CHAPTER VIII:
LEGAL POLICIES AND DRIVERS FOR ENVIRONMENT FRIENDLY FOOD SCM

8.1 Introduction to Green Supply Chain Management

Increasingly, companies are admitting that environmental management is a key strategic issue with the potential for a lasting impact on organizational performance. For example, more than 40,000 companies have implemented ISO 14001, the environmental management system standard (Zhu and Sarkis, 2004). Greening the supply chain is increasingly a concern for many business enterprises and a challenge for logistics management in the 21st century. The particular concern is how to raise organizational environmental awareness in corporate environmental management practices into their logistics activities (Zhu et al., 2008a, b, c). According to Zhu and Sarkis (2004) and Zhu et al. (2008a,b,c), Green Supply Chain Management (GSCM) covers a set of environmental management approaches which are beneficial for logistics management and are designed to integrate environmental considerations into the forward and reverse logistics. Examples of green supply chain management practices include reducing packaging and waste, evaluating suppliers based on environmental performance, developing more eco-friendly products, and reducing carbon emissions associated with the transport of goods (Walker et al., 2008).

Various definitions of GSCM exist in the literature. The following paragraphs recapitulate some of the definitions of GSCM that have been published in the literature. According to Gilbert (2001), greening the supply chain is the course of absorbing environmental criteria or concerns into managerial purchasing decisions and long-term relationships with suppliers. Essentially, there are three approaches to GSC: environment, strategy, and logistics. In addition, the concept of green productivity (GP) shows that for any development strategy to be sustainable it needs to have a focus on environment, quality, and profitability, which form the triple focus of GP (Hwa, 2001). Kogg (2003) used the definition of GSCM given by Zsidisin and Zsidisin, G.A., Hendrick, T.E., (1998).

Siferd (2001): “the set of supply chain management policies held, actions taken and relationships for average response to concerns related to the natural
Legal Policies And Drivers For Environment Friendly Food SCM

environment regarding the design, acquisition, production, distribution, use, re-use and disposal of the firm’s goods and services”.

Srivastava (2007) defined GSCM as “integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final products to the consumers, and end-of-life management of the product after its useful life”. GSCM is a concerted effort throughout the company and is more than simply putting some green practices in place, but rather a consistent, holistic improvement of the environmental performance of all levels of management and on the shop-floor (Davies and Hochman, 2007). Rettab and BenBrik (2008) defined the green supply chain as a managerial approach that seeks to minimize a product or service’s environmental and social impacts or footprint. According to Zhu et al (2008a, b, c), GSCM “ranges from green purchasing (GP) to integrated life-cycle management supply chains flowing from supplier, through to manufacturer, customer, and closing the loop with reverse logistics”.

![Fig.8.1. Steps in implementing a Green Supply Chain (Adapted from EPA 2000)](image)

The U.S. Environmental Protection Agency (2000) provides four basic steps to implementing a green supply chain, as shown in Fig. 8.1. These are: (a) Identify costs (b) Determine opportunities (c) Calculate benefits, and (d) Decide, implement and monitor.

According to Srivastava (2007), GSCM covers activities such as ‘green design’, ‘green sourcing/procurement’, ‘green operations’ or ‘green manufacturing’,
‘green distribution, logistics/marketing’ and ‘reverse logistics’. According to Walker et al (2008), the green supply chain concept covers all phases of a product’s life cycle, from the extraction of raw materials through the design, production, and distribution phases, to the use of the product by consumers.

Figure 8.2: Process involved in green supply chain management  
Adapted from Hervani et al (2005)

and its disposal at the end of the product’s life cycle. Hervani et al. (2005), discuss the various processes that are involved in GSCM. These processes are illustrated in Fig.8.2. The main objectives of this chapter are: (1) to identify and rank the drivers that can affect the implementation of a green supply chain; (2) to determine the interactions among the identified drivers; and (3) to understand the managerial implications of this research. The sections of the chapter are covering literature review on green supply chains, problem description, policy implications,
legal framework, supply chain actions and the drivers that affect their implementation. The solution methodology is explained in the end, followed by discussion and conclusions. A case study of aluminium products' company has been taken for illustration and analysis of the steps required in the process of GSCM adoption.

8.2 Problem Description

The case of a company is under study, which is a leading firm and produces aluminium products in southern India. The company produces mainly pressure cookers, and also sauce pots and saucepans. Today, it makes 57 different models of pressure cookers in 10 different types. It is the leader in the pressure cooker market in India and has been exporting its products since 1974 to various countries in each of the six continents of the world. Due to environmental legislation the company is planning to implement green supply chain concept. Choosing the drivers that are important for implementing green supply chain management practices involves a literature review and a decision-making team which includes experts from the industry.

