



University of **HUDDERSFIELD**

University of Huddersfield Repository

Dani, Samir

Green Supply Chains: An Indian Perspective

Original Citation

Dani, Samir (2011) Green Supply Chains: An Indian Perspective. In: Proceedings of the 16 th International Symposium on Logistics (ISL 201 1) Rebuilding Supply Chains for a Globalised World. Nottingham University. ISBN 978 085358 278 6

This version is available at <http://eprints.hud.ac.uk/id/eprint/19873/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>

GREEN SUPPLY CHAINS: AN INDIAN PERSPECTIVE

Samir Dani

School of Business and Economics, Loughborough University, Loughborough, UK

ABSTRACT

In today's business environment global supply chains have to deal with the complexities of sourcing, logistics and costs. In order to keep costs down, supply chains are long and thus have to deal with complex inventory management challenges. Another challenge faced by supply chains is that of being environmentally friendly or green. As the discussion regarding climate change gathers momentum, the supply chains will be held under scrutiny for carbon emissions and use of fuel. Green supply chains are designed to be environmentally friendly from the raw material phase to product disposal. This paper considers the Indian perspective with regards to green supply chains and questions the barriers and enablers for implementing green supply chains in India. The study is exploratory and utilises desk research and a short survey.

INTRODUCTION

Global supply chains operate with the aim to source products for customers and shareholders at the cheapest prices and good quality. For this, supply chain designs will account for being further away from the point of consumption. This however leads to a trade-off between polluting the planet and providing value to the customer. Barcoding, RFID tagging, individual packaging according to customer needs, commoditisation, mass customisation, etc are some of the practices which provide increased revenues but can lead to environmental pollution. Higher carbon emissions, reduced fresh water availability, increased temperatures and inherently a change in climatic conditions have introduced a challenge to the supply chain community to innovate practices and reduce energy consumption and waste in order to meet sustainability requirements. Hence, the assumption is that future supply chain designs will inculcate these new characteristics. Sustainability, Green and Ethical purchasing are the important factors affecting next generation supply chains (Vachon and Klassen, 2006). Since India provides an important outsourcing location both for manufacturing and services, it is pertinent to investigate the propagation of "green factors" within the supply chain design. As exporters Indian companies will need to in the near future start changing their practices to bring in more "green credentials", starting with supply chain management.

GREEN SUPPLY CHAINS

According to Srivastava (2007), green supply chain management consists of introducing green or environmental principles into supply chain management. This could be possible through product design, material sourcing and selection, manufacturing, delivery and reverse logistics. Zsidisin and Siferd (2001) defined green supply chain management as the "set of supply chain management policies held, actions taken and relationships formed in response to concerns related to the natural with regards to design, acquisition, production distribution, re-use and disposal". It is important to note that greening the supply chain will need a radical think of how the supply chain is configured and governed. Hervani et al (2005) and Walker (2008) discuss green supply chains and suggest that the chain covers all processes from raw material procurement to disposal taking into the account the product lifecycle. Vachon and Klassen (2006) suggest that due to the lack of consensus in the supply chain literature, it is difficult to have a clear unified framework for green supply chains. Bowen et. al (2001) has defined green supply as the purchaser's intent to improve the environmental performance of the supplier and/ or product. Green supply chains not only consider the processes but also try to reduce fuel and energy use. Green supply chains have strict performance criteria and they also have to work within national and international regulatory compliance with regards to carbon emissions, toxic waste and product disposal. A literature search revealed only a couple of academic publications catering towards green supply chain management within the Indian context

(Mudgal, et al, 2009, 2010; Flores, 2008). This paper explores the enablers and barriers that affect green supply chains in India. The research questions are:

RQ1. What are the barriers to Greening the Supply Chain within the Indian context?

RQ2. What are the enablers to Greening the Supply Chain within the Indian context?

RQ1. Does Green Supply Chains have an impact on the Indian business environment?

RESEARCH METHODOLOGY

The paper presents a new area of work and hence the methodology at the outset is to be exploratory in nature. A literature review considers the issue through various viewpoints and assimilates a better understanding of the research questions. Secondary data through cases is analysed to get a practical insight into current problems. The research is conducted in two stages. The first stage is desk research which comprises of an extensive literature review using journal publications, professional magazine articles, and published case information. This stage provides insight into the research questions. The second stage consists of a survey questionnaire deployed to supply chain practitioners electronically via surveymonkey. The data from the two stages is analysed to arrive at an understanding of green supply chains in India. This research tries to provide an insight for the research questions. In doing so, it identifies the variables that will influence green supply chain implementation in India.

