social, environmental and economic, then by theme (for example, education), and finally by sub-theme (for example, literacy). The themes related to the social dimension of sustainable development are equity, education, health, housing, security, population, etc., and each sub-theme consists of a minimum of three quantifiable indicators associated with it, as specified in Table-2.1. Further, Magis and Shinn (cited in Dillard *et al.*, 2008) suggest four emergent principles of social sustainability, i.e. human wellbeing, equality, democratic government, and democratic society. They argue that these four principles create a self-reinforcing virtuous cycle that facilitates progress towards even environmental sustainability.

Dyllick and Hockerts (2002) have also discussed the importance of the relationship among the sustainability dimensions and coined the term “socio-efficiency” and “eco-efficiency” for a sustainable society. Other scholars describe various other elements of social sustainability, such as the objective basic needs and subjective basic needs, objective social resources and subjective social resources, cultural diversity, and justice (Omann and Spangenberg, 2002). According to Littig and Griebler (2005), ‘social sustainability is a quality of societies that signifies the nature-

society relationships, mediated by work as well as relationships within the society. Social sustainability is given, if work within a society and the related institutional arrangements satisfy an extended set of human needs and are shaped in a way that nature and its reproductive capabilities are preserved over a long period of time and normative claims of social justice, human dignity and participation are fulfilled’.

Littig and Griebler (2005) point out three core indicators of social sustainability. The first deals with the satisfaction of basic needs and quality of life. Others pertain to poverty, income distribution and unemployment, education, training, housing conditions and health (private and workplace), security and income, and the rest are related to social justice and social coherence. Bansal (2005) describes social equity as an important component of social sustainability and asserts that all the members of a society must have equal access to the resources and opportunities. In organisations, the term social equity has been extended to mean ‘fair and equitable treatment of employees’ (Krause *et al.*, 2009; Ghosh and Sahney, 2010).

Bramley and Power (2009) assert that social sustainability is often equated with social cohesion, social capital and social inclusion. This also underlines the importance of focusing on the higher order needs, such as access to necessary goods and services, and basic societal development. Further research on social sustainability emphasises providing intra- and inter-generational equity and distribution of power, employment, resources, education, freedom, provision of basic infrastructure and services, justice, and access to influential decision-making fora (Mitlin and Satterthwaite, 1996; Redclift, 2005; Källström and Ljung, 2005; Bramley and Power, 2009).

The Organisation for Economic and Social Cooperation and Development (OECD) views social sustainability from two different perspectives, social and human (OECD, 2008). The social dimension comprises actions that are beneficial to the society while the human dimension refers to knowledge, skills, ability and talent that determine the individual performance in the labour market (OECD, 2008; Hobbs, 2000; Milward, 2003). Moreover, according to some scholars, social sustainability is concerned with the management of social resources that include people’s skills and abilities, relationships and social values (Sarkis *et al.*, 2010; Ghosh and Sahney, 2011, 2013).

More recently, Vallance et al. (2011), in his research titled “What is Social Sustainability”, has formulated a threefold literature schema comprising: (1) development sustainability, addressing basic needs and creation of the social capital; (2) bridge sustainability, concerning behavioural

changes to achieve the bio- and physical-environmental goals, and (3) maintenance sustainability, referring to the social and cultural characteristics, such as the ways in which people actively resist or embrace change. On the basis of these studies, it can be said that social sustainability is all about social issues and the ways in which they are, or can be addressed, leading to the long-term wellbeing of the people in different societies.

Taking the discussion further, the next section considers various definitions of social sustainability.

2.4 Defining social sustainability

To begin with, the section examines the issues involved in defining social sustainability for the purpose of creating a common research agenda. A working definition of social sustainability has been provided at the end of this section. However, since arriving at a single useful definition proved an onerous task, the section, instead, suggests various useful approaches that have evolved over time. As seen above, social sustainability is all about the people and members of a particular society. Although social sustainability can have a bigger, universal agenda, it is bound to differ in terms of “what” and “where” because of the different social issues evolved in different societies over time. These issues are highly contextual. For example, the social issues in the Western countries and the developing nations vary greatly. To elaborate further, issues such as juvenile arrests, living wages and recreation are hardly relevant to the developing nations where issues like poverty, health, safety, hygiene and sanitation, and bonded and child labour are far more important. Thus, although the issues look relevant under the bigger umbrella of social sustainability irrespective of the society, their contextual nature makes the priorities different.

Generally, there has been a strong focus on defining sustainability as a condition, and measuring it with a series of indicators. Social sustainability is known to be a life enhancement feature within the communities, and includes the processes that can achieve life enhancement. Thus, possible indicators to social sustainability are: equity in accessing the key services, including health, education, transport, housing and recreation; and equity between generations, meaning that the future generations should not be disadvantaged due to the activities of the present generation. The social dimensions and indicators will further be elaborated under the section on “social dimensions”. For now, various definitions of social sustainability given by scholars based on their studies can be seen in Table 2.2.

Table 2.2 Social sustainability definitions evolved over time

Definitions	Authors
“The preservation of the planet and its ecosystems, society and its communities, for finest, equitable environmental and human health and wellbeing”	Hill (1998)
“Development that improves the quality of human life while living within the carrying capacity of supporting ecosystems”	IUCN WWF, UNEP, (1991)
“Social sustainability as a human code of conduct which needs to be achieved in an equitable, inclusive and prudent manner”	Lafferty and Langhelle (1999)
“Social sustainability of a city as: ‘Development and/or growth that is compatible with the harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population.’”	Polése and Stren (1999)
Social Responsibility is defined as “the continuing obligation by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families, local community and society at large”	WBCSD (2000)
“Social capital facilitates collective actions that are beneficial to the society”	Hobbs (2000)
According to Western Australian Council of Social Services (WACOSS, 2000), Social sustainability occurs when the formal and informal processes, systems, structures and relationships actively support the capacity of current and future generations to create healthy and livable communities. Socially sustainable communities are equitable, diverse, connected and democratic and provide a good quality of life.	WACOSS (2000)
“Social capital” is an important aspect of social sustainability, just as environmentalists describe “natural capital” to environmental	Robert (2001)

sustainability, and amenities.	
“A socially sustainable system must achieve fairness in distribution and opportunity and adequate provision of social services including health, education and gender equity and political accountability and participation”	Harris and Goodman (2001)
“Human health aspects are essential for the well-being of a society, but they should not be confused with environmental sustainability”	Wackernagel (2001)
“Sustainability is essentially an anthropocentric concept of inter- and intra-generational justice”	Grunwald (2004)
“Claiming the right to a dignified life to humans”	Littig and Griebler (2005)
According to Dillard et al. (2008) a working definition of social sustainability developed through seminars and workshops over a period: that social sustainability should be understood as A) The process that generates social health and well being now and in the future and B) Those social institutions that facilitate economic and environmental sustainability now and for future	Dillard et al. (2008)
The Organization for Economic Cooperation and Development (OECD) views social sustainability in two diverse dimensions: human and social. The human dimension refers to man’s skills, abilities knowledge and talents, which determines an individual’s performance in the labor market and is also relevant to the process of economic growth (OECD Insights, 2008) cited in Tracey & Anne (2008).	Tracey & Anne (2008)
Sustainable development comprises of ecological, social, cultural, political and economic capitals, may be expressed through human related activities in terms of perception and environment friendliness on the one hand, their balanced commitments to action, relationship and locality, on the other(PEARL)	Bilgin (2012)

Thus, having discussed social sustainability as touching upon various issues that fall under the ambit of “humanness”, we can arrive at a working definition of social sustainability as follows:

‘Social sustainability is all about addressing the social issues in today’s societies, facilitating a sustainable future for the future generations.’

Moreover, since this study focuses on the issues related to the supply chain, we further limit ourselves to the social aspects that are specifically related to the supply chain and have been discussed under the section on “social sustainability and supply chain”. Therefore, the next section will discuss the literature on supply chain management and the way supply chain management has evolved over time. In addition, it will also explore the supply chain performance metrics.

2.5 Supply Chain Management

The concept of supply chain management is well established in the literature. Supply chain generally refers to the arrangement of firms that bring products and services to the market (Lambert et al., 1998a). In laymen’s language, “supply chain” can be understood as ‘the process that involves everything to bring products from the farm to the fork’. The supply chain consists of the manufacturer, supplier, warehouses, transporters, wholesalers and retailers, and the customers. Any product traded in the commercial market undergoes a series of successive transactions from the raw material stage to the finished product stage. According to Chopra and Meindl (2007, p.3), ‘a typical supply chain consists of all the parties involved directly or indirectly in addressing the customer’s request. In an organisation, many functions are involved in fulfilling the customer’s request. These functions comprise product development, marketing operations, distribution, finance, and customer service’.

Similarly, Chen and Paulraj (2004) argue that ‘a typical supply chain is a network of materials, information and services, linked with the characteristics of supply, transformation and demand’. In the same vein, Ayers (2006) calls the supply chain the ‘life cycle processes comprising physical, informational, financial, and knowledge flows, whose purpose is to satisfy the end-user requirements with products and services from multiple linked suppliers’. This definition makes it clear that the supply chain encompasses the processes of sourcing, manufacturing, transporting and selling physical goods and services. It also gives us to understand that a supply chain has multiple linked suppliers with a large number of different configurations. These may vary from a small grocery supply chain to the large cannery fish supply chains. Before we get into a detailed

discussion on the supply chain management, however, we need to understand how the concept of supply chain management emerged. Therefore, the next section traces the evolution of supply chain management in the literature.

2.5.1 Evolution of supply chain management

Supply chain management was well conceptualised much before the 1950s in the form of military logistics. The logistics era before 1950 has been termed “dormant” years, and during these years logistics was considered a strategic function (Ballou, 1978). It was mainly concerned with the functions of procurement, maintenance and transportation of military facilities and the people. Later, in the 1960s the term “physical distribution and logistics” emerged (Heskett *et al.*, 1973). With the transformation in the logistics after the 1950s, the companies started recognising physical distribution as a separate organisational function (Heskett *et al.*, 1964). Later, the concept of supply chain management was introduced to the mainstream by two consultants (Oliver and Webber, 1992) and the stream of SCM was quickly added to the academia (Ellram and Cooper, 1990; Jones and Riley, 1987). It advocated the need for looking at SCM as a single entity, and for strategic decision making at a higher level to manage the chain in the original form.

SCM, since its introduction in the 1980s, has consistently gained popularity in the management circles in general (Oliver and Webber, 1982; La Londe, 1997). Due to the intense global competition in the 1990s, SCM continued to evolve in leaps and bounds, and the process is still going on (Handfield *et al.*, 1998). This is reflected in the enormous academic publications and articles in leading journals in the area of manufacturing, customer management, distribution, transportation, marketing, etc. The first book on SCM was published in 1992 (Christopher, 1994) and supply chain management gained a greater importance in the early 1990s in the automotive industry, retail networks, textiles and electronics. There were other forces, such as increased competition, the trend of outsourcing, development of IT and its integration with the business, and logistics service expansion, all of which contributed to the development of SCM. Thus, the term supply chain management (SCM) evolved over the years of the 1980s-90s to articulate the need for integration between the key business processes, beginning with the original supplier to the customer (Oliver and Webber, 1982).

Further, Drucker (1998) points out a paradigm shift in the management literature affirming that the businesses that successfully incorporate SCM will face a new kind of competition in the global market, whereby the competition between companies would be less important than the competition for the success of their supply chains. The objective of supply chain management is, first of all, to meet the customer demand by way of an efficient use of resources, which includes distribution capacity, labour and inventory. Secondly, it should match the supply with demand, and with less or minimum inventory. Another important aspect of supply chain management is to liaise with the suppliers and achieve a balance between the lowest material cost and transportation, by optimising the manufacturing flow through just-in-time (JIT) techniques, and identifying optimum location, factories and warehouses to target the customer markets and locations. To increase the efficiency, techniques such as vehicle routing analysis, dynamic programming and optimisation have been applied.

In fact, business management today is in the era of inter-network competition and the success of a business depends on the management's ability to effectively integrate its network of business relationships (Jain *et al.*, 2010). The first research paper in the field of SCM was on the National Health Service (Fernie and Clive, 1995). Later, Sampson (2000), and Kathawala and Khaled (2003) explored the application of supply chain management in the service industry. Going further, many other scholars extended the research on SCM to various industries, including automobile, education, oil, retail, etc. (O'Brien and Kenneth, 1996; Cigolini *et al.*, 2004; Lau, 2007).

The development of SCM continued through the 1990's as the organisations extended their best practices to their strategic suppliers and logistics functionaries in order to manage the corporate resources better (Tan, 2001). In today's competitive business environment, most of the manufacturers and retailers are finding it imperative to embrace SCM in order to improve the efficiency and effectiveness of the supply chain. Morgan and Monczka (1995) even advocate over-exploitation of the suppliers' technological capabilities by the manufacturers, in order to support new product development.

However, the separate evolution of supply chain and logistics has led to confusion between these two terminologies in the literature. Larsen and Halldorsson (2004) argues that the concept of SCM is not well defined. Cooper *et al.* (1997) also emphasise the necessity of research to define and

expand the boundaries of SCM. Nevertheless, there still are many satisfactory definitions of SCM given by various scholars.

Thus, Stock and Lambert (2001) define SCM as ‘the integration of key business processes from the end user through the original suppliers, that provide products, services and information that add value for the customers and other stakeholders’. Similarly, according to Christopher (1998), SCM is ‘the management of upstream and downstream association with the suppliers and customers, in order to deliver superior customer value at the minimum cost to the supply chain as a whole’. Yet another view of SCM defines it as ‘that part of the supply chain process that plans, implements and controls the efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption, in order to meet the customers’ requirements’ (Council of Logistics Management, 2000). Further, APICS dictionary defines SCM as ‘design, planning, execution, monitoring and control of the supply chain activities with the aim of creating absolute value, building a spirited infrastructure, leveraging worldwide logistics, synchronising supply with demand and measuring performance globally’.

In the supply chain literature, five important periods in the evolution of SCM can be noted. These are creation, integration, globalisation, specialisation phase one and two, and SCM-2 (Lavassani *et al.*, 2008). The first, i.e. the creation era, discusses the development of SCM, including the requirement of large scale changes in engineering and cost reduction programmes that resemble the Japanese style of management. The second era of integration, which coincides with the development of information technology, is witness to the introduction of electronic data exchange (EDI) systems which can support SCM, followed by the Enterprise Resource Planning (ERP) systems. Two significant changes took place in this period, i.e. value addition and cost reduction through integration.

The third period of globalisation is characterised by global supplier relationships and expanded supply chains across national boundaries and continents. This period of the development of SCM is attributed mainly to the requirement of enhancing the competitive advantage through value addition and cost reduction by way of global sourcing. The fourth period, i.e. specialisation phase one and two, is very crucial in the evolution of supply chain management as companies began to focus on their core competencies and started abandoning the non-core operations in this period, outsourcing these to other companies. This impacted the supply chain models by expanding the

supply chain operations across the specialised supply chain partnerships. This is seen as a transition period whereby the companies re-focused and re-analysed their fundamental perspectives. In this era, multiple supply chains emerged that were product-, design- and customer-specific in nature.

Finally, during the current period of SCM-2, SCM has seen developments such as introduction of transportation brokerage, warehouse management and non-asset based carriers. The period is dominated by the market forces that require readiness for change on the part of the suppliers, logistics providers, locations and customers at any time. To sum up, the supply chain is a very complicated structure making it imperative for the organisations and companies to have a good understanding of its processes and demands, in order to achieve the optimum results. To understand these complex structures better, many authors have advanced various definitions, as mentioned in the following section.

2.5.2 Definitions and models of SCM

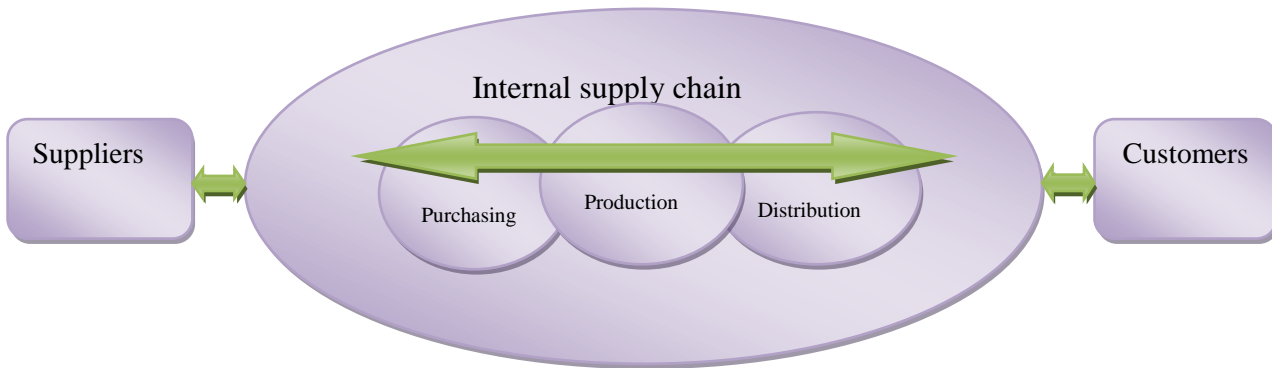
As discussed in the previous sections, the supply chain comprises many activities and processes pertaining to the flow of goods and information from the raw material stage to the end customer stage. According to Handfield and Nichols (2003), supply chain is an integration of the activities and processes among the members of the chain, frequently referred to as supply chain management. Further, according to Waters (2011), supply chain management or logistics is the function responsible for the storage and transport of materials on their journey from the original suppliers through the intermediate operations to the final customer. Russel and Taylor (2008) aver that the faculty of supply chain management is instinctive to manage the flow of products, information and services across the network of supply chain partners and customers.

The field of supply chain management has gone through various changes and extensions since its introduction in the early 1980s. Many scholars attribute the foundations of SCM to the historical evolution of logistics. Many authors even consider SCM and logistics synonymous with each other. However, Hugos (2006) argues that logistics is responsible for the movement of materials within the boundaries of a single organisation, whereas the supply chain takes a broader view of the movement through all the related organisations that are part of the chain. In addition, the supply chain acknowledges the activities including the traditional logistics, marketing, new product development, finance and customer service (Hugos, 2006).

In their endeavour to clear the confusion between logistics and supply chain management, Larson and Halldorsson (2004), in their research, identify four different views. The first, i.e. the traditionalist view, considers SCM as a part of logistics. On the contrary, the second, i.e. re-labelling, argues that what was logistics earlier is SCM now. The third, i.e. the unionist view, also sees logistics as a part of SCM, but limits the logistics function to one of the business processes. Finally, the fourth, i.e. the intersection view, suggests that SCM should be looked at in a broader sense. According to this view, SCM is placed at the intersection of the processes responsible for the strategic and tactical decisions, while logistics covers the operational decisions.

A similar research conducted by Ballou *et al.* (2000) suggests three dimensions of SCM: Intra-functional, i.e. the management of activities within the logistics function of the company; inter-functional, which refers to the coordination of the functions of various functional areas of the organisation; and inter-organisational, which includes the coordination of the activities of different or distinctive companies. Thus, the literature, as a whole, suggests that the supply chain management consists of many different entities and functions. It includes companies that exist all along the flow of the goods and services from the supplier to the end customer, and an effective management of these activities is considered to be the key element of SCM. Over three decades, SCM has been explored by various scholars, academicians and practitioners, who have brought out several different perspectives. We synthesise these perspectives and trace their evolution in Table 2.3.

Figure 2.2 A typical company’s supply chain



Source: adopted from Lambert *et al.* (1998), Chen and Paulraj (2004a)

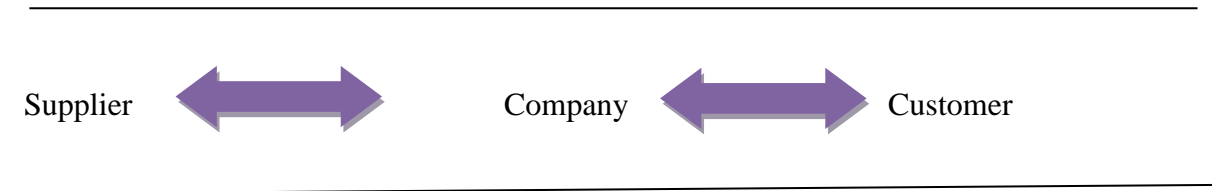
Table 2.3 List of definitions of supply chain management

<p>“Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption.”</p>	<p>Oliver and Webber (1982).</p>
<p>Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and stakeholders.”</p>	<p>Lambert et al. (1998, p.1),</p>
<p>“Supply chain management encompasses materials/supply management from the supply of basic raw materials to final product (and possible recycling and re-use).Supply chain management focuses on how firms utilise their suppliers' processes, technology and capability to enhance competitive advantage.”</p>	<p>Tan et al. (1998)</p>
<p>Supply chain (sometimes called the value chain or demand chain) management consists of firms collaborating to leverage strategic positioning and to improve operating efficiency. For each firm involved, the supply chain relationship reflects strategic choice. A supply chain strategy is a channel arrangement based on acknowledged dependency and relationship management. Supply chain operations require managerial processes that span across functional areas within individual firms and link trading partners and customers across organizational boundaries.”</p>	<p>Bowersox et al., (2002)</p>
<p>“Supply Chain Management is the systemic, strategic coordination of the traditional business function and tactics across these business functions within a particular company and across business within the supply chain, for the purpose of improving the long term performance of the individual companies and the supply chain as a whole.”</p>	<p>Sweeney (2007)</p>

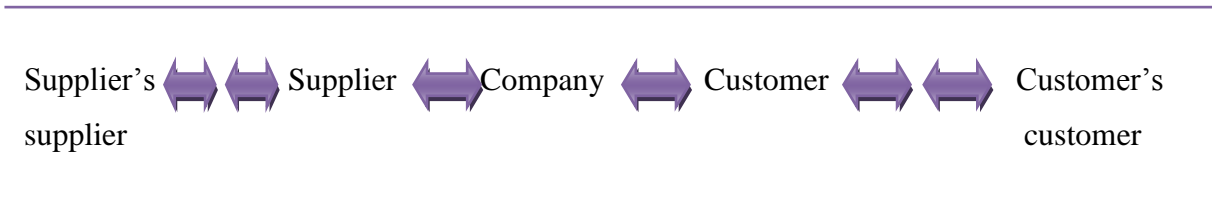
<p>“Supply Chain Management consists of developing a strategy to organize, control and motivate the resources involved in the flow of services and materials within the supply chain.”</p>	<p>Krajewski et al. (2007)</p>
<p>Supply Chain Management is the active management of supply chain activities and relationships in order to maximize customer value and achieve a sustainable competitive advantage.”</p>	<p>Bozarth and Handfield (2008)</p>
<p>“Supply Chain Management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantity, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements.”</p>	<p>Simchi-Levi et al. (2008)</p>
<p>“Supply chain management is the integration of trading partners’ key business Processes from initial raw material extraction to the final or end customer, including all intermediate processing, transportation and storage activities and final sale to the end product customer.”</p>	<p>Wisner et al. (2012)</p>

Figure 2.3 Types of channel relationships

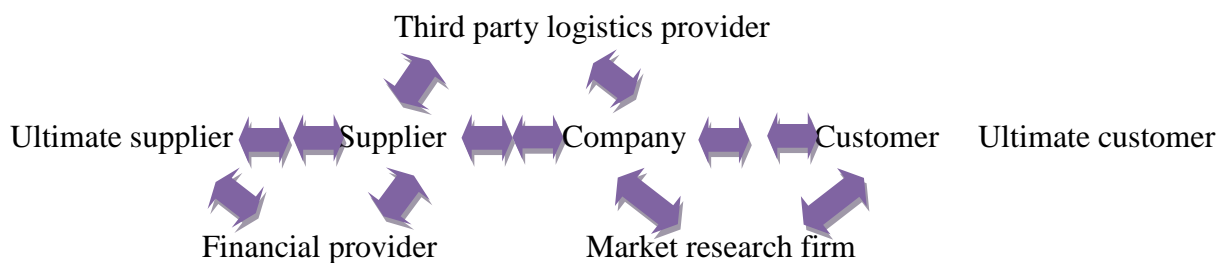
Supply Chain-Direct



Supply Chain-Extended



Supply Chain-Ultimate



Source: Mentzer et al. (2001)

In addition to the above definitions that have evolved over a period of 30 years, there are a few notable definitions widely accepted in the academic circles. Thus, according to the Council of Supply Chain Management Professionals (CSCMP), 'supply chain management encompasses the

planning and management of all the activities involved in sourcing and procurement, conversion, and all logistics management activities'. Similarly, the Association for Operations Management (APICS) defines it as 'the design, planning, execution, control and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, synchronising supply with demand, and measuring performance globally'.

2.5.3 Supply chain performance metrics

The role of performance measurement system (PMS) is vital in business, as it provides the information required for making decisions and taking actions. As Kaplan and Norton (1992) assert, 'no measures - no improvement'. Moreover, they emphasise measuring the right things at the right time in the supply chain, so that the necessary action can be taken at the appropriate time. Good performance measures and metrics help in facilitating a transparent atmosphere for the people which, in turn, leads to a more congenial work culture and improves the organisational performance. Performance measurement can be defined as the process of quantifying the effectiveness and efficiency of action (Neely *et al.*, 1995; Rameshwar *et al.*, 2015). Effectiveness refers to the extent to which the customer requirements are met, while the efficiency measures how economically a company's resources are used to provide a specified level of customer satisfaction. There have been numerous approaches to performance measurement (Neely *et al.*, 1995) which include the balance scorecard (Kaplan and Norton, 1992), performance measurement questionnaires (Dixon *et al.*, 1990), performance measurement matrix (Keegan *et al.*, 1989), and some of the computer aided manufacturing approaches.

Most of the literature pertaining to performance measurement can be classified into three categories, i.e. operational, design and strategic (Huang *et al.*, 2004). The operational studies focus on the improvement of performance of the supply chain (Smith *et al.*, 2005), whereas the design studies aim at optimising the performance through supply chain re-design (Wu, 2005; Chen *et al.*, 2005). Strategic studies, on the other hand, dwell on the ways in which the supply chain can be aligned with the firm's strategic objectives (Balasubramanian and Tewary, 2005). Yet another aspect of the supply chain measurement emphasises the adoption of a systematic approach to performance measurement. These can be the modern management approaches, such as just-in-time, quality management, and information technology approaches (Flynn and Flynn, 2005; Green and Inman, 2005).

There is a vast amount of research on the supply chain performance measurement metrics and systems, carried out by a large number of scholars. These are Artz (1999), Maloni and Benton (1997), Beamon (1999), Cachon and Lariviere (1999), Ramdas and Spekman (2000), Stephens (2001), Van Hoek (2001), Bourne *et al.* (2000, 2002), Webster (2002), Talluri and Sarkis (2002), Lai *et al.* (2002), Dasgupta (2003), Li *et al.* (2005a, 2005b), Chan (2003), Chan and Qi (2003), Windischer (2003), Chen and Paulraj (2004), Windischer and Grote (2003), Gunasekaran *et al.* (2001, 2004), Huang *et al.* (2004, 2005), Fynes *et al.* (2005a,b), and Wang *et al.* (2004, 2005). However, although there is an abundance of performance measures in the literature, formal grouping has not been done owing to the differences among scholars. Although there have been a few attempts made recently to systematically group the performance measures, there is still a lack of consensus over the most appropriate way to categorise them. Thus, the literature does not point to any clear opinion among the researchers over this issue, and so, a few of the attempts made to categorise these measures are summarised in Table 2.4.

Table 2.4 Performance measures in the supply chain management

S.No	Category of performance measures	Relevant literature
1	Balance score card perspective	Kaplan and Norton (1992)
2	Identifies under qualitative or quantitative perspectives	Beamon (1999), Chan (2003)
3	Based on cost and non-cost parameters	Gunasekaran et al.(2001), De Toni and Tonchia(2001)
4	Parameters such as quality, cost, delivery and flexibility	Schoˆnsleben (2004)
5	Cost, quality, flexibility, trust and innovativeness, resource utilization, and visibility	Chan(2003)
6	Under resources, outputs and flexibility	Beamon(1999)

7	Groups parameters in terms of supply chain collaboration efficiency, coordination efficiency, and configuration;	Hieber (2002); Jain and Dubey (2005)
8	Input , output and composite measures	Chan and Qi(2003)
9	Based on strategic, operational or tactical focus	Gunasekaran et al. (2001)
10	Based on supply chain related process	Chan and Qi (2003), Huang et al. (2004), Li et al. (2005b), Stephens (2001).

The purpose of performance measurement system is to provide the managers with adequate information to address the issues, such as the status of finance, internal customer processes, innovation and improvement (Kaplan and Norton, 1992). A widely used measurement system is the balance score card method (BSC), providing a strategic perspective with clear mission, appropriate metrics and suitable targets. Many scholars have suggested various measures for supply chain performance. For instance, Globerson (1985) advocates that performance criteria should be primarily based on the company's core objectives, they should be comparable with those of the similar organisations that use similar criteria, and the data collection and calculation methods should be ratio-based, rather than absolute number-based.

According to Maskell (1989), there are seven principles of performance measurement systems: 1) the performance measures should be oriented to the firm's strategy; 2) adoption of non-financial measures should be encouraged; 3) the measures should be location specific; 4) they should be flexible and amenable to change with the circumstances; 5) they should be easy and simple to use; 6) they should provide feedback; and 7) they should stimulate continuous improvement.

The literature reveals several metrics for performance measurement in the SCM system (Gunasekaran *et al.*, 2004, 2005; Folan and Browne, 2005; Fynes *et al.*, 2005; Bendavid *et al.*, 2009; Gunasekaran *et al.*, 2015). However, there have been few efforts to identify the minimum number of metrics that should be used in measuring the SCM system. Neeley *et al.* (1995) suggest

various categories of performance measures including time, quality, cost and flexibility. Weber (2002) discusses a model that provides for both the need for agility and an agile organisation by analysing the sources of variance in the supply chain systems. Bagchi (1996) advocates the supply chain metrics in four categories, i.e. time, quality, cost, efficiency and diagnostic measures, and uses them in selected companies to compare their competitiveness.

Further, Kaplan (1990) has grouped many performance measures used by a large computer supplier into eight items with 3-8 measures for each. Many other researchers, including Garvin (1987), Stalk (1988) and Schonberger (1990), have also discussed generic performance measurement terms, such as quality, time, cost and flexibility. Further, Fitzgerald *et al.* (1991) argue that there are two basic types of performance measures. The first relate to results and include competitiveness and financial performance, while the second determine results and comprise quality, flexibility, resource utilisation and innovation. In yet another study, Stewart (1995) has developed a causal model pertaining to the use of the best practices (performance) with four objectives: flexibility, reaction time, cost and quality. A comprehensive list of performance metrics in the literature available till now has been given in Table 2.5.

Table 2.5 Comprehensive list of supply chain performance metrics

Supply chain stages	Measures	Literature	Cost (C)	Time (T)	Quality (Q)	Flexibility (F)	Innovativeness	Quantitative	Qualitative
Plan	Sales , Profit, Return on investment (ratio of net profits to total assets), Rate of return on investment, Net profit vs. productivity ratio, Information carrying cost, Variations against budget, Total supply chain management costs, Cost of goods sold, Asset turns, Value added productivity, Overhead cost,	Gunasekaran et al. (2001) Beamon (1999) SCOR level 1 metrics Chan (2003) VDI guidelines (association of	√ √ √ √ √ √					√ √ √ √ √ √	

	intangible cost, Incentive cost and subsidies, Sensitivity to long term costs, Percentage sales of new product compared to whole sales for a period, Expansion capability, Capital tie up costs	engineers)	√					√	
	Total supply chain response time	Gunasekaran et al. (2001)		√				√	
	Total supply chain cycle time	Beamon (1999)		√				√	
	Order lead time	SCOR level 1 metrics		√				√	
	Order fulfillment lead time	Chan (2003)		√				√	
	Customer response time	VDI guidelines		√				√	
	Product development cycle time	(association of engineers)		√				√	
	Total cash flow time	Hieber (2002)		√					√
	Cash to cash cycle time			√					
	Horizon of business relationship			√				√	
	Percentage decrease in time to produce a product			√				√	
	Fill rate (target fill rate achievement & average item fill rate), Order entry methods	Gunasekaran et al. (2001)			√			√	
	Accuracy of forecasting techniques	Beamon (1999)			√			√	
	Autonomy of planning	SCOR level 1 metrics			√				√
	Perceived effectiveness of	Chan (2003)			√				√

	departmental Relations Order flexibility Perfect order fulfillment	Hieber (2002) Ellinger (2000)			√		√	
	Mix flexibility New product flexibility	Beamon (1999) Chan (2003)				√	√	
	Number of new products launched Use of new technology	Chan (2003)					√	√
Source	Supplier cost saving initiatives Percentage of late or wrong supplier delivery Supplier lead time against industry norm Supplier's booking in procedures Purchase order cycle time Efficiency of purchase order cycle time Buyer-supplier partnership level Level of supplier's defect free deliveries Supplier rejection rate, Mutual trust, Satisfaction with	Gunasekaran et al. (2001) Gunasekaran et al. (2001) Gunasekaran et al. (2001) Hieber (2002) Sperka (1997)	√ √ √ √ √ √ √ √ √ √				√ √ √ √ √ √ √ √ √ √	√ √ √

progress,		√				√
scrap level, finished goods in transit)		√				√
Inventory cost, Inventory turnover ratio, Inventory flow rate, Inventory days of supply,	Gunasekaran et al. (2001)	√				√
Economic order quantity,	Beamon (1999)	√				√
Effectiveness of master production schedule, Number of items produced, Warehouse costs, Stock capacity, Inventory utilization,	SCOR level 1 metrics	√				√
Stock out probability,	Chan (2003)	√				√
Number of backorders, Number of stockout, Average backorder level, Percentage of excess/lack of resource within a period, Storage costs per unit of volume, Disposal costs.	Chan and Qi (2003)	√				√
Planned process cycle time, Manufacturing lead time, Time required to produce	VDI guidelines (association of engineers)					
a particular item or set of items,	Gunasekaran et al. (2001)		√			√
Time required to produce new product mix,	Beamon (1999)		√			√
	Chan (2003)		√			√
	Beamon (1999)		√			√
Production flexibility, Capacity flexibility, Volume flexibility,	SCOR level 1 metrics				√	√
					√	√

	Number of tasks worker can perform., Inventory range.	Chan (2003)			√	√			
	Inventory accuracy, Percentage of wrong products manufactured.	Schoönsleben (2004)			√			√	
		Chan (2003)						√	
		Chan and Qi (2003)							
Deliver	Total logistics costs, Distribution costs, Delivery costs, Transport cost, Transport costs per unit of volume, Personnel costs per unit of volume moved, Transport productivity, Shipping errors, Delivery efficiency, Percentage accuracy of delivery	Gunasekaran et al. (2001)	√					√	
		Beamon (1999)	√					√	
		Chan (2003)	√					√	
		VDI guidelines (association of engineers)	√					√	
		Chan and Qi (2003)		√				√	
	Delivery lead time, Frequency of delivery, Product lateness, Average lateness of orders, Average earliness of orders, Percent of on time deliveries.	Gunasekaran et al. (2001)				√		√	
		Beamon (1999)				√		√	
		VDI guidelines (association of engineers)				√			√
	Delivery performance, Delivery reliability, Number of on time deliveries,					√			√
	Effectiveness of distribution planning schedule, Effectiveness of delivery invoice methods,	Gunasekaran et al. (2001)				√			√
	Driver reliability for performance,	Beamon (1999)						√	

	Quality of delivered goods, Quality of delivery documentation, Achievement of defect free deliveries, Delivery flexibility, Responsiveness to urgent Deliveries, Transport flexibility.	SCOR level 1 metrics Chan and Qi (2003) Schoˆnsleben (2004) Gunasekaran et al. (2001) Beamon (1999) Chan and Qi (2003)						√ √	
Return	Warranty or returns processing costs	SCOR level 1 metrics	√						
Custo mer Satisfa ction	Customer query time Customer satisfaction (or) Dissatisfaction, Level of customer perceived value of product, Customer complaints, Rate of complaint, Product quality. Flexibility of service systems to meet particular customer needs	Gunasekaran et al. (2001) Beamon (1999), Chan (2003) Gunasekaran et al. (2001) Beamon (1999), Chan and Qi (2003), Schoˆnsleben (2004). Gunasekaran et al. (2001)		√				√ √ √ √ √ √	√ √ √ √ √

Source: Shepherd and Gunter (2006)

Based on the changing enterprise environments, many researchers have proposed new performance measures. However, there is still confusion over their relative importance and applicability to the SCM systems. For instance, Basu (2001) discusses five emerging metrics including external, value-based competition, consumer, network performance and intellectual. Stewart (1995), on the other hand, suggests that the better performing companies are found to have better qualities in four key operational areas, i.e. flexibility and responsiveness, logistics costs, delivery performance and asset management. Similarly, Chan and Qi (2003) identify six core processes, including supplier, inbound logistics, outbound logistics, manufacturing, marketing and sales, end customer, and present input and output measures for all these processes.