8.3 Drivers Involved in Green Supply Chain

The major drivers involved in Green Supply Chain Management found relevant for this study and the case under discussion are given in Table 8.1. These drivers have been identified by extensive literature surveys and discussions with the industry members.

<table>
<thead>
<tr>
<th>Tab 8.1: Drivers of green supply chain management</th>
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<tbody>
<tr>
<td>Drivers</td>
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<tr>
<td>Certification of suppliers' environmental management system (1)</td>
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</table>
In this workout, the methodology of Interpretive Structural Modelling (ISM) is used. ISM was developed for complex situations as a communication tool. The mathematical foundations of the ISM methodology can be found in various reference works (Harary et al, 1965), while the philosophical basis for the development of this
approach has been presented by Warfield (1973). ISM has been used for policy analysis (Hart and Malone, 1974; Hawthorne and Sage, 1975; Brand et al, 1976; Kawamura and Christakis, 1976) and, in recent years, management research (Mandal and Deshmukh, 1994; Jharkharia and Shankar, 2004, 2005; Sushil, 2005; Bolanos et al, 2005; Ravi et al, 2005; Kannan and Haq, 2007; Kannan et al, 2009, 2010). The main benefits of the ISM methodology is that it transforms unclear and poorly articulated models of systems into visible and well-defined models (Sage, 1977).

Fig 8.3: Flow chart for the ISM methodology Adapted from Kannan et.al (2009)

However, the ISM methodology has certain drawbacks as well (Kannan and Haq, 2007). There will be the subjective bias of the person who is judging the
variables, as the relations among the variables always depends on that person’s knowledge and familiarity with the firm, its operations, and its industry; this bias will affect the final model. Further more in ISM no weights are associated with the variables to give the irrelative importance. The various steps involved in the ISM methodology are given below (Kannan and Haq, 2007; Kannan et al., 2009). The flow chart for the ISM methodology is shown in Fig. 8.3 with the following steps:

Step 1: The drivers affecting the implementation of green supply chain management for the firm under study are listed.

Step 2: For each pair of drivers identified in Step 1, a contextual relationship is established.

Step 3: A Structural Self-Interaction Matrix (SSIM) is developed, which indicates pair wise relationships among drivers of the system under consideration.

Step 4: A reachability matrix is developed from the SSIM and the matrix is checked for transitivity. The transitivity rule states that if a variable ‘A’ is related to ‘B’ and ‘B’ is related to ‘C’, then ‘A’ is necessarily related to ‘C’.

Step 5: The reachability matrix obtained in Step 4 is partitioned into different levels.

Step 6: Based on the relationships given above in the reachability matrix, a directed graph is drawn and the transitive links are removed.

Step 7: The resulting digraph is converted into an ISM by replacing the variable nodes with statements.

Step 8: The ISM model developed in Step 7 is reviewed to check for conceptual inconsistencies, and necessary modifications are made.

We now apply the ISM methodology to the firm understudy. Each of the following subsections corresponds to one step of the ISM methodology.

8.4 Drivers for the implementation of GSCM

The various drivers important to the implementation of green SCM practices were identified based on literature review and a discussion with the decision making team which included experts from the industry. The major drivers identified in this study are given in Table 8.1.
### Tab 8.2: Structural self-interaction matrix for the drivers

<table>
<thead>
<tr>
<th>Drivers</th>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>Certification of suppliers’ environmental management system (1)</td>
<td>BH</td>
<td>BH</td>
<td>FH</td>
<td>NH</td>
<td>MH</td>
<td>FH</td>
<td>FH</td>
<td>NH</td>
<td>BH</td>
<td>NH</td>
<td>-</td>
</tr>
<tr>
<td>Environmental collaboration with suppliers (2)</td>
<td>BH</td>
<td>NH</td>
<td>NH</td>
<td>FH</td>
<td>NH</td>
<td>BH</td>
<td>BH</td>
<td>FH</td>
<td>NH</td>
<td>-</td>
<td></td>
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<tr>
<td>Collaboration between product designers and suppliers to reduce and eliminate product environmental impacts (3)</td>
<td>BH</td>
<td>NH</td>
<td>FH</td>
<td>FH</td>
<td>NH</td>
<td>FH</td>
<td>NH</td>
<td>NH</td>
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<tr>
<td>Government regulation and legislation (4)</td>
<td>FH</td>
<td>FH</td>
<td>FH</td>
<td>FH</td>
<td>FH</td>
<td>FH</td>
<td>FH</td>
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<tr>
<td>Green design (5)</td>
<td>BH</td>
<td>BH</td>
<td>FH</td>
<td>FH</td>
<td>BH</td>
<td>NH</td>
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<td></td>
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<tr>
<td>ISO 14001 certification (6)</td>
<td>BH</td>
<td>FH</td>
<td>NH</td>
<td>NH</td>
<td>NH</td>
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<td></td>
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<tr>
<td>Integrating quality environmental management into planning and operation process (7)</td>
<td>BH</td>
<td>BH</td>
<td>FH</td>
<td>BH</td>
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<tr>
<td>Reducing energy consumption (8)</td>
<td>BH</td>
<td>BH</td>
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<tr>
<td>Reusing and recycling materials and</td>
<td>BH</td>
<td>FH</td>
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8.5 Development of Structural Self Interaction Matrix (SSIM)

