

Chapter - 1

An introduction to Green Supply Chain Management

Supply Chains are focused towards increasing productivity and efficiency of industrial activities to improve the economic performance. Traditionally very less attention was paid on studying the environmental footprints of Supply Chains. But this changed in early 1990's as it became clear that human activities were imparting huge damage to Earth's ecology and it became clear to industries that they had to find a way to make their activities sustainable.

This is where Green Supply Chain Management comes into picture.

Green Supply Chain can be defined as:

“A green supply chains aims at confining the wastes within the industrial system in order to conserve energy and prevent the dissipation of dangerous materials into the environment.” (Torres et al. 2004).

From the above definitions we can conclude that the Green Supply Chain is the integration and combination of all the aspects of environment sustainability in all the aspects of Supply Chain. The term was first coined in early 1990's but has gained a lot of traction in modern era as issues related to sustainability and environment have kept on increasing.

Green Supply Chain are also gaining importance due to factors like increasing environmental activism by consumers and because of stringent environmental laws being brought by Governments of many countries facing environmental degradation.

GSCM can be implemented in organizations by bringing about environmental friendly changes in working of various departments of organization related to its operations.

Chapter - 2

Literature Review

The Literature review takes into consideration the role and implementation of GSCM in the operational activities of Supply chain from upstream till downstream portion along with major drivers and review of several studies in India's context. The study is aimed towards preparing a field towards understanding the drivers in context of Steel industry in India

2.1 What is GSCM

Dheeraj et al. (2012) states following definition of GSCM

GSCM = Green purchasing + Green manufacturing management + Green Distribution + Green Marketing + Reverse logistics

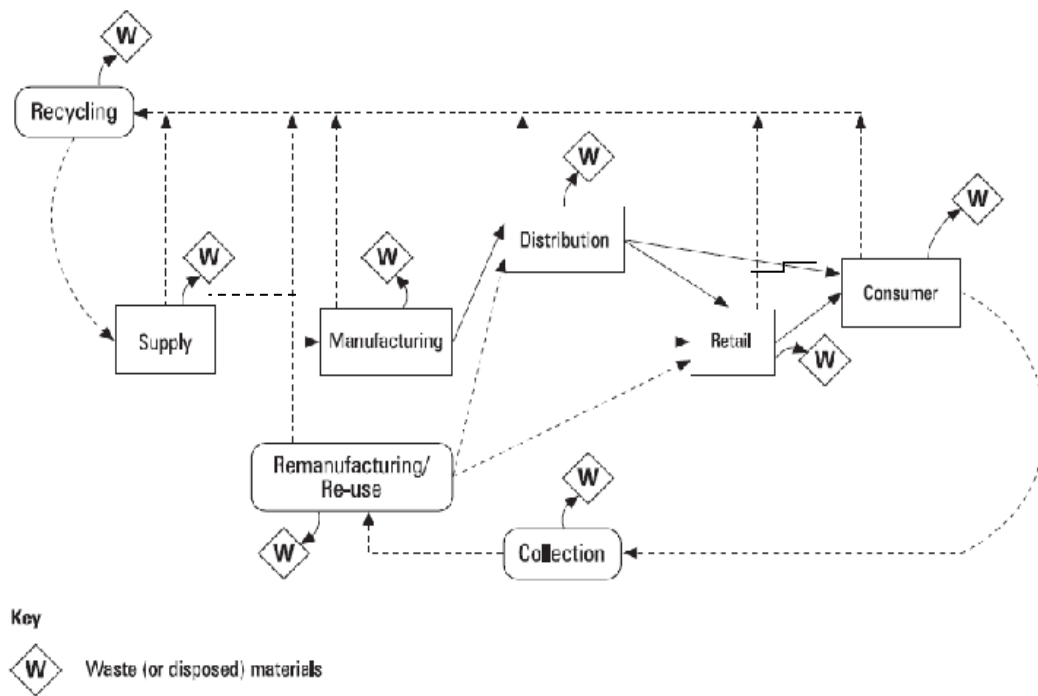
Sarkis (2012) states that several processes that are closely related to Green Supply chain management. They are Environment Management System (EMS), Life cycle analysis (LCA), Industrial ecology and Symbiosis, Product stewardship and extended producer responsibility and Design for the environment (DFE) or Eco design

Cost benefits are accrued from Green Supply Chain by finding the cost cutting opportunities in entire value chain by reducing wastage, reusing of materials.

The objective of integrating Environment factors with Supply chain is to improve both– Economic performance and environmental Performance.

The Green Supply chain can be implemented by organizations by integrating environmental aspects in upstream, organizational and downstream portions of the Supply Chain. The integration of Environment aspects in Supply Chain

In the extended Supply Chain, the wastage and promoting the recycling and reuse of materials in all the stages of Value Chain of product is considered.



Extended Supply chain (Beamon 1999)

To get full advantage of the benefits of implementing Green Supply Chain, the organizations should incorporate the GSCM facets in their Strategic Planning (Fortes 2009).

2.2 Drivers of Green Supply Chain

Organizations have realized the greater benefit of the green technology adoption in business operation, which also affects suppliers and customers (Seaman et al. 2012). Customers have more options to buy products from numerous firms than before and this has increased their hold on firms' Supply chains. Increasingly Customers are becoming more environment conscious and are demanding environmentally superior products. Therefore the organizations have to listen to such demands to gain the customer loyalty.

Lee (2008) suggests practices enabled by intra- and/or inter-organizational factors such as top management commitment and organizational capabilities including supply chain management capabilities, cross-functional teams, and closer cooperation with suppliers as the organizational drivers for GSCM.

Another reason for adoption of sustainable aspects in Supply Chain is due to environmental rules and regulations brought about by Governments.

The rapid evolution of Information Technology (IT) is another such reason which has become a major influencer for Green Practices in Supply Chains. Vikal et al. (2012) state the following enhancements that IT can bring to the Supply Chain Processes the improve the analysis of Product Life Cycle stages in terms of tracking and tracing the returns products linking with previous sales, information integration between Backward and Forward ends of Supply chain to reduce uncertainties and helps in better control over Suppliers, reduces cycle time.

2.3 Where to implement Green Supply Chain

As discussed a Supply chain has 3 stages (Upstream, Downstream and (Organizational). In these stages the opportunity en corporate the environmental factors is to be accomplished. Upstream factors include such inbound logistics (materials management) activities as green purchasing and vendor management.

Downstream factors include green outbound logistics (physical distribution) with activities such as distribution and marketing components of a product or organization's Supply chain (Kumar et al. 2012)

2.3.1 Green SC in Upstream Function

Upstream Supply chain consists of functions like Selection of Suppliers, Purchasing, Inbound logistics. The function of upstream portion is to bring the material and resources inside the organization for processing.

2.3.1.1 Green Purchasing

Purchasing is a function that involves procuring or arranging the raw material, products or equipment needed by an organization to manufacture the goods. Purchasing consists of duties such as vendor selection, material selection, outsourcing, negotiation, buying, delivery scheduling, inventory and materials management, and to some extent, involvement in design.

There are several measures that have been stated to enable organizations formulate strategies for Green Purchase. First and foremost is ensuring Suppliers are certified in terms of requirements like ISO 14001 Certification and additional customer specific and firm specific requirements. Further Murray, 2001 suggested that the Purchase Strategy should confirm with following keep track of several factors like legal and environmental compliance, maximum supplier utilisation, information system development, procurement according to a set green policy and achieving the better skill development of procurement personnel.

Another strategy that can enable Green Procurement was given by Min et al., (2005). He suggested that Procurement should be geared towards reducing source requirement and eliminating wastage. While reduction in source requirement focuses towards recycled and reusable products, the waste reduction focuses towards biodegradable and non toxic material.

It is very important to note that the use of environmental management standards is not necessarily going to significantly improve supplier environmental performance. This depends on the standard being applied. ISO 14001 does not require improvements in environmental performance, whereas the EMAS standard does. Thus buyers who choose the "low cost" strategy of simply requiring suppliers to meet some external standard for behaviour or management need to consider which standard they want to impose.

Rao and Holt (2005) suggest that Green purchasing can address issues such as reduction of waste produced, material substitution through environmental sourcing of raw materials and waste minimization of hazardous materials.

2.3.2 Greening the Internal Supply Chain

The internal Supply chain of an organization concerns with the Production/Manufacturing of goods and the processes supporting it. This phase of Supply Chain is very important because it takes into account how actually the organization is operating in terms of the environmental factors. Several options that can be explored in improving environmental aspects of

Internal Supply Chain are TQM, better Waste Management, Internal Product Recycling, Energy requirement and Life Cycle Analysis.

Total quality Management (TQM) is a methodology through which organizations strive for betterment of product quality through continuous improvement in processes. TQM methodology enables the usage of various qualitative and quantitative tools like 6 Sigma, Statistical Quality Control, JIT and Lean Production to help enable the reduction of wastage and improve process efficiency.