Further, the champions of supply chain operations reference model (SCOR) suggest that the supply chain performance needs multiple levels of assessment, and assign them to five different categories of metrics, i.e. reliability, responsiveness, flexibility, cost, and efficiency indicators (Stephens, 2001; Huang *et al.*, 2004; Lockamy and McCormack, 2004; Li *et al.*, 2005b). The complexity of the supply chain makes collating and outlining the performance metrics an onerous task. Nevertheless, Table 2.5 presents performance metrics outlined according to the process identified in the SCOR model, i.e. plan, source, make, deliver or return. These metrics have also been grouped on the basis of whether they measure cost, time, quality, flexibility or innovativeness, and whether they are qualitative or quantitative.

The measures identified in Table 2.5 substantiate Beamon's (1999) argument that they remain unbalanced, focussing on cost measures (42%), and non-cost measures, including quality (28%), flexibility (10%), time (19%) and innovativeness (1%). Moreover, there are very few measures pertaining to the process of return or customer satisfaction (5%), when compared to the other aspects of the supply chain process. Secondly, the majority of the metrics are quantitative rather than qualitative. A few scholars even observe that these measures are very much related to the internal logistics performance measures, and do not capture the performance of the supply chain as a whole (Lambert and Pohlen, 2001).

In fact, the performance measurement systems have attracted perhaps the most wide-ranging criticism in the literature (Neeley *et al.*, 1995). Some of the points raised are: these measures have

no relation with strategy (Beamon, 1999; Gunasekaran *et al.*, 2004); they focus too much on cost over the non-cost measures (Beamon, 1999; De Toni and Tonchia, 2001); they do not focus on the customers and competitors (Beamon, 1999); they encourage local optimisation and loss of the supply chain context, and they have no system thinking (Chan, 2003; Chan and Qi, 2003). However, of late, some researchers have attempted to address these limitations by designing a balanced performance measurement system. The most well-known and widely accepted of these is the supply chain operation reference (SCOR) model. This was first developed by the Supply Chain Council in 1997 and is recognised as a systematic approach for evaluating and monitoring the supply chain performance (Stephens, 2001).

Having discussed the performance measures, we now explore social sustainability and the ways in which it has been practiced in the supply chain, in the next section.

2.6 Social sustainability and supply chain

Social sustainability is of paramount importance in the supply chain of manufacturing industry because of the increased awareness, on the part of the stakeholders, of not only “where” the products are made but also “how” and “in what conditions” they are produced (McCarthy *et al.*, 2010). Though this creates somewhat undesirable situations due to the increased costs for the corporates, the benefits for the human capital and its importance in terms of the strategic advantages for the firm have been proved beyond doubt through researches (Barney, 1986b; Peteraf, 1993, Sushil, 2015). Social and environmental problems do not stop at the gates of one company, but need to be taken into account along all the supply chains as the materials and information flow across the entities (Seuring and Muller, 2008a; Gunasekaran *et al.*, 2014).

Dao *et al.* (2011) have created a sustainability framework and demonstrated the adoption of good human resource measures and its impact on sustainability in the supply chain. Hence, it can be said that the corporates in the modern times understand the social issues and attempt to find different ways of integrating the human and social aspects into the supply chain. In operations and supply chain management, according to Wood (1991), the socially sustainable practices can be defined as the product and process aspects that determine human safety, welfare and wellness (Klassen and Vereecke, 2012). To understand the concept better, there is a need to elaborate how these human and social issues are managed in the supply chain, affecting the sustainability of the firm. According to Wood (1991), Mani *et al.* (2015b), we need to explore three fundamental questions in

this regard: 1) Whom to target? 2) What issues to address? 3) And how these issues can be addressed?

The answer to the first question is provided by the stakeholder theory which addresses all the stakeholders in the supply chain, including the suppliers, employees, society, NGOs and customers (Freeman, 1984; Stieb, 2009; Campbell, 2007; Sushil, 2014). Yet another research arrives at a similar view, seeing social responsibility as an organisation's ability to manage its stakeholders (Waddock and Bodwell, 2004; Clarkson, 1995). As for the second question, many scholars have identified various issues related to the people in the manufacturing supply chain. For instance, Emmelhainz and Adams (1999) point out human rights and working conditions of the labourers. Another study conducted in the US emphasises health and safety, diversity, philanthropy, human rights and ethics in the supply chain (Carter and Jennings, 2002a, 2002b, 2004). However, this research also acknowledges that ethics cannot be used as a social sustainability dimension in the supply chain.

Nevertheless, a later study by Lu *et al.* (2012) emphasises ethics as one of the important social dimensions of corporate sustainability. Tsuda and Takaoka (2006) propose a comprehensive "gross social feel good" (GSF) index for sustainability. The GSF index consists of six components, namely safety, health, environment, comfort and health. Similar research by many scholars insist on various human issues, such as safety, health, diversity, working conditions, child and bonded labour, and poverty in the supply chain (Whooley, 2004; Carter, 2005; Maloni and Brown, 2006; Kortelainen, 2008; Vachon and Mao, 2008; Andersen and Skjoett-Larsen, 2009). Moreover, some scholars have also identified the criteria for fair and equitable treatment, like human rights, child and forced labour, training, employment and wages, as issues in the supply chain (Pagell and Wu, 2009).

Dreyer *et al.* (2005) assess the impact of products and services on the people, specifically in terms of health, human dignity and basic needs fulfilment, using the life cycle assessment method (Husbands and Dey, 2002; Dey, 2005; Barki and Aguiar, 2013). Ciliberti *et al.* (2008), using the logistics social responsibility (LSR) taxonomy, also identify and list various issues pertaining to the supply chain, including diversity, human rights, safety and philanthropy. In addition to the above research, Hutchins and Sutherland (2008), through their life cycle analysis, identify equity, healthcare, safety, philanthropy and their relationship with the country's financial performance.

Similarly, Vachon and Mao (2008) investigate the potential links between the supply chain characteristics and sustainable development at the country level, and prove how the strengthening of the supply chain characteristics (social and economic) can enhance the GDP of the country.

The research on the Brazilian and Chinese retailers by Gunasekaran and Spalanzani (2012), Delai and Takahashi (2013), and Kolk *et al.* (2010) have yielded various social parameters and revealed their importance in achieving social sustainability (Sebastiani *et al.*, 2014; Irani *et al.*, 2015). In Canada, Morali and Searcy (2013) identify ethics, health and human rights as the social sustainability indicators in the supply chain. Similarly, other qualitative research under various domains conducted by Andersen and Larsen (2009), Gopalakrishnan *et al.* (2012), and Mani *et al.* (2015b) discuss various social dimensions, such as equity, safety, health, philanthropy, housing, education, wages and their relationship with the social sustainability of the organisation.

Thirdly, as far as the question of addressing social issues is concerned, many scholars have discussed various ways and means to tackle the supplier side social issues. Some of them argue that the incorporation of the social issues in the supplier selection and development process can help reach social sustainability in the upstream supply chain (Krause *et al.*, 2007, 2009; Bai and Sarkis, 2010; Mani *et al.*, 2014). Similarly, Gold *et al.* (2010) assert that the partner-focused supply management capabilities develop the corporate core competencies, as competition shifts from an inter-firm level to an inter-supply chain level. The “collaborative paradigm” in the supply chain management regards the strategic collaboration as a crucial source of competitive advantage (Wamba, 2012). Yet another view is that socially responsible organisational buying can help achieve sustainability, and socially responsible organisational buying can be possible only through skilful policy entrepreneurship in a favourable organisational climate (Drumwright, 1996; Carter *et al.*, 1999; Maignan and Ralston, 2002).

However, some writers suggest that fair trade principles and their adoption can lead to social sustainability in an organisation. For example, Goworek (2011), through a case study, demonstrates how the adoption of fair trade principles can lead to sustainability in the clothing industry. In the operation and supply chain management literature, many CSR theories suggest the adoption of various methods, including: 1) corporate citizenship (Maignan *et al.*, 1999); 2) meeting customer needs through CSR (Luo and Bhattacharya, 2006); 3) corporate social responsibility

activities (McWilliams and Siegal, 2000); and flexible human resource practices (Sushil *et al.*, 2016), to achieve sustainability in manufacturing.

Dyllick and Hockerts (2002), by defining corporate sustainability as ‘meeting the needs of a firm’s direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities, etc.), without compromising its ability to meet the needs of the future stakeholders as well’, imply that corporate sustainability can be achieved by addressing the needs of all the stakeholders. They further emphasise the importance of the human and societal capital in achieving social sustainability for a firm. Labuschagne *et al.* (2005) point out practices related to poverty alleviation, administering justice, human rights and welfare of all the employees in the supply chain as essential to social sustainability. Leire and Mont (2010) also enumerate social issues, such as reduction in unemployment, protecting employees’ health and safety, ensuring equal treatment and preventing social exclusion, and explain how these dimensions can be linked and incorporated into the supply chain. Hutchins and Sutherland (2008), on the other hand, discuss issues, such as equity, healthcare, safety and philanthropy, through their life cycle analysis and assert that there is a significant relationship between social sustainability and the country’s economic performance (US).

Finally, many authors, through various studies, have discussed the question of how social issues can be addressed in the supply chain. One way is to incorporate these parameters in the corporate buying process, known as socially responsible buying (SRB). SRB refers to the incorporation of social issues in purchase decisions by the organisational stakeholders (McWilliams and Siegel, 2001). Carter and Jennings (2002a, 2002b, 2004) and Ciliberti *et al.* (2008) describe the role of purchasing managers in the area of social responsibility within the supply chain, and show how the enactment of these roles could lead to improved trust and supplier commitment through purchasing social responsibility (PSR) and logistics social responsibility (LSR).

A later research conducted by Leire and Mont (2010) indicates how the social criteria could be used to monitor the suppliers and ensure their compliance. Bai and Sarkis (2010) as well as Mani *et al.* (2014) have also demonstrated the use of social parameters in supplier selection. This means that incorporating social parameters in the evaluation and selection of suppliers can lead to social sustainability of the organisation. Goworek (2011) emphasises socially responsible and environmentally sustainable sourcing practices, and describes how they could be applied to the

clothing industry. Socially responsible supplier development (SRSD) and its importance in measuring the buyers' sustainability as well as the relationship between social sustainability and supplier development efforts has also been established by Lu *et al.* (2012) in their research conducted in China. Klassen and Vereecke (2012) point out the importance of practices like collaboration, monitoring and innovation in the supply chain, and demonstrate how they help in achieving social sustainability.

Yet some other studies argue for the use of sustainability measures at customer locations and their relationship with the overall performance of the organisation (Gunasekaran and Spalanzani, 2012). In addition to these, many scholars, in their studies, have explored and proposed different forces enabling social sustainability. Notably, Clarkson (1995), Strong (1997), McWilliams and Siegel (2001), Campbell (2007) and Ehr Gott *et al.* (2011) advocate, through empirical research, parameters like customer requirements, stakeholder requirements, employee requirements, skilful policy entrepreneurship, and economic status of the organisation for an effective incorporation of social sustainability. On the other hand, Tate *et al.* (2010) identify institutional pressure as a major driving force for the companies to behave in a socially responsible manner. Thus, on the whole, the literature on the subject suggests that social sustainability in the supply chain is concerned with how organisations manage social issues, such as equity, philanthropy, labour rights, safety, health, wages, employment, housing and ethics in the supply chain.

To summarise, studies on supply chain social sustainability were rather limited till recently, compared to the other dimensions of sustainability. Seuring and Muller (2008b), in their literature review comprising 191 research papers published between 1991-2007, point out that most of these studies focused on the environmental/green aspects while research on social aspects were rare. Yet another literature review carried out by Carter and Easton (2011) affirms the scantiness of the studies related to social sustainability in the supply chain literature, and proposes a sustainability framework consisting of the environmental performance, economic performance and social performance, insisting on the adoption of sustainable practices for the long-term survival and profitability of firms. This view is again supported by a systematic review, conducted by Ashby *et al.* (2012), of the literature pertaining to the period 1983-2012. This review found only 27 research papers focusing on social sustainability, and the majority of them were either conceptual or case-based. In addition, it also pointed out that most of these studies were conducted in the developed,

Western countries and were scant in the developing countries, such as India and other countries of Asia.

Therefore, it should be remembered here that the social issues identified in the discussions above have all been the result of research conducted in the Western countries. However, social issues vary from one geographic location to the other, based on the societal values which develop over a period of time. Similarly, the enabling factors (antecedents) too vary based on the country's social dynamics, and are highly contextual in nature. Therefore, the next section will discuss the antecedents and impediments to the adoption of social sustainability in the developing countries.

2.6.1 Antecedents and impediments to social sustainability

Another aspect of social sustainability in the supply chain is concerned with what enables the adoption of social sustainability. Several scholars have identified the ways and means of integrating the social parameters into the supply chain. For example, Drumwright, (1994) asserts that the socially responsible organisational buying depends on two factors: first, the skilful policy entrepreneurs who institute new policies with zeal for social wellness in their policy decisions, and second, the organisational context in which the decisions are made. There have been many studies focusing on how social sustainability can be achieved if the corporates act responsibly in their roles. Drumwright (1994), Clarkson (1995), Strong (1997), McWilliams and Siegel (2001) and Campbell (2007), along with Ehr Gott *et al.* (2011), argue that various parameters, such as customer requirements, stakeholder requirements, employee requirements, skilful policy entrepreneurship, economic status of the corporates, and public and private regulations influence the adoption of social sustainability (Table 2.6). Mani *et al.* (2015a) have established many new enablers for social sustainability adoption in the emerging economies, which include the awareness of social sustainability, social organisations' pressure, pressure from employee unions, investors' pressure, and the financial status of the company.

There are many enablers as well as barriers which can lead to social sustainability adoption in the manufacturing supply chain, or hinder it. These are explained in the next section with the help of Table 2.6.

Table 2.6 Antecedents to social sustainability adoption in the supply chain

S. NO	Antecedents	References
1	People oriented organisation culture	Carter and Jennings(2000, 2002b), Miao et al. (2012)
2	Top Management leadership or skilful policy entrepreneur	Drumwright (1994),Carter and Jennings(2000, 2002b), Ehrgott et al. (2011), Mani et al. (2015a); Dubey et al. (2015b)
3	Government regulation	Carter and Jennings(2000, 2002b), Aguilera et al. (2007), Campbell (2007), Ehrgott et al. (2011), Miao et al. (2012),Mani et al. (2015a)
4	Customer pressures	Carter and Jennings(2000, 2002b), Ehrgott et al. (2011), Miao et al. (2012), Mani et al. (2015a), Dubey et al. (2015b)
5	Individual values	Carter and Jennings(2000, 2002b)
6	Pressure from employee union	Aguilera et al. (2007), Campbell (2007), Mani et al. (2015a)
7	Direct incentives	Mani et al. (2015a)
8	Awareness on social sustainability	Mani et al. (2015a)
9	Stakeholders pressure	Aguilera et al. (2007), Campbell (2007), Mani et al. (2015a), Miao et al. (2012)
10	Competitive pressures	Campbell (2007), Mani et al. (2015a)
11	Social concerns	Mani et al. (2015a)
12	International certifications	Mani et al. (2015a)

13	Shareholders pressure	Mani et al. (2015a)
14	Ability to spend(Financial status)	Bansal(2005),Campbell (2007), Mani et al. (2015a)
15	Social organisations pressure	Bansal(2005),Campbell (2007), Mani et al. (2015a)

Source: Adopted from Mani et al. (2015)

2.6.2 Antecedents to social sustainability adoption in the supply chain

a) *Awareness of social sustainability*

Awareness of socially sustainable activities can act as a key factor to accelerate social sustainability (Haugh and Talwar, 2010; Maloutas, 2003). If the manufacturing companies are aware of the social sustainability parameters and their relevance to the social capital development, this may help in the adoption of social sustainability in the supply chain.

b) *Competitive pressure*

In the modern economy, companies are always conscious of their competitors' actions, and this may potentially strengthen their capabilities. The social measures adopted by the competitors may force other companies to adopt similar measures for sustainability (Lamming and Hampson, 1996; Sarkis, 2003; Zhu and Sarkis, 2006; Carter *et al.*, 2000; Rao and Holt, 2005). This is because it is important for the companies to have resources and capabilities which cannot be imitated by their competitors, in order to gain competitive advantage. Rao and Holt (2005) also assert a positive relationship between sustainable measures and competitive advantage.

c) *People oriented organisational culture*

Organisational culture can be defined as a set of values, beliefs, assumptions and ways of thinking shared by the organisation's members, and taught to the new members of the organisation (Barney, 1986b, Chapman and Jehn, 1994; Wiener, 1988). This means that the organisational culture influences the work behaviour. Similarly, research has established the relationship between culture and the organisation's success. Carter and Jennings (2000) have studied this aspect and proved that it helps in the adoption of social sustainability.

d) *Customer requirements*

In manufacturing, many companies are expected to comply with the customer requirements because of their inter-dependence and economic relationship with the customers. Many studies have proved the importance of these requirements and the necessity of complying with them while developing socially sustainable suppliers, as well as their impact on the buyers' image and financial performance (Christmann, 2004; Drumwright, 1994; Sen and Bhattacharya, 2001; Lu and Lee, 2012; Carter and Dresner, 2001; Klassen and Vachon, 2003; Sarkis, 2003; Zhu and Sarkis, 2006).

e) *Direct and indirect incentives*

Direct and indirect incentives provided by the government in the form of tax benefits and other subsidies may also drive the social sustainability (Cerin and Karlson, 2002; Hilson and Nayee, 2002; Ostrom et al., 1993). For example, Cerin and Karlson's (2002) found in their research that extending property rights acted as an incentive for the companies to practise sustainable measures. Similarly, other incentives, such as permitting individual harvest, territorial rights, and price ecosystem services, coupled with public research and monitoring, have been found to promote sustainability in the fishing industry (Campbell, 2007).

f) *Corporations' financial ability*

A company's economic health and the level of competition it faces also determine the probability of its adopting socially responsive behaviours. Small companies first tend to focus on economic sustainability and, as they move up the ladder, extend their focus to social sustainability (Campbell, 2007; Alkhidir and Zailani, 2009; Luthra *et al.*, 2011).

g) *International Certifications*

Many international certifications have come up to ensure social standards, including 26000, ILO, OHSAS 18001, AA 1000, and ISEA 1999. This also exerts pressure on the companies for social compliance as certification, or absence of it, has a direct impact on the company's image and operational performance (Viscusi, 1986; Handfield *et al.*, 2002; Gonzalez *et al.*, 2008; Zuckerman, 2000). For example, some voluntary certifications and labelling have helped in achieving social sustainability in the coffee industry (Reynolds *et al.*, 2007).

h) Investors' Pressure

The shareholders' and investors' actions also influence the adoption of social sustainability measures in an organisation (Tagesson *et al.*, 2009; Buchholz and Rosenthal, 2005; Laplume *et al.*, 2008). The investors' positive role in bringing sustainability reporting has been asserted by many case studies (Tagesson *et al.*, 2009).

i) Easy implementation without resistance

The top executive's "resistance to change" attitude acts as a barrier to the adoption of social sustainability. On the contrary, a positive attitude to accept the change may speed up social responsiveness in the organisation (Shrivastava, 1995).

j) Pressure from employee unions

The employee unions in the bigger organisations act as catalysts in negotiation and demand for social sustainability measures. With their bargaining power, these unions can exert effective pressure on the top management to address the social issues and adopt the corrective measures with top priority (Sen and Bhattacharya, 2001; Hansson *et al.*, 2003).

k) Regulatory compliance (government regulations)

The regulatory authorities or government regulations, as part of the external stakeholder group, certify the corporations as streamlined and regulated for social measures. The government, as the protector of the society, formulates policies to regulate and orient the companies to socially responsive activities (Green *et al.*, 1996; Gonzalez *et al.*, 2008; Beamon, 1999; Reynolds *et al.*, 2007). Carter and Jennings (2000) and Ehr Gott *et al.* (2011) also assert that there is a positive relationship between government regulations and the adoption of social sustainability by companies.

l) Skilful policy entrepreneurship

As mentioned above, the top executive's role in adopting social sustainability has been established by many researchers. Drumwright (1994) affirms that the policy entrepreneurs who invest to institute their policies can drive social sustainability (Banerjee, 2003; Buckholz, 1991). In another research, Carter *et al.* (2007) map the social network within an organisation to demonstrate how even a low level manager can effectively champion and drive a safety related supplier management project.

m) Social concern

The organisation's social concern can have a positive role in the adoption of social sustainability. Many organisations, through several reporting standards, display their social concern (Laufer, 2003; Walker and Preuss, 2008).

n) Social organisations' pressure

Social groups encourage the companies to implement social sustainability practices. Walker and Preuss (2008) have identified the importance of social groups for corporate performance. Such social groups include non-governmental organisations (NGOs) that work against child and bonded labour, and to improve the living conditions, promote gender equity, and ensure health and hygiene. In India, a few of these popular social organisations are Samhita, Ruchika, Sulabh International, Sambhav, and the Parikrama Foundation.

o) Stakeholders' pressure (others)

Other than the internal stakeholders, the external stakeholders, for example, the media influences the organisations to adopt social sustainability measures (Jones, 1995; Post *et al.*, 2002a, b; Maignan and Ralston, 2002; Sharma and Vredenburg, 1998; Sarkis *et al.*, 2010). A research conducted by Jones (2005) on 18 top corporations shows how these companies practise social sustainability due to the stakeholders' pressure to get their ratings featured in the Dow Jones Sustainability Index (DJSI)

2.6.3 Impediments to social sustainability adoption in the supply chain

Many scholars who have discussed the barriers in the supply chain of manufacturing industries have identified various aspects that lead to non-adoption and act as bottle-necks for social sustainability. For instance, Dillard *et al.* (2008) identify four factors that contribute to a relative neglect of social sustainability by organisations. The first consists of the organisation's economic aims, commonly perceived as increasing the wealth of the shareholders. Secondly, the issues related to social sustainability have their modern origins in the issues of environmental sustainability. Thus, social sustainability is sometimes seen as related to the developing world issues, such as access to water, education and health care, etc. The third barrier to the adoption of social sustainability is that social issues are often seen to be the responsibility of the state or the society. Finally, social sustainability appears to bring in more severe challenges in terms of

understanding and communication than other forms of sustainability. Further, research on social sustainability has established many other barriers as described in Table 2.7

Table 2.7 Impediments to social sustainability

S. No	Impediments	References
1	Lack of awareness	Haugh & Talwar (2010), Maloutas (2003)
2	Lack of competitive pressure	Lamming and Hampson, (1996), Carter <i>et al.</i> , (2000), Rao and Holt, (2005), Campbell (2007).
3	Lack of customers' requirements	Ehrgott <i>et al.</i> (2011), Christmann (2004), Drumwright (1994), Sen and Bhattacharya (2001), Carter and Dresner (2001), Klassen and Vachon(2003), Sarkis(2003), Zhu and Sarkis (2006).
4	Lack of investor pressure	Tagesson <i>et al.</i> (2009)
5	Lack of pressure from employee unions	Bhattacharya <i>et al.</i> (2014), Hansson <i>et al.</i> (2003), Haugh and Talwar (2010) Campbell (2007), Aguilera <i>et al.</i> (2007)
6	Lack of pressure from regulatory authorities (Government regulation)	Campbell (2007), Green <i>et al.</i> (1996), Gonzalez <i>et al.</i> (2008), Beamon(1999), Reynolds <i>et al</i> (2007).
7	Lack of interest from skilful policy entrepreneur	Banerjee (2003), Buckholz, (1991), Ehrgott <i>et al.</i> (2011)
8	Lack of social concern	Laufer (2003), Walker and Preuss (2008)
9	Lack of pressure from social organizations	Walker and Preuss (2008) Campbell (2007), Bartley (2003)
10	Lack of stakeholder's pressure	Jones (1995), Post <i>et al.</i> ,(2002a;2002b), Maignan and Ralston (2002), Sharma and Vredenburg (1998), Laplume <i>et al.</i> (2008)

a) *Lack of awareness*

Lack of awareness of social sustainability measures may hinder sustainable development in the supply chain. On the other hand, awareness of relevant social activities can accelerate social sustainability (Haugh and Talwar, 2010). Maloutas (2003) emphasises the need for creating awareness of social sustainability, as the lack of cognisance in adopting social measures impedes the movement in the direction of social sustainability.

b) *Lack of competitive pressure*

A moderate level of competition among companies encourages them to behave in socially responsible ways, although both high and low competitions tend to make them socially less responsible (Campbell, 2007). As some organisations utilise their socially sustainable image for overall strategic advantage, other organisations are compelled to adopt socially sustainable practices. In a global environment, competitive pressure plays a vital role in the supply chain. As far as social sustainability is concerned, companies need to build and own the resources and capabilities which cannot be easily imitated by their competitors who, therefore, will be forced to own and maintain such resources of their own, helping the cause of long-term sustainability (Lamming and Hampson, 1996; Carter *et al.*, 2000; Rao and Holt, 2005). Rao and Holt (2005) have identified the linkages between sustainability measures and competitive advantage and firmly established the relationship between sustainability and financial performance of a firm.

c) *Lack of customer requirements*

The customers or consumers can exert a strong pressure on firms to adopt social sustainability measures through CSR, if their requirements necessitate such measures (Aguilera *et al.*, 2007). In fact, the customers' requirements with regard to the social dimensions may go a long way in achieving social sustainability. These demands not only mandate the suppliers to adopt sustainable practices in the short-term but also guarantee long-term sustainability in the supply chain. The growing requirement of developing a socially responsible supplier base and its impact on the company's image and financial operations has been affirmed by several researchers (Ehrgott *et al.*, 2011; Christmann, 2004; Drumwright, 1994; Sen and Bhattacharya, 2001; Carter and Dresner, 2001; Klassen and Vachon, 2003; Sarkis, 2003; Zhu and Sarkis, 2006).

d) *Lack of investor pressure*

The role of investor pressure in social sustainability reporting has been brought out by many case studies. As shown by these studies, privately owned companies do not disclose as much social information as the state owned organisations (Tagesson *et al.*, 2009).

e) *Lack of pressure from employee unions*

Employee unions are the members of the internal stakeholder group, involved in persuading firms to behave in a socially responsible way through negotiations and dialogue (Campbell, 2007). Aguilera *et al.* (2007) affirm that employee unions have an important role in compelling companies to be more socially sustainable. They play the role of catalyst in successfully bargaining for social measures (Bhattacharya *et al.*, 2014; Hansson *et al.*, 2003; Haugh and Talwar, 2010).

f) *Lack of pressure from regulatory authorities (government regulations)*

Government regulations through law enactment and law enforcement can bring about a change in corporate social behaviour (Aguilera *et al.*, 2007). The government, as part of the external stakeholder group in the developing countries, monitors companies for their social sustainability measures (Campbell, 2007; Green *et al.*, 1996; Gonzalez *et al.*, 2008; Beamon, 1999; Raynolds *et al.*, 2007). There is a positive relationship between government regulations and implementation of social sustainability measures (Ehrgott *et al.*, 2011).

g) *Lack of interest of skilful policy entrepreneurs*

As Drumwright (1994) affirms, socially responsible buying happens because of two key factors: skilful policy entrepreneurs who use their resources to institute policies, and the organisational setting in which these policies operate (Banerjee, 2003; Buckholz, 1991). Ehrgott *et al.* (2011), in their research, have mapped the social network within a particular organisation to show how even a handler at the lower ranks can effectively champion and drive a safety related supplier management project.

h) *Lack of social concern*

Organisations' social concerns can have a positive impact on the social sustainability measures (Laufer, 2003; Walker and Preuss, 2008). Organisations increasingly display their social measures by adopting several reporting standards to show their social concern to the stakeholders and shareholders. Lack of social concern may hinder the adoption of social sustainability by them.

i) *Lack of pressure from social organisations*

The NGOs and other social organisations that monitor the corporations for socially responsible behaviour may act as a driving force to increase social sustainability (Campbell, 2007; Bartley, 2003). Moreover, socially responsible corporate behaviour tends to overlap with the extent to which the firms belonging to the industrial and corporate systems are amenable to dialogue. The NGOs, through boycotts, campaigns and multi-party dialogues, can influence the corporates to adopt socially responsible practices (Aguilera *et al.*, 2007). Walker and Preuss (2008), in their research on sustainability, emphasise the importance of the social groups' pressure on corporate performance. In fact, the presence of active social groups warrants the adoption of social sustainability practices by the corporates.

j) *Lack of stakeholder pressure*

Internal stakeholders through their direct strategic decisions, and external stakeholders exercising their collective voice, can influence the acceptance of socially sustainable practices in the corporations (Aguilera *et al.*, 2007). On the other hand, the media stakeholders can also influence the organisations to adopt social sustainability criteria (Jones, 1995; Post *et al.*, 2002; Maignan and Ralston, 2002; Sharma and Vredenburg, 1998; Laplume *et al.*, 2008). An inquiry conducted by Jones (2005) in 18 top corporations has revealed how the companies had adopted social sustainability measures pushed primarily by the stakeholder pressure, in addition to their attempt to increase their ratings in the DJSI to be specifically recognised for social sustainability.

2.7 Social sustainability dimensions

One of the fundamental questions that must be answered, if we are to move forward with social sustainability in manufacturing, is: What are the social sustainability dimensions and how do we measure these dimensions in the supply chain? A consensus on the measurement of social sustainability still eludes the scholars because of its highly contextual nature. Another fact is that the sustainability indicators have largely been developed by consultancy firms (such as Elkington's own company) which extend services to large companies by helping them to arrive at an indicator system for their corporate sustainability reporting. Social sustainability is much more difficult to quantify than economic and environmental impact and, as such, it is the most neglected part of the triple bottom line reporting. All the social sustainability indicators are too general to be useful and

specific indicators still need to be developed for particular states and industries, down to the company level. This means that the usefulness of the existing indicators to the academic discourse in the particular context of social sustainability is questionable (McKinsey, 2004).

Social sustainability dimensions were first proposed by the United Nations Division for Sustainable Development (UNSD, 2001) and widely accepted by the researchers, academicians and practitioners. This framework describes themes and sub-themes, and under each sub-theme there are some indicators. The first of these frameworks proposed by the UNSD measures the progress of the social sustainability indicators that are tied to the Millennium Development Goals. According to this framework, the indicators are first classified by the primary dimensions (social, environmental and economic), then by their theme (for example, education), and finally by the sub-theme (for example, literacy). The broad themes under the social dimension are: equity, health, education, housing, security and population. Each sub-theme has at least one, or as many as three, quantifiable indicators associated with it. These indicators have been considered very useful and shared with many countries by the Human Development Report Office of the UNEP (UNSD, 2001).