Based on contextual relationship among identified drivers, a Structural Self Interaction Matrix (SSIM) was developed (Table 8.2). This matrix indicates the pairwise relationships among the drivers affecting the implementation of green supply chain management initiatives for the firm under consideration. The symbols used to denote the direction of the relationship between the drivers are given below. Let us assume that the drivers under study are j and k, and then the symbol ‘FH’ denotes that driver j will help to achieve driver k, the symbol ‘BH’ means that driver k will be help to achieve driver j. The symbol ‘MH’ means that drivers j and k will help each other to be achieved, and the symbol ‘NH’ means the drivers are unrelated. FH – Driver j will help to achieve Driver k; BH – Driver k will help to achieve Driver j; MH – Drivers j and k will help to achieve each other; and NH – Drivers j and k are unrelated. The following statements illustrate the use of symbols FH, BH, MH and NH in the SSIM matrix.

- Green design driver will help to achieve reduction in energy consumption (FH);
- Green design driver will be achieved by reverse logistics driver (BH).

8.6 Reachability matrix

We derived the reachability matrix from the structural self interaction matrix (SSIM) developed in the previous step. The initial reachability matrix is constructed from the structural self interaction matrix (SSIM) using the following rules:

a) If the (j, k) entry in the SSIM is FH, the (j, k) entry in the reachability matrix is set to 1 and the (k, j) entry is set to 0.
b) If the (j, k) entry in the SSIM is BH, the (j, k) entry in the reachability matrix is set to 0 and the (k, j) entry is set to 1.
c) If the (j, k) entry in the SSIM is MH, the (j, k) entry in the reachability matrix is set to 1 and the (k, j) entry is set to 1.

d) If the (j, k) entry in the SSIM is NH, the (j, k) entry in the reachability matrix is set to 0 and the (k, j) entry is set to 0.

The final reachability matrix (Table 3) is derived from the initial reachability matrix taking into account the transitivity rule, which states that if a variable ‘X’ is related to ‘Y’ and ‘Y’ is related to ‘Z’, then ‘X’ is necessarily related to ‘Z’.

8.7 Level partitions

The reachability matrix derived in Section 4.3 above was partitioned into different levels. The reachability and predecessor set for each driver (Warfield, 1974) were obtained from the final reachability matrix (Table 3). The reachability set for an individual driver consists of itself and the other drivers which it may help to attain. The predecessor set consists of the drivers themselves and the other drivers which may help in achieving it. The intersection of both these sets was also found for all drivers. If the reachability set and the intersection set for a given driver are the same, then that driver is considered to be in level and is given the top position in the ISM hierarchy (Kannan and Haq, 2007). With this division, iteration 1 is finished. After the first iteration, the drivers comprising level 1 is neglected and with the left over drivers, the above stated modus operandi is continued in iteration 2. These iterations are continued until the level of each driver has been found.

<table>
<thead>
<tr>
<th>Drive r Power</th>
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<td>Driver</td>
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<td>10</td>
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<td>11</td>
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</table>

Table 8.3 Final Reachability matrix for the drivers.

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<tr>
<th></th>
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<th>4</th>
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<th>8</th>
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<td>4</td>
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<td>1</td>
<td>9</td>
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</table>
### Tab 8.4: Level partition of drivers – Iteration 1