Processes require energy to happen and Energy requires fuel in some form. The consumption of fuel leads to pollution and results in monetary “wastage”. Therefore it is essential to keep track of energy requirements of the process to reduce the fuel wastage. Energy Requirement analysis can be done through Pinch Analysis and Industrial Energy Analysis.

Toke et al. (2010) states that Closed-loop manufacturing is one of the internal measures that can be used to improve the environmental performance of the internal supply chain.

2.3.3 Green Supply Chain in Outbound function

Outbound function of Supply chain consists of activities of distribution and supporting processes. Whereas, purchasing and in-bound logistics focuses on managing the vendor-organization relationships of the supply chain, the distribution and out-bound logistics function is meant to address the organization-customer relationship issues (Sarkis 1999).

2.3.3.1 Green Marketing

Green marketing can be viewed as adherence to ethical and social responsibility requirements in marketing (Dheeraj et al., 2012). It points at commitment towards providing to customers environmentally friendly products and conducting marketing campaigns to stress towards organization’s commitment towards Green practices. Prakash (2002) states that organizations may be forced into green their processes due to market factors (consumers, business partners) on non market factors (regulatory

factors, citizen groups and other stakeholders). If the firm decides to green its processes, it may lead to higher societal benefits in form of reduced environmental footprints of the organization but it comes at a cost which has in turn to be transferred to the consumer. Marketing literature on greening products builds on both the societal and social Marketing (Prakash 2002). Whereas Societal Marketing states that the organizations should understand the need of their target markets and deliver their products so that they increase “consumer’s and society’s wellbeing”. The Social Marketing focuses on designing and implementing programs that *increase the acceptability of a social idea, cause, or practice* in (a) target group(s) (Kotler, 1994).

In doing so, the organizations have to decide what kind of customers they are serving. Whether they are:

1) extremely environmental conscious, or 2) moderately environmental conscious, or 3) slightly environmental conscious, or 4) not environmental conscious. Further in this line Ginsberg and Bloom (2004) suggests that the organizations should take into consideration the following factors before devising its Green Marketing Strategy:

How substantial is Green Consumer Base of the company and its implications?

How much differentiation can organization achieve through its Green strategy?

After analysing these parameters, the organizations should achieve one of the following green Strategy:

Lean Green - Use Green Marketing in crisis or response to competitor’s action. The green efforts are sincere and sustained but the efforts to promote them are temporary.

Defensive Green - Use Green Marketing in crisis or response to competitor’s action. The green efforts are sincere and sustained but the efforts to promote them are temporary.

Shaded Green - Organizations that have advanced technical and financial capability to incorporate sustainable aspects in their processes to develop environment friendly products but choose not to market these characteristics but some other more tangible benefit.

Extreme Green - Organizations that have fully incorporated environmental aspects in their strategic goals. The environmental responsibility undertaken by such organizations reflect in their processes from manufacturing till marketing.

(Geensberg and Bloom. Choosing the right Green Marketing Strategy, 2004)

2.3.3.2 Green Supply Chain and Distribution/ Outbound Logistics

The logistics and distribution activities related to Supply Chains are major contributors of Green House emissions. These activities have the role of moving goods from manufacturers to consumers and in present scenario, these are changing from standalone services like transportation and warehousing to increasingly integrated set of services. Because of Outsourcing, Logistics /3PL service providers are increasingly providing these services and the roles that they are playing is becoming more varied. The logistics service industry is undergoing a major transition as a result of a number of changes affecting logistics and SCM such as economic, social, technological and environmental sustainability (Evangelista et al. 2010). For example, the practice of postponement of product finishing to downstream stages of supply chains means that 3PLs have the opportunity to offer services such as final assembly and customisation of products (van Hoek, 2000).

In order to optimize the distribution, the organizations have to take various trade-off decisions. Typical examples of trade off decisions include options such as direct shipping or hub-and-spoke, central warehouse or distributed network, intermodal or single mode, and third party services or private fleet.

The effectiveness of Logistics can be improved by several ways. Firstly the improvement can be brought about by overhauling Logistics organization. In this way changes can be brought about by pooling common resources (transport fleet, warehouses etc.) and exploiting synergies between organizations, regulating the movement of empty vehicles and removing unnecessary infrastructure (Singh et al 2009). Another way to improve environmental performance of Logistics is shift towards Transportation that is more environmentally sustainable. These changes are also brought about by Government regulations. The general consensus is that the road transportation produces maximum pollution and therefore alternative methods of transportation like shipping and railways should be considered.

2.3.3.3 Reverse Logistics

Reverse Logistics is a specialized segment of logistics focusing on the movement and management of products and resources after the sale and after delivery to the customer. Includes product returns for repair and/or credit (Supply Chain Management: Terms and Glossary, Feb 2010).

In other words the goal of reverse Logistics is to move a product opposite of the distribution system.

In terms of Green Supply chain, with help of Reverse Logistics, the unusable material is collected after the end of its life cycle and transported to recyclers where this waste is reconverted into fresh materials and again injected to the Supply chain. This helps to conserve the resources and minimise wastage.

RL issues are mainly regulatory-driven in Europe; profit-driven in North America and in incipient stage in other parts of the world, including India, where both consumer awareness and globalization are likely to lead to greater economic, consumer and regulatory pressures in the coming future (Srivastava et al. 2006).

According to Brito et al. (2003) Reverse Logistics is different from waste management as the latter mainly refers to collecting and processing waste (products for which there is no new use) efficiently and effectively whereas

Reverse Logistics concentrates on those streams where there is some value to be recovered and the outcome enters a (new) supply chain. Reverse Logistics is also used in collecting dysfunctional products from consumers and taking it back to producer for repair. This is very important in Technological product intensive industries like Automobile and Electronics.

One common reverse logistics organizational structure involves Collectors, Sorters, Processors and Remanufacturers (Bloomberg et al., Logistics, 2002). Packaging at upstream and downstream of Supply chains is another area that generates a lot of waste and from around 30.3 percent of municipal Waste (Min 1997). Reverse logistics also enables to remove this waste for reuse and promote sustainable processes in Supply Chain.

In the figure shown below the lower portion of comprises of reverse logistics and it is clearly obvious how it is related to entire Supply Chain.

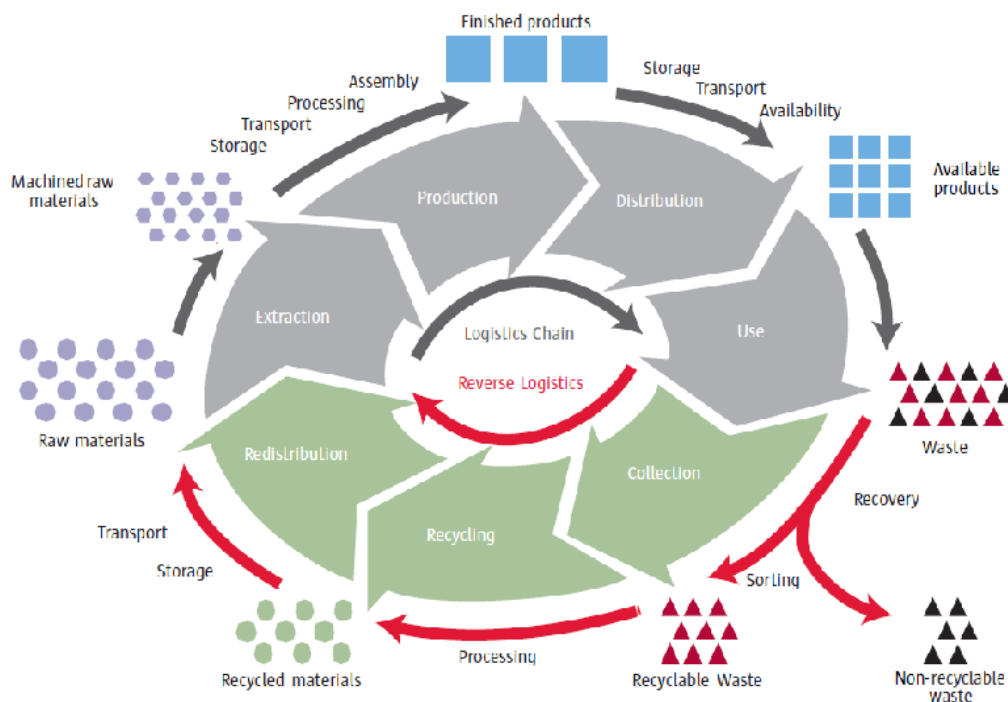


Fig 2- Reverse Logistics

Source: How Green is Your Supply Chain (Bearing Point 2008)

2.4 Barriers to Green Supply Chain

There are several categories of barriers to Green Supply Chains and these include legislation conflicts, inadequate or misaligned stakeholder incentives, lack of environmental norms and tools, lack of resources, and the high costs of implementation and technology.

Differing legislation can be either a driver or a barrier, depending on how a firm optimizes regulatory trade-offs. Operations spanning multiple countries face varying environmental regulations; therefore, firms are forced to decide between a standardized or differentiated environmental supply chain strategy (Mollenkopf et al., 2009).