Further, there is another framework called “The sustainability Reporting Guidelines”, developed in conjunction with many stakeholders, including the business houses, non-profit organisations, investors’ organisations and trade unions. This has been developed primarily with the efforts of the United Nations Environment Programme (UNEP) in association with the Coalition for Environmentally Responsible Economics (CERES). Though this framework is very similar to that of the UNSD, it still differs in many areas. In particular, it differentiates the “core indicators” with the “additional indicators”. The core indicators are more relevant to the reporting organisations and stakeholders. However, the majority of these indicators are subjective and qualitative. In the “sustainable reporting guidelines” many of these indicators are informative, yet it is very difficult to incorporate such qualitative guidelines in the decision making tools required by businesses. Trying to overcome these limitations, Carter and Jennings (2000, 2004), through their research in the US, have proposed many social dimensions, including diversity, human rights, philanthropy and safety, in the manufacturing industry.

Labuschangne *et al.* (2005) have greatly contributed to the improvement of the sustainability framework by proposing additional indicators that incorporate criteria from a number of key

frameworks, namely the United Nations Commission on Sustainable Development, Global Reporting Initiative, Sustainability Metrics of Institution of Chemical Engineers, and Wuppertal Sustainability Indicators. They conclude that the indicators in these frameworks are not “adequate”. As a result, eight supplementary guidelines have been reviewed to identify additional indicators. Similarly, the Supply Chain Council has proposed the “SCOR People” framework through the supply chain operation reference (SCOR) model, for the manufacturing supply chain (SCOR Framework). However, the sustainability reporting framework proposed by the Global Reporting Initiative (GRI), a non-governmental organisation, is widely accepted in the corporate circles.

Though, as discussed earlier, there are many dimensions and measures for social sustainability in manufacturing industries, these cannot be generalised because “socialness” evolves over a period of time in a society and social issues are highly contextual. For example, the social issues in the developing countries are different from those of the developed economies. Various research conducted by many renowned scholars have identified specific social sustainability dimensions that can be used as a tool for measuring social sustainability in manufacturing industries.

Many authors have adopted different dimensions to measure social sustainability pertinent to the supply chain, as mentioned in Table 2.8. For instance, in New York City, Sachs (1999) identifies access to goods, human rights, employment and cultural sustainability as social sustainability indicators. Similarly, Carter and Jennings (2000, 2004), and Emmelhanz and Adams (1999) identify diversity, philanthropy, health and safety, and human rights in their study conducted in the US. Further, Whooley (2004) discusses safety, health, diversity and poverty as the social sustainability dimensions in Europe. A similar study has been carried out at Nike Corporation, again in the US, in which the labour practices were used as social parameters (Zedek, 2004).

Bansal (2005) has also identified similar social dimensions, including safety, equity and poverty in the Canadian oil firms. Further, social sustainability research has been extended to the food industry which, in the US, has adopted dimensions such as safety, human rights, labour practices and health. One such study, conducted by Hutchins and Sutherland, identifies equity, safety, philanthropy and health as the social dimensions in the supply chain through life cycle analysis. Kortelainen (2008) in Europe and Vachon and Mao (2008) in the Canadian World Economic Forum reports discuss equity, labour practices and human rights for social sustainability. In Asia,

Gupta (2007) has identified human rights and labour standards in the Indian manufacturing industry.

A few case studies and qualitative approaches by Andersen and Larsen (2009) in Denmark, Gopalakrishnan *et al.* (2012) in the UK, and Tate *et al.* (2010) and Hens and Nath (2005) with global corporations, have identified diversity, safety, human rights and health as the social dimensions. Others have identified ethics as an important social dimension in the supply chain of China (Lu *et al.*, 2012) and India (Krishna *et al.*, 2011a, 2011b; Dubey *et al.*, 2015b). Similarly, Yusuf *et al.* (2013) vouch for the importance of labour practices for social sustainability in the UK oil firms. In India, safety, wages and labour practices have been discussed as the social sustainability dimensions (Kumar *et al.*, 2014). Similarly, a comparative case analysis by Mani *et al.* (2015b), in the Indian manufacturing sector, has identified various supply chain social dimensions that include safety, health, philanthropy, wages, education, housing, and child and bonded labour.

Thus, although there are many studies on social sustainability and its measurement, as mentioned above, these have been carried out in different countries with different contexts. As we know, social sustainability dimensions vary from country to country and are highly contextual in nature. Some even say that it is very complex to understand and measure them, as they vary from place to place (Gugler and Shi, 2009). In addition, most of these social sustainability studies have been supplier oriented, rather than case study or mathematical modelling based. A few studies, for example, those of Carter and Jennings (2000, 2004), have developed a scale of measure towards social sustainability in the supply chain. However, even these are too much oriented towards socially responsible purchasing decisions, and skewed towards the supplier side CSR activities. A similar study by Lu *et al.* (2012) has also developed a scale to measure social sustainability, but this scale focuses only on the ethical dimension and its relationship with the corporate performance.

As this discussion reveals, there have been numerous studies on social sustainability conducted in the developed countries (Table 2.8), and various dimensions and measures have been identified specific to the geographical locations of the studies because of the highly contextual nature of these dimensions. Hence, the researchers in India have virtually no idea of the social measures and

dimensions specifically suitable to the Indian manufacturing industries. Based on this literature gap, our first research question is as follows:

RQ-1 What are the social sustainability measures and dimensions specific to the Indian manufacturing supply chain?

Table 2.8 List of social sustainability dimensions identified in different countries

Country	Industry	References	Housing	Diversity	Philanthropy	Safety	Equity	Human Rights	Employment	Wages	Labour practices	Poverty	Health and hygiene	Hunger	Ethics	Child and bonded labour	Procurement from minority	Education
US(Maryland)	Conceptual paper	Poist(1989)	√	√	√	√							√	√				√
United States	Manufacturing	Carter et al. (1999)															√	
United States	Apparel Industry	Emmelhainz and Adams(1999)						√			√							
United States	Consumer Products	Carter & Jennings (2000)		√	√	√		√							√			
United Nations Division for Sustainable Development	United Nations Guidelines	UNSD(2001)	√	√	√	√	√	√	√	√		√	√	√				√

United States	Consumer Products	Carter & Jennings (2002a, 2004)		√	√	√		√										
Europe	Manufacturing Industry	Whooley(2004)		√		√	√					√						
United States	Manufacturing Industry	Carter (2005)		√	√	√	√											
The world summit of sustainable development based on Johannesburg Conference, South Africa	Book	Hens and Nath (2005)					√					√	√					
US	Nike corporation	Zadek (2004)										√						
Canada	Canadian Oil firms	Bansal(2005)				√	√					√						
US	Food Industry	Maloni and Brown (2006)				√		√				√	√					
Europe	Analytical research conducted on the	Kortelainen (2008b)						√				√					√	

	data of 20 European union countries																		
US(Michigan)	Manufacturing supply chains	Hutchins and Sutherland (2008)			√	√	√						√						
Canada	World economic forum reports	Vachon and Mao(2008)					√					√	√						
Denmark	IKEA Corporation	Andersen and Larsen (2009)				√		√				√					√	√	√
US and Canada	10 global corporations	Pagell and Wu(2009)				√											√		
Hong Kong	Construction Industry	Wong et al. (2010)				√		√				√					√		
Europe(Sweden)	Manufacturing	Leire and Mont(2010)				√	√		√				√						
Global corporations	Based on sustainability reports	Tate et al. (2010)				√							√						
United Kingdom	UK's food	Yakovleva et al.					√		√	√									

	industry	(2012)																
Germany	H&M and Verner Frang	Kogg and Mont(2012)			√					√							√	
United Kingdom	British Aerospace Systems	Gopalakrishnan et al. (2012)		√		√		√					√		√			
China	Manufacturing	Lu and Lee(2012)													√			
United Kingdom	Oil and gas supply chains	Yahaya et al. (2013)										√						
India	Electrical and Cement manufacturing	Mani et al. (2014)		√	√	√	√	√	√	√	√		√		√	√		√
India	Fireworks Industry	Kumar et al.(2014)				√				√	√							
India	Cement and Pharmaceutical	Mani et al. (2015)		√	√	√	√	√	√	√	√		√		√	√		√

The next section discusses the literature related to the supply chain social sustainability and its relationship with the performance of the supply chain.

2.8 Social sustainability and Supply chain performance

In recent times, in addition to the traditional parameters, supply chains have also been measured with sustainability parameters, and the incorporation of sustainability measures in the supply chain has gathered pace because of the stakeholders' awareness and pressure (Bai and Sarkis, 2010).

There is an enormous amount of literature available to prove the relationship between social sustainability and supply chain performance. For example, Seuring (2008) affirms the importance of adopting social sustainability measures across the supply chain, as the materials and information flow into different entities (Seuring and Gold, 2013). Many other scholars have also demonstrated this through their research in different domains. Notably, Carter and Jennings (2000) have introduced the term “purchasing social responsibility” and advocate the adoption of social measures in the upstream supply chain to improve the performance of the supply chain entities. However, they could not establish a direct relationship between social responsibility and supply chain performance. On the other hand, Ciliberti, *et al.* (2008) have proposed a logistical social responsibility framework (LSR) with 31 sustainability measures in the supply chain, and demonstrated the importance of adopting sustainable measures and their performance in Italian companies.

Hutchins and Sutherland (2008), in their research based on the life cycle analysis, emphasise social issues and demonstrate how, by addressing these issues the corporate sector can improve not only the performance of the supply chain but also the financial performance of the country. Further, Andersen and Larsen (2009), through their case study, demonstrate the relation between social sustainability measures and supply chain performance. Similarly, Dao *et al.* (2011) demonstrate the impact of the adoption of human resource measures on the supply chain sustainability through their framework. In the same vein, Klassen and Vereecke (2012) discuss various social issues and their impact on the supply chain performance.

The Supply Chain Council views social sustainability as an important dimension in the supply chain for achieving an optimum performance, and proposes the “SCOR People” framework through the Supply Chain Operation Reference (SCOR) model (SCOR Framework). Yet, another

global, non-profit organisation suggests various social measures to be followed by companies through its Global Reporting Initiative Framework (GRI) which is widely accepted in the corporate circles. Chin and Tat (2015) have also established social measures, such as gender diversity and their relationship with the supply chain performance. More recently, Husgafvel *et al.* (2015) have identified social performance measures and demonstrated their relationship with the supply chain and company performance. Thus, as suggested by the literature under various domains, there is a positive relationship between social sustainability measures and the supply chain performance. In keeping with this, our next research question is as follows.

RQ-2 In Indian manufacturing industries, is there a relationship between social sustainability and the supply chain performance?

As many scholars suggest, social sustainability measures should be accounted for by not only one stage of the supply chain but also other entities in the linkage (Seuring, 2008). Therefore, in the next section, we discuss the literature on various other entities, including supplier performance, manufacturers' operational performance and customer performance.

2.9 Supplier performance

Supply chain consists of many players or partners from the point of raw material entry in the system to the final exit point. These players include the suppliers, manufacturers, distributors and other channel partners in various forms (franchisees, dealers) and customers (distributors, dealers, end consumers) (Mentzer *et al.*, 2001; Chen and Paulraj, 2004; Chopra and Meindl, 2007). Research suggests that the performance of the supply chain depends on the performance and actions of the individual supply chain entities. Therefore, it is essential for each entity in the system to perform better, so that it can enhance the performance of the whole supply chain. Supplier performance is very crucial in the upstream supply chain and sometimes determines the performance of the buying firm. Hence, many organisations engage in supplier selection, as well as supplier development and nurturing activities to not only ensure the smooth flow of the materials but also increase the overall efficiency in the system (Krause *et al.*, 2007).

There is an abundant literature on the supplier performance metrics. We attempt to review all the metrics mentioned therein to understand the importance and relevance of the supplier performance metrics for our study. The literature, taken together, suggests that quality and cost are the dominant

factors along with flexibility and on-time delivery. The literature in the 1970s and early 1980s gave much emphasis to the cost factor, while the cycle time and customer responsiveness were added in the late 1990s. Later, researchers also realised the importance of flexibility and, more recently, the environmental safety issues have been the key factors in the industrialised nations.

There have been numerous studies identifying the supplier performance metrics. For example, Roa and Kiser (1980) give a comprehensive list of 60 supplier performance metrics, Dickson (1966) gives 23, Ellram (1990) 19, and Stamm and Golhar (1993) 13. According to Beamon (1999), these metrics should satisfy four different properties: 1) inclusiveness, i.e. measurement of all pertinent aspects; 2) universality, i.e. easy comparability under various operating conditions; 3) measurability; and 4) consistency with the organisational goals.

In general, delivery reliability, lead time length, on-time delivery and inventory service levels are the common performance variables used for measuring supplier performance (Stock and Lambert 2001). Shin *et al.* (2000) advocate taking help of the supply management orientation (SMO) phenomenon and demonstrate its effect on the supplier performance through several variables, including supplier cost, supplier lead time, on-time delivery, reliability and quality. Gunasekharan *et al.* (2001) group the essential parameters for measuring the suppliers' performance into three broad levels, i.e. strategic, tactical and operational. At the strategic level, there are measures such as lead time, quality level, cost saving initiatives and supplier pricing against market; the tactical level measures include efficiency of the purchase order cycle time, booking-in procedures, cash flow, quality assurance and capacity flexibility; while the operational level measures comprise ability in the day-to-day technical representation, adherence to the developed schedule, ability to avoid complaints and achievement of defect-free deliveries, etc.

Similarly, Huang and Keskar (2007) identify 3 categories of metrics for supplier performance. These are product related (reliability, responsiveness, flexibility), supplier related (cost, financial assets, infrastructure), and society related (safety, environment) as described in Table 2.9.

Table 2.9 Supplier performance metrics

S.No	Category	Definitions
1	Responsiveness	Related to the speed at which a supplier provides products to the customer
2	Reliability	Related to the performance of a supplier in delivering the ordered components to the right place, at the right time, in the required condition and packaging, and desired quantity
3	Flexibility	Criteria pertaining to the agility of a supplier in responding to OEM demand changes
4	Assets and Infrastructure	Effectiveness of supplier in managing assets to support OEM demand
5	Cost and Financial	This criteria related to cost and financial aspects of procuring from supplier
6	Environment	Supplier's effort in pursuing environmentally conscious production
7	Safety	Supplier's readiness for occupational safety in the facility.

Source: Huang and Keskar (2007)

However, Choffray and Lilien (1978) point out that the performance criteria for the suppliers vary from industry to industry and product to product. For example, some scholars identify the quality of the product, price, delivery time/order fulfilment and service as the performance criteria in the electronics components industry (Bharadwaj, 2004). On the other hand, Amin and Razmi (2009) propose two important criteria for supplier performance. The supplier related criteria are accessibility, reliability, security and speed, while the service related criteria include effective marketing and promotion, experience, financial strength, management stability, strategic alliances and supporting resources in the service industry. Cho et al. (2012) propose various performance metrics pertinent to the suppliers in the service industries, including service flexibility, service delivery cost, range of services, customer query time, post-process services, and service capacity.

Amin and Zhang (2012), in their research on supplier selection, use three broad categories of supplier performance metrics, including quality, delivery and cost reduction. Another study conducted by Modi *et al.* (2007) operationalises a construct of supplier performance, involving items such as: 1) the number of incoming defects; 2) percentage of on-time deliveries; 3)

percentage of orders delivered completely; 4) time from order placement to final receipt of order; 5) procured product cost; etc. In two other such studies, Carter and Jennings (2004, 2005) suggest the use of a supplier performance construct with such items as product quality, lead-time and efficiency (Silver and Jain, 1994; Humphreys *et al.*, 2004).

Overall, the literature suggests quality, cost, reliability, time and flexibility as the most widely accepted performance metrics for the suppliers. In addition to the traditional parameters, these social sustainability parameters are used to measure the supplier performance (Bai and Sarkis, 2010; Mani *et al.*, 2014). Further, the suppliers' ethical behaviour has been considered one of the judging parameters for performance by Lu *et al.* (2012). Socially responsible supplier nurturing and development practices help to improve the buying firm's operational performance and the suppliers' social performance (Sancha *et al.*, 2015b). In order to improve the suppliers' sustainability performance, firms need to manage their supply chains (Andersen and Larsen, 2009; Beske and Seuring, 2014). To address this, many firms rely on supplier development as well as assessment and collaboration with the suppliers (Gualandris *et al.*, 2014; Klassen and Vachon, 2003; Vachon and Klassen, 2006).

However, till now, the literature on social sustainability practices and supplier performance has been scant and studies have focused more on the environmental aspects than supplier performance (Akamp and Muller, 2013; Seuring and Muller, 2008b). The scarcity of literature on social aspects and supplier performance has also been acknowledged by Gimenez and Tachizawa (2012), Hoejmose and Adrien-Kirby (2012), Moxham and Kauppi (2014), and Seuring and Muller (2008b). To fulfil this research void, we frame our third and fourth research questions as follows.

RQ-3: Can social sustainability practices lead to a better supplier performance?

RQ-4 Is there a relationship between supplier social performance and the supply chain performance?

Studies suggest that the supply chain entities need to co-ordinate and collaborate to achieve a better performance for the whole supply chain system (Vachon and Klassen, 2008; Krause *et al.*, 2007). Many authors even argue that the individual performance of each entity in the supply chain may have an impact on the other entities. For example, the performance of the suppliers may affect

the operational performance of the firm (Gimenez *et al.*, 2012; Sancha *et al.*, 2015). In the next section, we explore the literature on the firms' operational performance and their metrics.

2.10 Manufacturers' operational performance

Operational performance of the manufacturer plays a vital role in the supply chain operations. The performance of manufacturers in the "in-house operations" is mainly dependent on the performance of the other entities in the system, since they are placed ideally "in-between" the suppliers and the customers. The operational performance can be described as the capability of the manufacturing plant to more efficiently produce and deliver products to the customers (Zhu *et al.*, 2008a). There is an abundant literature on operational performance, in which the scholars have used various independent variables to measure it. For example, an adaptation of the TQM practices in the supply chain and the way it affects the operational performance has been established by Samson and Terziovski (1999). Further, Shin *et al.* (2000) have demonstrated the supply management orientation (SMO) phenomenon and the effect of such supply chain management orientations on the operational performance construct, with the items including quality, delivery, flexibility and cost. Similarly, Ahmad and Schroeder (2003) have shown the firms' HRM practices and their effect on operational performance. In this research, the construct "operational performance" has been measured through the parameters of cost, quality, delivery and flexibility, as specified in Table 2.10.

Table 2.10 Operational performance measures

Measures	What it means
Cost	Cost of manufacturing /unit
Quality	How well the product meets the expected quality norms
Delivery	Delivery performance-on time
Flexibility	Flexibility to change volume
Speed	Pace of the new product introduction

Source: Ahmad and Schroeder (2003)

Devaraj *et al.* (2007), in their research on e-business, show how the implementation of e-applications helps in enhancing the operational performance of the manufacturing firm. Table 2.11 describes various items that can be used to measure the operational performance of a firm and the details of the studies conducted by various authors against each measure.

Table 2.11 Operational performance measures

S.No	Measures	Literature support
1	Percentage of returns	Rosenzweig et al. (2003), Frohlich and Westbrook (2001), and Poirier and Quinn (2003)
2	Percent of defects	Rosenzweig et al. (2003), Frohlich and Westbrook (2001)
3	Delivery speed	Frohlich and Westbrook (2001, 2002), Chen and Paulraj (2004)
4	Delivery reliability	Poirier and Quinn (2003), Rosenzweig et al. (2003), Chen and Paulraj (2004)
5	Production costs	Frohlich and Westbrook (2001, 2002), Zhu and Kraemer (2002), Rosenzweig et al. (2003), Poirier and Quinn (2003), Chen and Paulraj (2004).
6	Production lead time	Frohlich and Westbrook (2001), Rosenzweig et al. (2003), Ranganathan et al. (2004), Hailemariam and Jain(2015).
7	Inventory turns	Zhu and Kraemer (2002), Ranganathan et al. (2004)
8	Flexibility	Rosenzweig et al. (2003), Chen and Paulraj (2004)

Source: Devaraj et al. (2007)

More recently, research on supply chain integration at various levels in an organisation clearly show an enhancement in organisational performance (Wong *et al.*, 2011). Wong also demonstrates the construct “operational performance” with the measurement items, such as production cost, delivery, product quality, and production flexibility. As the literature shows, the measurement of operational performance has been conceptualised and proposed by many scholars in their research. For example, Zhu *et al.* (2008) demonstrate the use of operational performance construct with a six

time scale, including increase in the amount of goods delivered on time, decrease in inventory levels, decrease in scrap rate, increase in product quality, increase in product line, and improved capacity utilisation.

In a subsequent research, Green *et al.* (2012) operationalise all the items proposed by Zhu *et al.* (2008) to measure the operational performance. As discussed earlier, and also suggested by the literature, the operational performance can be measured with clearly defined and proven parameters, such as delivery, cost, lead time, quality, flexibility and reliability. Table 2.11 describes the various operational measures adopted by different authors under various domains. More recently, it has been evident in the literature that the sustainability measures adopted by the firms in their supply chains lead to an enhanced operational performance (Chang and Kuo, 2008). Yet, as pointed out by several scholars, research on social sustainability and the firms' operational performance remains one of the least explored areas (Akamp and Muller, 2013; Gallear *et al.*, 2012; Gimenez *et al.*, 2012; Hollos *et al.*, 2012; Klassen and Vereecke, 2012).

On the contrary, a few scholars argue that the implementation of social sustainability practices through supplier management does not result in an improvement in the supplier performance or the firms' operational performance (Akamp and Muller, 2013). Another contradictory result has emerged from the research conducted by Hollos *et al.* (2012) who say that the buying firms' efforts to push socially responsible behaviour at the supplier locations do not help them in cost reduction and operational performance enhancement. On the other hand, Gallear *et al.* (2012) demonstrate how monitoring and sharing of the best social sustainability practices affects the suppliers' and the firms' financial performance. Sancha *et al.* (2015b) also demonstrate the social sustainability practices and their impact on the suppliers' and the firms' operational performance.

Thus, the literature gives mixed results for sustainability practices and their relationship to the suppliers and the firms' operational performance. Hence, our fifth and sixth research questions are as follows.

RQ-5: Can the adoption of social sustainability practices lead to a better operational performance of the firm?

RQ-6: Is there a relationship between supplier performance and the operational performance?

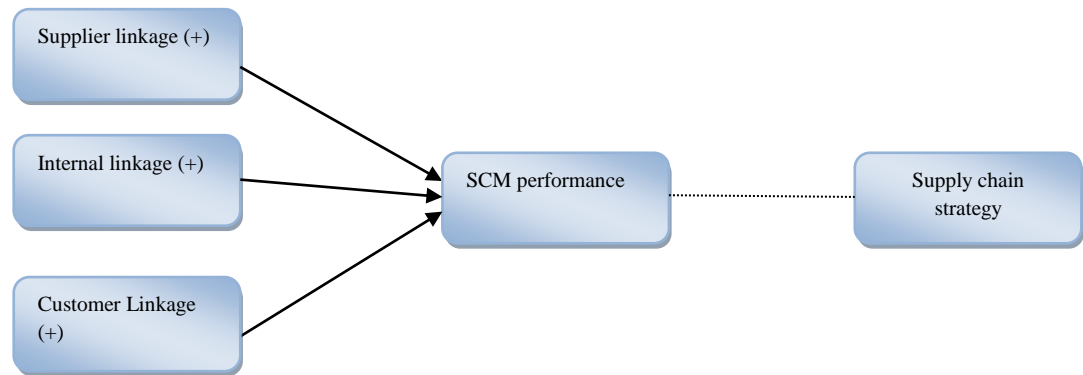
2.11 Customer performance

The customer-supplier linkage and their relationship management form a critical aspect of a manufacturing supply chain. The supply chain's overall performance is determined by the combined improvement in the profitability of all its members. The customer is one of the critical partners whose performance is reflected directly on the supply chain. The integration of all three members and their linkages in terms of co-ordination lead to an overall performance improvement in the supply chain (Lee *et al.*, 2007).

Figure-2.4 describes the essential elements of the supply chain and the relationships among them. As seen in the figure, the customers' practices and actions are crucial in determining the overall performance of the supply chain (Lambert, 2008). In a modern business environment, the customer (distributor, retailer) must be able to deal with the increased competition, both domestically and globally. Over the years, the changing customer expectations and regulatory demands have all driven the efforts to deliver improved performance and better customer service (Bruno and Barki, 2014). In a modern retail environment, the retailers need to be equipped with the tools to deal with the increased demand. As a result, the retailers look far beyond their organisational boundaries to integrate and evaluate adequate resources and capabilities, thereby creating superior value and competitive advantage which would give them sustenance over a period of time.

Measuring the customer performance and its importance to the business performance has been well documented by Gupta and Zeithaml (2006). Their research discusses and proposes both observable (behaviour) and unobservable (customer satisfaction) metrics, pertinent to the business performance. Further, Petersen *et al.* (2009) identify various customer performance metrics and categorise them into brand value metrics, customer value metrics, referral value metrics, acquisition and retention metrics, cross-buying and up-buying metrics, multi-channel shopping metrics and product return metrics.

Figure 2.4 Elements of supply chain and their collaboration



Source: Conceptual model developed by Lee et al. (2007)

Hooley *et al.* (2005), in their marketing research, identify the elements of customer performance, including financial performance, and group them into three categories: overall profit level achievement and increased sales; market performance, i.e. more sale volumes compared to the competitors; and customer performance, i.e. the customers' increased loyalty.

Recently, the stake holders' awareness of the corporate social responsibility perceptions has had a profound impact on the image of the firms and led to a tendency of the consumers to buy specific brands and patronise certain retailers, thus improving their financial performance (Luo and Bhattacharya, 2006). For example, America's Star Bucks coffee brand gained popularity among the customers for its socially responsible ways of sourcing and servicing, which has significantly enhanced the retailer's image (Argenti, 2004).

Increasingly, the changing business scenarios have forced many customers (retailers) to adopt socially sustainable practices. Delai and Takahashi (2013), in their research, posit the importance of social sustainability practices adopted by the Brazilian retailers and show how they affect the performance of the supply chain. Similarly, Sebastiani *et al.* (2014) advocate adopting social sustainability practices, particularly by the customers (i.e., the franchisees), and their relationship with the corporate performance.

Thus, the literature affirms the importance of the customer performance for achieving an overall performance improvement in the supply chain. In addition, it also suggests various metrics, such as customer loyalty, sale volumes, customer image, customer profit and sustainable practices for better performance. Still, it is clear that there have been relatively few studies focusing on the customer performance and its relationship with the supply chain performance. Though the literature on customer performance is abundant in the marketing literature, the studies that can establish the relationship between the adoption of social practices and the supply chain performance are scant. Hence, our next research questions are as follows.

RQ-7 Is there a relationship between social sustainability and the customer performance?

RQ-8 Do the customer social sustainability practices lead to improved supply chain performance?

2.12 Cost reduction

During the 1980s, the manufacturers were in the race to quickly adopt just-in-time (JIT) and total quality management (TQM) practices to improve their efficiency (Dong *et al.*, 2001). Today, the need for mass customisation and flexibility is growing, as the customers prefer more specialised and customised products to meet their needs. Many manufacturers, who once engaged in mass production of items, are now exploring the modified manufacturing processes to achieve reduced lead time, make-to-order, assemble-to-order, etc. As a result, low cost, high quality and efficient small batch production, as well as greater flexibility, has become a reality.

To align with these developments, companies are upgrading their purchasing function to be an integral part of the corporate strategic management process. For example, companies are increasingly adopting the route of integration and strategic alliance for better performance, customer service and cost reduction. This integration has many formats in the literature, such as supplier integration, buyer supplier partnerships, integrated purchasing strategy, supply base management, strategic supplier alliances, supply chain synchronisation, etc. In other words, companies are in a constant endeavour to find better processes to not only meet the customers' increased aspirations but also achieve reduction in the cost of service.

Tan *et al.* (1999) advocate supplier integration and tracking practices and show how these practices could have a positive impact on reducing the supplier base and improving the corporate performance. This research also posits the supplier integration practices and their relationship with

the firms' return on investment, cost of production, product quality, supplier performance and competitive position.

Shin *et al.* (2000) have demonstrated reduction in production cost through supply management orientation (SMO) and shown how the SMO orientation leads to a better supplier as well as buyer performance. Similarly, Scannell *et al.* (2000) have proved that, integrating practices such as supplier development, supplier partnering and JIT in the supply chain, can lead to overall cost reduction. There are other studies affirming that the improved supplier performance leads to lower costs, which means that the activities such as supplier integration, knowledge sharing, and supply management orientation, invariably lead to cost reduction.

Thus, Dong *et al.* (2001) posit that just-in-time (JIT) purchasing results in reduced order sizes, low lead times and adoption of quality control measures that lead to a significant reduction in the logistics cost, including the cost of purchase for the buying firms. Others argue that the improvements in scrap rates, defect rates and improved quality practices lead to increased profits and decreased product cost (Adams *et al.*, 1997; Fyenes and Voss, 2002). In this way, the literature asserts that the adoption of better social sustainability practices can lead to low lead times, reduced order sizes, improved quality, improved scrap rate, and reduced defect rates, resulting in reduction in the cost of production.

In recent times, there has been an upsurge of awareness of the sustainability related aspects among the consumers. As a result, companies are adopting more sustainable measures in their supply chains to become accountable to the consumers and gain a strategic advantage. There has been an enormous amount of research carried out by the academicians and practitioners to establish the "green benefit" for the companies. Rao and Holt (2005) have demonstrated the companies' competitiveness through the adoption of green practices and their cost reduction in inbound and outbound supply chain. A similar study by Carter (2005) using the purchasing social responsibility (PSR) phenomenon proves the relationship between social responsibility measures and the supplier performance, leading to cost reduction for the buying companies.

Cost reduction can be maximised through various approaches in the supply chain. For example, Danese and Romano (2011) demonstrate how the supplier integration and customer integration efforts yield the cost reduction objectives of the firms. Similarly, a study carried out in China supports the contention that supply chain integration leads to competitiveness and cost reduction

(Huo *et al.*, 2014). Dey *et al.* (2015), in their case study of the UK manufacturing organisations, find that constant supplier evaluation measures can lead to competitive performance and cost reduction for the organisation. Other scholars have also discussed the cost reduction benefits gained through the environmental sustainability measures. For example, Sarkis (2001) and Rothenberg (2012) have established the relationship between environmental sustainability and cost reduction, and shown how the adoption of environmental sustainability measures can benefit the firms in their cost reduction efforts.

However, by and large, the studies have been concentrated on environmental sustainability, except that of Carter (2005) who provides the evidence of cost reduction due to the managers' efforts to project the companies' socially responsible purchasing behaviour. Therefore, our last research question is as follows.

RQ-9 Is there a relationship between social sustainability practices in the supply chain and cost reduction?

Based the literature review and discussions, we summarise all the research questions as follows.

2.13 Research questions

- RQ-1 What are the social sustainability dimensions and measures specific to the Indian manufacturing supply chain?
- RQ-2 In the Indian manufacturing industries, is there a relationship between social sustainability and supply chain performance?
- RQ-3 Can social sustainability practices lead to better supplier performance?
- RQ-4 Is there a relationship between the suppliers' social performance and the supply chain performance?
- RQ-5 Can the adoption of social sustainability practices lead to better operational performance of the firm?
- RQ-6 Is there a relationship between the supplier performance and the operational performance?
- RQ-7 Is there a relationship between social sustainability and the customers' social performance?

- RQ-8 Do the customers' social sustainability practices lead to improved supply chain performance?
- RQ-9 Do the social sustainability practices in the supply chain lead to cost reduction of the firms?

CHAPTER-3

METHODOLOGY

3.1 Introduction

In the previous chapter (chapter-2), we have explored the literature pertaining to social sustainability and their importance to the supply chain. In addition, we have also explored the relationship between social sustainability and the supply chain performance. Since, the supply chain constitutes suppliers, operations and customers in manufacturing, the review of literature pertinent to operational performance, supplier performance, and customer performance and related measurement metrics were explored. The systematic literature review helps greatly in identifying the potential gaps. At the end of the literature review, based on discussions the research questions were raised appropriately. Based on the research questions, the objectives and followed by research hypothesis for the study has been developed in this chapter. The methodology and the process of research design to accomplish the set hypothesis were described in the preceding section.

3.2 Research gaps identified based on literature review

- Since many researchers adopted different dimensions according to their specific need, there is a need to identify social sustainability dimensions related to the specific country (i.e., India).
- There was no specific measurement scale available to measure exclusively social dimensions in the supply chain. There is a need to develop the measurement scale to measure the social sustainability measures in India.
- There is a need to explore the relationship between social sustainability measures and the supply chain performance
- Suppliers being the part of upstream supply chain ; there is a need to explore the possibility of the relationship between suppliers social sustainability activities and their performance
- We also need to explore relationship between social sustainability measures and operational performance of the company.

- There is a need to explore relationship between supplier performance and supply chain performance.
- There is a need to explore the relationship between supplier performance and operational performance.
- Customers being a part of down- stream supply chain in manufacturing industries, there is a need to explore the relationship between customer social practices and their performance.
- Explore, focal company by adopting social sustainability activities in the supply chain, improve in their cost reduction measures.

3.3 Research Questions

- RQ-1 What are the social sustainability dimensions and measures specific to the Indian manufacturing supply chain?
- RQ-2 In the Indian manufacturing industries, is there a relationship between social sustainability and supply chain performance?
- RQ-3 Can social sustainability practices lead to better supplier performance?
- RQ-4 Is there a relationship between the suppliers' social performance and the supply chain performance?
- RQ-5 Can the adoption of social sustainability practices lead to better operational performance of the firm?
- RQ-6 Is there a relationship between the supplier performance and the operational performance?
- RQ-7 Is there a relationship between social sustainability and the customers' social performance?
- RQ-8 Do the customers' social sustainability practices lead to improved supply chain performance?
- RQ-9 Do the social sustainability practices in the supply chain lead to cost reduction of the firms?

3.4 Objectives of the study

The major objectives of the research are listed below

- To identify social sustainability dimensions, metrics and scale items appropriate for Indian supply chain.
- To develop the social sustainability measurement scale relevant to Indian manufacturing Industry.
- To explore the relationship between social sustainability measures and supply chain performance.
- To explore the role of supplier performance on supply chain performance.
- To explore the relationship between operational performance and supply chain performance in relation to social sustainability.
- To explore the relationship between customer performance and supply chain performance

3.5 Hypothesis development

To achieve the research objective-1 and RQ-1, we have proposed the following hypothesis.