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Reachability set</th>
<th>Antecedent set</th>
<th>Intersection</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification of suppliers’ environmental management system (1)</td>
<td>1,2,5,6,7,8,9,10</td>
<td>1,3,4,6,7,8,9,10,11</td>
<td>1,6,7,8,9,10</td>
<td>I</td>
</tr>
<tr>
<td>Environmental collaboration with suppliers (2)</td>
<td>2,4,5,6,7,8,9,10,11</td>
<td>1,2,3,4,5,6,7,10,11</td>
<td>2,4,5,6,7,10,11</td>
<td></td>
</tr>
<tr>
<td>Collaboration between product designers and suppliers to reduce and eliminate product environmental impacts (3)</td>
<td>1,2,3,5,6,7,8,9,10</td>
<td>3,4,10,11</td>
<td>3,10</td>
<td></td>
</tr>
<tr>
<td>Government regulation and legislation (4)</td>
<td>1,2,3,4,5,6,7,8,9,10,11</td>
<td>2,4,5,6,11</td>
<td>2,4,5,6,11</td>
<td></td>
</tr>
<tr>
<td>Green design (5)</td>
<td>2,4,5,7,8,9,10</td>
<td>1,2,3,4,5,6,7,8,9,10,11</td>
<td>2,4,5,7,8,9,10</td>
<td>I</td>
</tr>
<tr>
<td>Certification of ISO 14001 (6)</td>
<td>1,2,4,5,6,7,8,10,11</td>
<td>1,2,3,4,6,7,0,11</td>
<td>1,2,4,6,7,10,11</td>
<td></td>
</tr>
<tr>
<td>Integrating quality environmental management into the planning and operation process (7)</td>
<td>1,2,5,6,7,8,9,10</td>
<td>1,2,3,4,5,6,7,8,9,10,11</td>
<td>1,2,5,6,7,8,9,10</td>
<td>I</td>
</tr>
<tr>
<td>Reducing energy consumption (8)</td>
<td>1,5,7,8,9</td>
<td>1,2,3,4,5,6,7,8,9,10,11</td>
<td>1,5,7,8,9</td>
<td>I</td>
</tr>
</tbody>
</table>
Table 8.4 implies that the green design, integration of quality environmental management into planning and operation process, reducing energy consumption, and reusing and recycling materials and packaging drivers are positioned at level I and form the top level in the ISM hierarchy. The collaboration with suppliers on environmental issues, collaboration with customers on environmental issues and certification of ISO 14001 drivers are positioned at level II; the certification of suppliers environmental management system driver is placed at level III; the collaboration between product designers and suppliers to reduce and eliminate product environmental impact drivers is placed at level IV; and the remaining drivers (government regulation and legislation; reverse logistics) fall in at level IV. The initial iteration and final level of each driver is given in Tables 8.4 and 8.5, respectively.

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Level</th>
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<tbody>
<tr>
<td>Certification of suppliers’ environmental management system (1)</td>
<td>III</td>
</tr>
<tr>
<td>collaboration with suppliers on environmental issues (2)</td>
<td>II</td>
</tr>
<tr>
<td>Collaboration between product designers and suppliers to reduce and</td>
<td>IV</td>
</tr>
<tr>
<td>eliminate product environmental impacts (3)</td>
<td></td>
</tr>
<tr>
<td>Government regulation and legislation (4)</td>
<td>V</td>
</tr>
<tr>
<td>Green design (5)</td>
<td>I</td>
</tr>
<tr>
<td>ISO 14001 certification (6)</td>
<td>II</td>
</tr>
<tr>
<td>Integrating quality environmental management into planning and</td>
<td>I</td>
</tr>
<tr>
<td>operation process (7)</td>
<td></td>
</tr>
<tr>
<td>Reducing energy consumption (8)</td>
<td>I</td>
</tr>
<tr>
<td>Reusing and recycling materials and packaging (9)</td>
<td>I</td>
</tr>
<tr>
<td>Environmental collaboration with customers (10)</td>
<td>II</td>
</tr>
</tbody>
</table>
8.8 Formation of ISM model

With the help of the level partition shown in Tables 4 and 5, a model of the various drivers important for implementing green supply chain management for the firm under study was developed, and is shown in Fig.8.4.

8.9 MICMAC analysis

In MICMAC analysis, the dependence power and driver power of the variables are analyzed. On the basis of the above study, the drivers were classified into four sectors. These four sectors are autonomous, dependent, linkage, and driver/independent. In the final reachability matrix, shown in Table 8.3, the driving power and dependence of each of the drivers are calculated. The drivers that have weak driver power and weak dependence will fall in sector I and are called autonomous elements. Drivers that have weak driver power, but strong dependence power will fall in sector II and are called dependent elements. Drivers that have both strong driver power and dependence power will fall in sector III and are called linkage elements. These elements are unstable due to the fact that any action on these elements will affect the others, and may also have a feedback effect on them. Drivers that have strong driver power but weak dependence power will fall in sector IV and are called driver/independent elements (Kannan and Haq, 2007).