Rothenberg et al. (2001) states that the common belief that environmental practices do not pay and the perception that green initiatives are time consuming and expensive.

Of these factors the issue with high cost is very important. Cost can be high in Green purchasing mainly due to investment in Cleaner Technology.

2.5 Benefits of GSCM

For organizations involved in businesses, the investments are fruitful only if the sum of benefits obtained is more than the sum of expenses accrued in investment. These benefits can be tangible or intangible and are well documented

Many examples have emerged from Green Supply Chain practices regarding the economic benefits of the adoption of the green practices. Commonwealth Edison reported financial benefits of \$50 million annually from managing material and equipment with a life-cycle management approach. Pepsi saved \$44 million by switching from corrugated to reusable plastic shipping containers (Swami and Shah 2011). Lakshmi et al. (2012) showed with help of case studies the improvement in Productivity, by using sustainable solutions in Supply Chain.

The benefits are obtained from facts like Cost Savings by using a less expensive material or through proper Management of Product Life Cycle. The Environment Protection Agency (EPA) of USA gave following Categories of cost/Benefits of Green Supply chain:

Benefit Category	Meaning
Conventional	Material, Labour and other expenses and revenues
Potentially Hidden	Benefits to the firm that are not typically traced to the responsible products or processes,
Contingent	Benefit that depends on the occurrence of a future event
Image/Relationship	Benefits related to the subjective perceptions of a firm's stakeholders
External	Benefits of a company's impacts upon the environment and society that do not directly accrue to the business

(Adapted from: The Lean and Green Supply Chain: A Practical Guide for Materials Managers and Supply Chain Managers to Reduce Costs and Improve Environmental Performance, EPA, Year 2000)

Lee et al. (2012) in a research to analyse organizational performance relationship with GSC in SMEs in Electronics industry suggested that the SMEs perceive that implementation of GSCM practices help improve their operational relationship with their much larger buyers. Furthermore the analysis showed that Business performance could be enhanced by improving operational efficiency but the same study concluded that employee satisfaction could be eroded at later stages due to higher pressure coming from Buyer demand.

A study by Rao et al. (2005) to find relationship between Green Supply Chain and firm competitiveness in East Asia demonstrated "that greening the inbound function, as well as greening production, significantly lead to greening outbound, as well as to competitiveness and economic performance of the firm."

2.6 Green Supply Chain: From Indian Perspective

India is the seventh largest country in the world and has 2nd largest population (Over 1.21 Billion in 2011) after China. It is also one of the most industrialised regions in the world after China, USA and European Union. Although the GDP was \$1.8 Trillion in 2012, the country population is mostly poor in comparison to Global standards. Although the country is rich in minerals like Iron Ore but it short of good quality Coal and Petroleum and by virtue of having a rapidly growing population, it needs natural resources to continue the economic growth. In this regard, the sustainability issues of environment gather an even important context in case of Indian Industry.

India Ranks at 125 in 2012 Environmental Performance Index of UN, which is a low rank.

Although there is a great need of better environment practices in Indian Supply chains, there seems to be lesser research of Indian context in comparison to foreign research. Although there are sufficient studies on the matter like Analysis of factors driving Green Supply chain and the factors hindering it. This is mostly done Industry wise.

A study by Toke et al. (2012) used “Cronbach alpha“ and Analytical Hierarchy Process (AHP) to indicate that Top management Commitment and Societal Concern for Environment are the most important factors whereas Competiveness and Reverse Logistics practices are least important factors driving the Green Supply chain performance in context of Indian Industry.

Verma et al. (2012) states that given increasingly high regulatory pressures and governmental scrutiny, pharmaceuticals supply chain companies have also started adoption consideration of hopeful GSCM practices, while their external GSCM (Green Purchasing and Customer Cooperation) implementation is still relatively weak.

Batheja et al. (2011) states that Most of the Indian manufacturing small and medium enterprises like cutting & hand tools & auto parts & spare parts & industrial equipments and machinery manufacturer & various other products

manufacturer are seem to be quite advanced in the implementation of green warehousing and distribution initiatives, most likely because these initiatives often also mean added efficiency. They further state that the areas that receive most investment appears to be area directly affecting operational performance like Inventory reduction and product handling.

Kumar et al. (2012) in a study on adoption of Green supply chain Practices state that for the management point of view they should give more Strength on stakeholdersll, Marketing and Communication, Vendor Management, Internal Environmental Management Performance —for improving green supply chain factorsll.

Another study by Luthra et al. (2011) on Barriers to Green Supply chain Practices in Indian Automobile Industry using Interpretive Structural Modelling (ISM) Technique concluded following findings:

Drivers Variables	Lack of Government Support Systems; Lack of Top Management Commitment and Lack of IT Implementation have been identified as the driver variables.
Dependent Variables	Market Competition and Uncertainty; Lack of Implementing Green Practices; Cost Implications; Unawareness of Customers; Supplier Reluctance to Change
Linkage Variables	Resistance to Technology Advancement Adoption; Lack of Organization Encouragement ; Poor Quality of Human Resources have been identified as the linkage variables
Autonomous	None

(Adapted from Luthra et al. 2011)

A similar study using ISM Technique by Muduli et al. (2012) on Barriers in Healthcare Waste suggested that Lack of Top Management Commitment and Lack of Government Policy is most important factor towards Lack of Proper waste disposal strategy in Healthcare Industry.

Chapter – 3

3.1 Case Study Development

The iron and steel industry involves a myriad of operations which generate vast volumes of air emissions, effluents and solid wastes. Environmentally suitable means of collection and disposal of this hazardous waste is a priority but unfortunately this area has not been addressed properly. Therefore there is a need to study the GSCM aspects with respect to Steel industry in India.

3.2 Research Objective

The objective of this research is to find out among the drivers of GSCM, the ones that are considered by employees in Steel Industry to be important.

3.3 Research Methodology

Various previous researches were analysed to come out with practices that drive GSCM. These practices covered top management commitment, societal concern for protection of natural environment, regulations, supplier involvement, customer satisfaction, EMS, employee involvement, green product development, green procurement practices, availability of clean technology, green disposal, green transportation, reduce/recycle, lean manufacturing practices, economic interests, and competitiveness.

Based on these findings a questionnaire containing statements was developed and forwarded to employees in various steel companies. The respondents were mostly employees ranging from supervisory to middle management roles. The responses were measured according to a Likert's scale ranging from Strongly Agree to Strongly Disagree. With help of this scale the disposition of employees towards these factors was checked.

The scale was given the following Score:

Strongly Agree = 4, Agree = 2, Neutral = 0, Disagree = -2 and Strongly Disagree = -4. For all the factors their cumulative score was calculated.

Based on these scales, the total score obtained by the GSCM driver was computed. From the total score, the Mean Score was computed by dividing the total score by Number of respondents. Mean Score helps to compute the relative importance assigned to the driver.

Similarly Standard deviation of score was computed that helps in finding the consistency of the score computed.

Chapter - 4

Results and Discussion

The Questionnaire was floated to 43 respondents, of which 21 responses were received giving a response rate 44.7%. Following are the observations

4.1 Top Management Commitment

Statement 1 – Top Management should assume responsibility for GSCM Initiatives.

Total Score= 72

Mean= 3.43

Standard Deviation=0.93

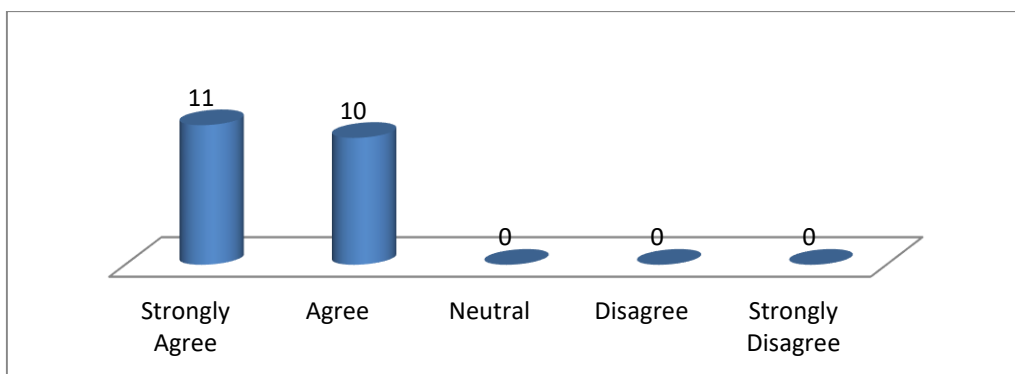


Fig 4.1 - Top Management should assume responsibility for GSCM Initiatives

Statement 2 - Top management should Allocate resources for GSCM initiatives

Total Score= 72

Mean= 3.43

Standard Deviation=0.93

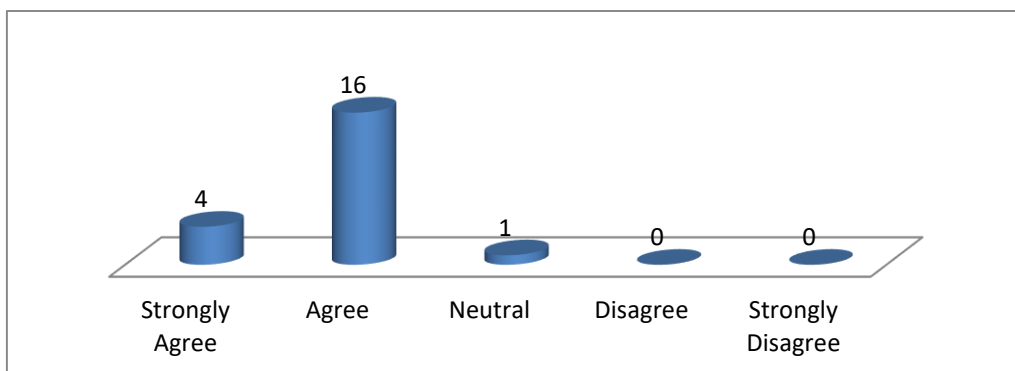


Fig 4.2 - Top management should allocate resources for GSCM initiatives

Statement 3 – Top Management should change organizational objectives for Environmental Concerns