ANALYSIS AND FINDINGS

The literature review and the survey have identified the barriers and enablers for green supply chains. In the Indian context it is difficult to implement green supply chains as this is a relatively new concept within the Indian business environment. Due to the global nature of today's supply chains, Indian companies feature quite prominently within the structure of global supply chains. Hence, it is important for these Indian companies to meet the green credentials of today's multinational supply chains.

Barriers and Enablers of green supply chains

Green supply chains are a part of a cultural change within the field of supply chains. To implement green supply chains certain enablers are required to be present within the business environment. There are more barriers than enablers, however if these barriers can be identified it will be a good starting point to facilitate implementation of green principles within the supply chain.

Walker, et. al. (2008) has identified the barriers and drivers for an environmental supply chain. The authors have identified the barriers as: Internal barriers (costs, lack of training, lack of understanding green initiatives) and External barriers (regulation, poor supplier commitment and industry specific barriers). Ravi and Shankar (2005) have studied the Indian automotive sector with regards to reverse logistics and have identified barriers for it. These are identified as: lack of information and technological systems, problems with product quality, company policies, resistance to change, lack of appropriate performance measures, lack of training, financial constraints, lack of commitment from top management, lack of awareness and reluctance from supply chain partners.

When discussing about green supply chain management Bowen et. al. (2001) state that organisations will adopt green supply chain management only if they can identify specific operational and financial benefits. They also have internal drivers for implementing green supply policies (strategic purchasing and supply, corporate environmentally proactivity, and supply management capabilities. Walker et al. (2008) have identified the drivers for green supply chains, Internal drivers (organisation factors), external drivers (regulation, customers, competitors, society and suppliers). Lee (2008) identified the main drivers as and green supplier buyer influence, government involvement and green supply chain readiness. Diabat and Govindan (2010) discuss enablers and barriers.

Responses from industry

A survey questionnaire was created using 'surveymonkey'. The link to this questionnaire was emailed to a sample of 12 senior managers in India. These managers had on a previous occasion attended a supply chain workshop that the researcher was a part of. The link was also posted on to an Indian supply chain group on 'Linkedin, however this did not generate any new data. Of the 12 respondents 9 filled in the questionnaire completely. The data from the 3 incomplete questionnaires was not considered for analysis. The data is insufficient for statistical analysis, however it provides a good exploratory insight as the managers represent senior level in India and can be assumed to have a strategic focus. However, one limitation of the survey is that these responses may be valid only for this dataset as it is small number of responses.

Referring to figure 1, it can be seen that of the 8 companies out of the 9 are currently involved in green initiatives. These include initiatives such as

'creating energy efficient products, having an organisational Environment policy, working on creating a reliable source of clean energy to power the production plant, sustainable farming practices, sustainable packaging, reducing carbon footprint by ways of reducing emissions from the products, reduce power consumption, producing recyclable parts/accessories, energy conservation and rain water harvesting'

These initiatives range from organisational level initiatives to reduce energy use to creating green products. There are some broader social initiatives too.

Another positive aspect is that 7 out of the 9 companies have some sort of a proactive process to conduct green initiatives. 2 companies have dedicated teams whereas 5 companies have a team comprised of members from various functions within the company. Only 2 companies said that they do not have a proactive team looking at green challenges but will form a team as when required. This is represented again when looking at green initiatives across the supply chain and 7 out 9 companies have said that they work actively with partners in the supply chain to implement green initiatives.