8.10 Integration of Quality Environmental Management

The drivers involved in the execution of green SCM for the enterprise under study pretend significant challenges for the management of the firm. Due to the intricacy of GSCM practices, customer and cost pressures and regulation uncertainty, execution of GSCM is examined as a fruitless task that increases overall product cost (Hsu and Hu, 2008). Decision makers must be attentive to the associated importance of the various drivers and the techniques for implementing them. Highlighting the 11 types of drivers, an ISM model was evolved and the interactions between these drivers were examined for the firm under study using the ISM model and MICMAC analysis.
From Fig. 8.4, it is apparent that government regulation and legislation and reverse logistics are major drivers to realize the association between product designers and suppliers to diminish and eliminate product environmental impact driver, which is in turn decisive in achieving the GSCM suppliers’ certification of environmental management system driver. Collaboration with suppliers on environmental issues, collaboration with customers on environmental issues and certification for ISO14001 are placed at an intermediate level of the ISM model. Green design, integrating quality environmental management into the planning and operation process, reducing energy consumption, and reusing and recycling materials and packaging drivers are at the top level of the ISM hierarchy.

From the MICMAC analysis revealed in Fig.8.5, it is obvious that there is no driver that has poor dependence and poor driving power, so there are no drivers that map to sector. Next, the reducing energy consumption driver is examined to have weak driving power and strong dependence power so it maps to sector II of Fig.8.5. The drivers suppliers’ certification of environmental management system, environmental cooperation with suppliers, green design, certification of ISO 14001, integration of quality environmental management in to the planning and operation process, reusing and recycling materials and packaging, and alliance with customers on environmental issues are found to have strong driving power and strong dependence power so they map to sector III of Fig. 8. 5. These drivers are unstable due to the fact that any change occurring to them will affect other drivers and may themselves be affected through a feedback mechanism (Qureshi et al., 2008). Finally, the cooperation between product designers and suppliers to diminish and eliminate product environmental impacts, government regulation and legislation, and reverse logistics drivers posses strong driving power and weak dependence power, so they map to sector IV of Fig. 8. 5. The above model is based on the Interpretive Structural Modelling methodology, which has its own limitations. For example the model is highly dependent on the judgments of the expert team.
Indian society being predominantly agriculture-based has undergone transformation from traditional agriculture of mere sustenance to realizing the optimum potential for commercialization and export oriented agribusiness. At present, commercial agriculture emphasizes on high productivity and the production is linked with markets. Indian farmers are trying to compete with global market. Many internationally reputed agri-business corporations either alone or through joint ventures have entered Indian agribusiness which in turn has an impact on rural society in the form of employment opportunities, farmers empowerment, absorption of labour force, building economic base among rural folks resulting in better standard of living and supporting the farmers’ welfare schemes run by Government of India. However
this is one side of the coin. The Agribusiness activities have great bearing on not only different areas of agriculture like food processing, horticulture and seed business but also erodes our capacity for sustainable growth for future generations.

Sustainability is regarded as a much broader phenomenon, embracing ethical norms for the survival of living matters, the rights of future generations and the institutions responsible for ensuring that such rights are fully taken into account in policies and actions. Moving towards sustainability will, therefore, oblige a concerted process of change. A change takes place against a context in which much of the structure and approach of the past (unsustainable) practices say little of the models of practices required for a (sustainable) future. Sustainability exists beyond compliance with legal requirements.

However, if we accept that sustainability involves a concern for the social as well as environmental changes that take place in relation to human activities then compliance to legislations which confronts the structure and approach of past (unsustainable) practice to build a new structure required for a (sustainable) future could be an approach if we want to move towards sustainability.

The present study attempts to analyze the role of government legislations in general and judiciary in particular in the process of sustainable development. An attempt has been made to develop hypothesis that role of government legislations/actions of judiciary in case of non-compliance of the environmental legislation could be an important weapon to achieve the goal of sustainability. Though government legislations and intervention of judiciary is not the only way to move towards sustainable development, but it may be an important component of policy framework for the sustainable development, particularly in the era of globalization. To substantiate this hypothesis we have discussed some of the landmark judgments on environment degradation by the Indian Apex Court during the recent past. The study has highlighted that in the face of continuous depletion of natural resources and environmental degradation the Indian judiciary has come forward to check such unsustainable developments.
8.11 Sustainable Green Food SCM

The UK Sustainable Development Commission (SDC; DEFRA 2002) has combined many different stakeholder views to produce an internationally applicable description of ‘sustainable food supply chains’ as those that produce safe, healthy products in response to market demands and ensure that all consumers have access to nutritious food and to accurate information about food products. Sustainability supports the viability and diversity of rural and urban economies and communities. The Sustainable SCM enables viable livelihoods to be made from sustainable land management, both through the market and through payments for public benefits, respects and operates within the biological limits of natural resources (especially soil, water and biodiversity). It also achieves consistently high standards of environmental performance by reducing energy consumption, minimizing resource inputs and using renewable energy wherever possible. Ideally it should ensure a safe and hygienic working environment and high social welfare and training for all employees involved in the food chain, also achieve consistently high standards of animal health and welfare and sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential to meet other needs of the society.