Total Score= 62

Mean= 2.95

Standard Deviation=1.20

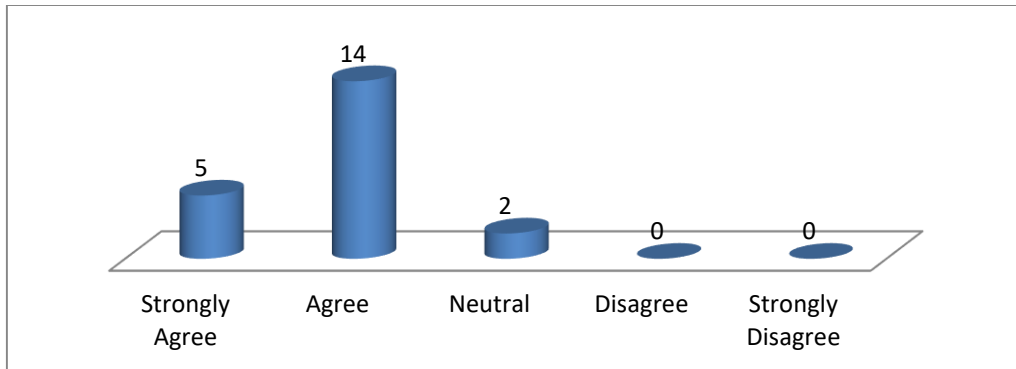


Fig 4.3 - Top Management should change organizational objectives for Environmental Concerns

Observation

Of the responses received maximum would agree strongly with the statement that Top management has important role to play in GSCM practices. This is due to the reason that Top Management ultimately sets the direction for organizations to follow.

4.2 Procurement and Supplier Activities

Statement 1 - Suppliers should be ISO 14000 Certified

Total Score= 64

Mean= 3.05

Standard Deviation=1.02

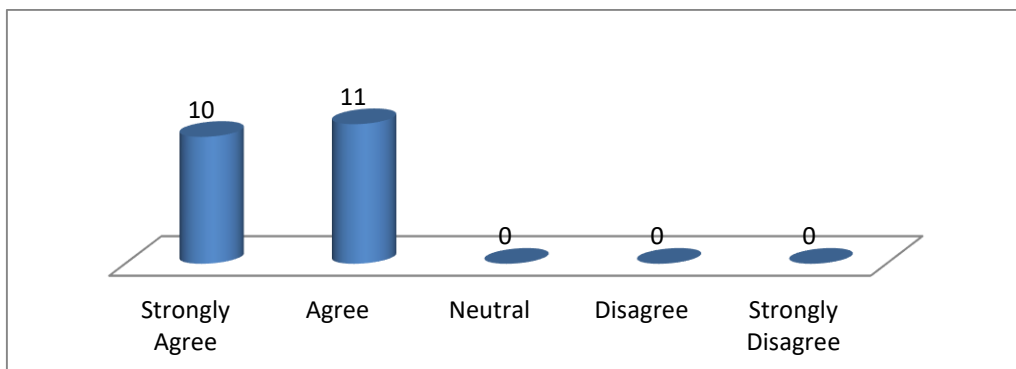


Fig 4.4 - Procurement and Supplier Activities

Statement 2 - Organization should be willing to invest in improving Supplier Environmental performance

Total Score=48

Mean=2.29

Standard Deviation= 1.20

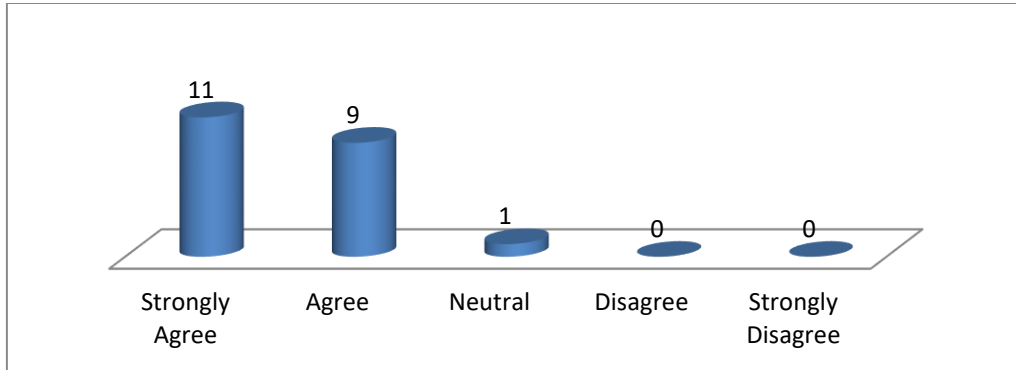


Fig 4.5 - Organization should be willing to invest in improving Supplier Environmental performance

Statement 3 - Procurement activities are important to analyse environmental performance

Total Score= 48

Mean= 2.29

Standard Deviation=1.15

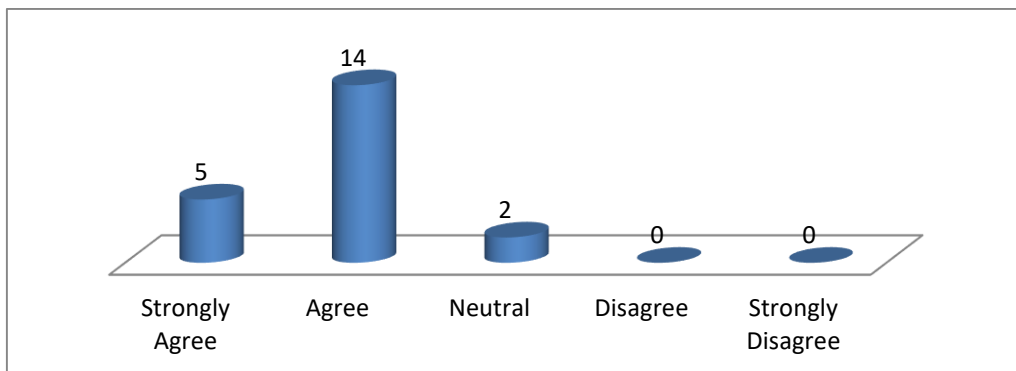


Fig 4.6 - Procurement activities are important to analyse environmental performance

Statement 4 - Green Procurement helps reduce costs

Total Score= 32

Mean= 1.52

Standard Deviation= 2.09

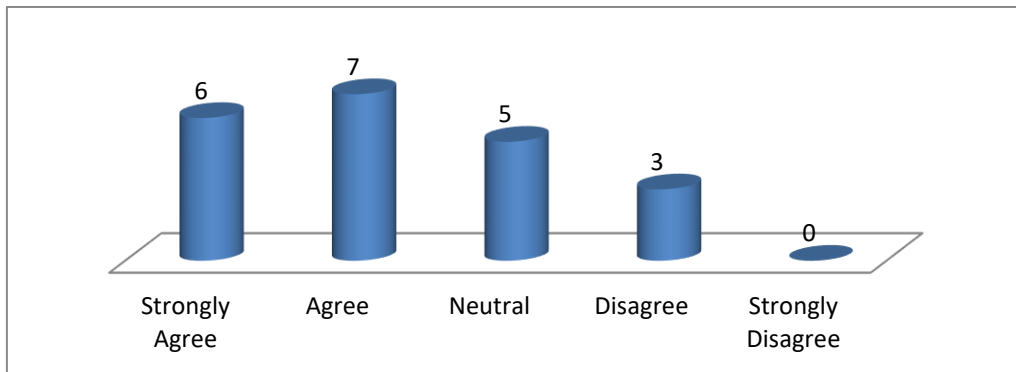


Fig 4.7 - Green Procurement helps reduce costs

Observation

On the Procurement and Supplier front, it is observed that the respondents agree towards having ISO certified suppliers. This indicates towards very positive disposition ISO 14000 that these standards help smoothen the operations. Furthermore the employees are not sure of any cost savings if the the material procured is eco-friendly.

