TOWARDS A MODEL FOR IMPACT OF TRUST ON GREEN SUPPLY CHAIN DRIVERS, PRACTICES AND PERFORMANCE

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Abstract: *In the modern age of globalization and industrialization the issue of environmental sustainability has become a compulsory factor for every firm. The notion of sustainable development encompasses an always interaction of three areas: environmental sustainability, economic sustainability and social sustainability. The inclusion of the environmental sustainability into the consideration of the today's firms in their tactical as well as strategic operational decisions across the entire gamut of the supply chain has led to the "Greening" of the entire supply chain. Previous literary sources and other established works have shown the unending role of trust on technology on the supply chain performance. In general, it has been found that more trust on technology; the more the trust and transparency and willingness to collaborate and cooperate among the supply chain partners; hence the better supply chain performance. So in this perspective an urge is felt to analyze the role of trust on technology across the green supply chain drivers, practices and how the same affects the green supply chain performance.*

Keywords: Trust on Technology, GSC Drivers, GSC Practices, GSC Performance

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1. Introduction

In recent days, the environmental pollution and the greenhouse effect have attracted considerable attention. It's not only the textile and apparel but even the mid scaled chemical manufacturers have attached considerable importance to the issue of environmental sustainability so the environment can be saved from considerable damages caused due to the improper disposal practices of harmful chemicals and other toxic wastes into the adjoin water bodies. With the emergence of a variety of green products in many known markets like textile and apparel, customers are also feeling a sense of responsibility for protecting the environment and in fact they are encouraging such kinds of products by buying and using the same. A prediction by Packaged Facts (2008) showed that the sales of global green apparel products would rise from 3 billion dollars in 2007 to 11 billion dollars in 2012. Global apparel brands and retailers, such as Nike, Timberland, Wal-Mart, Marks & Spencer, H&M and Tesco, have announced sustainable development strategies or commitments. Well examples apart, firms today should respond to an increasing rate of dynamism in many spheres; product and life cycles are getting shorter with simultaneous competitive pressures force rapid changes in the design of products and services and the ever changing tastes and preferences of the consumers augments to have increased differentiation of products and services.

As Min and Zhou (2002) points in their work that firms cannot succeed in isolation but in fact they need to form a network for achieving better performance and profits. This has given birth to the concept to supply chain as a network which is expected to provide the customer with the right product and services just in time with the specifications as demanded by the customer at the right place as per pre-agreed terms. As Lambert et al.(1998) points that a SC can be more complex and hence defined as a set of interdependent organizations that act together to control, manage and improve the flow of materials, products, services and information from the point of origin to the delivery point with an objective of satisfying customer needs at the lowest possible cost to all members. In today's market firms have to integrate their operations with sustainability considerations for maintaining a name of repute and market share. A recent focus for the supply chain is therefore to adopt broader adoption and development of sustainability from the initial processing of raw materials to delivery to the customer; along with issues pertaining to product design, manufacturing by-

products, by products produced during product use, product life extension, product end-of-life and recovery processes at end-of-life (Linton et al., 2007).

Now sustainability encompasses the multiple objectives of social, objective and economic sustainability. For social sustainability, firms should ensure that their products are meeting the expectations of the customers and hence the population. Considering economic sustainability, the ultimate objective of supply chain performance is profit maximization for firms concerned indicating thereby the efficient utilisation of raw materials and allied infrastructure and energy sources in the production of products and services. For environmental sustainability, the utilisation of non-renewable should be minimized with more emphasis on renewable usage with minimum waste generation and permanent environmental damage should not be allowed (Zhou, Cheng and Hua,2000). A sustainable supply chain has several benefits like it reduces waste generation and thereby revenue maximization with increase of market share and right employee retention(Buyukozkan and Berkol, 2011). Rao and Holt (2005) and Markley and Davis (2007) have mentioned that the green supply chain management (GSCM) practices were critical success factors in companies' sustainable development. Thus it's evident that the inclusion of environmental sustainability in the supply chain has given birth of the Green Supply Chain concept. In fact Green Supply Chain Management has drawn considerable attention as an organizational philosophy helping firms and their partners to reap rich profits and in attaining significant market share simultaneously minimizing environmental risks and improving ecological efficiency. (Zhu et al., 2008a, de Figueiredo and Mayerle, 2008).