8.12 Food Supply Chain Policies

The key to the successful growth of a modern organization is its ability to coordinate and control the supply chain i.e. its supplier and suppliers of the suppliers. A supply chain is “the design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer. The development and integration of people and technological resources are critical to successful supply chain integration”.

The supply chain requires an understanding at several levels. All factors associated with SCM are highly variable in nature. Traceability, knowledge and influence only trickle along many commodity supply chains, where foods, bought and sold to standard specifications worldwide, are often bulked for low costs and ease of transport and storage. Commodities are usually simple conserved foods that can be stored and traded internationally, often using long-distance sea transport. Prices are
dependent on market mechanism and may be subject to future trading. Since production often exceeds demand for traditional food commodities, prices tend to be low, unstable and declining (FAO 2004).

Making commodity-based foodstuffs (e.g. bread, sugar, rice and beverages) available to consumers from all sectors of society may be having catastrophic impact on the lives of farmers when prices fall dramatically. Several, often contradictory, trends have emerged in the last 20–40 years. The removal of trade barriers, relatively inexpensive transport and technical advances in food conservation have encouraged international standardization and commoditization of conserved food, as producers of, for example, frozen chicken, wine, orange juice, fruits and vegetables, often in developing countries, compete internationally in ‘buyer-driven’ markets (Gereffi 1994). Meanwhile, manufacturers and retailers have been demanding differentiated specific attribute products, rather than traditional commodities from farmers (Martin 20016) in order to enhance their own product quality, brand reputation or range of specialty products. Political and social movements towards more local food supplies have also emerged in some parts of the world.

The study specifically discovers the potential of food supply chain management for sustainable development and the effects of policy implications and judicial decisions in India. The legal implications for the concerned states and non state stakeholders also come under scrutiny. Further to develop understanding of area as it is now and its growing importance due to the diversification of our economy the study highlights the extra decision variables. The Indian agricultural sector can survive in the fiercely competitive global market not only if it adopts the modern means of farming, gets financial support and efficient infrastructure; it needs also the sound policy framework backed by pragmatic legal sanctions and support to the contracting parties.

Following are the major problems encountered by the poor food supply chain polices. It gives ample proof that agriculture food supply chain sector deserves an urgent attention in the form of policy intervention and legal system for further improvement and development.
High value commodities are often perishable in nature and lack of coordinated supply chains can result in significant post-harvest losses and low net returns to the farmers as well as the firms. Horticultural commodities are vulnerable to both production and price risks, and the lack of risk-mitigating measures such as crop insurance or assured markets compound these risks (Gulati 2008). Lack of transparency, tracking and traceability in the supply chain, lesser control of product safety and quality across the supply chain, investment, benefits and risks not shared by all the partners in the chain, poor shelf life of products and lack of farmers awareness and knowledge, lack of storage and other post harvest facilities, absence of innovative technology including cool chain, poor and uneconomic handling, transportation, storage etc. causing post harvest losses in food products are just a few problems faced in sensitive commodities.

All of the above and some other constraints have adverse effect on the sustainable development of agriculture. However it can be mitigated if not totally overcome by encouraging farmer-industry cooperation and by way of adopting appropriate contract farming systems, establishment of agro-industrial cooperation, improvement of cold storage and infrastructural amenities, application of information technology and facilitating the farmers’ empowerment.

8.12.1 Policy Implications

Spurred by drivers such as technological developments, demographic changes, changing consumer preferences, trade liberalization and financial capital mobility, food and agricultural systems are being forced for adaptation and modernization. Increasingly, such systems are becoming organized into tightly aligned chains and networks, where the coordination of production, processing and distribution activities is closely managed in these modernized systems.

The above transformations, and the organizational responses in the SCM, are creating challenges and opportunities not only for producers, processors, wholesalers, retailers and other supply chain actors but also to policy makers. Apprehensions are growing not only in India but in the entire developing countries that the farmers and small medium sized enterprises are vulnerable to exploitation due to the dominant position of the corporate world. But the greatest casualty will on environment. The

The right to clean environment as one of the fundamental rights is taken care under the Articles 14, 15, 21, 21(C), 32. In Indian Council for Enviro-Legal Action vs. Union of India (AIR 1996 SC 1446), the Supreme Court has implemented the right to wholesome environment as part of the Right to Life enshrined in Article 21.

Thus Right to Life envisaged in the Article means something more than survival of animal existence. It includes right of healthy living. The Andhra Pradesh High Court in MP Rambabu vs. Divisional Forest Officer (AIR 1997 SC 3297), has rightly observed- “In terms of Article 21 of the Constitution, a person has a right to a decent life, good environment and maintenance of ecology.”