RQ-1 What is the social sustainability dimensions and measures specific to Indian manufacturing supply chain?

H1: Issues related to equity in the supply chain constitute a social dimension

H2: Issues pertaining to safety in the supply chain constitute the social dimension

H3: Issues related to health and welfare constitute the social dimension of sustainability

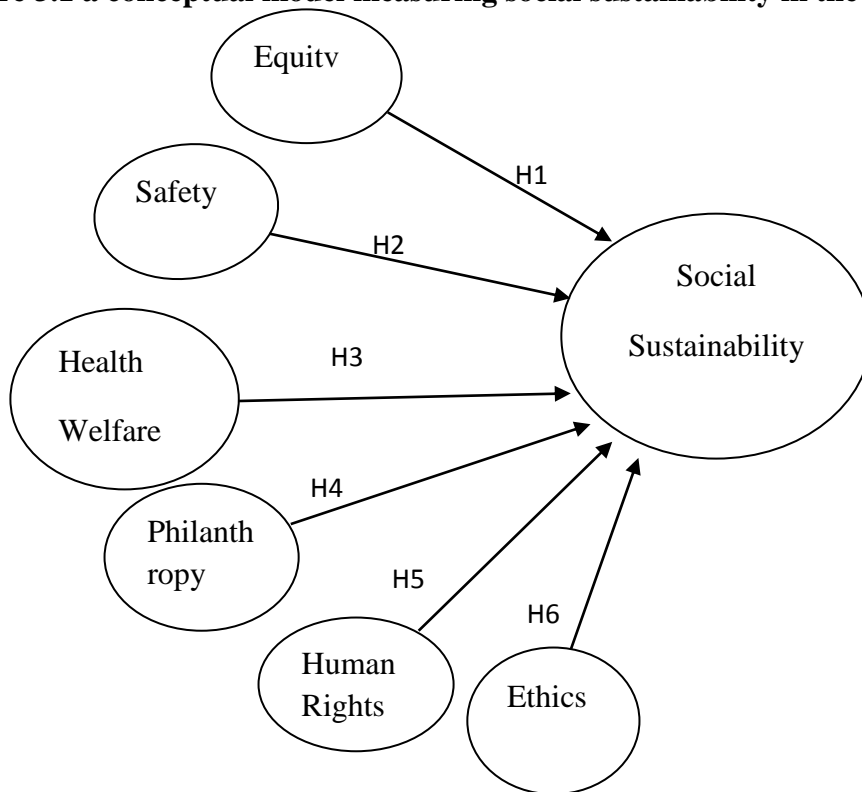
H4: Issues related to philanthropy constitute the social dimension

H5: Issues related to human rights may constitute the social dimension

H6: Ethical issues in the supply chain constitute the social dimension

Based on the hypothesis H1:H6, a conceptual model was developed as shown in Figure-3.1

Figure 3.1 a conceptual model measuring social sustainability in the supply chain



To achieve the research objective-2 and RQ-2

RQ-2 In the Indian manufacturing industries, is there a relationship between social sustainability and supply chain performance?

H7: whether there exists a relationship between social sustainability and supply chain performance?

To achieve the research objective -3 and RQ-3

RQ-3 Can social sustainability practices lead to better supplier performance?

H8: Whether there exist relationship between social sustainability and supplier performance

To achieve the research objective -4 and RQ-4

RQ-4 Is there a relationship between the suppliers' social performance and the supply chain performance?

H9: whether, there exists the relationship between supplier social performance and supply chain performance

To achieve the research objective -5 and RQ-5

RQ-5 Can the adoption of social sustainability practices lead to better operational performance of the firm?

H10a: Whether, adoption of social sustainability practices can lead to better operational performance of the firm

H10b: Whether, there exist the relationship between operational performance of the firm and supply chain performance

To achieve the research objective -6 and RQ-6

RQ-6 Is there a relationship between the supplier performance and the operational performance?

H11: Whether, there exists the relationship between supplier performance and operational performance

To achieve the research objective -7 and RQ-7

RQ-7 Is there a relationship between social sustainability and the customers' social performance?

H12: Whether, there exists the relationship between social sustainability and customer performance.

To achieve the research objective-8 and RQ-8

RQ-8 Do the customers' social sustainability practices lead to improved supply chain performance?

H13: Whether, there exist the relationship between customer performance and supply chain performance

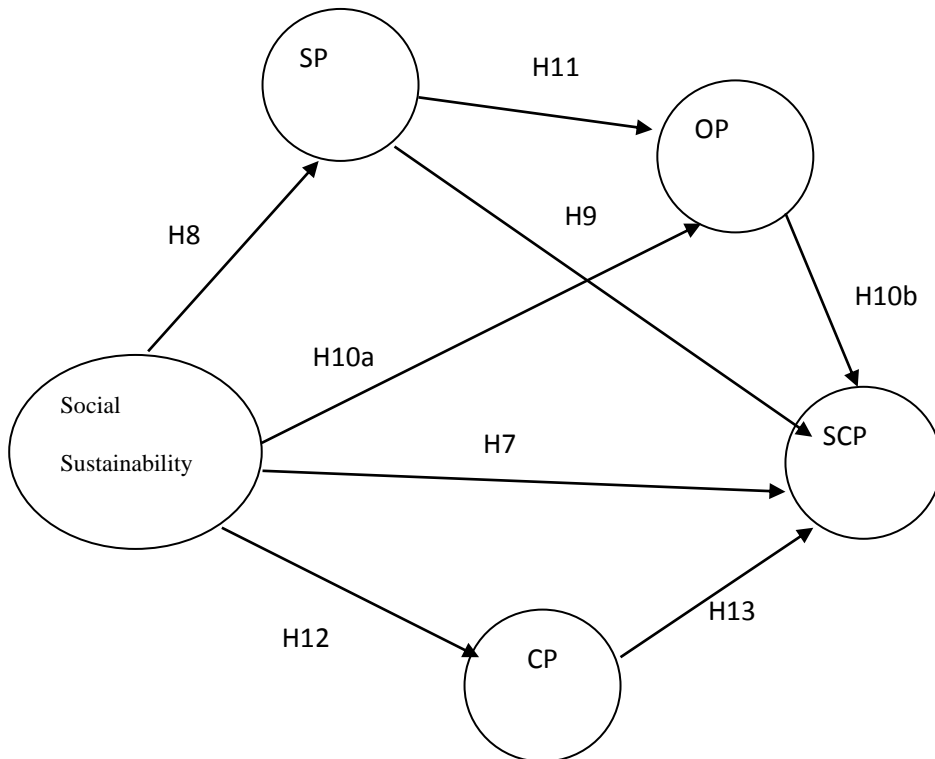
To achieve the research objective -9 and RQ-9

RQ-9 Do the social sustainability practices in the supply chain lead to cost reduction of the firms?

H14: Whether, the social sustainability practices in the supply chain lead to cost reduction of the firms?

Based on the hypothesis H7 to H13, we propose the model depicted in Figure-3.2

Figure 3.2 Conceptual model showing relationship between social sustainability and supply chain performance



3.6 Research design and methodology

We have adopted both qualitative and quantitative methods for the research. Initial phase of our research was qualitative in nature. First, extensive literature review was carried out to explore the possible social issues and dimensions used in the supply chain of manufacturing industries. In this phase: various social measures and dimensions were identified and listed (Chapter 2). Second: in-depth interviews were carried out with supply chain professionals in order to identify social issues pertinent to the Indian manufacturing industry. In this qualitative phase of the study, various social issues relevant to the Indian manufacturing Industry were identified. Finally, the social measures identified by both literature review and in-depth interviews were put through a series of quantitative measures and validated. The steps involved in the qualitative process are described in the preceding section.

3.7 Methodology for qualitative study (phase-1)

In this research, we explore the social sustainability issues that are pertinent to the manufacturing supply chain. A qualitative exploratory approach was adopted as the research focuses on the social sustainability phenomenon in the Indian manufacturing industry. In case of emerging research subjects, the exploratory approach is the most suitable one (Richardson, 1999). Qualitative methods are more useful and appropriate to generate theory that is grounded in data in areas for which previous work is scant (Glaser and Strauss, 1967; Eisenhardt, 1989). We followed grounded theory approach because such approach helps in generating the new theory from data. According to Glaser and Strauss (1967) the propositions are grounded in the data and complimentary, extant literature (Sherry, 1991). We have chosen a more qualitative approach based on the exploratory nature of our research and we intend to develop rich explanations of the phenomenon under study (Glaser and Strauss, 1967; McGrath, 1982).

We adopted a semi-structured interview approach; the questionnaire is displayed in Appendix-I. Many researchers advocate saying “unstructured fieldwork is the best way of doing research”(Spradely, 1979), others suggest that “tighter design” of more structured approach gives greater clarity and avoids the data “overload”(Miles and Huberman, 1994). Further, a more structured approach helps the researcher with the ability to narrow and be selective in the data collection (Weller and Romney, 1988). In addition, it is also undesirable to enter into any research

without purpose (Wolcott, 1982). Semi-structured interview approach helps in achieving internal validity by ensuring that responses are measured comparably across all interviewees (Weller and Romney, 1988). The pretest was conducted to assess the face validity of the questionnaire, followed by a pilot test with supply chain managers. All the individuals were from different firms not serving as interview participants. Finally, with interviewee's verbal responses, the data triangulation was done with the help of independent documentation. The content of the semi-structured questionnaire is enclosed as Appendix-I.

3.7.1 Research design and data collection

The research was conducted in two elaborate steps that involve first detail study of literature as to what is social sustainability in the supply chain and manufacturing. In this preliminary phase, various social sustainability activities and related dimensions were identified and analyzed. This analysis includes identifying the various social sustainability research done in all the stages of the supply chain across the globe under different domains and classification of social sustainability dimensions with its taxonomy in manufacturing. The methodology adopted in this phase was primarily a review of literature and secondary information sources (Books, United Nations Reports etc). In the second phase, we intend to conduct the semi-structure interviews with the supply chain managers and executives with over a decade experience in supply chain function and should be representing a company with minimum One Billion revenues. According to IBEF report, the manufacturing industries in India were classified into basic goods, capital goods, intermediate goods and consumer goods (IBEF Report, 2012). Interview respondents were carefully picked up from these companies so that the whole manufacturing sector is represented.

The semi-structured interviews were conducted to unearth the activities that constitute the social sustainability in the supply chain of manufacturing industries. For the purpose, we conducted in-depth interviews with 27 supply chain managers with over a decade of experience in the supply chain function from manufacturing industries. All the interview respondents were the delegates or paper presenters(research) for the society of operation management conference (SOM 2014) held during 13-15 Dec 2014 and Biennial supply chain management conference conducted by Indian Institute of Management, Bangalore (IIMB). These two conferences are well known in India among supply chain managers, practitioners and academicians in the area of supply chain and

operations. Most of the supply chain managers in India are associated with society of operations management (SOM) either as members or supply chain practitioners.

The participants for this interview process were selected based on the information provided by the organizing committee of both the international conferences. The information was obtained 30 days prior to the actual conference schedule and subsequently the respondents were contacted for prior appointment with the brief on social sustainability. Total 96 respondents were selected based on experience, knowledge, Industry they represent (current), and revenue of the company they represent. To all 96 respondents, we sought appointment during 4 days of their conference stay (including conference and 2 days prior to conference and 2 days later). Total 55 corporate executives have responded positively and agreed for in-depth interviews. Further, the appointments were scheduled and the information on appointments was communicated to the respondents a week prior to their arrival to the conference venue. Owing to time constraint, and other reasons, only 27 corporate executives were agreed for the interview and subsequently they were interviewed during these conference days and later from Dec 2014 to Jan 2015. The profile of the respondents are described in Table 3.1.

3.7.2 Analysis procedure

The data analysis involved several steps. As Strauss suggests, coding of the data was done in advance, and often it was interrupted by the writing of analytical memos. After each interview, a detailed summary was prepared listing all the activities specified by the respondent during interview, when there were conflicts in the accounts of individual, the follow up phone calls were made for clarification. Further, the interview transcripts and remaining documents pertaining to social sustainability were scrutinized line by line and paragraph by paragraph to suggest initial themes or categories these Strauss calls as “open coding”. Based on these themes, a series of analytical memos were recorded. Next step- which Strauss refers as “axial coding”, by which the transcripts were scrutinized again and again to consider each of the theme among several cases to appraise the fit of each theme to the data. At least one analytical memo was written on each theme. Once approximately two thirds of the data collected, a major memo was prepared in efforts to bring together the themes and identify other areas for investigation. Coding of qualitative data, the new understandings and insights into the data emerged (Lincoln and Guba, 1985).

There were numerous iterations and review done with the notes and transcribed interviews. Over the time, the issues such as “decaying of codes” or “becoming too general” occurred (Miles and Huberman, 1994). Finally, the stage called “selective coding, once again the remaining data were scrutinized to get refined themes and identify the findings for each. Then, the final sets of memos were written through which the themes were integrated (Glaser and Straus, 1967). We discuss the results of these analyses in the preceding section. We then attempt to identify the various activities related to the social sustainability of the supply chain in Indian Manufacturing Industries.

Figure 3.3. Research methodology

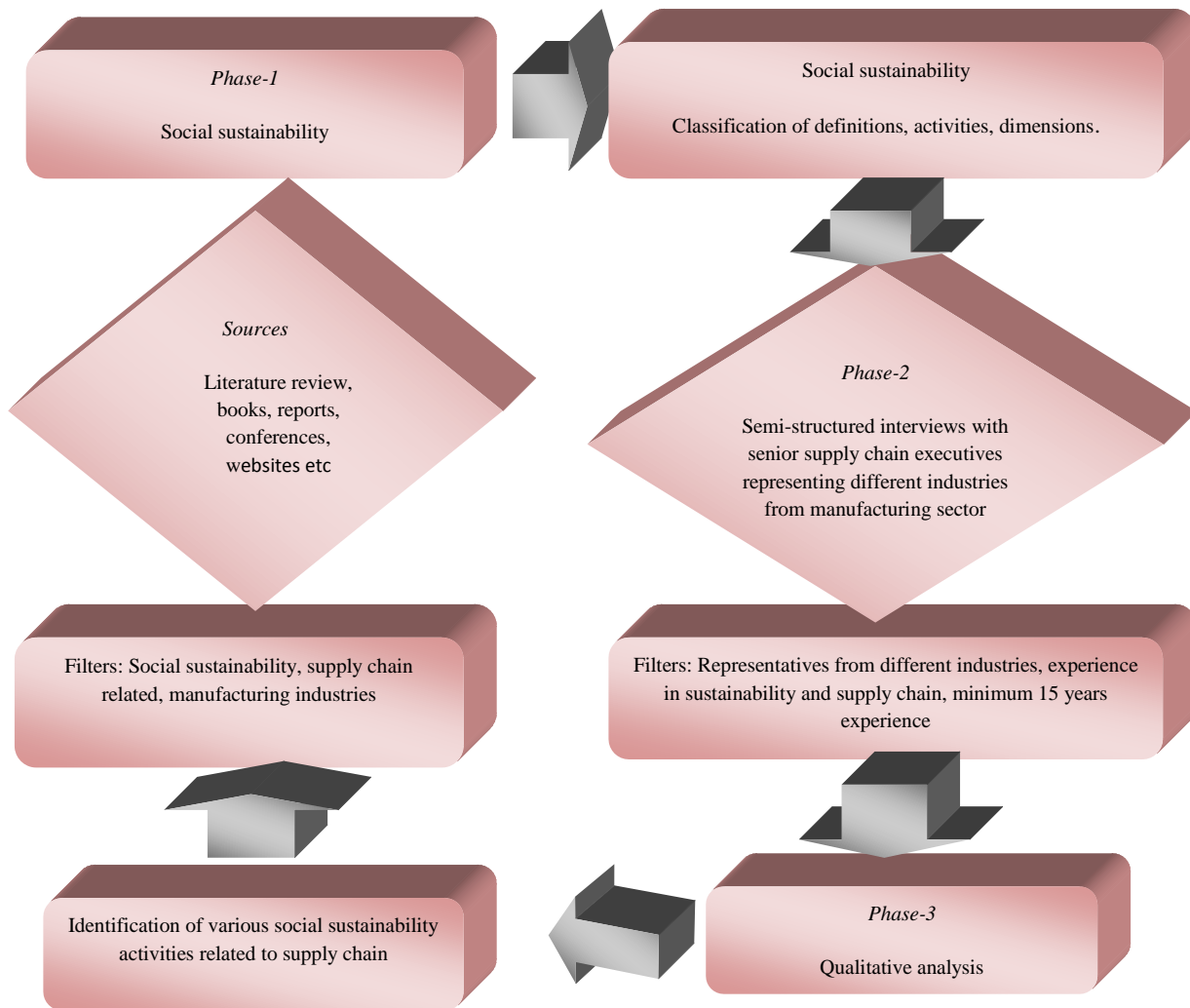


Table 3.1 Profile of supply chain managers who participated in interview process

S.No	Designation/Position	Industry	Experience in SCM function & sustainability	Revenues
1	Associate Vice President- Supply chain and operations	Leading Telecom and Fortune 500 company	Over 25 Years	Over 10 Billion
2	Vice President -Supply chain operations	Global Automotive giant based out of Bangalore, India(Fortune 500 Company)	Over 30 Years	Over 10 Billion
3	Head -Supply Chain Planning & Warehouse	Global Electric company based out of Vadodara, Gujarat, India(Fortune 500 company)	21 Years	Over 10 Billion
4	Director -Operations	Dutch based food and beverages company, operating out of Pune, India	Over 25 Years	Over 10 Billion
5	Manager -Supply chain operations	A leading home appliances company(A subsidiary of USA corporation),	Over 20 Years	Over 10 Billion
6	Director- Supply chain	India's leading fertilizer (co-operative) company	Over 30 Years	Over 5 Billion
7	Dy. General Manager	India's leading private petroleum manufacturer Based out of Mumbai, India	Over 25 Years	Over 10 Billion
8	General Manager- Sustainability	A leading two wheelers manufacturer based out of south India.	30 Years	Over 10 Billion

9	Head- Operations	Manufacturers of IT products based out of Bangalore, India.	Over 20 Years	Over 10 Billion
10	Sr. Manager Supply Chain Management	Electrical power systems manufacturers	20 years	Over 5 Billion
11	President- Operations	Leading IT products manufacturers, based out of Chennai, India	25 Years	Over 10 Billion
12	Vice president	A global IT corporation dealing with IT products	20 Years	Over 10 Billion
13	President	Electrical and Electronics products manufacturer based out of Tumkur, India	30 Years	5 Billion
14	General Manager	India's heavy electrical and electronics company based out of Bangalore, India	20 Years	Over 10 Billion
15	AGM-Operations	A leading Hydro power generation company.	25 Years	Over 10 Billion
16	Head- Supply chain operations	A Japanese photocopier and printer manufacturer based out of Gurgaon, Delhi, India(Fortune 500)	20 Years	Over 10 Billion
17	Vice president- CSR and Sustainability	A leading Steel manufacturer	30 Years	Over 10 Billion
18	General Manager- Supply chain management	India's leading tobacco & packaged food manufacturer	22 Years	Over 10 Billion
19	Chief Executive Officer	Herbal drug manufacturer based out of Bangalore, India	20 Years	Over 5 Billion

20	Assistant General Manager- Sustainability	A leading farm equipment manufacturer	30 Years	Over 5 Billion
21	Sr. General Manager operations	A state owned petroleum company	25 Years	Over 10 Billion
22	President- Supply chain	A Hyderabad based sea food manufacturer	20 Years	Over 5 Billion
23	Sr. Manager- Supply chain operations	One among top 4 Cement manufacturer	19 Years	Over 10 Billion
24	General Manager- Operations	A leading Pharmaceutical company based out of Bombay	25 Years	Over 5 Billion
25	Chief Executive Officer	A leading watch manufacturer based out of Bangalore	20 Years	Over 5 Billion
26	General Manager- Operations	A state owned soaps and detergents manufacturer, Bangalore	30 Years	Over 5 Billion
27	Head- Supply chain and operations	Leading hi-tech bus manufacturer, Bangalore, India.	25 Years	Over 10 Billion

Compiled by author

3.7.3 Reliability and validity of the methodology

Reliability and validity is particularly important for the qualitative research (Miles and Huberman, 1994). Reliability involves the repeatability of the experiment and even after the replication of the experiment; the same results will be achieved. In this case, the interviewer is accompanied by a scholar with different study background who has possibly no idea on supply chain sustainability. Both were asked independently to record and transcribe the interview, later the results found to be almost same. In addition pretest and pilot test were also conducted to ensure face validity. The second issue in the quality of the research design is i.e. external validity-how the results can be more generalizable (Yin 2003; Auramo et al., 2005).

External validity reflects how precise results represent the phenomenon under investigation, establishing results generalisability (Yin, 2003). In this research, the generalisability was enhanced as in depth-interviews were conducted with senior executives with adequate experience who also possess diverse background and represent the industries in manufacturing domain(Automobile, FMCG, Oil and Natural Gas, Agro, Cement, Food and beverages, Telecom, electrical and electronics and IT etc.) According to Yin (2003), the term construct validity refers to establishment of adequate measures for the concept under investigation. For this purpose, Yin (2003) states that construct validity can be enhanced by returning the study reports to the informants for verification. In this case, all the respondents were forwarded the interview transcript reports before the analysis.

3.8 Methodology for quantitative study (Phase-2)

To achieve the research objective-2, we have conducted quantitative study that involves the development of social sustainability measurement scale. The process of the research design is described in the preceding section.

3.8.1 Constitution of expert panel and scale development process

To identify, develop and validate the scales for social sustainability, we followed Churchill's (1979) paradigm and other scale development process (Linderbaum and Levy, 2010) that include employment of both qualitative and quantitative methods. In order to identify and develop the constructs, we adopted systematic literature review process and discussions with subject matter experts. Specifically, we have reviewed the literature on sustainability, social sustainability, operation management, sustainable development and CSR to identify and develop the draft scales. Next, we constituted an expert panel to solicit expert's insights to refine our scales (Yeung, 2008). The expert panel was formed based on two criteria. First, the members should be knowledgeable in the supply chain sustainability and operations in India. Second, the members of this panel were identified with diverse background to make sure that insights from these executives would give different perspectives (Bryman, 2008). Further, the expert panel consists of 27 supply chain managers from manufacturing industries, representing various domains including, petro chemical, pharmaceuticals, cement, FMCG, automotive, electrical and electronics and IT companies. In addition two senior professors from supply chain operations background from premier business school and a scholar from operations management were chosen. In the process of identifying

literature pertaining to social sustainability scale items, suggest the list of various social issues identified by researchers across the globe as mentioned in Table.3.1.

Figure 3.4 Flowchart describing research methodology process

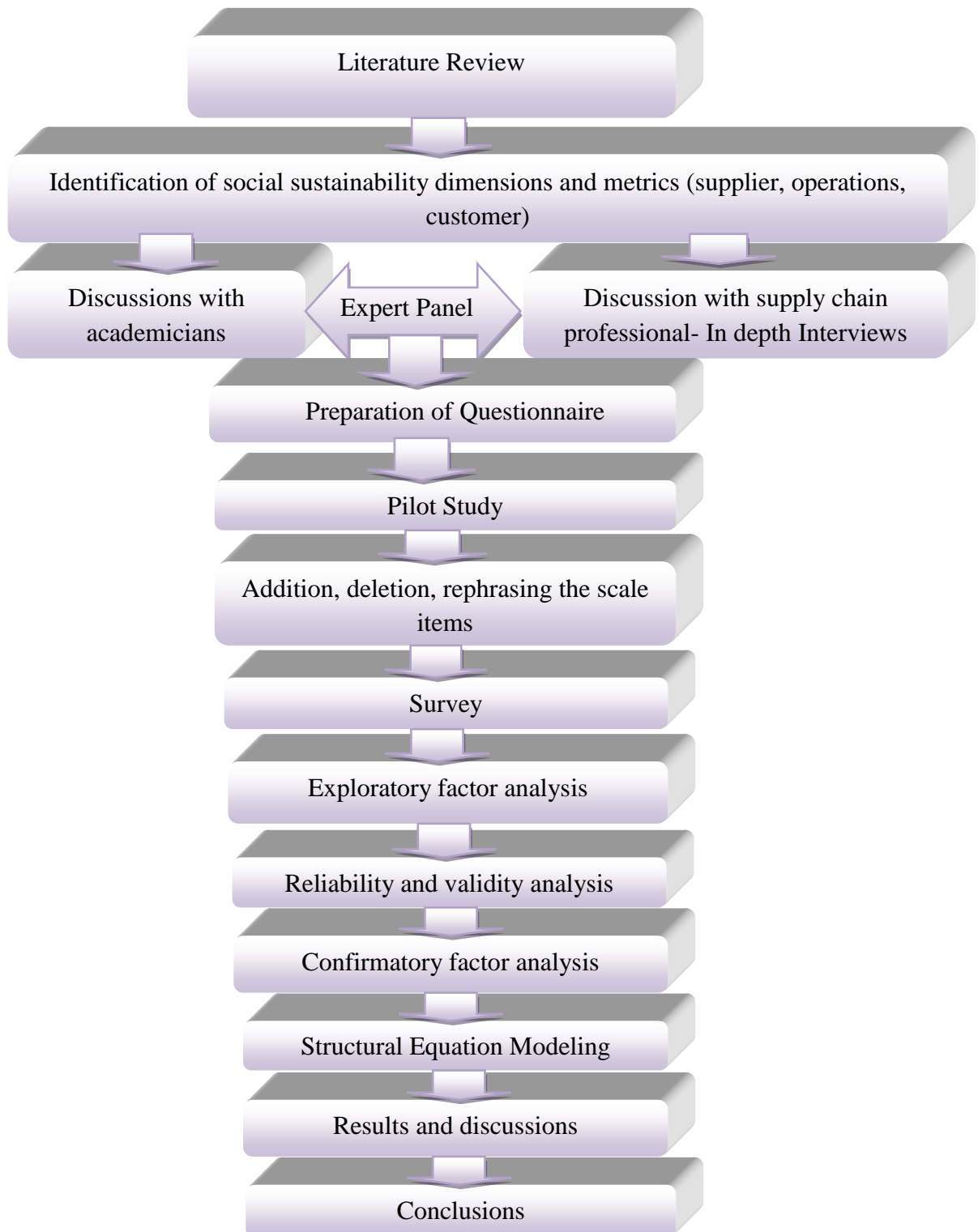


Table 3.2 Scale items and measures for social sustainability

Author's	Measures
UNSD(2001), Hutchins and Sutherland(2008), Yakovleva et al. (2012)	Ensures gender non-discrimination policy in our suppliers
UNSD(2001), Yakovleva (2007), Hutchins and Sutherland(2008), Yakovleva et al. (2012), Chardine-Baumann and Botta-Genoulaz(2014)	Ensures adoption of a gender non-discrimination policy in our own manufacturing locations
Yakovleva et al. (2012)	Ensures strict adherence of gender non-discrimination policy in customer locations (Distributor and Dealers)
Dollinger et al. (1991), Carter and Jennings(2000), Ciliberti et al.(2008)	Purchases from minority/ disabled/ women owned business enterprise (MWBE) suppliers
Clair et al.(1997), Chin and Tat(2015)	Ensure workplace diversity at customer (Distributor and dealer) locations
Clair et al.(1997), Chin and Tat(2015)	Ensures diversity in our own manufacturing locations
Carter and Jennings(2000), Chin and Tat(2015)	Ensures diversity at supplier locations
Carter and Jennings(2000), Ciliberti et al. (2008)	Ensures safety measures in supplier operations
Carter and Jennings(2000), Ciliberti et al.(2008)	Ensures the safe, incoming movement of product to our facilities
Amral and Rovere(2003),Sharma and Vredenburg(1998), Halme et al.(2006), Ciliberti (2008), Chardine-Baumann and Botta-Genoulaz(2014)	Ensures our manufacturing facilities adhere to strict safety regulations (OHSAS 18001)
Author developed	Ensures non -usage of hazardous materials in our products

Honeyman and Goodman (1991); Jamieson (2004); Neumayer and De Soysa (2007); Pearson (2007), Preuss(2009)	Ensures women's safety in our own manufacturing units
Author developed	Ensures women's safety at supplier locations
Author developed	Ensures women's safety at customer locations
Mani et al.(2015a, 2015b)	Inspect customer locations and audit the safety measures
Hutchins and Sutherland(2008), Tate et al. (2010)	Periodically audit supplier's and ensure adherence of occupational health policy
Hutchins and Sutherland(2008)	Ensures good drinking water and sanitation conditions at customer locations
Hutchins and Sutherland(2008), Tate et al. (2010)	Ensures availability of minimum health care facilities in supplier locations
Hutchins and Sutherland(2008), Chow and Chen(2012), Chardine-Baumann and Botta-Genoulaz(2014)	Ensures adoption of occupational health measures for employees at our own manufacturing facilities.
Hutchins and Sutherland(2008), Chardine-Baumann and Botta-Genoulaz(2014)	Conducts health related camps for the society surrounding to our manufacturing facilities
Hutchins and Sutherland(2008), Yakovleva et al. (2012)	Ensures the policy guidelines related to wages at supplier locations
Hutchins and Sutherland(2008), Yakovleva et al. (2012)	Provide our employees with salaries that properly and fairly reward them for their work
Yakovleva et al. (2012)	Audit customer locations and ensure adequate wages for the employees
Clarkson(1995), Chow and Chen (2012), Carter and Jennings(2000)	Ensures our manufacturing unit to volunteer at local charities
Hutchins and Sutherland(2008), Lu et al.(2012), Chardine-Baumann and Botta-Genoulaz(2014)	Ensures our manufacturing unit to offer donations to schools and colleges

Hutchins and Sutherland(2008), Clarkson(1995), Carter and Jennings(2002)	Ensures Our manufacturing unit to donate to religious organizations
Hutchins and Sutherland(2008), Clarkson(1995), Carter and Jennings (2000)	Ensures our manufacturing unit to donate to NGO's for societal development
Hutchins and Sutherland(2008), Clarkson(1995)	Encourage suppliers in philanthropic activities
Clarkson(1995)	Encourage customers (Distributors and dealers) in philanthropic activities
Jennings and Entine (1999), Chow and Chen(2012), Carter and Jennings(2000), Ciliberti et al. (2008), Chardine-Baumann and Botta-Genoulaz(2014)	Ensure non-employment of sweatshop labours in supplier locations (workers with low wages and without basic living conditions)
Ciliberti et al. (2008), Chow and Chen(2012). Chardine-Baumann and Botta-Genoulaz(2014)	Has human rights policy for our manufacturing facilities
Chow and Chen (2012)	Periodically visit customer locations (Distributors and Dealers) and addresses human rights violations
Carter and Jennings(2000), Ciliberti et al. (2008), Chow and Chen(2012),	Audits supplier locations and ensures non employment of child and bonded labour
Geibler et al.(2006), Collins et al. (2007)	Visits periodically to customer locations (Distributor and dealer) and audit the violations of child and bonded labour
Labuschagne et al. (2005), Sharma and Vredenburg(1998), Ciliberti et al. (2008)	Ensures prohibition of child and bonded labour in our own manufacturing locations
Lu et al.(2012)	Has established a set of transparent, comprehensive and stringent ethical codes of conduct in our manufacturing units

Lu et al. (2012)	Ensures, strict implementation of an ethical code of conduct by every manager and employee in our manufacturing units
Lu et al. (2012)	Established an ethical compliance team, department or division in our manufacturing facilities
Carter(2000a,2000b) Chardine-Baumann and Botta-Genoulaz(2014)	Ensures complete prohibition of unethical practices by suppliers (usage of sub- standard materials, bribing, coercion, pollution, insider trading)
Lu et al.(2012)	Audits the customer place for strict compliance of ethical code of conduct

The in-depth interview and discussions with the expert panel in the first phase of our research (study-1) brought some interesting results. Indian Manufacturing increasingly plagued with, safety, health, child labour, bonded labour, equity, labour working conditions and women safety issues. Thus, Government of India has now mandated all the listed (SEBI) manufacturing companies to adhere to business responsibility reporting (sustainability), in addition to traditional financial reporting guidelines. Further, Govt. of India believes that a commitment towards addressing sustainability issues is a way forward for increasing competitiveness in Indian manufacturing (NMCCR, 2014). Since, this research is an extension of social sustainability research done by Mani et al. (2014, 2015), and we adopted social measures identified by Mani et al. (2014,2015) that are more relevant to India. These dimensions include equity, safety, health, child and bonded labours (Labour rights), philanthropy and ethics (Mani et al., 2014, 2015). In depth interviews with the experts brought us comprehensive list of social issues in all the stages of supply chain. In addition; the extensive literature review to identify the scale measures, yielded with many social items used by various scholars in different domains that are listed in table 3.2.

Although, there were many social dimensions proposed by UNDS(2001), Global reporting Initiative(GRI), Hutchins and Sutherland(2008), etc., our expert panel is of the opinion that all these dimensions may not be relevant to Indian Manufacturing Industries, as a result we dropped, poverty, education and housing dimensions from the list. Further, our literature review suggests

that dimensions such as poverty and education and housing were not used frequently in the supply chain management literature.

Finally, expert panel suggested dimensions such as equity, safety, health, philanthropy, ethics, and labour rights with the measures specified in Table-3.2 for our study. Panel also suggested that the measurement scales developed by Carter and Jennings (2002, 2004) for social sustainability, addressing diversity, safety, philanthropy, human rights, ethics were deemed to be fit in measuring social sustainability with small modifications. For ethical dimension, the expert panel also suggested that, the scales developed by Lu et al. (2012), in China could be appropriate, however, expert panel also felt that, these scales can't be used directly in Indian context, thus offered small modifications, and addition of new items etc. This whole exercise yielded 40 social measures as mentioned in Table 3.2. In addition, for supply chain performance, supplier performance, and customer performance: the expert panel further suggested, using of Carter and Jennings(2000) for supplier performance construct, and Chin and Tat(2015) for supply chain performance, and also offered suggestions for developing customer performance, operational performance constructs and measures. Interestingly, majority of the measures (scale items) was available in the literature on one way or the other form as mentioned in Table-3.3 for SCM, SP, CP, and OP constructs. Few scale items such as women safety in supplier locations and women safety in customer locations were developed by the author with the help of expert panel(Table 3.2). Thus, the new social sustainability scale with 40 items for our research was developed by the way of modifying the scale items wherever necessary, and using the existing scales as discussed above.