Also other forces like increasing pressure from communities and consumers have given rise to strict environmental regulations such as the Waste Electrical and Electronic Equipment Directive in the European Union. These regulations force manufacturers to integrate environmental concerns into their management practices (Rao and Holt, 2005, Yang et al., 2009, Paulraj, 2009). Also, the increased awareness of the sustainability issue among consumers may force firms to be responsible for environmental and social performance of their suppliers. Previous researches establishes the importance of several resources in implementing GSCM (Green Supply Chain Management) practices; for example management support/ commitment and cross-functional communication (Apsan, 2000, Zhu et al.,

2008a), professional knowledge of environmental management and environmental management systems (Sharma et al., 1999) and abundant human and financial resources (Boiral, 2005; Hanna et al., 2000; Presley et al., 2007; Sarkis et al., 2010), which all are critical success factors for companies' successful implementation of GSCM practices.

The importance of trust like other factors cannot be undermined. Previous literature shows that trust mediates human relationships and hence in the same way can also mediate the human-technology relationships. (Sheridan, 1975; Sheridan and Hennessy, 1984). Many studies have demonstrated that trust is a meaningful concept to describe human-technology interaction, both in naturalistic settings (Zuboff, 1988) and laboratory settings (Lee and Moray, 1992; Muir and Moray, 1996). So this shows that since trust plays an un-denying role in the relationship between human beings and technology; it also exhibits the fact that trust has considerable influence in supply chain performance as technology like IT facilitates information sharing thereby improving transparency and coordination among supply chain partners thereby achieving optimal supply chain performance. In this paper an attempt has been made to assess the role of trust on technology on Green Supply Chain drivers, practices and performance.

2. Theoretical background and Hypothesis Development

As it is evident that the inclusion of sustainability development; particularly environmental sustainability in the due consideration of the supply chain partners have led to the concept of green supply chain. Now to have a green supply chain there need to be drivers, practices which will ultimately affect then GSC performance. Hence in the coming lines we will try to develop the our research framework and allied hypotheses with the adaptation of a framework from Wu et al. (2011). Considering that, the GSCM drivers consist of (a) Organizational Support; (b) Social Capital; (c) Government Involvement. In a similar fashion, GSCM practices constituted of: (a) Green Purchasing; (b) Co-operation with customers; (c) Eco-Design; (d) Investment Recovery.

2.1. GSCM Drivers

2.1.1. Organizational Support

Lee (2008) pointed that the more the readiness for companies for GSC, the more they are willing to implement GSCM practices. But in doing so there exist a lot of internal obstacles specific to the firm which are called as organizational problems or threats towards implementing GSC. So the first step towards implementing GSC will be in solving these problems such as lack of management support, lack of environmental professional knowledge etc.(Gonzalez-Torre et al. 2010).Many works have indicated that support from the senior management and commitment are critical factors in the successful implementation of GSCM practices.(Zhu et al., 2008a; Min and Galle, 2001; Sharma et al., 1999; Walker et al., 2008; Ramus and Steger, 2000). Also firm specific capabilities professional knowledge, cross-departmental communication and environmental management system enable companies to implement environmental management (Gonzalez-Torre et al., 2010; Lee, 2008). Also the importance of free communication cannot be undermined as it improves cross-departmental environmental collaboration (Apsan, 2000; Zhu et al., 2008a). Also employee's involvement is mandatory for implementation of environmental management practices (Boiral, 2005; Hanna et al., 2000). Thus Trust on technology in all the above cases can facilitate information sharing either in increasing involvement. commitment by increasing transparency. This in turn will increase trust between organization members and ultimately contributing to improved performance.

H.1.*Trust on Technology positively influences organizational support*

2.1.2. Social Capital

It can be defined as the sum of social resources and as connected by people and organizations (Nahapiet and Ghoshal, 1998).This network in turn can be used to share knowledge and information beneficial for both the partners concerned. Hence as Adler and Kwon (2002) rightly pointed that in this way organization could be benefited. As managing a supply chain successfully entails cross communication across organizations, according to social capital theory companies could establish good social relationships which in turn will help the companies to share their knowledge and increase the willingness for collaborative work((Lawson et al., 2008; Tsai and

Ghoshal, 1998). So if trust is there fully, then firms will be ready to invest their money and reap the collaborative benefits (Heide and Miner,1992). So having trust on technology can foster transparency and can deepen the social relationships.

H.2.*Trust on Technology positively influences Social Capital*

2.1.3. Government Involvement

In any region, industrial development is affected by the eagerness and willingness of the then government to invest. In fact such investments can be in the form of incentives to firms for building suitable infrastructure. As Porter (1990) pointed that such governmental incentives can help firms to modify their business models after obtaining technical and financial support from the Government. In fact, government involvement has improved companies' environmental performance in many instances (Holt, 2001; Lee, 2008). Government grants and technical support could not only reduce a company's expenses and technical uncertainties, but also help that company implement GSCM practices (Darnell, 2003; Darnall and Edwards, 2006). Thus, Trust on technology can increase transparency among government officials and other allied executive bodies so as to increase their willingness and eagerness to facilitate easy procedures for issue of loans to firms for building their environment friendly facilities and also will increase their technical capabilities for extending technical expertise to such firms.