### 8.12.2 Legal Framework

The present study has been carried out to analyze the role of government legislations in general and judiciary in particular in the process of sustainable development. An attempt has been made to develop hypothesis that the role of government legislations/actions of judiciary in case of non-compliance of the environmental legislation could be an important weapon to achieve the goal of sustainability. Though government legislations and intervention of judiciary is not the only way to move towards sustainable development, but it may be an important component of policy framework for the sustainable development, particularly in the era of globalization. To substantiate this hypothesis some of the landmark judgments have been discussed on environment degradation by the Indian Apex Court during the recent past.

### 8.12.3 Role of Judiciary

The Judiciary has come up with the “judge-driven implementation” of environmental administration in India. The India Judiciary has isolated specific
environmental law principles upon interpretation of Indian Statutes and Constitution. The Public Interest Litigations (PILs), which is the result of the relaxation of the locus standi rules by the judiciary, are the characteristic feature of the environmental litigation in India.

Disputes relating to environment are treated as cases related to violation of fundamental rights, rather than claims under law of torts. It has been held that the Supreme Court and the High Courts can be directly approached under Article 32 and Article 226 of the Constitution of India in case of matters relating to environment. The orders of the Supreme Court and the High Courts cover a wide range of areas including air, water, solid waste, hazardous wastes, forests, mining activities, and architectural treasures. Policy Statements of the government, which otherwise are not enforceable in courts, have been used as aids by the Judges for interpreting environmental statutes and for spelling out obligations of the Government.

8.13 Doctrines Evolved by Courts

The doctrines are the cardinal principles of justice and equity on which modern judiciary functions. The Indian court has found it very difficult to keep pace with the modern developments in the area of science and technology. The Indian concept of doctrine which is applied to equality or any concept of law has been heavily influenced with the UK and US legal system of law for example the idea of equality and its classification as propounded in Article 14 of the Indian Constitution combines the British doctrine of rule of law as well as the 'equal protection of law’ clause in the 14th amendment of the US constitution. Not only the doctrines, but their interpretations have also been approved by the Indian courts to give the true content to the rulings.

8.13.1 Public Trust Doctrine

M. C. Mehta v. Kamal Nath, (1996) 1 SCC 38: In a case where an attempt was made to divert flow of a river for augmenting facilities at a motel, it was held that State and its instrumentalities as trustees have a duty to protect and preserve natural resources. MI Builders Pvt. Ltd. v. RadheyShyamSahu, AIR 1996 SC 2468: a city
development authority was asked to dismantle an underground market built beneath a garden of historical importance.

### 8.13.2 Precautionary Principle

Vellore Citizens Welfare Forum v. UOI, AIR 1996 SC 2718: The principle was adopted to check pollution of underground water caused by tanneries in Tamil Nadu.

Narmada Bachao Andolan v. UOI, AIR 2000 SC 375: The Supreme Court held that the precautionary principle could not be applied to the decision for building a dam whose gains and losses were predictable and certain.

### 8.13.3 Polluter Pays Principle

The object of this principle is to make the polluter liable for the compensation to the victims as also for the cost of restoring of environmental degradation.

Vellore Citizens Welfare Forum v. UOI, AIR 1996 SC 2718: It was held that the precautionary principle and the polluter pays principle are part of environmental law of the country.

### 8.13.4 Absolute Liability Principle

M. C. Mehta v. UOI, (AIR 1987 SC 1086) Oleum Gas Leak Case: The principle was adopted to compensate victims of pollution caused by inherently dangerous industries.

Narmada Bachao Andolan v. UOI, (AIR 2000 SC 375): The Supreme Court held that the precautionary principle could not be applied to the decision for building a dam whose gains and losses were predictable and certain. (Hima Kholi, 2010)

Agribusiness is encompassing every facet of our agrarian economy and our legal system cannot afford to let loose any chain of its activity. In the absence of sound legal framework it will be very difficult to develop the sector on modern pattern. The soundness of legal framework will govern the FDI, cash liquidity, job opportunity and so on. Following are some of the broad requirements which are
Legal Policies And Drivers For Environment Friendly Food SCM

indispensable for the sound growth of India agri-business. The legal environment, to be effective in totality, requires the following:

- A legal & regulatory framework that defines rules & determines rights with respect to resources and business operations.
- Strengthen public sector cooperation with the private sector.
- Commodity, regional industrial & professional based, associations including producers' associations & cooperatives.
- Trade-offs between pace & nature of agro-industrial development and poverty; and Institutional mandates for influencing, regulating & supporting PS investment in Agri-business Regulatory Frameworks.
- Covers rules, rights & obligations for resources, assets & business operations.
- Fixing the level of protection of intellectual property rights.
- Legal or procedural preferences favoring government owned/assisted enterprises.
- Employment/contractual conditions & distribution of benefits from agri-business development.
- Effective Policy Reform & Institutional strengthening requires communication/cooperation between public and private sector.
- Public investment support of private sector innovation/product development mobilizes assets.
- Sound and Stable Legal Policies attracts foreign investments & access to technologies.