Table 3.3 Measures related to supply chain performance, supplier performance, operational performance and customer performance

Construct	Authors	Label Name	Scale items
Supplier performance	Huang and Keshkar (2007), Carter and Jennings, (2000; 2005), Modi et al.(2007)	SP1	We have been able to obtain products or services from suppliers that are of higher quality
		SP2	We have been able to obtain products or services from suppliers with shorter lead time

		SP3	The supplier's reliability is increased
		SP4	Suppliers have done their job efficiently
Supply chain performance	Gunasekaran et al.(2001, 2004), Beamon(1999), Chin and Tat (2015)	SCP1	Increased customer satisfaction
		SCP2	Achieve compressed order cycle time or lead time
		SCP3	Increased customer service level
		SCP4	On time delivery or precision delivery
		SCP5	Reduced operating cost
Operational performance	Frohlich and Westbrook(2001,2002), Ahmed and Schroeder(2003), Devaraj et al. (2007),	OP1	We have been able to achieve low lead time, in operations
		OP2	We have been able to achieve better quality in operations
		OP3	We have been able to achieve high reliability in operations
		OP4	We have been able to achieve high efficiency in operations
Cost reduction	Tan et al.(1999), Shin et al.(2000), Scannel et al.(2000)	CR1	Production costs have been reduced
		CR2	We have lowered the costs of purchase materials
		CR3	Labour costs have decreased
Customer performance	Gupta and Zeithaml (2006), Hooley et al. (2005), Petersen et al.(2009)	CP1	The customer is able to acquire more customers (customers customer)
		CP2	The customer's financial status is improved

		CP3	Resulted in increased customer service by the customers
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3.8.2 Pilot Test-Scale purification

As discussed earlier, 40 items scale was generated. In order to assess the face validity of the scale items; a pilot-test was conducted to 75 supply chain managers and experts (Heeler and Ray, 1972). The participant managers possessed the job title including General Manager, AGM, Sr. Manager, CEO, VP (sustainability) from leading manufacturing industries. To ensure that the scales are relevant to target audience, and industries; the informants of the pilot-test were selected carefully from the manufacturing industries. These managers were representing majority of the key manufacturing sectors of Indian economy that includes automotive, pharmaceuticals, FMCG, chemical, petrochemical, energy, electrical and electronics, cement, and IT. The managers were selected randomly from CMIE database and matched with the list of companies which complied global reporting initiative (GRI) norms for sustainability reporting. This is to ensure that the managers are knowledgeable on social sustainability issues. Finally, out of 95 respondents, 75 were agreed to participate in the initial pilot test. The selected respondents were given a brief description on social sustainability and followed by a questionnaire. Many of the managers even commented “social sustainability is interesting” in manufacturing. Based on the outcome of this pilot study, minor changes have been made to few scale items to improve the content validity and readability. Several items were removed for the reason; the item is not giving exact meaning of safety measures related to either supplier or customer. The ambiguous item “Inspect supplier and customer locations and audit the safety measures” was removed. Another item namely gender discrimination was replaced with “gender non-discrimination” as the managers felt that gender discrimination has a different meaning. Finally, on completion of the pilot test; the total no of scale items were reduced to 59 and each assessed by 5 point Likert scale anchored at 1-Strongly disagree to 5- Strongly agree to represent the social sustainability dimensions. 5 point Likert scale is more appropriate in measuring the attitude of the people and was used previously in several sustainability measurement studies (Zhu et al., 2008; Carter and Jennings, 2002, 2004; Miao et al., 2012)

3.8.3 Target population -Domain specification and scale validation

India is 4th largest emerging economy in the world. According to Mckinsey and company India's manufacturing sector poised to touch US\$ 1 trillion by 2025. There is huge potential for the manufacturing sector to account for 25 % of India's GDP and expected to create 90 million domestic jobs by 2025(IBEF, 2012). India is rated as 4th competitive manufacturing destinations in the world in terms of low cost manufacturing. To boost India's manufacturing 'Make in India' initiative, followed by top global technology firms such as GE, Bosch, Tejas and Panasonic interest to invest in the electronic, medical, automotive and telecom manufacturing clusters in India. The Government of India has already received 57 investment proposals of a sum of US\$ 3.05 billion and approved. On the other hand, the domestic chemical industry is about US\$ 118 billion and accounts for 3% of the global chemical market. According to Organization for economic cooperation and Development (OECD), India is anticipated to witness better momentum among BRIC nations, where as other member countries are expected to see stable growth. In terms of private wealth, India could become the world's seventh biggest nation, with a 150 per cent increase in total, from US\$ 2 trillion in 2013 to US\$ 5 trillion in 2018. The foreign direct investment (FDI) to India doubled to US\$ 4.48 billion in January 2015, the highest inflow in last 29 months, from US\$ 2.18 billion in January 2014. As per International monetary fund report (IMF), India's is expected to become the world's fastest growing economy by 2016 ahead of China. India stand to gain growth rate of 6.3 per cent in 2015, and 6.5 per cent in 2016 by when it is likely to cross China's projected growth rate, the IMF said in the latest update of its World Economic Outlook (IBEF, 2012).

These are some of the highlights of Indian manufacturing sector and their potential role in the International markets. However, several social sustainability issues such as , labour conditions, and recent recovery of child and bonded labours (BBC News, 5th Feb 2014)in the manufacturing set up and recall of medicines owing to customer safety issues, put the entire manufacturing in a back seat. Government of India is committed to increase manufacturing competitiveness through various measures, for example sustainability (all dimensions) is one among them. In addition, companies are mandated to furnish sustainability reports as “business responsibility reports” in their annual financial reporting. In the absence of structured guidelines on social sustainability, manufacturing companies are looking for various ways and means to increase and address social issues which could potentially help them to achieve their competitiveness. So in this research, we collect the data

from major manufacturing industries including automotive, telecom, pharmaceuticals, chemicals, electrical and electronics, petro-chemical, energy, textiles, food, office automation and FMCG to validate our scales (CMIE, 2014).

3.8.4 Method of sample and data collection

In this research, we have collected the manufacturing companies' information from Centre for Monitoring Indian Economy (CMIE) database (<https://Prowess.cmie.com>). CMIE database is known for its authentic information with regard to information on listed companies (SEBI). It provides address, information on promoters, financial information, products and revenues etc. Prowess also allows the user to sort the information based on custom made queries. For instance, the users will be able to sort the manufacturing companies in southern or northern part of the country along with revenues. Hence it is ideal and authentic database for academicians and researchers in India. Further, the sustainability and social sustainability issues are more likely to be considered as pertinent in large organizations, we identified the manufacturing companies randomly with annual revenues exceeding 100 million or more as our target sample. As a result, a database of randomly selected 1200 manufacturing companies that are evenly distributed among all the manufacturing sectors across south India was created. We followed procedure proposed by Dillman(2007) for questionnaire formatting, distribution and collection. We adopted both mail and telephone survey methods for data collection. The questionnaire (Appendix-II)with the write up information on social sustainability, and instructions on how to fill up the questionnaire was sent through mail to 1200 supply chain managers across India. These mails were forwarded in three phases, as it was not possible to send 1200 mails at one go from our mail system. However, all the mails were forwarded in a single day.

Table 3.4 Sample and data collection

	Data collection stage	Response	Total companies chosen
Sample (CMIE data)	Phase-1	300	1200
	Phase-2	450	1400
Sampling Frame	<ul style="list-style-type: none"> • Companies with over 100 million revenues. • Operation -Minimum 10 years in India. 		
Sampling method	Survey method		
Sampling Mode	<ul style="list-style-type: none"> • On line mail survey • Telephonic survey 		
Place	India		

3.9 Data Analysis Tools and Techniques

We have performed various statistical procedures to test the hypothesis; the following tests were briefed in this section. However, the detailed procedure of statistical tests is explained in chapter - 4 (analysis and discussion)

3.9.1 Exploratory factory analysis

In this research, we have used exploratory factor analysis (EFA) by using SPSS 20.0, to extract the factor structure for our study. Similarly, we have evaluated the reliability and validity of the constructs and sampling adequacy were determined.

3.9.2 Confirmatory factor analysis (CFA)-Measurement model

In order to test the psychometric properties of the scale items, a confirmatory factor analysis was performed by using SPSS AMOS-20.0. In this, various measures such as convergent validity, discriminate validity of the items were evaluated.

3.9.3 First order confirmatory factor analysis and Second order confirmatory factor analysis

In this, AMOS-20 was used to model the first order factors and how these factors together measure the second order dimension (Social sustainability) was ascertained. In addition, predictive validity and efficacy testing was performed to evaluate the second order latent structure.

3.9.4 Structural equation modeling (SEM)-Structural Model

Structural model using Amos -20 has been created to test the proposed hypothesis. In order to evaluate the model fit; various model fit indices, such as Chi- square value, CFI, NNFI, RMSEA, GFI are evaluated. The path loadings are evaluated to check; how well the measurement scale predicts the dependent variable.

In the next chapter, various analysis related to both qualitative and quantitative study (Study-1 and Study-2) will be discussed

CHAPTER-4

RESULTS AND ANALYSIS

4.1 Introduction

In the previous chapter (Chapter-3), we have described the research methodology for qualitative and quantitative study. This chapter discusses the results of the qualitative and quantitative analysis. The first section of this chapter discusses the results of the qualitative analysis and the second part of the chapter discusses the quantitative measures using various statistical tools. First, the results of exploratory factor analysis performed on social sustainability issues in the supply chain, followed by confirmatory factor analysis to evaluate the psychometric properties of the factors. Further, this chapter discusses the results of second order confirmatory factor analysis and structural equation modelling. In addition, this chapter also discusses the results of various statistical test used for reliability, validity of the constructs considered for the study. Finally, this chapter validates the various hypothesis proposed in the chapter -3 through the results outcome.

4.2 Findings and analysis: Qualitative study (Phase -1)

In chapter-3, the process of in- depth interview and the method of data collection in qualitative research was described in detail. Further, in this chapter, we elaborate on the detailed findings of the various social issues associated with the supply chain of Indian manufacturing Industries.

Analysis of the data led to the development of a framework for social sustainability in the supply chain of manufacturing industries, describing various activities in all the stages of the supply chain that constitute supply chain sustainability. This also led to the identification of three possible patterns of sustainability –issues related to supplier social sustainability, manufacturer social sustainability and customer social sustainability.

New insights emerged out of in depth interviews carried out to the practicing managers of the manufacturing organizations. We describe the series of findings from the data in the preceding section.

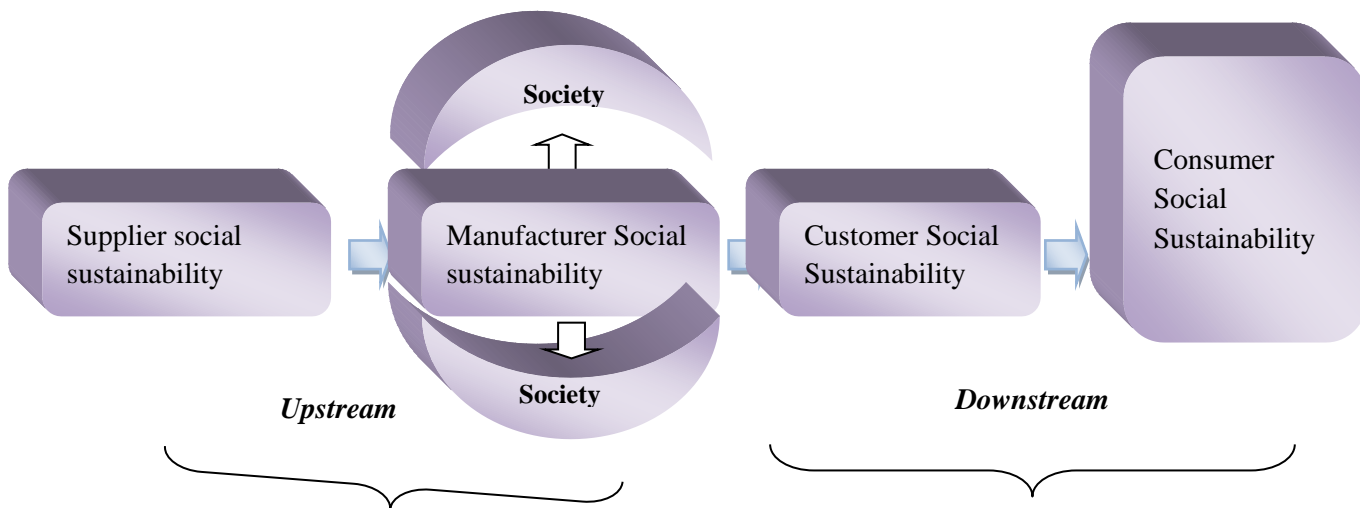
4.3 Social Sustainability in the supply chain

The literature review suggests that social sustainability can be described as how the corporate addresses the social issues in the supply chain that can lead to the longer survival of the organization. This includes addressing people issues in supplier locations, in house operations, society, and customer. These issues include equity, education, wages, safety, health, housing, philanthropy, child labour, bonded labour and ethics as discussed in the literature (UNSD, 2001; Carter and Jennings, 2000; GRI, 2014; Mani et al., 2014). We report the series of findings from our in-depth interviews as follows.

A middle level supply chain manager quote

[...] If we manage people well, by providing adequate wages, good working conditions, safety and health at most, that can take us to long term survival of the organization [...] (I-1)

Figure 4.1 a diagram depicting social sustainability in manufacturing, supply chain



Many supply chain managers are of the opinion that they understand the term social sustainability and practice in their corporate activities. Further, some managers have incorporated sustainability measures in their vision and mission statements and were instrumental in forming of committee on sustainability. A manager from leading private sector Petro- chemical company expressed

“We have four tier sustainability execution model in which first planning is done, second-implementation at the respective sites, third-checking and corrective action, and finally review is conducted” (I-7)

The above statement reinforces their commitment towards sustainability in the manufacturing supply chain and also implies that they understand the various sustainable activities. When it comes to social sustainability activities in the supplier’s, the activities such as employee safety and health and hygiene were of prime concern, in addition child and bonded labour and women's safety was considered as important issues by supply chain managers. Because of recent incidents like sexual harassment on women in India, that created much chaos in the society and invariably these incidents have made supply chain managers aware about the sensitivity involved in the social system. Hence, managers felt that the establishment of pro-women and friendly atmosphere is the need of the hour that can give women employees the much needed safety environment at work place. A manager asserts

[...] We have strict guidelines named “partner code of conduct” for suppliers, wherein we enforce suppliers to adhere to safety and health related issues and non –appointment of child and bonded labours in suppliers. We make surprise audits to supplier facilities and ensure supplier compliance to partner code of conduct guidelines [...] (I-9)

For better understanding of our findings, we have classified our discussion into different headings, namely; supplier social sustainability activities, manufacturer social sustainability activities and customer social sustainability activities.

4.4 Issues related to supplier social sustainability

After careful analysis and clustering, the lists of activities related to suppliers were identified. The outcome of the interviews suggests that these activities if addressed carefully can lead to the social sustainability of the supplier. A comprehensive list of issues related to suppliers is listed in Table-4.1.

Table 4.1 Issues related to supplier social sustainability

Social dimensions	Issues related to supplier social sustainability	Frequency(No of times)
Health and Safety	• Ensuring safety in supplier locations	8
	• Ensuring health and hygiene in supplier locations	11
	• Ensuring drinking water and sanitation at work place	8
	• Ensuring women's safety in the workplace	6
Ethics	• Avoiding sub-standard materials in manufacturing	7
	• Usage of non –hazardous materials	11
	• Not engaging in unethical practices (Bribery, coercion, pollution)	8
Labour rights	• Ensuring labour, working conditions	7
	• Right to associate to any union/ group	5
	• Protecting labour rights.	10
Child and bonded labour	• Prohibition of child and bonded labours	21
Education	• Educating and training the labours for skill enhancement and development	17
Wages	• Paying reasonable wages of the employees	11
	• Non use of sweatshop labours	9
Society	• Helping to develop local suppliers (supplier’s supplier)	7
	• Philanthropic activities	8
Equity	• Hiring locals, women, handicapped, marginalized, minorities.	10
	• Promoting every employee equally based on merit.	15

	<ul style="list-style-type: none"> • Not denying any rights and privileges to employee because of their age, sex, race, community, religion and nationality. 	11
Others (Regulatory responsibility)	<ul style="list-style-type: none"> • Supplier compliance to local manufacturing regulations 	9

The series of activities that constitute the supplier sustainability are listed in Table 4.1. Managers discussed issues related to people’s safety in the suppliers’ workplaces, health and hygiene conditions, sanitation, and potable drinking water, etc. Since all these activities suggest relevance to safety and health of the employees, we labelled them under health and safety dimension. Among this, women’s safety was felt important by the practitioners because of the increasing incidents reported by the media i.e. sexual harassment by peers and seniors that creates a panic environment and a threat to women. In suppliers, human issues such as safety of the employees and women’s safety issues were highlighted in the numerous studies (Carter and Jennings, 2000; Ciliberti et al., 2008; Rajak and Vinodh, 2015). Similarly, health and hygiene issues and their importance to supplier’s sustainability were advocated (Hutchins and Sutherland, 2008; Tate et al., 2010; Rajak and Vinodh, 2015; Sureeyatanapas et al., 2015).

Managers discussed the importance of bribery, usage of sub-standard materials, adulteration etc., in supplier premises. Few others stressed practices such as non –usage of substandard and hazardous materials and non-inclination towards unethical practices such as bribery, coercion and pollution to the environment; these were labelled under ethical dimension. Carter (2000a), in his research discussed ethical practices and their impact on supply chain performance. Further, Chardine-Baumann and Botta-Genoulaz (2014) advocated the prohibition of unethical aspects and their importance to sustainability.

Similarly, many supply chain managers felt the poor working conditions of the employees at supplier locations. These include unclean, unsafe and unhygienic working conditions. Additionally, employees should be allowed to associate freely to any labour union of their choice that gives freedom for their expression and voices in the corporate environment. Yet another important aspect

is child and bonded labour, problem in suppliers. Many managers were of the opinion that child and bonded labours in the suppliers should be prohibited. A manager says

[...] “In practice though we audit and rate the suppliers based on many social parameters, still there are some grey areas beyond our purview and control. For example, we neither have access or control to tier-2, and tier-3 suppliers where child and bonded labour are engaged” [...] (I-15)

Discussions also suggest the sweat shop labourers. In practice, suppliers in smaller towns use sweat shop labourers, by paying below average wages and their working conditions are below industry standard. Payment of minimum wages to employees helps with employee retention and sustainability. This was echoed by a supply chain manager

[..]“In supplier locations, job attrition is very high due to low wages, this in turn put our purchasing function on high risk” [...] (I-27)

This outcome supports the similar view of scholars in the literature. For example, Jennings and Entine (1999), Chow and Chen (2012), Carter and Jennings (2000), Ciliberti et al. (2008) have discussed issues including protecting the labour rights, especially prohibition of sweat shop labours, bonded labour, and child labour etc.

The role of education in the form of training and skill enhancement for the labours in the suppliers was discussed most often by supply chain managers. Such training includes safety, health and hygiene, acquisition of new skills and career advancement etc. Firms in India invest thousands of man-hours in imparting training to the employees in the area of safety and skill enhancement. So we labelled such activities under the theme supplier ‘education’. Poist (1989) and Andersen and Larsen (2009), Sureeyatanapas et al. (2015) have emphasized the employee education initiatives and how such initiatives can impact the supplier and supply chain performance.

Activities such as hiring locals, women, marginalized people, handicapped people and minorities were emphasized in the interviews. Other aspects include not denying privileges and rights to anybody based on gender, religion, caste, race, age and nationality were discussed. These activities of suppliers have been labeled under the theme equity. The interview discussions led to identification of supplier’s compliance with local manufacturing regulations. In tier -2 towns, many suppliers ignore the government regulations or take lightly or do not strictly adhere to the compliance. Further, in the literature, Carter and Jennings (2004), Chin and Tat (2015) advocate the

gender diversity issues and their importance to supply chain sustainability. Similarly, gender non-discrimination practices associated with supply chain were identified and their importance to supply chain performance was discussed (Hutchins and Sutherland, 2008, Yakovleva et al., 2012).

Many supply chain managers have emphasized the purchasing from minority and women owned enterprises for sustainability. Firms have included such acts in their sustainability policies. Other scholars have emphasized the development of minority owned enterprises and purchase from such enterprises may lead to social sustainability of the suppliers (Dollinger et al., 1991, Carter and Jennings, 2000; Ciliberti et al., 2008).

Others discussed supplier philanthropy practices. Such issues are specific to geographic location. For example a manager from Chennai discussed the benefit of renovating the temples; another manager stressed offering donations to the primary school in the vicinity. Further, suppliers' philanthropic activities such as extending donations to schools, renovation of schools, renovation of temples, and conducting health camps may contribute to the social performance of the suppliers (Hutchins and Sutherland, 2008; Clarkson, 1995).

4.5 Issues related to manufacturer social sustainability

The issues pertinent to manufacturer's social sustainability can be described as the broad spectrum of socially sustainable activities practiced by the manufacturer towards addressing the people issues pertaining to the manufacturing operations. Perhaps, in-house manufacturing facility might act as tier-1 supplier of the other manufacturing company. In such cases, it may act as a tier -1 supplier to the other manufacturer. However, the social issues remain more or less same as that of suppliers. In order to get clarity and further group, these activities under broad theme "manufacturer's in-house operations"; we limit the activities specific to only the particular manufacturing set up and its immediate society. In operations, many managers felt the importance of manufacturer's social sustainability towards its own in-house operations and immediate society in which it operates. Many of these activities come under the rubric of corporate social responsibility (CSR). In the past, a numerous research related to CSR has taken place, but there are just extensions of CSR issues to supply chain research (From Carroll, 1979 to Lu et al., 2012). However, our focus is at the much larger aspect of sustainability in operations.

Table 4.2 List of issues related to manufacturers social sustainability

Social dimensions	Issues related to manufacturers	Frequency
Equity	<ul style="list-style-type: none"> • Hiring and promoting equity between male and female 	15
	<ul style="list-style-type: none"> • Ensuring diversity in hiring and promotion 	20
	<ul style="list-style-type: none"> • Non-discrimination based on age, gender, income, race, community, nationality, religion, and geography. 	8
Safety and Health	<ul style="list-style-type: none"> • Complying OHSAS 18000 certification for occupational safety and health 	19
	<ul style="list-style-type: none"> • Ensuring of safety, health and hygiene for contract labours 	9
	<ul style="list-style-type: none"> • Ensuring women's safety at workplace 	19
	<ul style="list-style-type: none"> • Maintaining hygiene and availability of potable water 	21
Child and Bonded labour	<ul style="list-style-type: none"> • Prohibition of child and bonded labour in manufacturing operations 	12
Education	<ul style="list-style-type: none"> • Imparting training and education for skill development and promotion 	10
Philanthropy	<ul style="list-style-type: none"> • Offering donations to education institutions, NGO's, and religious organizations 	15
	<ul style="list-style-type: none"> • Construction and renovation of schools and colleges and educational institutions 	11
Ethics	<ul style="list-style-type: none"> • Not allowing employees to engage in any unethical practices that include bribing, insider trading pollution, and whistleblower policy 	19
	<ul style="list-style-type: none"> • Not using hazardous substances in manufacturing 	16
	<ul style="list-style-type: none"> • Not using sub- standard materials in 	11

	production.	
Labour rights	• Non appointment of sweatshop workers	19
	• Protecting human rights and right to associate with unions	11
Housing	• Construction and extending subsidies to employee housing	10
Wages	• Providing the salaries that properly and fairly reward them for their work.	12
Society	• Buying from women owned minority enterprises	8
	• Buying from local suppliers	11
	• Extending help to local communities in building schools, colleges and training centres	15
	• Training and education for local youth for gaining employment	9
	• Local supplier development	11
	• Extending entrepreneurial activities for local unemployed youth	8
	• Construction of primary health centres, hospitals and conducting health camps and building toilets for health and hygiene	12
	• Construction of community centres for social well-being of people.	16
	• Extending help in sustainable farming	5
	• Construction of potable drinking water facilities for communities	6
• Employment for eligible local youth	4	

Our in-depth interviews suggest many interesting issues related to people in the manufacturing set up and the immediate society. For example, the activities such as hiring and promoting the employees equally (between male and female) and maintaining gender diversity in hiring and promotion. This means, the company should institute a mechanism in which, people from various disciplines, strata, age, gender, marginalized, different religions, caste and handicapped etc., are hired and promoted equally. Many supply chain managers felt that manufacturing set up's tend to ignore or not taking the gender discrimination issues seriously due to lack of clear policy . A manager says

“We hire the people who just fit into our business requirements; we tend to ignore the social priorities for example –practicing non-discrimination in our activities due to business pressures and deadlines”

The issues related to these activities have been grouped under “equity” dimension. This outcome further corresponds to the view of many scholars who emphasized the equity related practices and their importance in achieving sustainability of the firm (Clair et al., 1997; Chin and Tat, 2015).

The discussions suggest other issues such as safety and health and their compliance. Many companies practice safety audits, safety drills, and employee education initiatives as preventive measures as part of OHSAS 18000 compliance. Others suggest the manufacturer's moral responsibility in protecting the contract labourers although they do not fall under their payrolls. In addition, the employee hygiene practices lead to good health of the employees in a manufacturing set up. Few managers, of the opinion that the promotional activities conducted at various levels related to hygiene resulted in improved health and hygiene of the employees. An interesting outcome emerged under manufacturers social sustainability was women's safety. The majority of the managers pointed out the importance of corporate interest in adopting women safety measures at work place. This is consistent with our earlier discussion pertaining to supplier social issues where women's safety was prioritized and it reaffirms the importance of women's safety in manufacturing. A manager said

[...] “As a policy, we instituted many measures to improve women's work place safety because women in our manufacturing set up constitute 28 % of our overall workforce and they are integral part of our company. These are above the industry average ratio between women and men in manufacturing set up. Some of the measures we instituted in our facilities including pick up and

drop facility, a committee for women grievances, headed by women employee for addressing issues related to workplace” [...] (I-5)

In addition to safety, maintaining hygiene in workplace, the availability of potable water was a concern. Discussions suggest that water borne diseases are high in rise and heavy water contamination in ground water makes it difficult to get the potable water in nearby places where manufacturing exists. Many stressed the responsibility of firms for water availability. The issues related to potable water and safety fall under safety and health dimension. Carter and Jennings (2000), Ciliberti et al. (2008) have advocated the best practices related to safety and safe, incoming movement of products to the facilities and social sustainability. Few others have posited the importance of adopting operational health and safety measures and their importance to sustainability (Chardine-Baumann and Botta-Genoulaz, 2014; Diabat et al., 2014; Ahi and Searcy, 2015).

Many managers discussed child and bonded labour issues and suggested that prohibition of child and bonded labours in the manufacturing set up is their top priority and promise to eliminate such issues by instituting mechanisms. In fact, they urged that these issues should be addressed not only by manufacturing set up, but also by the extended stakeholders to whom the corporate has a meaningful economic relationship. A manager argued

“The child and bonded labour’s in any form should be prohibited in manufacturing and in fact; these are already mandated by many of our buyers from west” (I-9)

Ciliberti et al. (2008) have identified labour rights as one of the social sustainability dimensions in his sustainability taxonomy. Few others; for example, Labuschagne et al. (2005), Sharma and Vredenburg (1998) have also emphasized the requirement of better labour right practices in the manufacturing set up.

Discussions also emphasized employee education in the form of “training for career development” or “training for organizations effectiveness” for better sustainability. Further, our interviews suggest company’s involvement in philanthropic activities in various forms. Some suggest the construction and renovation of schools and colleges; while others favour offering donations to educational institutions, NGO’s and religious organizations. We look at the benefit of these activities in two ways- first: it can create a knowledgeable society; second: create the availability of the skilled manpower; both are good for the corporate. Other managers with over a decade of experience felt

that due to philanthropic activities, the company has gained good image in the society and helped the company to sail through the difficult situations in operations. A supply chain manager from leading IT peripherals manufacturer quotes

“Because of our philanthropic activities, in the form of establishing school and renovation, maintenance of temples in and around Tumkur city has helped company to gain positive image among people in the society. When we initiated dialogue with stakeholders to close the operations in Tumkur, we realized the positive image in the minds of stakeholders; as a result we could close our operations without any hassles” (I-27)

The above statement reaffirms the importance of philanthropic activities carried out by manufacturing set up and their impact during crisis situations. This outcome is in-line with the literature; for example, Hutchins and Sutherland (2008) in his life cycle analysis in US discussed the importance of philanthropy to social sustainability and how these practices led to the country’s financial performance. Carter and Jennings (2001) introduced a term purchasing social responsibility (PSR) and advocated the adoption of philanthropy as social dimension and established its relationship with firm’s indirect performance.

Another important human issue was discussed; i.e., non- appointment of sweatshop labourers: these labourers lack basic living conditions and basic wages. Another social issue was echoed by a majority of the managers. This relates to the freedom for the employees to associate freely with any union of their choice. Further, providing the adequate wages to the employees may lead the enterprise to social sustainability (Chardine-Baumann and Botta-Genoulaz, 2014). Managers suggest the adoption of minimum wage practices not only meets the statutory requirements, but also leads to social sustainability.

While discussing ethical aspects of the business, managers viewed non-usage of hazardous and sub-standard materials for production and not allowing employees to engage in any unethical practices more explicitly; bribing, coercion and pollution, etc. Lu et al., (2012) have pointed out the adoption of better ethical practices and their relationship with the firm’s performance. However, others for example, Carter and Jennings (2004) in their research ruled out the relationship between social responsibility and ethical behaviour and concluded that ethics does not constitute the dimension of social sustainability. On contrary to Carter and Jennings’s findings, Chardine-Baumann and Botta-Genoulaz (2014) advocated the importance of ethical issues in manufacturing.

Supply chain managers suggest that the manufacturer's social sustainability should not be limited to addressing social issues pertaining to employees of the firm but should also address broad social issues in the immediate society. The issues related to the society such as buying from women owned enterprises, developing local suppliers, extending help to local communities in building schools, training centres, colleges and extending training to local youth for gaining employment (vocational training) etc. Some managers discussed about extending entrepreneurial activities for unemployed youth and construction of primary health centres, conducting health camps, and building toilets for health and hygiene of the society. Similarly, others discussed issues such as extending employment opportunities to unemployed youth, construction of potable drinking water facilities and extending help in sustainable farming etc. However, these issues might vary from place to place and it will be of contextual in nature. For example, drinking water may be an important issue in some manufacturing locations, whereas in some locations it could be unemployment problem or both. It depends on how the companies prioritize its activities and addresses those issues.

4.6 Issues related to customer social sustainability

The social issues pertinent to customers in the supply chain have been recorded in this section. Discussions reveal that many companies neither have channel partners nor direct consumers; hence have no idea of what constitutes consumer social sustainability activities. These companies engage in manufacturing of industrial goods that are produced on demand and serve either to manufacturers or OEM's directly. Except them; others pointed out the issues, including protection of human rights in channels, and prohibition of child and bonded labours etc. Geibler et al. (2006), Collins et al. (2007) have emphasized the adoption of better human rights practices and their relationship with customer performance. Delai and Takahashi (2013) in his research posited the importance of social sustainability practices, especially labour practices adopted by Brazilian retailers and how it impacts on the performance of the supply chain.

Table 4.3 List of issues related to customer social sustainability

Social dimensions	Customer social sustainability(CSS)	Frequency
Human rights	• Protection of human rights in channels	13
	• Prohibition of child and bonded labours in channels	17
Health	• Ensuring health care and insurance programs for channel employees	9
	• Non usage of hazardous materials in products thereby protecting consumers.	11
Equity	• Gender diversity in hiring and promotions in channel employees	15
Education	• Educating and training the channel employees for skill development.	10
Society	• Hiring sales and marketing workforce locally.	15

Discussions also emphasized the health care activities for employees and insurance (health) programs for employees, and non-usage of hazardous materials that potentially hurt or damage the health of the consumers. We grouped these issues under the theme ‘health and safety’ of the consumer. While discussing issues related to consumers, supply chain managers pointed out issues including assurance of customer-friendly packaging, non-usage of toxic materials in packaging, appropriate product labeling, and ensuring customer safety and health in product usage etc. In addition, issues of setting up customer feedback and grievances redressal mechanisms were discussed. Ahi and Searcy (2015) in his research advocate the importance of adopting health and safety of the customer and their relationship with sustainability. Others, for example, Mani et al. (2015) have identified various issues related to customers and their relationship to supply chain performance in their qualitative study in India. Other social issues; for instance, gender diversity in hiring and promotions of channel employees was stressed. In addition, the importance of hiring a local workforce for sales and marketing roles was discussed. A supply chain manager expresses

[...]“Our company hires the local workforce and trains them on marketing and sales, later employed either by our direct channels or indirect channels. As per our past experience, these recruitments tend to have low attrition rate as compare to other method of hiring” [...] (I-29)

Yakovleva et al. (2012) have pointed out the gender diversity practices in customers and their relationship with supply chain performance in the food industry. Overall discussions suggest; the issues related to human rights, health, safety, equity, education, and consumer wellbeing as mentioned in Table 4.3

4.7 Possible outcomes of social sustainability and development of research framework

After careful analysis and clustering of social issues, the interview discussions were led towards an understanding of possible outcomes gained by the firms through adopting such social sustainability activities. Discussions with managers brought some interesting outcomes. These outcomes were based on their past experience. Discussions suggest that solving social issues have resulted in overall supply chain performance, productivity, operational performance, image enhancement and risk reduction in manufacturing. Others have discussed; addressing social issues have improved supplier’s performance, improvement in buyer and supplier relationship, buyers trust, and organizational learning’s etc.