Is your current organisation involved in any green initiatives?		
Answer Options	Response Percent	Response Count
Yes	88.9%	8
No	11.1%	1
Details		5

Does your organisation have a functional team looking at CSR and green initiatives?		
Answer Options	Response Percent	Response Count
Yes, a full time team	22.2%	2
Yes, a team of members from other departments	55.6%	5
No, we use external consultants to guide us.	0.0%	0
No, we handle green issues as an when they happen	22.2%	2
Other (please specify)		1

Does your organisation work actively with the suppliers or distributors to implement green initiatives?		
Answer Options	Response Percent	Response Count
Yes	77.8%	7
No	22.2%	2

Fig 1: Involvement of Indian companies in green practices

Figure 2, presents the barriers to implementing green supply chains within India. The barriers identified as the most important are related to training and information needs. The barriers are: *Lack of knowledge regarding green initiatives, Lack of training to implement green initiatives, Lack of knowledge regarding international legislation, Lack of buyer awareness about green, Lack of company policies regarding green, Lack of green supplier network.* There are other barriers but it seems that the major hurdle is **lack of knowledge and inclination to go green.**

Figure 3, presents the enablers for implementing green supply chains within India. Most of the respondents have identified the items presented in the survey as important enablers for implementing green supply chains in India. The two most significant are: **pressure from the markets for green products** and change of perspective- **being green will provide a competitive advantage in the long term.** This also supports the view that there is a need to have a green supplier network and sufficient knowledge regarding international regulations on green.

Figure 4, presents a perspective from the respondents on how they think the Indian business environment will change in case green supply chains were implemented. The respondents think that there will be an increased effort in the Indian business community to **reduce energy, reduce waste and reduce carbon emissions.** The results also suggest that the Indian business environment will actively think about the interaction of the business environment with the social environment.

It is difficult to implement Green Supply chain Management in India due to the following reasons: (Please tick whether you agree or disagree for each factor)							
Answer Options	Strongly Disagree	Disagree	Maybe	Agree	Strongly Agree	Rating Average	Response Count
It is not cost effective	0	3	1	4	1	3.33	9
Does not provide the appropriate Return on Investment	0	3	1	2	3	3.56	9
Lack of company policies towards green initiatives	0	1	1	5	2	3.89	9
Lack of resources	1	0	3	4	1	3.44	9
Lack of performance metrics	0	0	3	4	2	3.89	9
Lack of knowledge regarding green initiatives	0	1	1	5	2	3.89	9
Lack of training to implement green initiatives	0	0	2	5	2	4.00	9
Lack of knowledge regarding International legislation	0	0	1	4	4	4.33	9
Lack of management commitment	0	1	0	6	2	4.00	9
Lack of buyer awareness regarding green	0	0	2	6	1	3.89	9
Lack of a green supplier network	0	0	2	2	5	4.33	9
Lack of appropriate national legislation	0	0	3	3	3	4.00	9
Lack of reverse SC initiatives	0	0	3	5	1	3.78	9
Lack of reverse SC infrastructure	0	0	3	5	1	3.78	9
Lack of Societal requirements for green initiatives	0	0	4	2	3	3.89	9
Any other barriers- please specify							1

Fig 2: Barriers to Green Supply Chain management in India

Green Supply chain Management can be implemented in India if the following was done: (Please tick whether you agree or disagree for each factor)							
Answer Options	Strongly Disagree	Disagree	Maybe	Agree	Strongly Agree	Rating Average	Response Count
Pressure from the markets to buy green products	0	0	1	6	2	4.11	9
Pressure from society for organisations to go green	0	0	3	5	1	3.78	9
Introduction of a national green regulatory compliance	0	0	3	3	3	4.00	9
Organisations focus on CSR activities on moral grounds	0	1	4	3	1	3.44	9
Better training to employees regarding green initiatives	1	0	3	4	1	3.44	9
Better coordination with the supply chain partners to implement green initiatives	0	1	1	6	1	3.78	9
Change of perspective- gaining competitive advantage by going green	0	1	0	5	3	4.11	9
Clear performance metrics	0	0	3	5	1	3.78	9
Better knowledge about International regulations	0	0	2	6	1	3.89	9
Any other barriers- please specify							0

Fig 3: Enablers to Green Supply chain management in India

Green Supply chain Management will have an effect on the Indian Business Environment: (Please tick whether you agree or disagree for each factor)							
Answer Options	Strongly Disagree	Disagree	Maybe	Agree	Strongly Agree	Rating Average	Response Count
There will be more Corporate Social Responsibility initiatives	1	0	3	3	2	3.56	9
More thought regarding the interaction of the business environment with society	0	0	2	7	0	3.78	9
Change in organisational governance structures and mission statements	0	2	1	5	1	3.56	9
Thinking proactively regarding how the organisational operations affect climate change	0	1	2	6	0	3.56	9
Increased Innovation capability for green products and processes	0	0	3	4	2	3.89	9
Increased effort to reduce carbon emissions	0	1	0	8	0	3.78	9
Increased effort to reduce energy use	0	1	0	5	3	4.11	9
Increased effort to reduce waste within product offerings Increased effort to reduce waste within business operations	0	1	0	5	3	4.11	9
Any other barriers- please specify							0