8.14 Supply Chain Action as Part of Corporate Social Responsibility

Casimir&Dutilh (2003) argue that mainstream food businesses should not mix ideas of 'markets' and 'corporate responsibility' by trying to communicate sustainability messages to consumers, because consumers make purchasing decisions in the 'masculine' (outgoing) mode rather than demonstrating 'feminine' concern for continuity and future generations when they behave as citizens. Brand-based
communication and advertisements that cross the consumer-citizen divide may even create public outcry, as for example, in The Netherlands when Heineken replaced ‘Biertje?’ (‘Want a small beer?’) with ‘Bobje?’ (‘take a friend; do not drink and drive’). A message to responsible citizens) in the brand logo style on advertising hoardings. Fox & Vorley (2004) also consider that sustainability is part of what it means to be a ‘responsible retailer...responding to Civil Society stakeholders acting on behalf of citizens’, and that businesses should not conflict the notions of ‘customer’ and ‘stakeholder’ accountability or ‘customer value’ and ‘public good’. The emphasis of many governmental and civil society organizations is now to demand that manufacturers and retailers act as responsible corporate citizens and use a mixture of science, business rationale, politics and emotion to assess the right course of action (Knight 2002a) rather than just making appropriate products available and encouraging consumers to ‘buy green’. For those food businesses dependent on hedonistic products such as alcohol (e.g. Scottish & Newcastle 2004) or sweets (e.g. Cadbury-Schweppes 2004) and other products where dietary advice is to ‘eat less’ (such as manufactured food is high in fat, salt and sugar; Nestle (2002). Department of Health (2005), finding the marketing and lobbying strategies that maintain corporate credibility and reputation, while also improving profitability and market share, is a key challenge. Many of the options for food businesses and potential routes to more sustainable food supply chains discussed can create benefits both for the businesses involved and for others in the supply chain from farm to farmers.

Although creating niche markets for more sustainable locally produced produce, conserved foods and some manufactured foods can result in significant social, environmental and economic benefits for those involved; greater overall gains could undoubtedly be made by improving the sustainability of mainstream agriculture and international supply chains. Multi-stakeholder initiatives, where food businesses work together with farmers, academics, innovators, governments and NGOs, are important for raising the baseline for near-commodity and commodity food supply chains, including those important for manufactured foods.

8.15 Conclusions
Indian society being predominantly agriculture-based has undergone transformation from traditional agriculture of mere sustenance to realizing the optimum potential for commercialization and export oriented agribusiness. At present, commercial agriculture emphasizes on high productivity and the production is linked with markets. Indian farmers are trying to compete with global market. Many internationally reputed agri-business corporations either alone or through joint ventures have entered Indian agribusiness which in turn has an impact on rural society in the form of employment opportunities, farmers empowerment, absorption of labour force, building economic base among rural folks resulting in better standard of living and supporting the farmers’ welfare schemes run by Government of India. However this is one side of the coin. The Agribusiness activities have great bearing on not only different areas of agriculture like food processing, horticulture and seed business but also erodes our capacity for sustainable growth for future generations.

Sustainability is regarded as a much broader phenomenon, embracing ethical norms for the survival of living matters, the rights of future generations and the institutions responsible for ensuring that such rights are fully taken into account in policies and actions. Moving towards sustainability will, therefore, oblige a concerted process of change.

However, if we accept that sustainability involves a concern for the social as well as environmental changes that take place in relation to human activities then compliance to legislations which confronts the structure and approach of past (unsustainable) practice to build a new structure required for a (sustainable) future could be an approach if we want to move towards sustainability.

The present study has analyzed the role of government legislations in general and judiciary in particular in the process of sustainable development. The role of government legislations/ actions of judiciary in case of non-compliance of the environmental legislation could be an important weapon to achieve the goal of sustainability. Though government legislations and intervention of judiciary is not the only way to move towards sustainable development, but it may be an important component of policy framework for the sustainable development, particularly in the era of globalization. To substantiate the above hypothesis the present study have has
discussed some of the landmark judgments on environment degradation by the Indian Apex Court during the recent past. Further the study has highlighted that in the face of continuous depletion of natural resources and environmental degradation the Indian judiciary has come forward to check such unsustainable developments.

References

1) AIR 1997 SC 3297
2) AIR 1996 SC 1446