Table 4.4 List of possible outcomes of social sustainability adoption

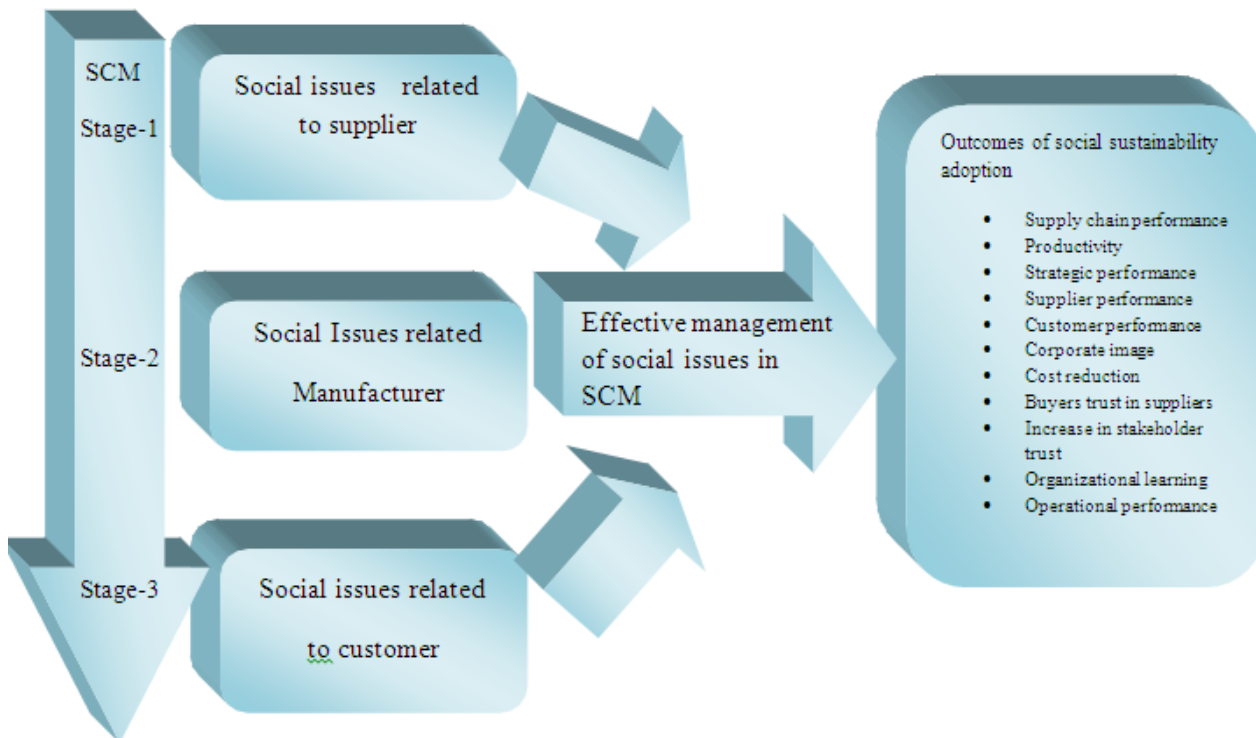
Possible outcomes of social sustainability	Frequency
Supply chain performance	19
Productivity	11
Strategic performance	15
Supplier performance	19
Customer performance	17
Corporate image	10
Buyers relationship and commitment	8
Buyers trust in suppliers	9
Increase in stakeholder trust	5
Organizational learning	8
Operational performance	15

A manager says

[...] “We have been employing the social sustainability activities in our entire value chain, as a result we were able to get reliable supplies from our suppliers, improvement in our production, and improved relationship with suppliers and customers”[...] (I-26)

Further, our discussions suggest; by addressing various social issues in the suppliers can result in improving social performance of suppliers. Social issues in the supply chain can be addressed by understanding the importance of the driving forces; similarly, by understanding the impediments that cause social sustainability non –adoption in the supply chain. The detailed discussion about the enablers and barriers to social sustainability adoption in the supply chain of manufacturing industry has been published separately (Mani et al., 2015b; Mani et al., 2016) In addition the research implies; if the corporate effectively overcomes these issues by the way of new policies, training, and stakeholder engagement, government regulation, strengthening unions, and customer awareness programs; the social sustainability can be a reality in the supply chain.

Figure 4.2 A proposed frame work for supply chain social sustainability



Source: Authors contribution

4.8 Quantitative Analysis (Phase-2)

We have discussed the various social issues through in depth interviews with supply chain managers in the previous section. Based on the discussions, we have proposed supply chain social sustainability (SCSS) framework in the previous section. In the preceding section, the proposed framework is being quantitatively evaluated through various statistical tests. First, we have done the statistical analysis towards developing the measurement instrument for social sustainability in the supply chain as discussed in Chapter-3. Secondly, the analysis on the possible relationship between social sustainability and outcomes of adopting such social sustainability measures through structural equation modeling (SEM).

4.8.1 Survey response

In our first lot of 500 mails sent to the supply chain managers, 88 mails were returned or bounced back or not reached because of the reasons such as incorrect email id, or the particular manager was no longer working in the company. Similarly, in a second set of 500 questionnaires, 99 mails were returned back. Out of the third lot of 200 mails, only 41 were returned. Hence, a total of 228 mails returned for the aforementioned reasons. We received 308 usable surveys and all these were reviewed for errors including missing data and miscoding. We found 9 questionnaires with missing data. We made follow up calls to the respective companies and managers to ask for required information. However, we could succeed in getting breakthrough in only one case, since the other executives were either busy or on business outside India. The whole process resulted in getting an effective response rate of 25.66%, which is considered adequate in sustainability related studies (Carter and Jennings, 2002, Zhu et al., 2008). The responses included: 40% of the respondents were from manufacturing companies with annual revenues exceeding 5 billion and over 30 % of the organizations revenues exceeded 10 billion. Another 30% of the respondents were from the companies whose revenues were between 1-5 billion. This implies that respondents mainly represent medium to large organizations. The majority of the respondents were possessing managerial positions in their respective firms while an additional 10% were holding executive positions such as Director or President or Vice president. Further, in survey research, key informant issues may tend to arise, since we need to make sure that the respondents are knowledgeable and aware of the issues under investigation. In order to address key informant issues in our research, we have used two specific measures for checking the knowledge of respondents (Campbell, 1955). Our pilot study

indicated that respondents belonging at managerial levels or Senior Executive levels had the necessary knowledge to answer sustainability-related questions (John and Reve, 1982). In addition, two questions included in our questionnaire assessed the informants' knowledge: the number of years the respondent has been involved in SCM function, and the current designation they hold in the firm. We have eliminated the responses from below the rank of Senior Executives from further analysis, and three respondents fell into this category. The characteristics of the sample are extrapolated in Table 4.5.

Table 4.5 Sample characteristics

Measure	Industry	Freq	Percent
Type of industry	Automobile industry	39	13
	Architectural/Construction/ Cement Industries	27	9
	Apparel manufacturer/Dying/Textiles/Spinning	41	13.6
	Battery manufacturers	2	0.7
	Breweries	1	0.3
	Ceramic wall tiles	1	0.3
	Chemical industry	20	6.7
	Commercial explosives	1	0.3
	Compressor manufacturers	1	0.3
	Consumer durable manufacturer	4	1.3
	Corbon production	1	0.3
	Cotton and thread manufacturer	6	2
	Cutting tools manufacturer	1	0.3
	Cycle manufacturing	1	0.3
	Die's and moulds manufacturing	1	0.3
	Drill pipes manufacturing	1	0.3
	Edible oil manufacturer	1	0.3
	Electrical and Electronics/IT products manufacturer	20	6.7
	Elevator manufacturing company	1	0.3
	Farm equipment manufacturer	1	0.3

	Fluid control products	1	0.3
	Fast moving consumer goods(FMCG)	9	3
	Food and beverages	28	9.3
	Infrastructure solutions	1	0.3
	Iron and steel /Mining/Steel drum	5	1.7
	Jewelers	2	0.7
	Laminates and tool manufacturing	1	0.3
	Medical equipment	1	0.3
	Metal injection and moulding	2	0.7
	Oil and natural gas industry	3	1
	Packaging solutions	4	1.3
	Paper and pulp/Paper board/	3	1
	Perlite products	1	0.3
	Petroleum products	1	0.3
	Pharmaceuticals companies	23	7.7
	Pipes and piping solutions	2	0.7
	Plywood manufacturer	2	0.7
	Pumps and Valves	1	0.3
	Power generation	5	1.7
	Publication	2	0.7
	Rubber and natural products	2	0.7
	Ship building companies	2	0.7
	Footwear	1	0.3
	Shrimp food manufacturer	2	0.7
	Sugar manufacturers	16	5.3
	Thermoplastics	1	0.3
	Tubes and foils manufacturer	1	0.3
	Upholstery and decorative fabrics	1	0.3
	Valve manufacturers	2	0.7
	Welding consumables	1	0.3
	Yarn manufacturers	1	0.3

Annual revenues	Below 100 Crores(1 Billion)	1	0.3
	100 to 500 Crores(Between 1 to 5 Billion)	90	30
	500 to 1000 Crores(Between 5 to 10 Billion)	119	39.6
	More than 1000 Crores(Over 10 Billion)	90	30
Location of the company	Andhra Pradesh	24	8
	Karnataka	57	19
	Kerala	13	4.3
	Tamilnadu	137	45.6
	Telangana	66	22
	Missing	3	1
Position of respondents	Lower Management (Executive, Sr. Executive, Asst. Manager)	81	27.0
	Middle Management (Sr. Manager, DGM, AGM)	189	63.0
	Upper Management (Director, ED, President, VP, CEO, MD)	30	10.0
	Below lower management(Asst. Executive)	0	0.0
Experience of respondents	1-5 Years	14	4.7
	5-10 Years	114	38.0
	More than 10 years	171	57.0
	Missing	1	0.3

Figure 4.3 Description of the companies

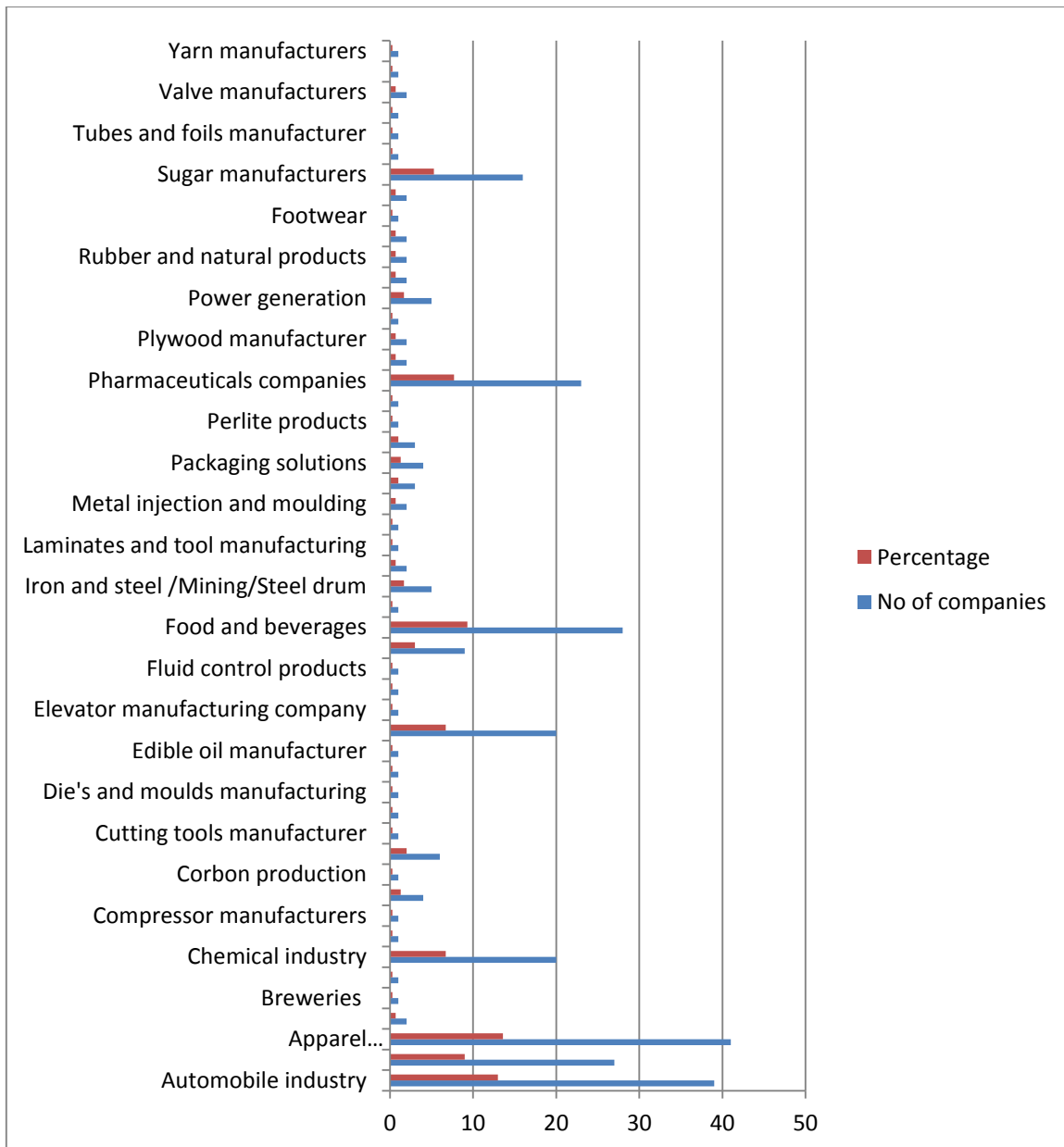


Figure 4.4 Location of the companies

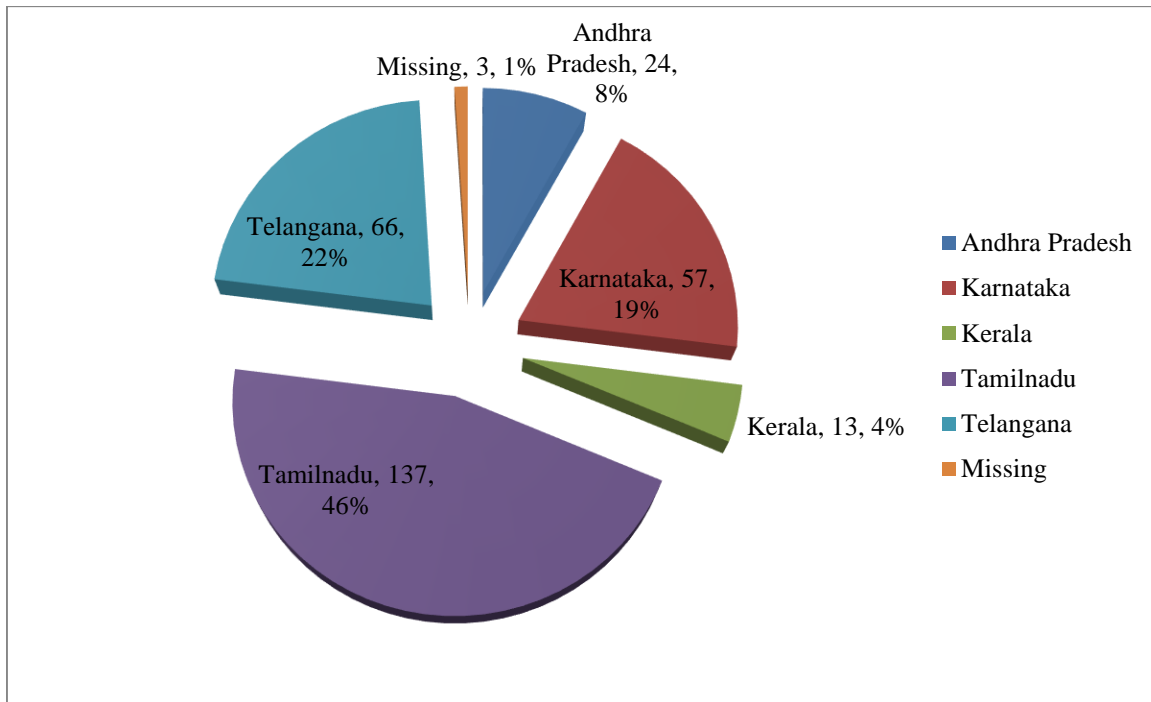


Figure 4.5 Company Revenues

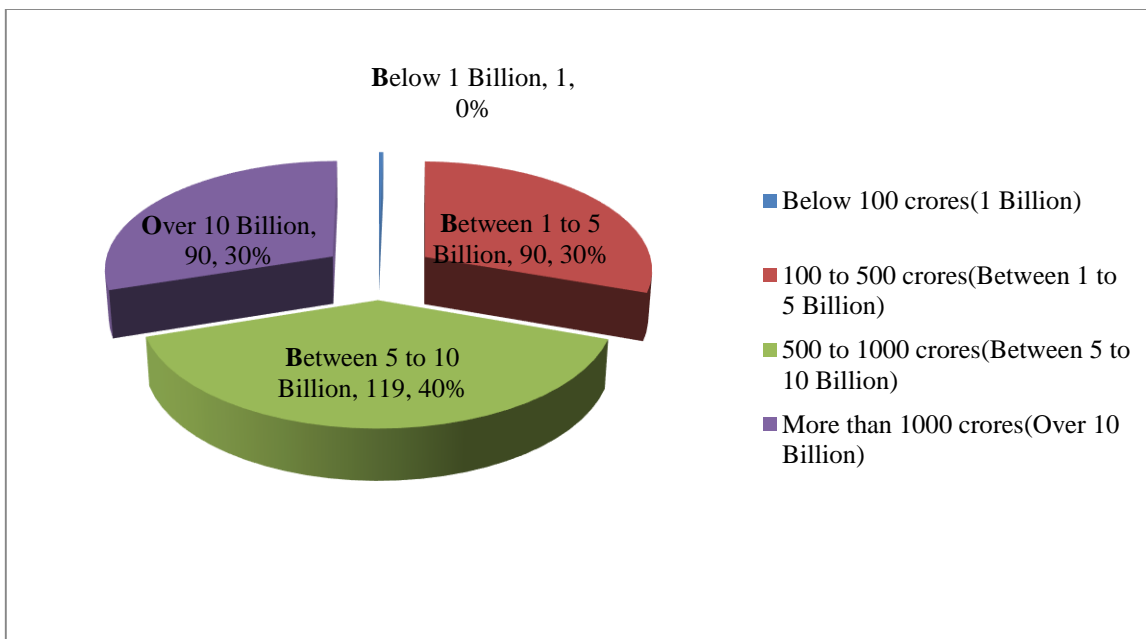


Figure 4.6 Position of the executives

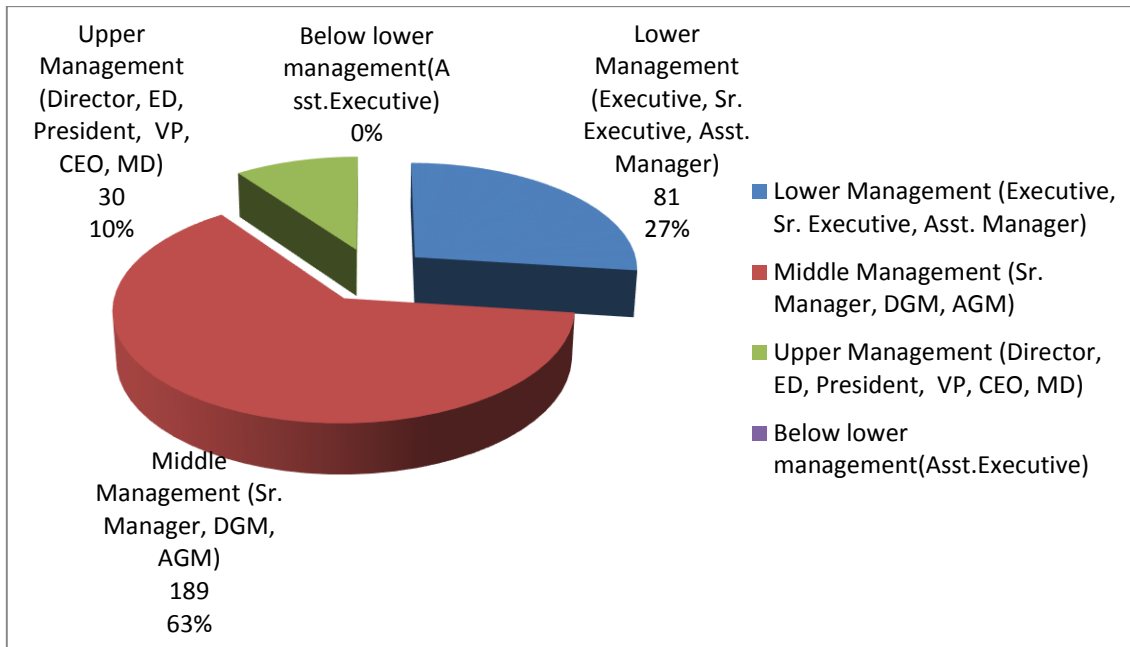
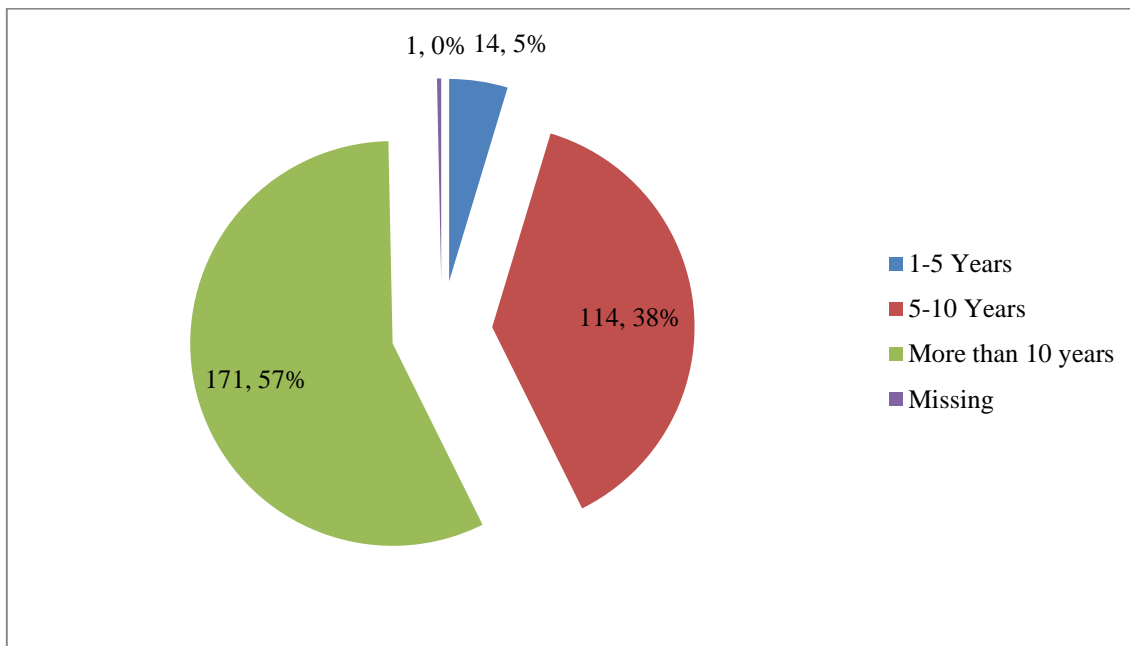


Figure 4.7 Experience of the executives



4.8.2 Nonresponsive bias and common method bias

To identify non-response bias, the answers of early respondents are compared with the answers of late respondents of the survey (Lambert and Harrington, 1990), where the late respondents are considered to be non-respondents than the early respondents (Armstrong and Overton, 1977). A multivariate t-test was used to study the variables, in order to find out whether, significant different exist between the early group of respondents versus late group. The results indicate that there is no significant difference between early respondents to late respondents group ($P= 0.842$). Further, we tested for the non-response bias by randomly selecting 20 non-respondents and by sending an abbreviated form of questionnaire to these respondents and following up with phone calls to ensure that all the 20 non-respondents completed and returned the abbreviated questionnaire (Lohr, 1999). Again, a second multivariate t-test was performed, comparing the responses to the full-length questionnaires to the abbreviated one. There was no significant difference between respondents and non-respondents ($P=0.412$). Then we have performed Harmon's one factor test using SPSS to check the common method bias. The test results show there is no common method bias exist (Extraction sums of square loadings 25.63 %).

4.9 Data analysis and results

In order to identify the psychometric properties of our constructs, we have conducted two procedural steps as explained in the preceding section. We conducted exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA). Following the literature (Carter and Jennings, 2000), we assumed that all the dimensions of social sustainability fall under the second order construct called 'social sustainability' (SS). To evaluate and check this assumption, it is essential to conduct second order confirmatory factor analysis. Before that, one need to understand that the second order analysis is commonly used method of structural model to verify whether the SS construct was represented by the integrated dimensions of Equity (EQ), Philanthropy (PH), Safety (SA), Health and Welfare (HW), Ethics (ET), and Human rights (HR). First order analysis is a prerequisite for second order analysis (Churchill, 1979). Hence, in the preceding section we have performed first order and second order (both) analysis to validate our scales.

4.9.1 Study 1: Exploratory factor analysis

We have performed EFA on 300 samples we collected in the first phase of our study to examine the dimensionality of the social sustainability (SS) scale in order to make certain that all the measures loaded into SS dimensions only. We have used Principal component analysis with promax rotation.

Promax rotation was employed because it is oblique in nature, so it is reasonable to assume that any extracted factors pertinent to SS must be inter correlated (Gorsuch, 1988). In order to identify the factors underlying the SS dimension, we applied three commonly used decision criteria (Hair et al., 2010). First, the items loading with less than 0.40 are excluded. Second, the items that are cross-loaded on to two or more factors are excluded. Finally, the factors with eigenvalue of 1 and more were considered for cutoff value for extraction. Furthermore, there were 6 factors explaining 62.23 % of total variance was extracted. Table 4 results shows the factor loadings for 22 item scale with all the item loadings are exceeding 0.50 and above. All the items loading significantly onto one factor indicate unidimensionality. The table also shows that no item had multiple cross loadings, this implies that preliminary discriminant validity of the scale. Finally, all factors' reliability value (Cronbach's alpha) is in excess of 0.70, which indicates acceptable reliability (Nunnally, 1978).

Table 4.6 Results from exploratory factor analysis for social sustainability (SS) items

	Component							
		1	2	3	4	5	6	
Philanthropy	PH1	.756	-.039	-.003	-.014	-.023	.021	
	PH2	.717	.100	-.140	.098	.085	-.053	
	PH3	.691	-.073	.136	-.023	.119	-.017	
	PH4	.657	-.214	.129	-.232	-.110	.300	
	PH5	.616	.216	-.043	.239	-.062	-.203	
Safety	SA1	.071	.794	-.086	.139	-.182	.113	
	SA2	-.082	.793	.000	.104	.019	-.048	
	SA3	.028	.779	.059	-.207	.056	.041	
	SA4	-.029	.625	.197	-.236	.154	.081	
Equity	EQ1	-.018	.010	.766	-.026	.066	.045	
	EQ2	.005	.138	.765	.082	-.119	-.031	
	EQ3	.113	-.012	.734	.041	.077	-.183	
	EQ4	-.069	-.028	.680	.075	-.025	.112	
Health and Welfare	HW1	-.077	.005	.049	.841	.009	.158	

	HW2	-.028	-.080	.095	.806	.074	-.030	
	HW3	.197	-.052	.002	.676	.027	.070	
Ethics	ET1	-.061	.000	-.076	.015	.826	.164	
	ET2	-.021	-.084	.113	.115	.760	-.058	
	ET3	.140	.083	-.044	-.013	.725	-.035	
Human Rights	HR1	-.162	.063	-.022	.030	.075	.812	
	HR2	.044	.011	.158	.159	-.115	.707	
	HR3	.185	.100	-.176	.029	.114	.618	
Cronbach's alpha		0.752	0.879	0.763	0.894	0.724	0.811	
Eigen value(Sum of squares)		5.97	2.73	1.42	1.28	1.14	1.12	
Cumulative variance explained		27.17	39.59	46.07	51.89	57.1	62.23	

Highest loading values are marked in bold

4.9.2 Study 2: Confirmatory Factor Analysis

To conduct CFA, the second phase of samples was collected, where another set of 1400 manufacturing companies from Centre for Monitoring Indian Economy (CMIE) database were identified (Prowess). These companies were identified, based on two criteria: firstly, the companies, whose revenues exceeding 100 million, and secondly, the companies with a decade of manufacturing experience in India. The questionnaire with reduced scale items (22 items) along with a write up on social sustainability was sent to the supply chain managers of 1400 manufacturing companies in India. Although, previous studies related to sustainability, used single sample for EFA and CFA (Chow and Chen, 2012; Zhu et al., 2008), it is desirable to use the different set of samples to test the unidimensionality of the scales. Hinkin (1998) emphasized the importance of testing the reliability and factor structure for a newly developed measurement on independent samples to assess construct validity. Out of 1400 questionnaires forwarded, to the managers, 359 questionnaires were returned in the first phase, and with the telephonic follow-ups and two mail reminders, another 98 filled up questionnaires were returned. In this vein, a total of

457 responses were received. After we conducted a preliminary assessment of the questionnaire responses, 8 questionnaires contained missing information. We followed up using phone calls to the managers, but only one questionnaire was filled up completely, and 7 questionnaires were discarded. In this second phase of our study, the response rate stands at 32.2 % and considered to be reasonably good in studies pertaining to sustainability. In these samples, there could be a possibility of common method bias as all the samples were collected through mail survey. To identify the common method bias, we have performed Harmon's single factor method in SPSS and the results indicate that there was no such problem (Total variance extracted = 18.59). Furthermore, we have performed CFA to create a measurement model and evaluate the measurement efficiency directly (Bentler, 1990). CFA techniques (construct reliability, convergent validity and discriminant validity) were applied in this study by using Amos 20.0 software with maximum likelihood estimation procedure (MLE). We have applied a series of procedures to verify that all the proposed measurement items represent the constructs. We test the convergent validity and unidimensionality in the subsequent sections.

4.9.3 Unidimensionality

To test the unidimensionality of the scales CFA was performed. We constructed in total 2 measurement models to analyze 6 dimensions of SS. In measurement model-1, all the social dimensions pertinent to SS dimension were considered as first order latent variables. In the measurement model-2 the SS dimension was considered as second order latent construct, measured by first order latent variables such as EQ, HR, PH, ET, SA, HW, following the literature (Carter and Jennings, 2000). The results of each measurement model with respect to Goodness of fit index (GFI), Adjusted goodness of fit index (AGFI), Comparative fit index (CFI), Bentler-Bonett normed fit index (NFI), and Non-normed fit index are listed in Figure 2. All the models with respect to results exhibit fit indices with the score of 0.90 or greater, that implies that both the models have a satisfactory fit indices and all the items are valid in measuring their corresponding constructs (Wheaton et al., 1977; Bentler and Bonnet 1980; MacCallum et al., 1996; Hu and Bentler, 1999; Hair et al., 2010; Marcoulides and Schumacker, 2013). The standardized item loadings and composite reliability and croanbach's alpha values are extrapolated in Table 4.7.

We then followed Sethi and Kings (1994) paradigm to evaluate our measurement items. Thus we deleted few measurement items with the highest value of standardized residuals and retained the

lower value of squared multiple correlation for better fit. Further, we adopted procedure suggested by Shi et al. (2005) to analyze substantive reasons for removing any measurement items. The item loadings for the items EQ1, S3, were below .50 and were removed from our measurement model for attaining better fit.

Table 4.7 Final CFA results for the constructs

<i>Construct in the model</i>	<i>Measurement Item</i>	<i>Items loading (Standardized)</i>	<i>t-value</i>	<i>Composite reliability(CR)</i>	<i>Cronbach's alpha</i>
Equity	EQ2	0.70	12.066 ^a	0.78	0.82
	EQ3	0.80	12.218 ^a		
	EQ4	0.72	*		
Safety	SA1	0.98	4.464 ^a	0.78	0.71
	SA2	0.62	*		
	SA4	0.65	5.412 ^a		
Philanthropy	PH1	0.60	7.917 ^a	0.75	0.80
	PH2	0.64	7.513 ^a		
	PH3	0.77	8.851 ^a		
	PH4	0.60	7.431 ^a		
	PH5	0.60	*		
Human Rights	HR1	0.70	6.645 ^a	0.74	0.82
	HR2	0.62	*		
	HR3	0.88	6.651 ^a		
Ethics	ET1	0.71	7.501 ^a	0.72	0.76
	ET2	0.72	6.734 ^a		
	ET3	0.72	*		
Health and Welfare	HW1	0.68	5.531 ^a	0.73	0.75
	HW2	0.70	5.774 ^a		
	HW3	0.62	*		

^a Standardized estimated factor loading significant at P<0.05, *Fixed at 1.0 for estimation purpose.

4.9.4 Convergent validity

In order to establish convergent validity the parameters such as the factor loading of the item, average variance extracted (AVE), and composite reliability (CR) must be examined (Hair et al., 2010). Table 5 indicates the standardized path loadings of all the items that are highly significantly related to their corresponding factors. The results of AVE and CR are summarized in Table 6 which illustrates the exceeded threshold levels of AVE and CR. AVE is a primary indicator of convergence and if the value of AVE is less than 0.5 indicates that more error is still remain in the model than the variance explained by latent variable (Hair et al., 2010). On the other hand, a CR value of 0.7 and above indicates the adequate internal consistency of the latent construct analyzed. All the constructs in the model fulfill the threshold levels of both AVE and CR and results, and are displayed in Table 6. Thus it implies high convergent validity for the scales in this research.