4.3 Government Regulations

Statement 1- Regulations are important aspect to implement steps related to environment sustainability in Supply Chain

Total Score=60

Mean=2.86

Standard Deviation= 1.01

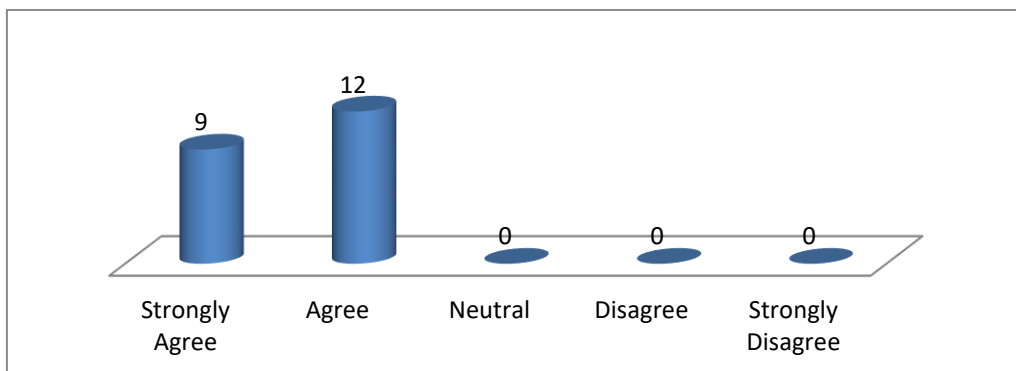


Fig 4.8 - Regulations are important aspect to implement steps related to environment sustainability in Supply Chain

Statement 2- Organizations should proactively strive to implement latest environment regulations

Total Score= 62

Mean= 2.95

Standard Deviation=1.02

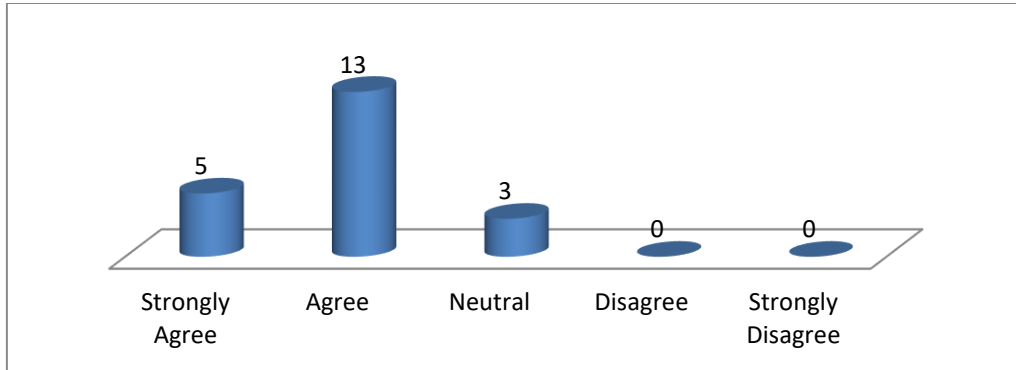


Fig 4.9 - Organizations should proactively strive to implement latest environment regulations

Statement 3- Organizations will lose competitive advantage if it fails to implement environmental regulations properly

Total Score= 54

Mean= 2.57

Standard Deviation= 1.57

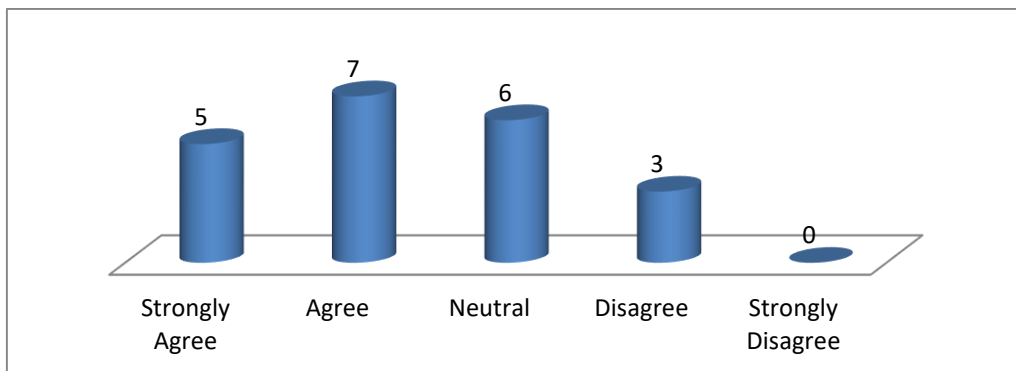


Fig 4.10 - Organizations will lose competitive advantage if it fails to implement environmental regulations properly

Observation

The GSCM practices seem to be highly influenced by the environment rules and regulations set up by Government. A number of respondents also believe that organizations will lose business if these regulations are not properly implemented.

4.4 Societal Concern for environment

Statement 1- Industry must invest on alternative solutions to minimise effects of waste disposals

Total Score= 56

Mean= 2.67

Standard Deviation= 1.15

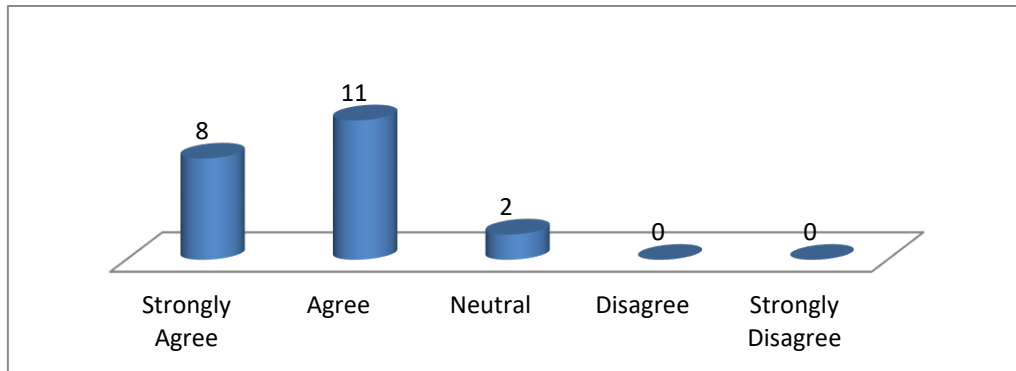


Fig 4.11 - Industry must invest on alternative solutions to minimise effects of waste disposals

Statement 2- Pollution prevention source is an important measure of performance.

Total Score=46

Mean=2.19

Standard Deviation= 1.78

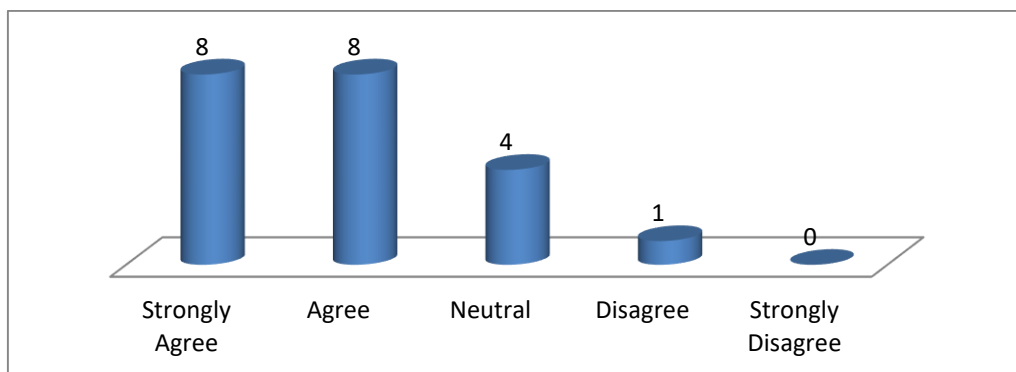


Fig 4.12 - Pollution prevention source is an important measure of performance.

Statement 3- Industry should focus on end of life treatment of material and products like Reuse/Refurbish etc.

Total Score=40

Mean=1.90

Standard Deviation=1.61

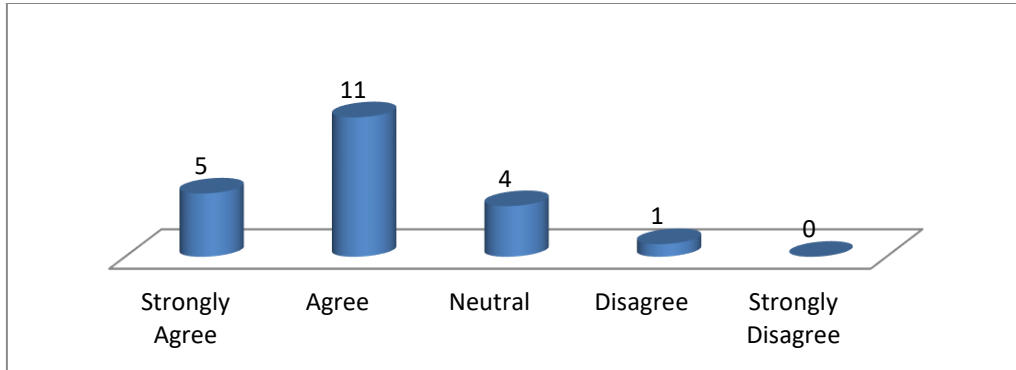


Fig 4.13 - Industry should focus on end of life treatment of material and products like Reuse/Refurbish etc.