Fig 4: Effect of green supply chains on the Indian Business Environment

CONCLUSION AND FUTURE SCOPE

The research has identified the current perspectives with regards to green supply chains within the Indian context. The paper has presented the barriers and enablers to green supply chain implementation both from literature sources and from a short survey conducted with professionals in India. The results have suggested that the barriers are an effect of lack of knowledge and training of green initiatives and implementation

processes. The results also suggest that green supply chain implementation can be possible if the customers start asking for green products. Currently, the Indian market (both industrial and consumer) are not very green in their outlook and also the Indian producers do not consider that being green can provide them with a competitive advantage. If the Indian producers are required to adhere to international regulation with regards to green measures, it will be important for the Indian supply chain to implement green measures. It is also quite logical to think that once the need to implement green initiatives arises it will have a profound effect on how business is conducted in India. The results of the short survey suggests that respondents who represent industry feel that there will be an increased focus on reducing energy, waste and carbon emissions. There will be a more proactive approach towards green implementation. One of the limitations of this research has been the size of the survey sample. Although it does provide some good insight, the sample is insufficient for a statistical analysis. In the future, the survey should be conducted for a larger sample. Also, as future work the variables for the barriers and enablers should be tested for correlation.

REFERENCES

- Bowen FE, Cousins PD, Lamming RC, Faruk AC. (2001) The role of supply management capabilities in green supply. *Production and Operations Management*; 10(2):174–89.
- Diabat A, Govindan K. (2011) Analysis of the drivers affecting the implementation of green supply chain management. *Resour Conserv Recy*, doi:10.1016/j.resconrec.2010.12.002
- Flores, M., Boer, C., Canetta, L., Pouly, M., Cherian, M. (2008) Critical Success Factors and Challenges to develop new Sustainable Supply Chains in India based on Swiss Experiences, 14th International Conference on Concurrent Enterprising, Costa da Caparica, Lisboa, Portugal, 23-25 June, 2008
- Hervani AA, Helms MM, Sarkis J. (2005) Performance measurement for green supply chain management. *Benchmarking: An International Journal*, 12(4):330–53.
- Lee S-Y. (2008) Drivers for the participation of small and medium-sized suppliers in green supply chain initiatives. *Supply Chain Management: An International Journal*; 13(3):185–98.
- Mudgal, R, Rakesh K. Ravi Shankar, Talib, P., Tilak Raj (2010) Greening the supply chain practices: an Indian perspective of enablers' relationships, *International Journal of Advanced Operations Management* 2009 - Vol. 1, No.2/3 , pp. 151 - 176
- Mudgal, R, Rakesh K. Ravi Shankar, Talib, P., Tilak Raj (2010) Modelling the barriers of green supply chain practices: an Indian perspective, *International Journal of Logistics Systems and Management*, Volume 7, Number 1 / 2010 , pages: 81 - 107
- Ravi V, Shankar R. (2005) Analysis of interactions among the barriers of reverse logistics. *International Journal of Technological Forecasting & Social change*; 72(8):1011–29.
- Srivastava, K S. (2007) Green supply-chain management: A state-of-the-art literature review. *International Journal of Management Reviews*, 9(1):53–80
- Vachon, S., Klassen, R.D. (2006) Extending green practices across the supply chain, *International Journal of Operations & Production Management*, Vol. 26 No. 7, pp. 795–821
- Walker H, Di Sisto L, Mc Bain D (2008) Drivers and barriers to environmental supply chain Management Practices: Lessons from the public and private sectors, *Journal of Purchasing and Supply Management* 8;14 (1):69–85
- Zsidisin G A, Siferd S P. (2001) Environmental Purchasing: A Framework For Theory Development. *European Journal Of Purchasing And Supply Management*, (1):61–73.