Table 4.8 Convergent and discriminant validity of the constructs

	CR	AVE	MSV	ASV	Ethics	Equity	Safety	Philanthropy	HR	HW
Ethics	0.725	0.500	0.233	0.114	0.707					
Equity	0.784	0.548	0.035	0.015	0.110	0.740				
Safety	0.787	0.561	0.132	0.048	0.364	0.024	0.749			
Philanthropy	0.752	0.521	0.216	0.105	0.363	0.187	0.141	0.721		
HR	0.749	0.502	0.233	0.103	0.483	0.141	0.297	0.346	0.708	
HW	0.730	0.501	0.216	0.068	0.244	0.087	0.023	0.465	0.232	0.707

4.9.5 Reliability test

Construct reliability measures display the accuracy and precision of the measuring instrument that refers to the level of internal consistency between multiple measures of variable (Hair et al., 2010; Fornell and Larcker, 1981). We tested our scales, using Cronbach's alpha and CR. All the scales as shown in Table 5, demonstrate Cronbach's alpha and CR greater than 0.7 and hence exhibit great reliability (Kline, 1998). We finally assessed discriminant validity, which is discussed next.

4.9.6 Discriminant validity

In order to evaluate the discriminant validity (Churchill, 1979; Hair et al., 2010) we: (i) examined factor correlations (Kling, 2001); (ii) examined maximum shared variance (MSV) and average shared variance (AVE), and square root of AVE should be greater than inter-construct correlations (Hair et al, 2010). When we examined the factor correlations (Table 7), all six factors correlations are below 0.80, confirming the discriminate validity of the scale (Bhattacharjee, 2002). Furthermore, the MSV was found lesser than the average shared variance of the factors (Table 6). In addition, average shared variance (ASV) values are less than the average variance extracted (ASV<AVE). The values in Table 6 also suggest that square root of AVE is greater than inter-construct correlations. Therefore, all our six dimensions of social sustainability passed the discriminant validity test.

Table 4.9 Evaluation of discriminant validity of the factors using factor correlations

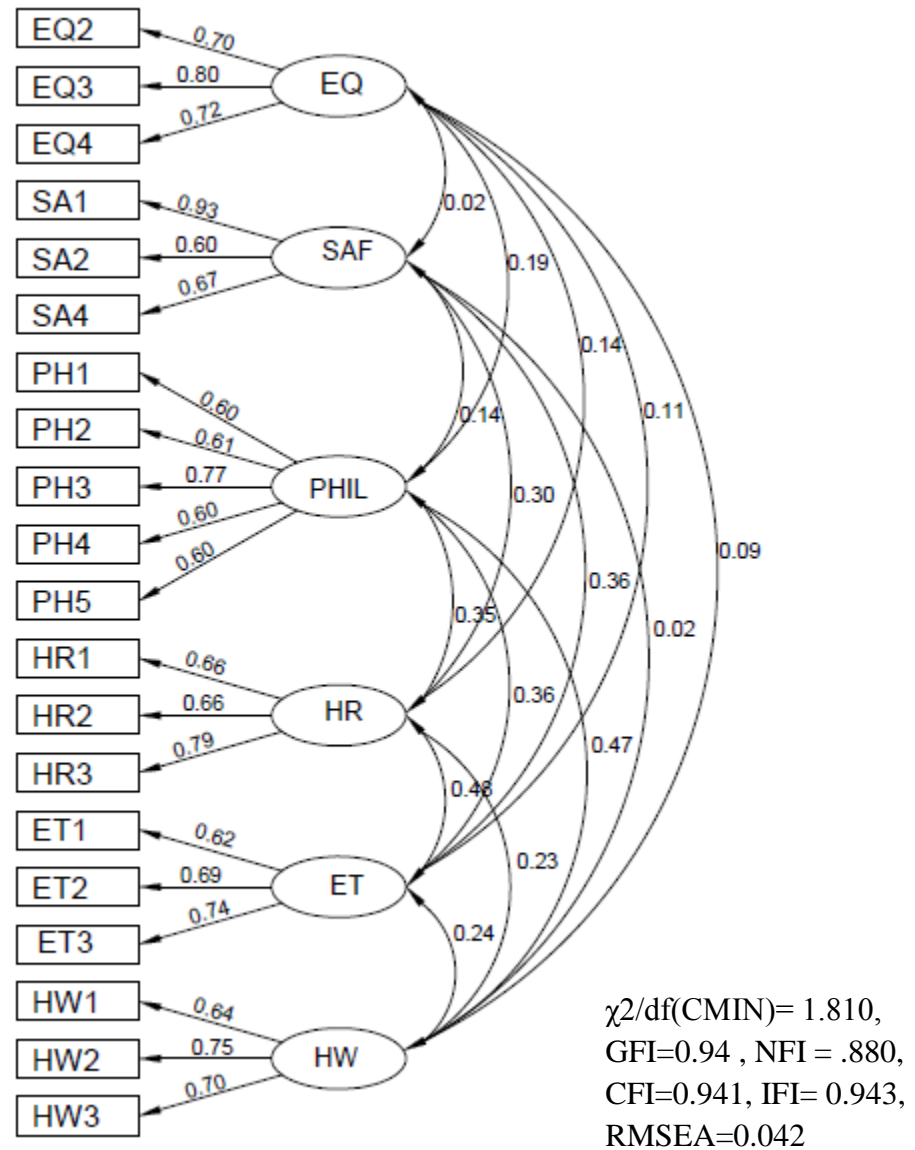
Component	Mean (SD)	1	2	3	4	5	6
Philanthropy	2.80(0.70)	1.000					
Safety	3.39(0.92)	.170	1.000				
Equity	2.91(0.75)	.134	-.007	1.000			
Health and Welfare	3.01(0.84)	.246	.141	.224	1.000		
Ethics	3.08(0.68)	.389	.145	.081	.187	1.000	
Human Rights	3.14(0.70)	.190	.065	.277	.330	.125	1.000

4.9.7 First order confirmatory factor analysis

Based on the analysis done using Amos 20, the first order correlated model for SS was constructed as depicted in Figure 2. The first-order model suggests that there are six dimensions (constructs) (i.e., EQ, PH, SA, HW, ET, HR). The dimensions are independent in their prediction of social sustainability. The construct such as EQ, SA, HW, ET, and HR are measured by three items, whereas the construct PH is measured by 5 items in the model (Figure 1). The first-order model for testing social sustainability in the supply chain passed all the required tests: $\chi^2/df(CMIN)= 1.810$, $GFI=0.94$, $NFI = .880$, $CFI=0.941$, and $RMSEA=0.042$. The results suggest that the first order model depicted in Figure 2 as an accurate representation for social sustainability. Furthermore, our results suggest the factor loadings for first order constructs of EQ, PH, SA, HW, ET, HR were

ranged from 0.80 to 0.70, 0.77 to .60, and 0.90 to .67, 0.75 to .64, 0.74 to .62, 0.79 to 0.66 respectively. In addition, the correlation between HR and ET stands at 0.48 followed by SA and HR at 0.30, finally HR to HW at 0.23 and rest were insignificant.

Figure 4.8 First-order confirmatory factor analysis (measurement model)



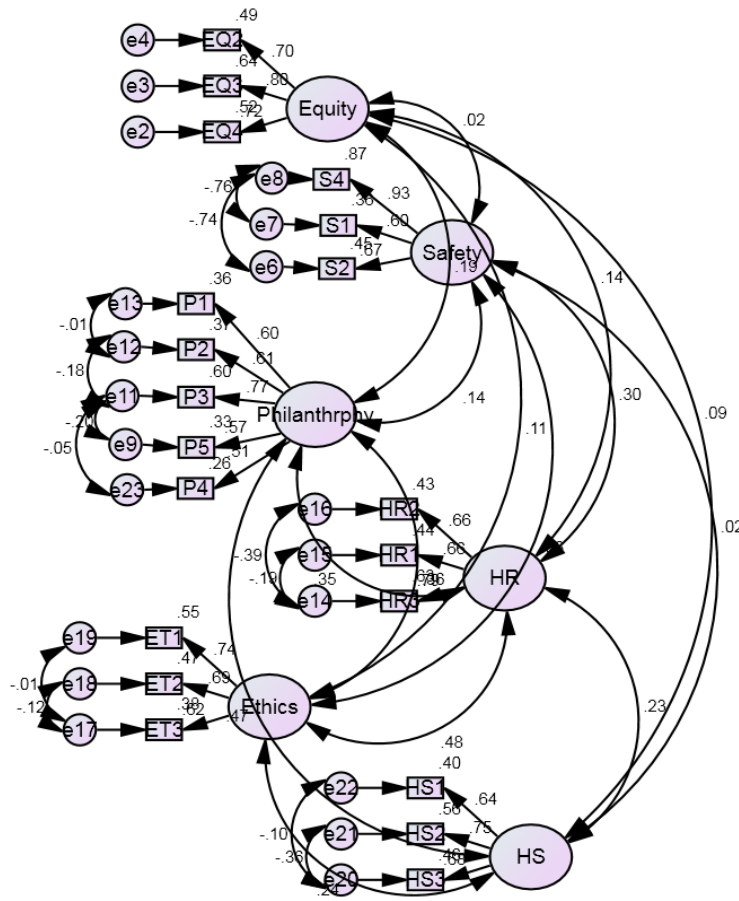
4.9.8 Second order confirmatory factor analysis

To test for second-order model of SS we performed second order confirmatory factor analysis, by using Amos 20, software and results as shown in figure-1. The second-order model postulated a latent factor governing the correlations among EQ, PH, SA, HW, ET, and HR. The path leading from the second order construct (SS) to all six social dimensions (constructs) was significant (Figure 3) (Carter and Jennings, 2000). The second order loadings on social sustainability (SS), were 0.65 for ET, 0.62 for PH, 0.20 for EQ, 0.35 for SA, 0.48 for HS, and 0.59 for HR. Furthermore, the results suggest that second order model for SCSS passed all goodness of fit parameters: $\chi^2/df(\text{CMIN}) = 1.997$, $\text{GFI}=0.937$, $\text{NFI} = .860$, $\text{CFI}=0.923$, and $\text{RMSEA}=0.047$. Although social sustainability dimension was considered as second order construct, we need to justify the existence of social sustainability as a second order factor because second order construct model may not show the improved fit when compared to the first-order model (Bollen, 1989; Doll et al., 1994). To test the validity of the second-order model, we have performed efficacy testing and predictive validity testing, which are described in the next section.

4.9.9 Efficacy testing

In the second order construct model, the efficacy can be measured by computing target (T) coefficient that demonstrates the chi-squares ratio of the first and second order models (Marsh and Hocevar, 1985). The T coefficient value above 1.0 indicates more effective representation. The chi-square value for model-1 and model-2, shows that both the models are identical. The T coefficient value close to 1.0, implies that our second order construct perfectly explained the first order construct model. Hence, both the models explain parsimonious representation of the relationship among them (Marsh, 1987; Smith et al., 2009). This result also indicates that both the models are equivalent and the second order construct perfectly represents the first order construct. Furthermore, the model reveals that ET had highest path loading ($r=0.65$), followed by PH ($r=0.62$), HR ($r=0.59$), SA ($r= 0.35$), HW ($r=0.48$) and EQ ($r=0.20$). These results are interesting and suggest that SA, EQ, PH, ET, HR, and HW are most likely to be the dimensions of social sustainability in India.

Figure 4.9 First order confirmatory factor analysis -Amos output

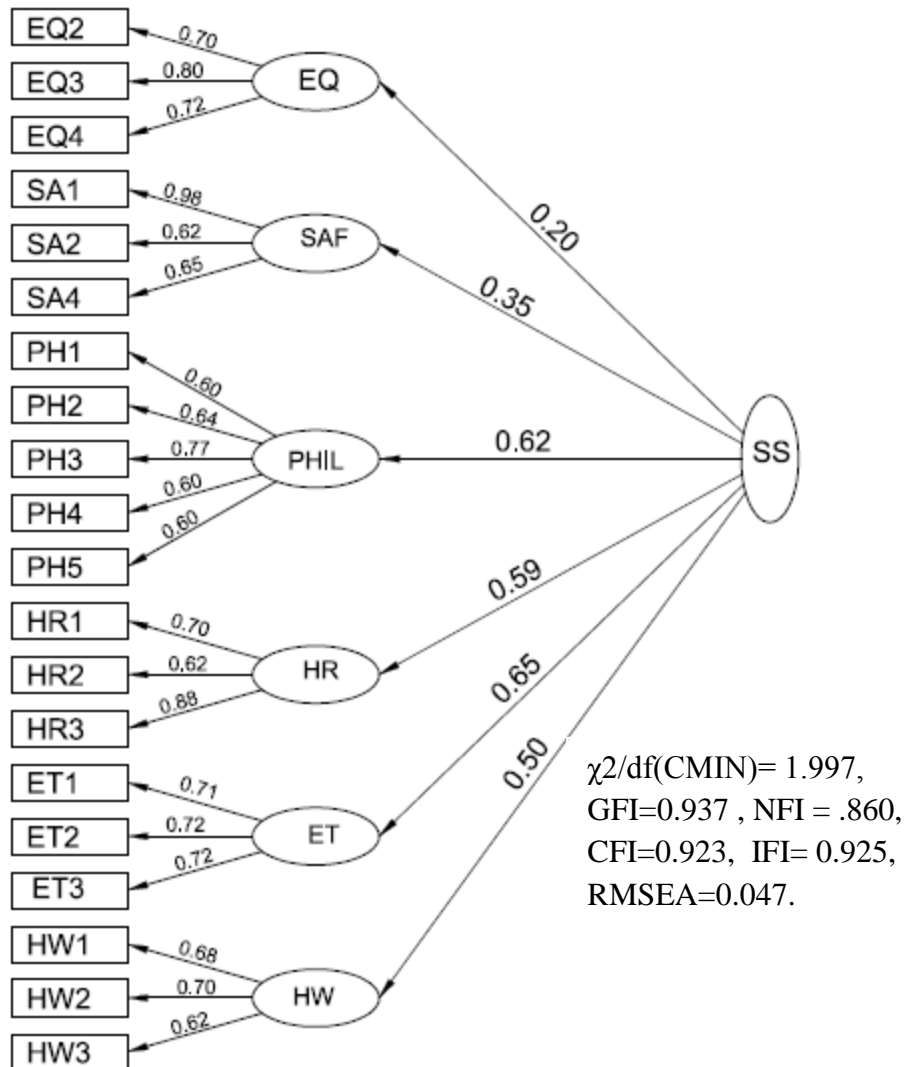


4.9.10 Predictive Validity

Predictive validity test is used to identify how well the enabling constructs predict the hypothesized dependent variable (Stratman and Roth, 2002). This also evaluates that whether the measures behaves accordance with the theory that separates the measurement movements. Since, implementation of social sustainability practices in the supply chain improves the overall performance of supply chain. We use the data of supply chain performance (Chin and Tat, 2015), supplier performance (Carter and Jennings, 2001), operational performance (Carter and Jennings,

2000, Chow and Chen, 2012) and consumer performance to assess the predictive validity of the social sustainability scales. Hence, the theory suggests that there is a positive relationship between

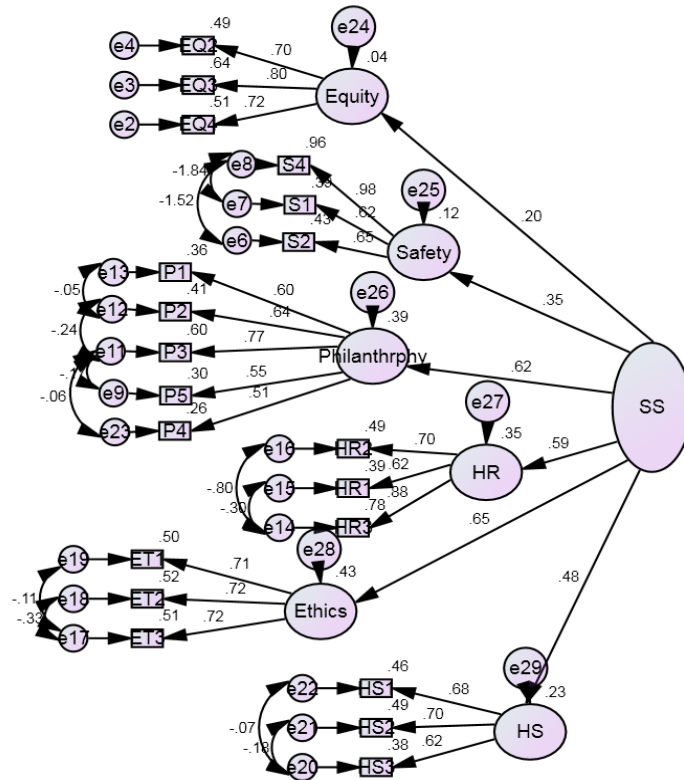
Figure 4.10 Second order confirmatory factor analysis model



social sustainability, and supply chain performance. Cronbach alpha of supply chain performance (SCP1, SCP2, SCP3, SCP4) was 0.812, and implies that all these four items were reliable. Furthermore, Cronbach alpha for supplier performance (SP1, SP2, SP3, SP4) was at 0.730 and all items were reliable. In order to validate the predictive validity, structural equation modeling was performed and results suggest the better fit with CMIN = 1.901, GFI=0.906, AGFI= 0.880, CFI=0.909, IFI=0.911 and RMSEA=0.045. The correlation result stands at r=0.56 for supplier

performance, and $r=0.60$ $n=450$, $p<0.01$ for supply chain performance. Thus, we conclude that our second order social sustainability model cleared the predictive validity test.

Figure 4.11 Second order confirmatory factor analysis –Amos output



4.10 Analysis of dependent variables

In the previous section, we have analysed the independent variables and their reliability and validity with the help of exploratory factor analysis and followed by confirmatory factor analysis. In order to test our proposed hypothesis H7, H8, H9, H10, H11, H12; we have evaluated the dependent variables and their reliability with various statistical procedures in this section. In addition,

structural equation modelling has been performed to test the relationship between social sustainability and supply chain performance (H7); supplier performance and supply chain performance (H8); social sustainability and operational performance (H9); supplier performance and operational performance (H10); customer social performance and supply chain performance (H11); supply chain practices and cost reduction.

We have performed an exploratory factor analysis on 450 samples collected in the second phase of our research to extract the dependent variables. We have performed a principal component analysis with varimax rotation. The reason to use varimax rotation; because it is orthogonal in nature, so it is reasonable to assume that extracted factors are uncorrelated (Gorsuch, 1988). Principal component with varimax rotation has been widely used in social sciences research (Hair et al., 2010). To identify the factors, we applied three commonly used decision parameters (Hair et al., 2010). First, the loading with less than 0.40 are excluded. Second, the items that are cross-loaded onto two or more factors excluded. In addition, the factors with eigenvalue of 1 and more were considered for cutoff value for extraction. The results in table-4.10 suggest four factors explaining 62.39 % of total variance extracted. Table-4.10 results show the factor loading of all the items that are exceeding 0.50 and above. All the items loading significantly onto one factor indicate unidimensionality. The table also shows that no item had multiple cross loadings, this implies that the preliminary discriminant validity of the scale. Finally, table-4.10 results indicate; all factors' reliability value (Cronbach's alpha) is in excess of 0.70 (SCP: 0.77; OP: 0.70; SP: 0.71; CP: 0.72), which indicates acceptable reliability (Nunnally, 1978). An interesting outcome has emerged out of this analysis; the cost reduction factor with four items (CR1, CR2, CR3, CR4) were loaded poorly below 0.30 and their reliability was below 0.40. Although cost reduction factor was included in our questionnaire survey, because of poor loading we have dropped from further analysis. It also suggests that, social sustainability activities do not have a significant relationship with cost reduction measures in Indian manufacturing industries (H12).

Table 4.10 Results of factor analysis performed on dependent variables

		Component			
		1	2	3	4
Increased customer service level	SCP1	.824			
On time delivery or precision delivery	SCP2	.811			
Achieve compressed order cycle time or lead time	SCP3	.698			
Reduced operating cost	SCP4	.679			
Increased customer satisfaction	SCP5	.633			
We have been able to achieve better quality in operations	OP2		.809		
We have been able to achieve low lead time in operations	OP1		.766		
We have been able to achieve high reliability in operations	OP4		.746		
We have been able to achieve high efficiency in operations	OP3		.683		
We have been able to obtain products or services from suppliers that are of hi quality	SP1			.772	
We have been able to obtain products or services from suppliers with shorter lead time	SP4			.758	
The suppliers reliability is increased	SP3			.743	
Suppliers have done their job efficiently	SP2			.702	
Resulted in increased customer service by the customers	CP1				.901
The customer is able to acquire more customers	CP2				.866
The customers financial status is improved	CP3				.723
<i>Cronbach's alpha</i>		<i>0.77</i>	<i>0.70</i>	<i>0.71</i>	<i>0.72</i>
<i>Eigen value(Sum of squares)</i>		<i>5.18</i>	<i>1.83</i>	<i>1.72</i>	<i>1.23</i>
<i>Cumulative variance explained</i>		<i>32.41</i>	<i>43.87</i>	<i>54.66</i>	<i>62.39</i>

Table 4.11 Confirmatory factor analysis results for the constructs (Dependent Variables)

Construct in the model	Measurement Item	Items loading (Standardized)	t-value	P - Value	Composite reliability(CR)	Cronbach's alpha
Social Sustainability	PH	0.61*	3.833	***	0.755	0.80
	HR	0.62*	3.939	***		0.82
	ET	0.67*	4.069	***		0.76
	HW	0.43*	3.241	***		0.75
	EQ	0.18*	2.365	***		0.82
	SA	0.39*	**	***		0.71
SCP	SCP1	0.88	**	***	0.821	0.77
	SCP2	0.75	14.071	***		
	SCP3	0.69	11.811	***		
SP	SP2	0.86	9.05	***	0.906	0.71
	SP3	1.0	**	***		
	SP4	0.71	7.422	***		
OP	OP1	0.61	**	***	0.727	0.70
	OP3	0.82	11.057	***		
	OP4	0.63	9.828	***		
CP	CP1	0.80	7.967	***	0.833	0.71
	CP2	0.88	**	***		

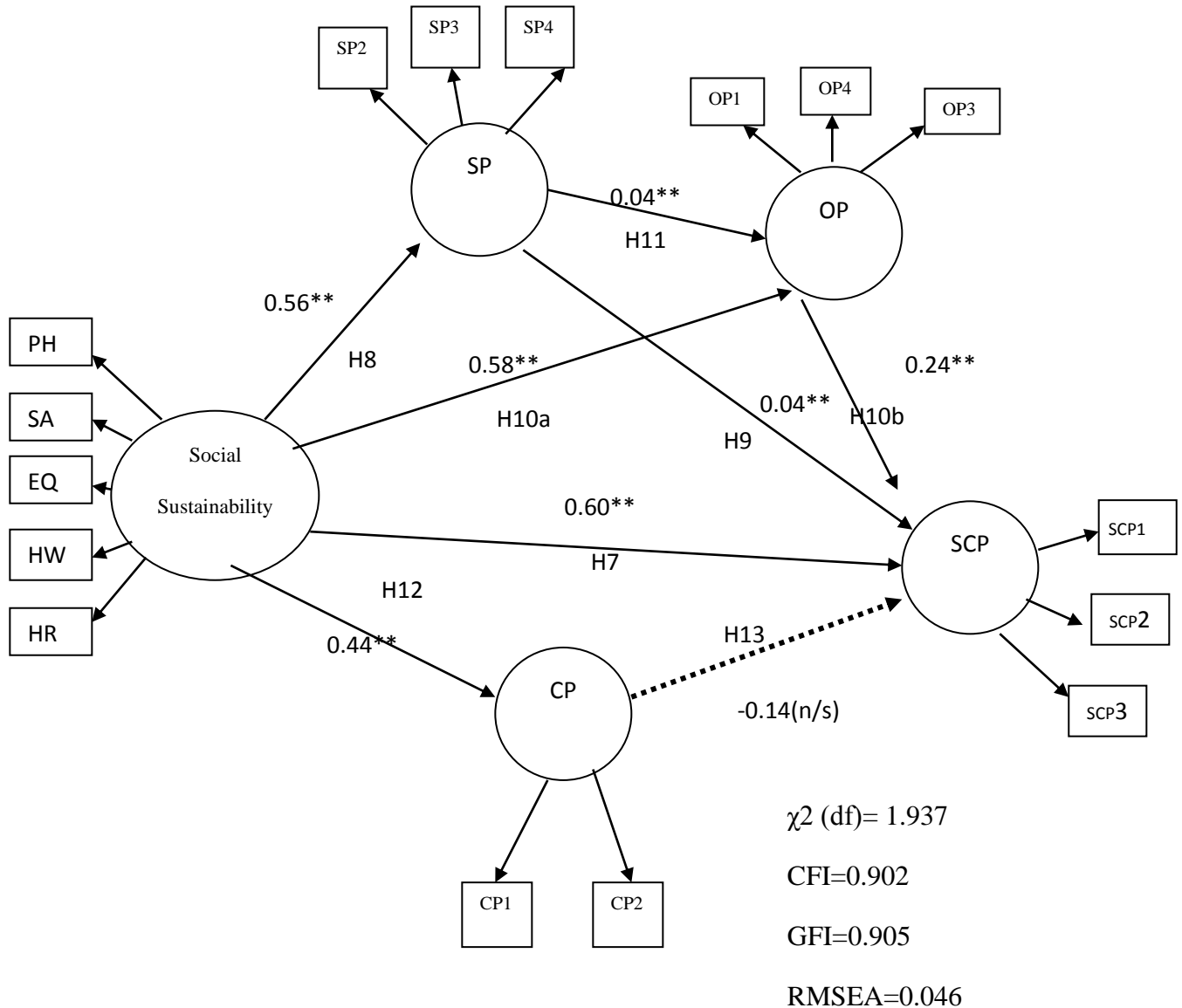
* Path loadings are significant at $P < 0.001$; ** Fixed at 1.0 for estimation purpose; *** All values are significant at $P < 0.001$

4.11 Structural Equation Modeling (SEM)

In order to test our hypothesis proposed in the chapter-3, a structural model using Amos 20.0 was created with the maximum likelihood procedure (MLH). We have followed two stage procedure proposed by Anderson and Gerbing(1988) for analysis. First, we have created a measurement model for the constructs to see the model fit and their convergent and discriminate validity. Table - 4.11 shows the reliability of the constructs: supply chain performance, operational performance, supplier performance, and customer performance; all measures show excellent internal consistency. In the previous section, we have validated six underlying dimensions (EQ, SA, PH, HW, HR, ET) measuring social sustainability (SS) as a second order latent construct. Table 4.11 shows the path loadings of all the measures above 0.50 and composite reliability values are above 0.70; this indicates the high convergent validity of the constructs. Results in Table 4.12 indicate that maximum shared variance (MSV) was found lesser than the average variance extracted (AVE) of

the factors. In addition, average shared variance (ASV) values are less than the average variance extracted (ASV<AVE). In addition, the values in Table 4.11 suggest that the square root of AVE is greater than inter-construct correlations (Hair et al, 2010). These results indicate; excellent discriminant validity of the constructs for our study. Secondly, we have created a structural model to test our proposed hypothesis as described in figure 4.5.

Figure 4.12 Relationship between social sustainability and supply chain performance



** All the values significant at $P < 0.001$ level

n/s = Not significant

Here, we have used social sustainability (SS) dimension that has been validated as second order latent construct in an earlier section as independent variable (Exogenous) and the constructs such as SCP, SP, OP, and CP as dependent variables (Endogenous). A structural equation modelling has been performed to test the proposed hypothesis (H7, H8, H9, H10, H11, H12, and H13). The structural equation models are analysed based on the fit between the theoretical model and the data through the goodness of fit indices. These indices are Bentler and Bonnett's(1980) non-normed fit index(NNFI), Bentler's (1989)comparative fit index(CFI), and RMSEA(Steiger, 1990). The values 0.90 and above for CFI, GFI; and values below 0.08 for RMSEA suggest the adequate fit between the model and the data (Baumgartner and Homburg, 1996).

Figure 4.13 Structural equation modeling –Amos output

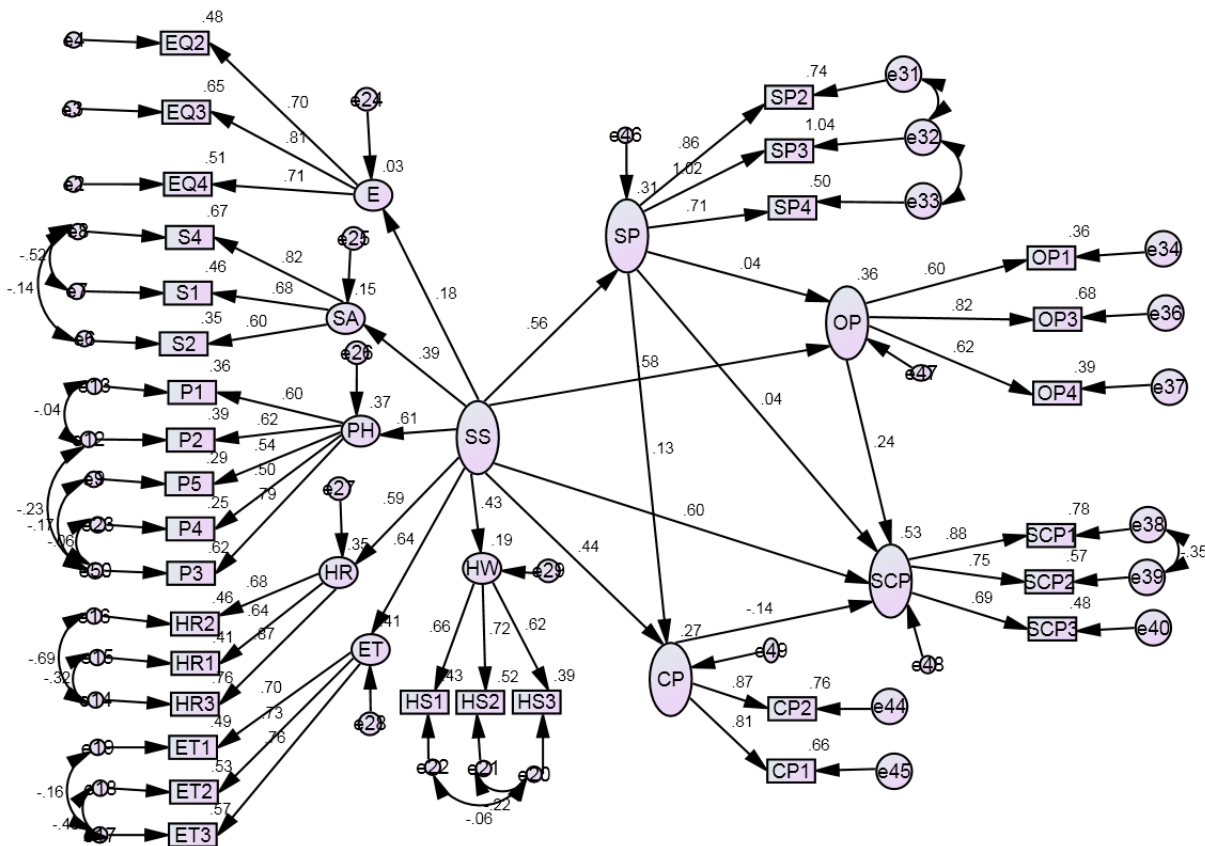


Table 4.12 Convergent and discriminate validity of the constructs (Dependent variables)

	CR	AVE	MSV	ASV	SCP	SS	SP	OP	CP
SCP	0.821	0.607	0.466	0.253	0.779				
SS	0.755	0.526	0.396	0.316	0.683	0.726			
SP	0.906	0.767	0.300	0.186	0.409	0.548	0.876		
OP	0.727	0.515	0.304	0.240	0.551	0.551	0.369	0.718	
CP	0.833	0.715	0.215	0.156	0.276	0.439	0.376	0.464	0.845

The values in the model for χ^2 (DF), CFI, GFI and RMSEA range from 1.937, 0.902, 0.905 and 0.046 respectively. Further, the entire factor loadings are significant at $p < 0.001$, indicating the convergent validity for the constructs (Gerbing and Anderson, 1988). All the constructs have the internal reliability coefficients over the 0.70, suggested minimum for establishing scales (Churchill, 1979; Flynn et al., 1994). Discriminant validity between the constructs was evaluated by performing chi-square difference test between a model in which parameter for factor correlation was fixed at 1.0 and the original unrestricted confirmatory factor analysis (CFA) model. The results indicate significantly worse fit for the study's restricted model versus unrestricted model; supporting strong evidence of discriminate validity. The findings suggest that the scale items to measure the model's constructs are reliable and valid; and an excellent fit exists between the model and the data. In the figure 4.5 the path loading between social sustainability and supplier performance stand at 0.56; similarly between SP and SCP: 0.40; between SP and OP: 0.40; between SS and OP: 0.58; between SS and SCP: 0.60; between SS and CP: 0.44; and between OP and SCP: 0.24; all the values significantly at $P < 0.001$. The path loading between CP and SCP was not significant (-0.14) and shown as a dotted line in figure-4. In addition, we have examined the values of squared multiple correlations; the values between SS and SP: 0.31, $P < 0.001$; between SP and OP: 0.36, $P < 0.001$; between OP to SCP: 0.53, $P < 0.001$; between SS and SCP: 0.53, $p < 0.001$; between SS to CP: 0.27, $P < 0.001$, indicating the degree of relationship between social sustainability and supply chain performance.