Observation

These observation points towards the fact that most of industry employees agree that industry should invest in finding alternative resources and pollution prevention. But the view towards using recycled products are not as high.

4.5 Competiveness

Statement 1- Green practices improves profitability of organizations.

Total Score=48

Mean=2.29

Standard Deviation= 1.82

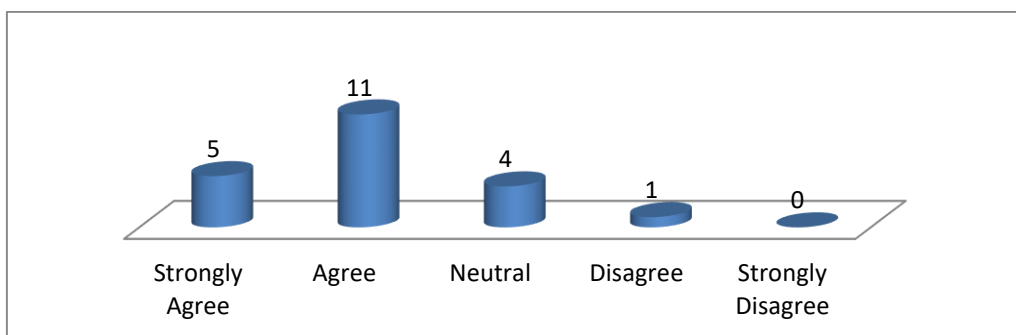


Fig 4.14 - Green practices improves profitability of organizations.

Statement 2- Environmental friendly image tend to improve Economic performance.

Total Score=36

Mean=1.71

Standard Deviation=1.59

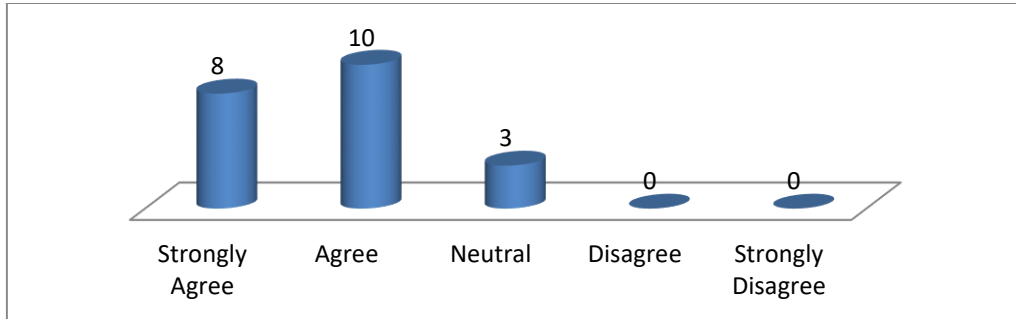


Fig 4.15 - Environmental friendly image tend to improve Economic performance

Statement 3 - Environmental performance of organization and Product is an important criterion for Customers.

Total Score=28

Mean=1.03

Standard Deviation= 2.03

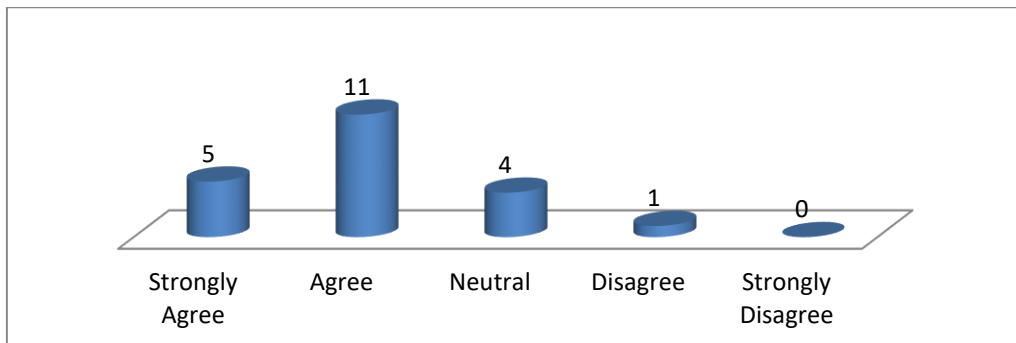


Fig 4.16 - Environmental performance of organization and Product is an important criterion for Customers.

Observation

The respondents agree that Green Practices do give positive image to organization but these are not very important for the customers that they are serving.

4.6 EMS and ISO 14000 Certification

Statement 1- The Certification to ISO: 14001 EMS helps to boost company image.

Total Score=50

Mean=2.38

Standard Deviation=1.50

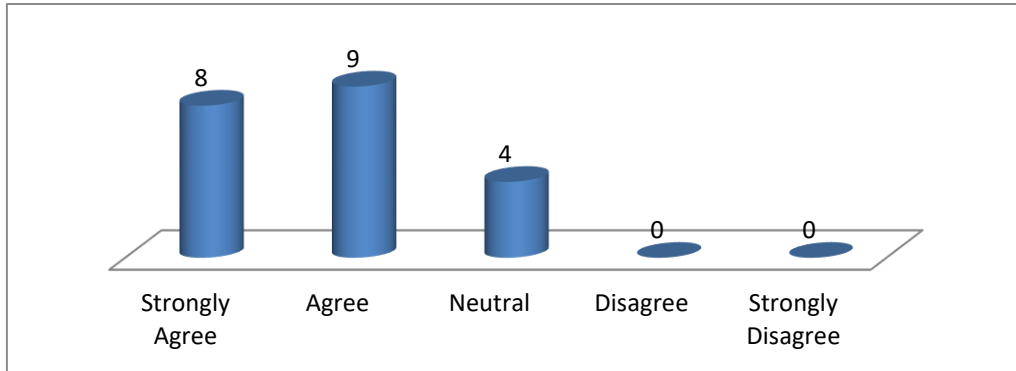


Fig 4.17 - The Certification to ISO: 14001 EMS helps to boost company image

Statement 2- ISO 14001 certification is legitimate indicator of organizations practices.

Total Score=50

Mean=2.38

Standard Deviation= 1.50

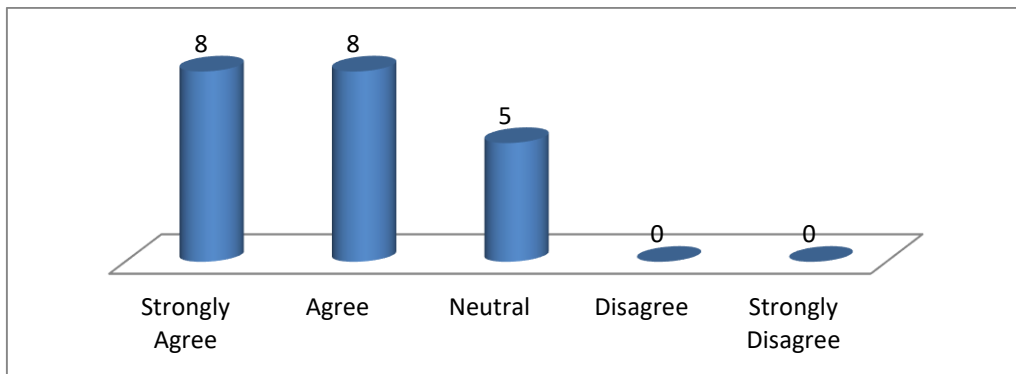


Fig 4.18 - ISO 14001 certification is legitimate indicator of organizations practices

Statement 3- ISO 14001 Certification leads to increased business.

Total Score=36

Mean=1.71

Standard Deviation=1.59

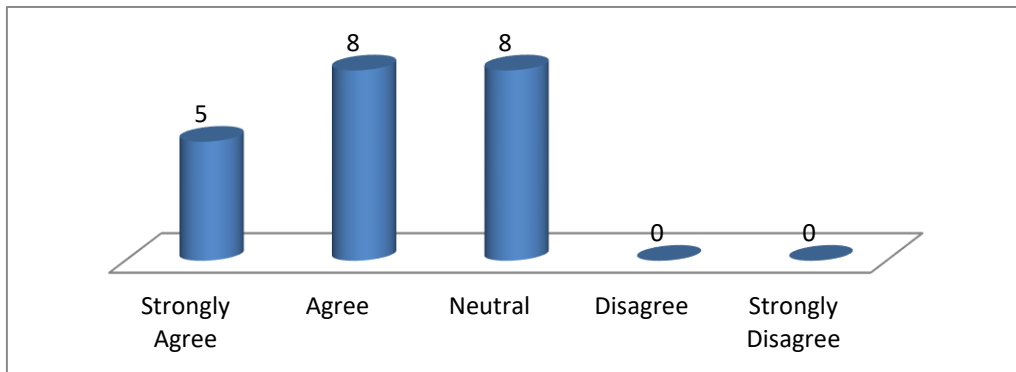


Fig 4.19 - ISO 14001 Certification leads to increased business.

Observation

Implementation of EMS and ISO certification has been deemed important by the respondents because these certifications confirm towards a standard set process. The respondents agree seems to be less on the fact whether it leads to higher business.

4.7 Internal "Green" Practices-Employees

Statement 1- Organization specific "Green" Training Program for employees is very important.

Total Score= 50

Mean=2.38

Standard Deviation=1.36

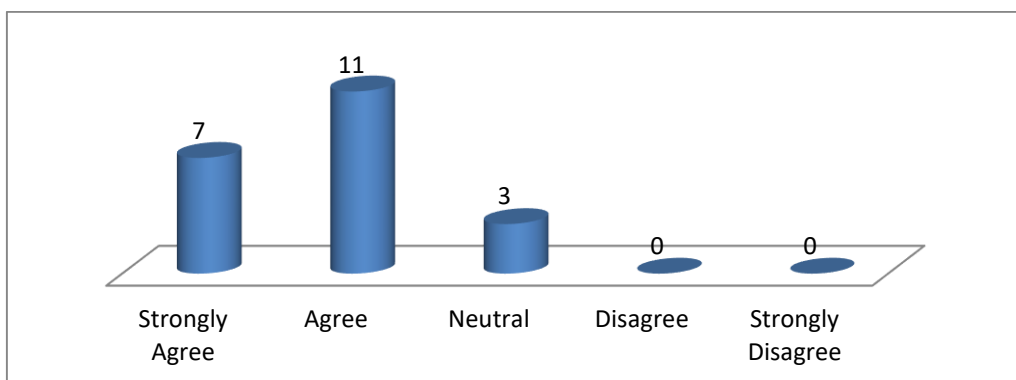


Fig 4.20 - Organization specific "Green" Training Program for employees is very important.

Statement 2- Important to train "non-supervisory" employee on Green Practices.

Total Score= 48

Mean=2.29

Standard Deviation=1.15

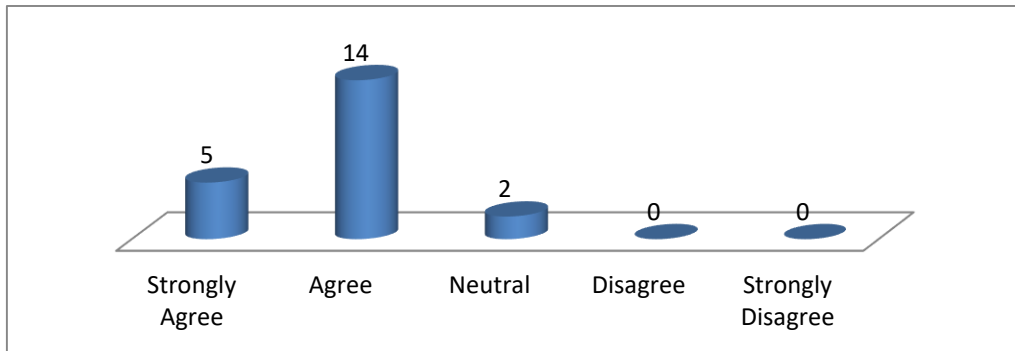


Fig 4.21 - Important to train "non-supervisory" employee on Green Practices.

Statement 3- Employees should propogate "Green" Education among their co-workers.

Total Score=42

Mean=2.0

Standard Deviation=1.10

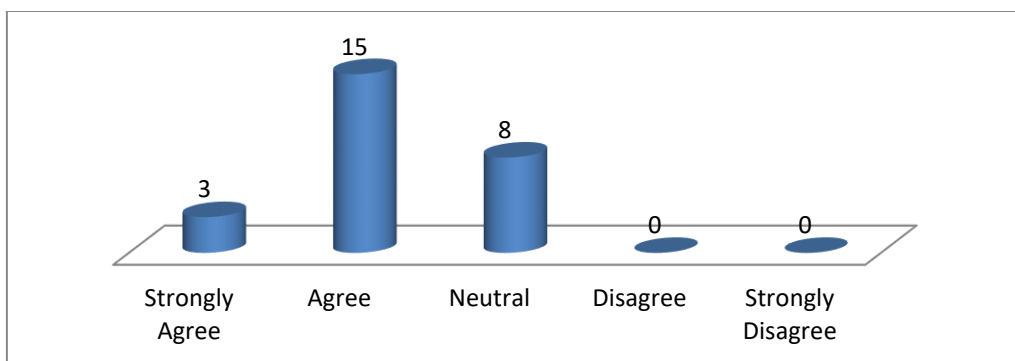


Fig 4.22 - Employees should propogate "Green" Education among their co-workers.

Statement 4- Employee morale is improved if they follow Green practices

Total Score=22

Mean=1.05

Standard Deviation=1.5

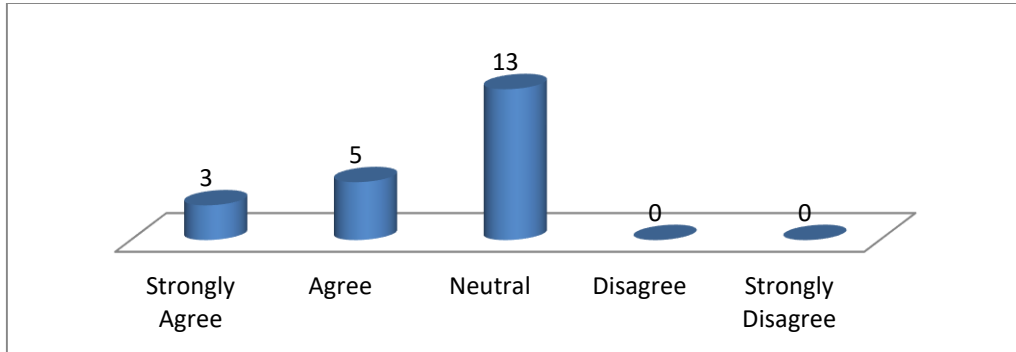


Fig 4.23 - Employee morale is improved if they follow Green practices

Observation

On the subject of employees and organizational GSCM practices, many respondents agreed with statements that the training of employees is essential for normal and non supervisory employees but many respondents seem not to agree with the statement that implementing GSCM practices can improve morale of employees.

4.8 Internal "Green" Practices-Processes

Statement 1- Production processes should be examined to reduce the amount of waste, energy consumption and emission.

Total Score=52

Mean=2.48

Standard Deviation=1.4

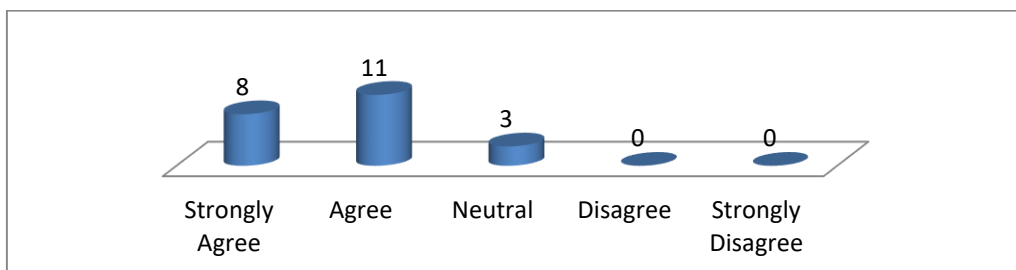


Fig 4.24 - Production processes should be examined to reduce the amount of waste, energy consumption and emission.

Statement 2- It is important to change existing manufacturing processes to reduce environment impact

Total Score= 54

Mean=2.57

Standard Deviation=1.69

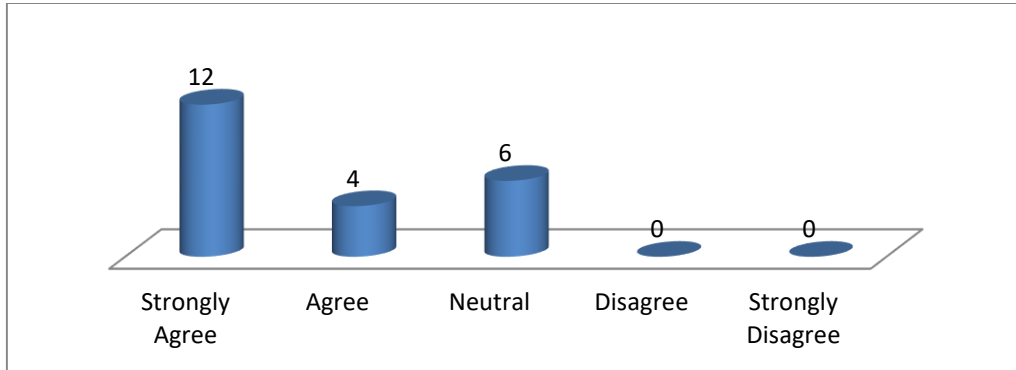


Fig 4.25 - It is important to change existing manufacturing processes to reduce environment impact

Observation

There is less than enthusiastic response towards changing the production processes in order to reduce the effect on environment.