4.12 Summary of the analysis

A second order measurement model for social sustainability indicates six underlying social dimensions, namely Equity, Safety, Health and Welfare, Philanthropy, Human Rights, and Ethics. These dimensions are significant ($P < 0.001$) in measuring social sustainability in the supply chain of manufacturing industry. The results in the table 4.13 show that ethical issues constitute the highest effect with the path loading of 0.64 to social sustainability. It implies that ethical issues in Indian manufacturing are of primary concern for social sustainability. Second, the philanthropy practices have been given importance with the direct path loading of 0.61 indicating philanthropy is the second important dimension for social sustainability. Human rights issues are at the third level in the manufacturing supply chain with the direct path loading of 0.59. Fourth, health and welfare issues constitute social sustainability with the path loading of 0.43. In Indian industries, health and welfare issues need to be addressed. Fifth, the issues related to safety with the path loading of 0.38 measures the social sustainability dimension. However, safety issues are less emphasized when compare to ethical and human rights issues in manufacturing. Finally, equity related practices with the path loading of 0.18 measures social sustainability. This indicates equity related issues are given less importance when compared to human rights, ethics and philanthropy in Indian manufacturing industries.

In addition, social sustainability practices directly affect the supply chain performance with the path loading of 0.60. The result implies that adoption of social sustainability practices impacts the supply chain performance. The results in the table 4.13 indicate that social sustainability issues affecting supplier performance with the direct path loading of 0.56. Supply chain social sustainability practices also impacts the focal company's operational performance with the path loading of 0.59. Further, these social issues impact the customer performance in the supply chain (0.51). Supplier performance indirectly affects the supply chain performance and Operational performance also impacts the supply chain performance (0.23). However, the results in Table 4.13 indicate that customer performance does not lead to the supply chain performance.

Table 4.13 showing standardized direct and indirect effects and their outcomes

Path	Direct Effect	Indirect effect	Total Effect	Result
H1: Equity → Social sustainability dimension	0.182	-----	0.182	Supported
H2: Safety → Social sustainability dimension	0.386	-----	0.386	Supported
H3: Health and Welfare → Social sustainability dimension	0.433	-----	0.433	Supported
H4: Philanthropy → Social Sustainability dimension	0.611	-----	0.611	Supported
H5: Human Rights → Social Sustainability dimension	0.593	-----	0.593	Supported
H6: Ethics → Social sustainability dimension	0.641	-----	0.641	Supported
H7: Social sustainability → Supply chain performance	0.600	0.090	0.690	Supported
H8: Social sustainability → Supplier performance	0.561	-----	0.561	Supported
H9: Supplier performance → Supply chain performance	0.039	-0.009	0.30	Supported
H10a: Social sustainability → Operational performance	0.575	0.023	0.598	Supported
H10b:Operational performance → Supply chain performance	0.235	-----	0.235	Supported
H11:Supplier performance → Operational performance	0.040	-----	0.040	Supported
H12:Social sustainability → Customer performance	0.437	0.074	0.511	Supported
H13-Customer performance → Supply chain performance	-----	-----	-----	Not Supported

* Path loadings are significant at $P < 0.001$

CHAPTER-5

DISCUSSION

5.1 Introduction

This chapter discusses the research outcomes that emerge after various statistical analyses carried out in the previous chapter (Chapter-4), as well as the contribution it makes to the existing body of research in the field. It also discusses the rationale for the relationships found out between various parameters in the previous chapter. Moreover, the discussion presented in this chapter represents a theory-driven examination of how the social sustainability dimensions are associated with the supply chain performance in the context of Indian manufacturing industries.

5.2 Social sustainability dimensions

In the literature on supply chain, there is a plethora of studies on sustainability. However, the majority of them focus on the suppliers and use qualitative methods or mathematical modelling to answer the relevant research questions (Carter and Jennings, 2002, 2004; Seuring and Muller, 2008; Ciliberti et al., 2008; Ashby et al., 2012; Lu et al, 2012). This study aimed at exploring the inclusion of social issues in the sustainable manufacturing supply chains, that is, the supply chain social sustainability (SCSS), because of the paucity of literature that discusses the issues related to the social dimension of sustainability in the developing countries, and also because of the endorsement of this research direction by scholars (Zhu et al., 2005; McCormack et al., 2008; Zapata and Nieuwenhuis, 2010; Silvestre and Silva Neto, 2014). In our results, 20 parsimonious measures emerged under six social dimensions, that is, Equity (EQ), Philanthropy (PH), Safety (SA), Health and Welfare (HW), Ethics (ET), and Human Rights (HR), to measure the SCSS (Table 5.1). Our results also suggest that social sustainability in the Indian manufacturing industry primarily emphasises the ethical issues, followed by philanthropy and human rights at the second level. At the third level, the issues emphasised are safety, health and welfare. Although equity issues are also considered for social sustainability in the supply chain, they receive less emphasis compared to other dimensions, such as safety, ethics, human rights, health and welfare, and philanthropy.

The development of these multidimensional conceptualisations has been instrumental in measuring multiple social sustainability aspects pertaining to the supply chain domain. The scales developed in this study are an important step towards achieving social sustainability, as they form a psychometrically sound measurement system which is a prerequisite for any theoretical advancement (Schwab, 1980). We, therefore, contribute to the literature on sustainability in the supply chain in that, we propose six distinguishable dimensions and measures that provide a better understanding of the social dimension of sustainability which has not been explored in-depth in the literature (Seuring and Muller, 2008; Ashby et al., 2012; Gunasekaran et al., 2015). Furthermore, we test and validate these dimensions and suggest the use of our proposed instrument by researchers in the field to study the relationship between social sustainability and the supplier performance, customer performance, operational performance and the whole supply chain performance in the developing countries, such as India. In contrast with the studies investigating social sustainability (e.g. Carter and Jennings, 2000) that focus on the supplier side in the developing countries, our study identifies social issues pertinent to the whole supply chain covering the supplier, manufacturer and customer sides. In a recent study, Chow and Chen (2012) proposed three dimensions (ENV, SOC and ECO) to study the impact of the sustainability dimensions on the corporate performance, but did not focus on the supply chain sustainability. This was also the case with the study of Lu et al. (2012), who focused mainly on the ethical dimension of sustainability of the suppliers, and its relationship with the corporate performance. Lu et al.'s research actually addresses the corporate stakeholders from the ethical perspective. Our study expands and builds on these studies, being one of the first studies examining the social dimension of sustainability spanning the whole supply chain.

The social sustainability scales developed in this research contribute to the managerial practice. Our proposed dimensions and measures can be used by the managers focusing on improving the social dimension of sustainability within their supply chains. The philanthropic dimension of social sustainability guides the firms by providing five clear measures to be considered by the manufacturers and the suppliers for the overall social supply chain sustainability. The second dimension (Safety) addresses the safety measures that would need to be adopted by the manufacturers, particularly concerning the safety of women in the manufacturing set up, and the safety pertaining to the incoming movement of goods as well as commitment to the non-usage of hazardous materials in production. The third dimension (Equity) provides measures on gender

diversity policies and gender non-discrimination for both the suppliers and the customers, whereas the fourth dimension (Health and Welfare) describes the importance of occupational health policy for the suppliers, welfare of women, and safety for the customers. The fifth dimension elaborates on the adoption of ‘Ethics’ in manufacturing in relation to the customers, whereas the sixth dimension (Human Rights) implies the prohibition of child and bonded labour as well as sweatshop labour in the manufacturers’ and the suppliers’ establishments (Table-5.1). Furthermore, since our proposed instrument has been developed using the experience of the supply chain managers in India, it provides valuable insights to those supply chain managers in the developing countries and the emerging economies who aim at measuring the social performance of the overall supply chain. The proposed scales are, we believe, useful for those supply chain managers who proactively think and act upon the social dimension of supply chain sustainability. Such an approach paves the way for a strategic thinking on the needs of the firms, and for further development and promotion of the strategic management competencies. The firms can also benchmark the existing social sustainability policies by applying our proposed social sustainability dimensions. These results support our hypotheses H1, H2, H3, H4, H5 and H6, and reaffirm our assertion of social sustainability with the six dimensions mentioned in Table-5.1

Table 5.1 Social sustainability scale items and their measures (after refinement)

(5-point Likert scale; 1=strongly disagree to 5=strongly agree)

<i>Dimensions</i>	<i>Items</i>	<i>Measures</i>
Philanthropy	PH1	Ensures our manufacturing unit to donate to religious organizations
	PH2	Ensures our manufacturing unit to volunteer at local charities
	PH3	Encourage suppliers in philanthropic activities
	PH4	Ensures our manufacturing unit to donate to NGO’s for societal development
	PH5	Conducts health related camps for the society surrounding to our manufacturing facilities
Safety	SA1	Ensures women's safety in our own manufacturing units
	SA2	Ensures our manufacturing facilities adhere to strict safety regulations

	*SA3	Ensures non -usage of hazardous materials in our products
	SA4	Ensures the safe, incoming movement of product to our facilities
Equity	*EQ1	Ensures diversity at supplier locations
	EQ2	Ensures strict adherence of gender non-discrimination policy in customer locations
	EQ3	Ensure workplace diversity at customer locations
	EQ4	Ensures gender non-discrimination policy in our suppliers
Health & Welfare(Partners)	HW1	Periodically audit supplier's and ensure adherence of occupational health policy
	HW2	Ensures women's safety at customer locations
	HW3	Ensures availability of minimum health care facilities in supplier locations
Ethics	ET1	Established an ethical compliance team, department or division in our manufacturing facilities
	ET2	Audits the customer place for strict compliance of ethical code of conduct
	ET3	Has established a set of transparent, comprehensive and stringent ethical codes of conduct in our manufacturing units
Human Rights	HR1	Has human rights policy for our manufacturing facilities
	HR2	Audits supplier locations and ensures non employment of child and bonded labour
	HR3	Ensure non-employment of sweatshop labours in supplier locations

* Items were removed for poor loading and fit in the measurement model.

5.3 Social sustainability and supply chain performance

The findings of this research indicate a significant relationship between social sustainability practices and the supply chain performance. This implies that the corporations and their commitment to addressing the social issues can have an impact on their supply chain performance. Although no direct relationship was found between the adoption of social sustainability and the financial performance, the supply chain performance would indirectly lead to cost reduction for the

organisation through waste minimisation, inventory optimisation, customer satisfaction, and so on. These results are contradictory to the results of Chin and Tat's (2014) study conducted in the Malaysian electronic firms, in which they ruled out any relationship between gender diversity practices and the supply chain performance. However, several earlier studies, e.g. by Carter and Jennings (2002, 2004), have established the relationship between gender diversity practices in the upstream supply chain and the supply chain performance. Our results indicate that social sustainability is being practised in the Indian manufacturing industries, and such practices have a significant relationship with the supply chain performance of the corporations. These findings support our hypothesis H7.

Table 5.2 Research hypotheses and outcomes

Sl. No	Hypothesis	Contents	Supported/Not supported
1	H1	Issues related to equity in the supply chain constitute a social dimension	Supported
2	H2	Issues pertaining to safety in the supply chain constitute the social dimension	Supported
3	H3	Issues related to health and welfare constitute the social dimension of sustainability	Supported
4	H4	Issues related to philanthropy constitute the social dimension	Supported
5	H5	Issues related to human rights may constitute the social dimension	Supported
6	H6	Ethical issues in the supply chain constitute the social dimension	Supported
7	H7	Whether, there exists a relationship between social sustainability and supply chain performance	Supported
8	H8	Whether there exist relationship between social sustainability and supplier performance	Supported
9	H9	Whether, there exists the relationship between	Supported

		supplier social performance and supply chain performance	
10	H10a	Whether, adoption of social sustainability practices can lead to better operational performance of the firm	Supported
	H10b	Whether, there exist the relationship between operational performance of the firm and supply chain performance	Supported
11	H11	Whether, there exists the relationship between supplier performance and operational performance	Supported
12	H12	Whether, there exists the relationship between social sustainability and customer performance	Supported
13	H13	Whether, there exist the relationship between customer social performance and supply chain performance	Not supported

5.4 Social sustainability and supplier performance

This research also investigated the relationship between social sustainability practices and the supplier performance through the hypothesis H8, i.e. there exists a relationship between social sustainability and the supplier performance. Our results clearly suggest a significant relationship between social sustainability and the supplier performance. This outcome supports the earlier research by Lu et al. (2012), Bai and Sarkis (2010) and Mani (2014), all of whom have demonstrated the importance of adopting social sustainability practices by the suppliers and their impact on the performance of the corporations. This also implies that the suppliers should focus on social sustainability whether mandated by the buyers or not. This result is also in line with Pagell and Wu's (2009) results, who emphasise social issues such as human rights, child and forced labour, training, employment and wages, in the suppliers' establishments. A recent study by Sancha et al. (2015) also demonstrates the importance of social practices in the suppliers' establishments and their direct impact on the suppliers' performance as well as the operational performance of the firms. Thus, our

hypothesis H8 is not only supported by the empirical results, but is also in consonance with the established theories in the literature.

5.5 Suppliers' social performance and supply chain performance

Having derived our understanding from the hypothesis H8, that social sustainability activities improve the supplier performance, we next ought to find the relationship between the supplier performance and the supply chain performance. Our results affirm a significant relationship between these two. Although the earlier research had proved that the supplier performance led to improved supply chain performance in more general terms (Gualandris *et al.*, 2014; Klassen and Vachon, 2003; Vachon and Klassen, 2006), the establishment of the relationship between the suppliers' social performance and the supply chain performance is a new phenomenon in the literature. Our findings support the view of a positive impact of the suppliers' social performance on the supply chain performance. Previous research on the suppliers' social responsibility have demonstrated the linkage between the supplier performance and the supply chain performance (Sancha *et al.*, 2015). Moreover, the scholars in the past have urged the companies to adopt supplier development as well as assessment and collaboration practices, in order to improve the suppliers' social performance and the supply chain performance (Gualandris *et al.*, 2014; Klassen and Vachon, 2003; Vachon and Klassen, 2006). Others have identified environmental sustainability practices as well as their relationship with the suppliers' and the overall supply chain's performance (Akamp and Muller, 2013; Seuring and Muller, 2008).

5.6 Social sustainability and operational performance

Adoption of social sustainability practices in the supply chain significantly affects the operational performance of a firm. Our study results indicate a significant and positive relationship between social sustainability and operational performance by confirming the hypothesis H10a. This outcome is in line with the findings in the literature that demonstrate the positive relationship between the adoption of sustainability measures in the supply chain and the operational performance of the firm (Chang and Kuo, 2008). Contrary to this, other studies in the past had pointed out that the buying firms' efforts to push socially responsible behaviour in the supplier locations did not help the buying firms in cost

reduction and operational performance (Hollos et al., 2012). As far as social sustainability in the supply chain is concerned, this empirical study has come at what may be considered a much early stage in the Indian manufacturing industries. Therefore, the insights developed would definitely help the supply chain managers in emphasising the social aspects as well as adopting the social sustainability measures in their supply chains. Our results are in concurrence with the previous studies which argued that the implementation of social sustainability practices through supplier management results in improved supplier performance as well as better operational performance of the firm (Akamp and Muller, 2013).

5.7 Operational performance and supply chain performance

Our statistical analyses and results demonstrate a significant relationship between the operational performance of a firm and the supply chain performance. This implies that the social sustainability practices help in not only improving the operational performance of a firm but also achieving a better supply chain performance. Our hypothesis H10b is supported by the empirical evidence and is in accord with the earlier research by Wong et al. (2011), who affirm a positive relationship between operational performance and the supply chain performance through supply chain integration. Further, Devaraj et al. (2007) have also demonstrated that the supply chain performance is driven by operational performance through e-applications in the supply chain. Thus, our findings are in line with the earlier research in the supply chain literature (Mani et al., 2015).

5.8 Supplier performance and operational performance

We also investigated the relationship between the supplier performance and the operational performance from the perspective of social sustainability. Our study results indicate a positive and significant relationship between the supplier performance and the operational performance proposed in the hypothesis H11. This implies that the adoption of social sustainability leads to an improved supplier performance which, in turn, leads to better operational performance of the firm. Our results correspond with the earlier research that have established a positive relationship between the supplier performance and the operational performance (Gosling et al., 2015). Other previous studies have also

demonstrated the positive impact of the improved supplier performance on the operational performance of the focal company (Tan et al., 1999; Krause et al., 2007). Hence, our results are in line with the existing operational theories.

5.9 Social sustainability and customer performance

In the past, the supply chain management literature mainly explored the upstream supply chain, the majority of them focusing on the suppliers. The research on customer performance, so far, has been bare minimum, or even ignored, in the operations literature. In this research, we have explored the ways of social sustainability adoption and its impact on the customer performance. Our statistical results establish a positive relationship between social sustainability and the customer performance. This implies that the social issues are important not only for the suppliers and the operations managers but also for the customers. Therefore, the firms equally need to gear up to address the social issues at the customer locations. This result supports the hypothesis H12. In addition, these results are also in line with the earlier studies that have demonstrated a positive relationship between the adoption of social sustainability by the retailers and the customer performance (Argenti, 2004). Yet another study, by Luo and Bhattacharya (2006), supports our assertion of the tendency of the consumers to buy specific brands and patronise certain retailers because of their socially sustainable activities that have an impact on their own financial performance.

5.10 Customers' social performance and supply chain performance.

Our research in the Indian manufacturing industries with respect to the customer performance and its impact on the supply chain performance yielded negative results. As indicated by these results, there is no significant relationship between the customer performance and the supply chain performance. This implies that, although social sustainability practices improve the customer performance, they do not play any role in improving the supply chain performance. This is in contrast with the earlier research that had established a positive role of the customers' social sustainability activities and the supply chain performance (Delai and Takahashi, 2013). Some other studies have also affirmed the linkage between the customer performance and the supply chain and business performance; for example, the research by Gupta and Zeithaml's (2006) that discusses the

observable (behaviour) and the unobservable (customer satisfaction) metrics of the customer performance and their impact on the business. However, our statistical results do not support the hypothesis H13.

5.11 Social sustainability and cost reduction

There have been numerous studies in the literature suggesting a positive relationship between social sustainability and cost reduction of the focal company (Carter and Jennings 2000). However, our statistical results do not support cost reduction measures. It could be because the respondents (supply chain managers) have not realised the direct cost reduction benefits accrued over a period of time due to the adoption of social sustainability measures in the supply chain. Although we adopted three clearly established cost reduction measures in our study (Carter and Jennings, 2004), all these measures were loaded poorly in the factor analysis stage itself and we had to drop these measures in our structural model.

Overall, social sustainability research in the Indian manufacturing supply chain has established six underlying social dimensions, measuring the second order latent construct (social sustainability) with 20 validated measures, and their positive impact on the supplier performance (SP), operational performance (OP), customer performance (CP) and the supply chain performance.

CHAPTER-6

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

6.1 Conclusions

In the supply chain literature, among all the dimensions of sustainability, social sustainability remains the least explored (Ashby et al., 2012; Seuring and Muller, 2008). Especially, studies on social sustainability in the supply chain of the Indian manufacturing industry are scant. We conducted this research with the objective of exploring social sustainability in the supply chains of the Indian manufacturing industry through clearly stated nine research questions. The primary objective of the research was to identify various social sustainability measures that could be modelled on and integrated with the social sustainability dimensions pertinent to the manufacturing supply chain. For the purpose, an extensive literature review was carried out giving comprehensive lists of social measures. In addition, in-depth interviews with the practitioners yielded lists of social issues at all three stages of the supply chain. With the help of an expert panel, among all these measures, the items relevant to the Indian manufacturing industry were identified. Then, a pilot study was conducted with the practitioners, followed by factor analysis that yielded social measures with six distinguishable dimensions. Subsequent statistical tests, such as confirmatory factor analysis (CFA) and convergent validity discriminate validity tests confirmed 20 specific scale items, giving six distinguishable social dimensions that can be used to measure social sustainability in the supply chain. Later, a second order confirmatory factor analysis was performed to evaluate the second order latent construct. The tests, such as efficiency test and predictive validity tests confirmed the structure of the second order latent construct, that is, social sustainability. With the help of these results, we conclude that there are 6 underlying social dimensions, including Equity (EQ), Philanthropy (PH), Safety (SA), Health and Welfare (HW), Ethics (ET) and Human Rights (HR) that constitute the social sustainability dimension of the manufacturing industries in India.

In order to explore the relationship between social sustainability and the supply chain performance, supplier performance, operational performance and customer performance, we first identified suitable scale measures through the literature review and, with the help of factor analysis, identified relevant measures. Further, a confirmatory factor analysis was performed to identify the

psychometric properties of the constructs (SS, SP, SCP, OP and CP). The model was tested for fitness and the fitness indices met the required parameters (CFI, GFI, NNFI, RMSEA, χ^2 Values). Further, a structural equation model was created to check the relationship between social sustainability and the supply chain performance. The results indicated a positive relationship between the supply chain performance and social sustainability. Hence, we conclude that social sustainability practices exist in the supply chain of the manufacturing industry and such practices lead to improved supply chain performance. In addition, there is a positive relationship between social sustainability and supplier performance; between supplier performance and supply chain performance; between social sustainability and operational performance; and between social sustainability and customer performance.

However, there was no significant relationship between customer performance and the supply chain performance. In addition, no relationship could be established between social sustainability and cost reduction measures in the Indian manufacturing industries. Thereby, we conclude that customer performance in the supply chain with respect to social sustainability does not impact the supply chain performance significantly, and social sustainability does not directly lead to cost reduction. With the help of our analysis in Chapter-4 and discussions in Chapter-5, we further conclude that social sustainability construct is measured by six reliable dimensions and plays a significant role in the supply chain performance of the manufacturing industry in India.

6.2 Managerial implications

This research on social sustainability points out many social sustainability issues at different stages of the supply chain. The results also show how these issues can be addressed by adopting social sustainability practices in the manufacturing supply chain. The six distinguishable social dimensions in the manufacturing supply chain that emerge as a result of this research provide better insights to the supply chain managers and practitioners who, otherwise, might have had no information as to what constitutes social sustainability. The developed scale with 20 social measures helps the policy makers and sustainability experts in the Indian continent to find the ways and means to address those measures to make their supply chains and firms socially more sustainable. In other words, with an understanding of these issues, the supply chain managers can address them more appropriately to increase their supply chain competitiveness in the market.

Since the results also suggest that the supply chain performance is impacted by social sustainability, this provides deeper insights as to how the supply chain performance can be enhanced by effectively practising social sustainability activities in the supply chain. The developed social sustainability scale can be used by the practitioners to measure the supply chain social sustainability to benchmark their supply chains globally. The research also helps academicians to understand the social issues related to the manufacturing supply chain for further knowledge and theory building. With better social sustainability adoption, the performance of the supply chain improves, thereby providing a competitive edge to the manufacturing firm. With this insight, the future managers can proactively incorporate “socialness” in their supply chains to be more competitive in the global market.

6.3 Limitations and Future Research

As with every other study, our study has had certain limitations. First, since all our samples were collected from the manufacturing industry, there is a possibility of bias creeping in. Further, even though best efforts were made to collect an adequate sample from the Indian manufacturing industry, it may not have been sufficient enough to represent the whole country. Owing to these limitations, further research needs to be conducted with larger samples across India to bring in newer insights. The future studies can also be on specific industries to generalise the phenomenon of social sustainability. For example, social sustainability in the food and beverages, chemicals, pharmaceuticals, poultry and meat, automobiles, and IT manufacturing industries can be taken up. In addition, the future studies can carry out inter-industry comparisons to bring in various perspectives to social sustainability.

Secondly, this study was focused on the forward loop of the supply chain and its social sustainability. So, the future studies can explore the reverse loop of the supply chain and the social sustainability measures pertinent to it. This research is just the first step in the study of social sustainability in the supply chain. Similar researches on cross-cultural and inter-continental perspectives can bring in more interesting insights into social sustainability, as the firms and their supply chains extend across the continents.

Finally, though our research findings suggest a good fit for all the tested parameters, two important aspects need to be kept in mind. First, in a reasonably good sample size, a good fitting model is sometimes rejected merely due to the small differences between the observed and the predicted

covariance matrix. On the other hand, ill-fitting models may be accepted as having an adequate fit in a relatively smaller sample size (Bentler and Bonnett, 1980). Hence, more studies need to be conducted in the future by using this instrument with different sample sizes, in order to generalise the findings across industries. Secondly, since the scale was developed in the Indian context, this instrument can further be tested in other developing countries.

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APPENDICES

Appendix-I

Interview protocol

Introduction

We are here to discuss the issues related to the social sustainability of the supply chain (supplier, manufacturer, customer). I would like to start by saying there is no right or wrong answers, no disagreement in views. I am interested to get both positive and negative comments; and both can be very useful. I am trying to capture your perspectives on social sustainability in the supply chain of your organization.

Questions

1. Can you please tell me about your corporate culture on social sustainability, whether it filters down to supply chain level?
2. I would like to shift our conversation from an organization perspective to supply chain function, based on your experience as a supply chain manager for over two decades, how do you define social sustainability in supply chain, of manufacturing industry?
3. What are some specific activities that you consider, leads to social sustainability in the supply chain? (Supplier related, operation related, customer related)
4. What do you think, could be enablers and impediments to social sustainability adoption?
5. What do you think, could be some of the outcomes of social sustainability activities? (Hint: If, these activities are practiced (Q-3), then the corporation can expect some measurable outcomes).

Thank you very much for your time.



Appendix II
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
DEPARTMENT OF MANAGEMENT STUDIES

Dear Participant,

Sustainability plays a vital role in today's organizations because of increased stakeholder awareness. Organisations understand the sustainability and started incorporating in their product and processes in manufacturing. Social sustainability in the supply chain refers to as how the social issues related equity, diversity, wages, philanthropy, child and bonded labour, education, ethics, human rights, safety and health are addressed in all the stages of the supply chain (supplier, manufacturing operations, and distributors and dealers).

In this direction, the attached questionnaire is a tool to help us understand your perceptions on the above said factors as you have work experience in the organization. Your responses will add value to our research as well as to the literature of the social sustainability and SCM practices. So, **please indicate your views by circling the appropriate number provided against each statement.** Confidentiality will surely be maintained and the aggregate responses shall only be used for academic purposes.

Thanking you.

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Questionnaire (Social sustainability)

(1- Strongly disagree; 2- Disagree; 3- Neither agree nor disagree; 4 - Agree; 5-Strongly agree)

S. No	<i>Questions</i>	<i>Strongly disagree</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>Strongly Agree</i>
	<i>Currently, our supply chain function</i>							
1	Ensures gender non-discrimination policy in our suppliers	Strongly disagree	1	2	3	4	5	Strongly Agree
2	Ensures adoption of a gender non-discrimination policy in our own manufacturing locations	Strongly disagree	1	2	3	4	5	Strongly Agree
3	Ensures strict adherence of gender non-discrimination policy in customer locations (Distributor and Dealers)	Strongly disagree	1	2	3	4	5	Strongly Agree
4	Purchases from minority/ disabled/ women owned business enterprise (MWBE) suppliers	Strongly disagree	1	2	3	4	5	Strongly Agree
5	Ensure workplace diversity at customer (Distributor and dealer) locations	Strongly disagree	1	2	3	4	5	Strongly Agree
6	Ensures diversity in our own manufacturing locations	Strongly disagree	1	2	3	4	5	Strongly Agree
7	Ensures diversity at supplier locations	Strongly disagree	1	2	3	4	5	Strongly Agree
8	Ensures safety measures in supplier operations	Strongly disagree	1	2	3	4	5	Strongly Agree
9	Ensures the safe, incoming movement of product to our facilities	Strongly disagree	1	2	3	4	5	Strongly Agree
10	Ensures our manufacturing facilities adhere to strict safety regulations (OHSAS 18001)	Strongly disagree	1	2	3	4	5	Strongly Agree
11	Ensures non -usage of hazardous materials in our products	Strongly disagree	1	2	3	4	5	Strongly Agree

12	Ensures women's safety in our own manufacturing units	Strongly disagree	1	2	3	4	5	Strongly Agree
13	Ensures women's safety at supplier locations	Strongly disagree	1	2	3	4	5	Strongly Agree
14	Ensures women's safety at customer locations	Strongly disagree	1	2	3	4	5	Strongly Agree
15	Inspect customer locations and audit the safety measures	Strongly disagree	1	2	3	4	5	Strongly Agree
16	Periodically audit supplier's and ensure adherence of occupational health policy	Strongly disagree	1	2	3	4	5	Strongly Agree
17	Ensures good drinking water and sanitation conditions at customer locations	Strongly disagree	1	2	3	4	5	Strongly Agree
18	Ensures availability of minimum health care facilities in supplier locations	Strongly disagree	1	2	3	4	5	Strongly Agree
19	Ensures adoption of occupational health measures for employees at our own manufacturing facilities	Strongly disagree	1	2	3	4	5	Strongly Agree
20	Conducts health related camps for the society surrounding to our manufacturing facilities	Strongly disagree	1	2	3	4	5	Strongly Agree
21	Ensures the policy guidelines related to wages at supplier locations	Strongly disagree	1	2	3	4	5	Strongly Agree
22	Provide our employees with salaries that properly and fairly reward them for their work	Strongly disagree	1	2	3	4	5	Strongly Agree
23	Audit customer locations and ensure adequate wages for the employees	Strongly disagree	1	2	3	4	5	Strongly Agree
24	Ensures our manufacturing unit to volunteer at local charities	Strongly disagree	1	2	3	4	5	Strongly Agree
25	Ensures our manufacturing unit to offer donations to schools and colleges	Strongly disagree	1	2	3	4	5	Strongly Agree
26	Ensures Our manufacturing unit to donate to religious organizations	Strongly disagree	1	2	3	4	5	Strongly Agree

27	Ensures our manufacturing unit to donate to NGO's for societal development	Strongly disagree	1	2	3	4	5	Strongly Agree
28	Encourage suppliers in philanthropic activities	Strongly disagree	1	2	3	4	5	Strongly Agree
29	Encourage customers (Distributors and dealers) in philanthropic activities	Strongly disagree	1	2	3	4	5	Strongly Agree
30	Ensure non-employment of sweatshop labours in supplier locations (workers with low wages and without basic living conditions)	Strongly disagree	1	2	3	4	5	Strongly Agree
31	Has human rights policy for our manufacturing facilities	Strongly disagree	1	2	3	4	5	Strongly Agree
32	Periodically visit customer locations (Distributors and Dealers) and addresses human rights violations	Strongly disagree	1	2	3	4	5	Strongly Agree
33	Audits supplier locations and ensures non employment of child and bonded labour	Strongly disagree	1	2	3	4	5	Strongly Agree
34	Visits periodically to customer locations (Distributor and dealer) and audit the violations of child and bonded labour	Strongly disagree	1	2	3	4	5	Strongly Agree
35	Ensures prohibition of child and bonded labour in our own manufacturing locations	Strongly disagree	1	2	3	4	5	Strongly Agree
36	Has established a set of transparent, comprehensive and stringent ethical codes of conduct in our manufacturing units	Strongly disagree	1	2	3	4	5	Strongly Agree
37	Ensures, strict implementation of an ethical code of conduct by every manager and employee in our manufacturing units	Strongly disagree	1	2	3	4	5	Strongly Agree
38	Established an ethical compliance team, department or division in our manufacturing facilities	Strongly disagree	1	2	3	4	5	Strongly Agree
39	Ensures complete prohibition of unethical practices by suppliers (usage of sub- standard materials,	Strongly disagree	1	2	3	4	5	Strongly Agree

	bribing, coercion, pollution, insider trading)							
40	Audits the customer place for strict compliance of ethical code of conduct	Strongly disagree	1	2	3	4	5	Strongly Agree

As a result of undertaking “social sustainable activities”

<i>S. No</i>	<i>Questions</i>	<i>Strongly disagree</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>Strongly Agree</i>
1	We have been able to obtain products or services from suppliers that are of higher quality	Strongly disagree	1	2	3	4	5	Strongly Agree
2	We have been able to obtain products or services from suppliers with shorter lead time	Strongly disagree	1	2	3	4	5	Strongly Agree
3	The supplier’s reliability is increased	Strongly disagree	1	2	3	4	5	Strongly Agree
4	Suppliers have done their job efficiently	Strongly disagree	1	2	3	4	5	Strongly Agree
5	The customer is able to acquire more customers (customers customer)	Strongly disagree	1	2	3	4	5	Strongly Agree
6	The customer's financial status is improved	Strongly disagree	1	2	3	4	5	Strongly Agree
7	Resulted in increased customer service by the customers	Strongly disagree	1	2	3	4	5	Strongly Agree
8	Increased customer satisfaction	Strongly disagree	1	2	3	4	5	Strongly Agree
9	Achieve compressed order cycle time or lead time	Strongly disagree	1	2	3	4	5	Strongly Agree
10	Increased customer service level	Strongly disagree	1	2	3	4	5	Strongly Agree
11	We have been able to achieve low lead time, in operations	Strongly disagree	1	2	3	4	5	Strongly Agree

12	We have been able to achieve better quality in operations	Strongly disagree	1	2	3	4	5	Strongly Agree
13	We have been able to achieve high reliability in operations	Strongly disagree	1	2	3	4	5	Strongly Agree
14	We have been able to achieve high efficiency in operations	Strongly disagree	1	2	3	4	5	Strongly Agree
15	Production costs have been reduced	Strongly disagree	1	2	3	4	5	Strongly Agree
16	We have lowered the costs of purchase materials	Strongly disagree	1	2	3	4	5	Strongly Agree
17	Labour costs have decreased	Strongly disagree	1	2	3	4	5	Strongly Agree
18	On time delivery or precision delivery	Strongly disagree	1	2	3	4	5	Strongly Agree
19	Reduced operating cost	Strongly disagree	1	2	3	4	5	Strongly Agree

II) The company belongs to (Please mark ✓)

Automobile industry/ Pharma Industry/ Electrical and Electronics/ FMCG/Consumer durable manufacturer/Architectural/Construction/ Cement Industry/Oil and Natural gas industry/Chemical Industry/ Food and beverages/IT products/Power generation/ Any other, please specify.....

III) Turnover of the company: Below 100 crores /100 to 500 crores / 500 to 1000 crores

IV) Location of the company

V) Kindly specify your position in the company

- Upper Management (Director, ED, President, VP, CEO, MD)
- Middle Management (Sr. Manager, DGM, AGM)
- Lower Management (Executive, Sr. Executive, Asst. Manager)

VI) How long have you been working with this organization

- 1-5 Years
- 5-10 Years
- More than 10 years

VII) Name (if you wish to specify).....