4.9 Product and Technology

Statement 1- ERP and other Information Technology applications help to improve environmental performance.

Total Score=54

Mean=2.57

Standard Deviation=1.29

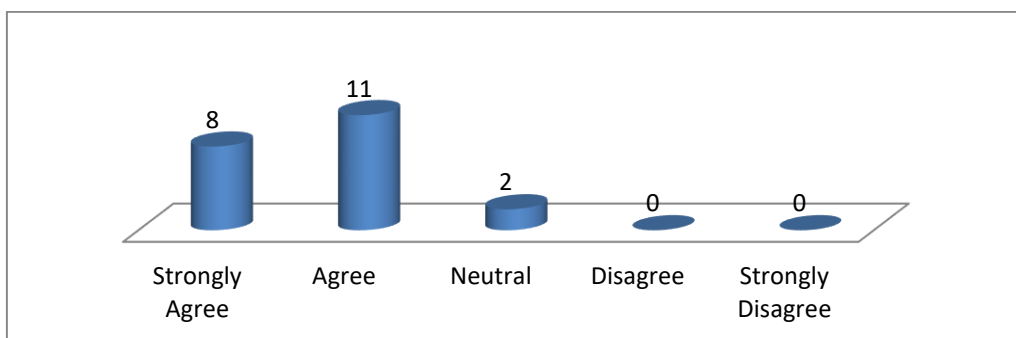


Fig 4.26 - ERP and other Information Technology applications help to improve environmental performance.

Statement 2- Automating Processes helps improve environmental performance.

Total Score=34

Mean=1.62

Standard Deviation=1.75

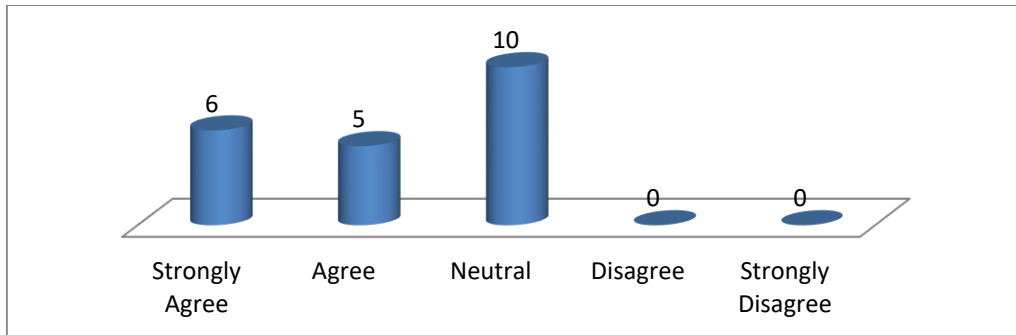


Fig 4.27 - Automating Processes helps improve environmental performance.

Statement 3- When designing a product it is important to integrate Environmental concerns from the beginning of its Life Cycle

Total Score=48

Mean=2.29

Standard Deviation=1.45

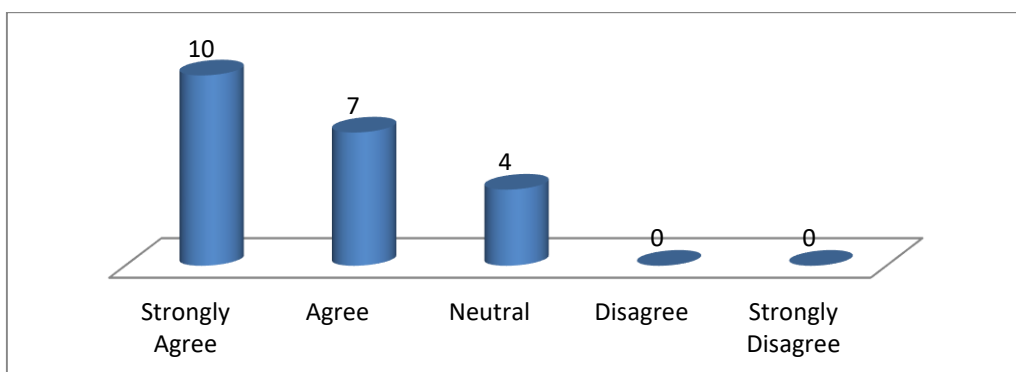


Fig 4.28 - When designing a product it is important to integrate Environmental concerns from the beginning of its Life Cycle

Observation

The responses on importance of IT and ERP in GSCM indicate a very positive disposition. The respondents also seem to agree that automating the processes can reduce the harmful effect on environment. The respondents also indicated that industry must invest to minimise harmful effects of wastage and reduce pollution.

Chapter – 5

5.1 Conclusion

The aim of the survey was to conduct an exploratory survey on the perceptions of employees of Steel Industry on the drivers of GSCM.

The main factors that have been identified by employees are the ones completely external to them. These two drivers are Top Management Commitment towards GSCM practices and following Government rules and regulations with regard to environmental practices. These two drivers are also among the top factors according to research done by Toke et al (2012). All other drivers of GSCM have level of acceptance lesser than these two. Another point that can be concluded is that the implementation of ISO practices and EMS are considered necessary but do not seem to give a huge competitive advantage to firms. This may be due to reason that a lot of organizations have these certifications today. The respondents also seem to indicate that GSCM practices can give higher profitability and competitive advantage but the level of acceptance is not very high. This may give indication that there is not much awareness on the Green practices in Steel Industry.

Although a further need is there to research in this matter, by the help of this survey it can be concluded that the employees though in general aware that GSCM practices can bring advantages, for them the onus to implement them generally lies on others.

Therefore the management should take into considerations the knowledge and perceptions of the employees to devise a strategy to increase the acceptance of GSCM practices in the organization.

5.2 Limitations

There is need to conduct more subjective research on GSCM in the industry to observe analyse the best practices and how they can be adopted in steel and other industries. The drivers identified should also be done in a way to choose the ones specific to iron and steel industry.

Due to paucity of time, the number of respondents for this research is limited to 21, from major players in the domestic steel industry. The respondents range from supervisory to mid management role but it is also imperative that the views of top management are also taken because ultimately they decide the steps on which rest of organization follows.

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Appendix - 1

Questionnaire

Please mark appropriate response.

5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree

Factors driving Green Supply Chain

Management Backing to Green SCM Initiatives

1	Top Management assumes responsibility for GSCM Initiatives	5	4	3	2	1
2	Top management Allocates resources for GSCM initiatives	5	4	3	2	1
3	Top Management is willing to change organizational objectives for Environmental Concerns	5	4	3	2	1

Procurement and Supplier Activities

1	Suppliers should be ISO 14000 Certified	5	4	3	2	1
2	Organization should be willing to invest in improving Supplier Environmental performance	5	4	3	2	1
3	Procurement activities are important to analyse environmental performance	5	4	3	2	1
4	Green Procurement helps reduce costs	5	4	3	2	1

Government Regulations

1	Regulations are important aspect to implement steps related to environment sustainability in Supply Chain	5	4	3	2	1
2	Organizations should proactively strive to implement latest environment regulations	5	4	3	2	1
3	Organizations will lose competitive advantage if it fails to implement environmental regulations properly	5	4	3	2	1

Societal Concern for environment

1	Industry must invest on alternative solutions to minimise effects of waste disposals	5	4	3	2	1
2	Pollution prevention at source is an important measure of performance	5	4	3	2	1
3	Industry should focus on end of life treatment of material and products like Reuse/Refurbish etc.	5	4	3	2	1

Competiveness

1	Green practices improves profitability of organizations	5	4	3	2	1
2	Environmental friendly image tend to improve Economic performance	5	4	3	2	1
3	Environmental performance of organization and Product is an important criteria for Customers	5	4	3	2	1

EMS and ISO 14000 Certification

1	The Certification to ISO: 14001 EMS helps to boost company image	5	4	3	2	1
2	ISO:14001 Certification is legitimate indicator of organizations practices	5	4	3	2	1
3	ISO 14001 Certification leads to increased business	5	4	3	2	1

Internal "Green" Practices-Employees

1	Organization specific "Green" Training Program for employees is very important	5	4	3	2	1
2	Important to train "non-supervisory" employee on Green Practices	5	4	3	2	1
3	Employees should propogate "Green" Education among their co-workers	5	4	3	2	1
4	Employee morale is improved if they follow Green practices	5	4	3	2	1

Internal "Green" Practices-Processes

1	Production processes are examined to reduce the amount of waste, energy consumption and emission	5	4	3	2	1
2	It is important to change existing manufacturing processes to reduce environment impact	5	4	3	2	1

Product and Technology

1	ERP and other Information Technology applications help to improve environmental performance	5	4	3	2	1
2	Automating Processes helps improve environmental performance	5	4	3	2	1
3	When designing a product it is important to integrate Environmental	5	4	3	2	1