H.3.*Trust on Technology positively influences Government Involvement.*

2.2. GSCM Practices

Attributing to the increased environmental awareness, firms have started using their GSCM practices so as to position them as a positive perception in the mindsets of their customers. This will help them to sustain their market share and revenue in the increased pace of market competition. Kainuma and Tawara (2006) pointed GSCM to consist of various product processes like raw material purchasing, product manufacturing, recycling, reusing and re-manufacturing and these processes must comply with environmental protection regulations. Zhu and Sarkis (2006) have defined GSCM practices as containing source management, supply chain integration and reverse logistics. Hence the GSCM practices can be viewed as a constant interacting closed loop where supply chain members are expected

to adopt procedures which are environment friendly (Zhu et al., 2008a). In fact, in Zhu et al.'s (2005) work where he investigated China's textile, automobile, power generating, chemical/petroleum, electrical and electronic industries suggested ways for GSCM practice implementation.

Those indicated four ways for implementing GSCM practices are:

(1) Firm's internal management: Support of managers for implementing environmental management systems (EMS);
(2) Co-operation from Suppliers and Customers: firms requested their allied suppliers for adopting and increasing their green performance and work in collaboration with their customers;
(3) Eco-design: companies should redesign their products in order to reduce raw material/energy usage and let these products be able to recycle and remanufacture;
(4) Investment recovery: companies should sell excess inventory/ material, scrap and used materials in order to return the capital. (Wu et al., 2011).

The second component has been further broken down into two sub components by Zhu *et al.*(2008b) in his study of the GSCM practices in China's Manufacturing industry: (a) Green Purchasing: Firms should have access to their suppliers' environmental management and certification while procuring raw materials; (b) Co-operation with Customers: Cooperation with customers meant that companies cooperated with their customers to perform green production and packaging.Inspite of having differences between cross-countries GSCM practices, Zhu and Sarkis (2006) and Zhu et al. (2007) both investigated the GSCM practices of China's manufacturing industries and discovered that investment recovery and eco-design were significant for all surveyed industries, but the significance of other GSCM practices depended on the industries themselves. Needless to say, the above 4 practices like Green purchasing, Cooperation with customers, Eco-Design and Investment recovery can be generalised to any industry. In that case, trust on technology will facilitate cooperation between supply chain partners and their customers fostering increased cooperation among them. Also it will enable the firms and their supplier for easier collaboration with each other in getting certificates while purchasing raw materials. Trust on technology will facilitate suppliers to resort to environmental management systems quickly. Trust on technology will help partners and firms to led their R & D for efficient and fast design of environment friendly products/spare parts and their subsequent manufacture

in their allied facilities. So considering investment recovery, it is clear that Trust on technology while helping in the above three practices will also have a positive impact on recovering the cash invested in adopting the above measures or practices.

H.4. *Trust on Technology positively facilitates green purchasing.*

H.5. *Trust on Technology positively influences co-operation with customers.*

H.6. *Trust on Technology positively helps in eco-design of products/spare-parts.*

H.7. *Trust on Technology positively facilitates investment recovery.*

2.3 GSCM Performance

With reference to Azevedo et al.'s (2011) framework, the green supply chain's performance might be measured in three dimensions:

(a) Economic, (b) Operational and (c) Environmental.

Now let's consider each dimension:

(a) ***Economic:*** As Azevedo et al. (2011) pointed that this dimension calls for having optimal performance in terms of cost, efficiency and cost to the environment. Trust on Technology enables a firm to resort to green practices which in turn enables the firm to reduce its overall cost efficiently and also at the same time providing the minimum possible damage to the environment;

(b) ***Operational***: Achieving customer satisfaction and maintaining strict quality standards are now the call of the hour. A firm having full trust on technology can easily achieve its target on producing environment friendly products with the required quality; thereby arriving at customer satisfaction simultaneously;

(c) ***Environmental:*** Business waste reduction is the key objective in this dimension. The waste produced during the manufacture of green products should be disposed off in such a way so as to provide minimum damage to the environment. Trust on Technology can help firms for quick recycle and safe disposal of wastes.

H.8. *Trust on Technology positively enhances GSC's Economic performance.*

H.9. *Trust on Technology positively enhances GSC's Operational performance.*

H.10. *Trust on Technology positively enhances GSC's Environmental performance.*

2.4. Theoretical Model

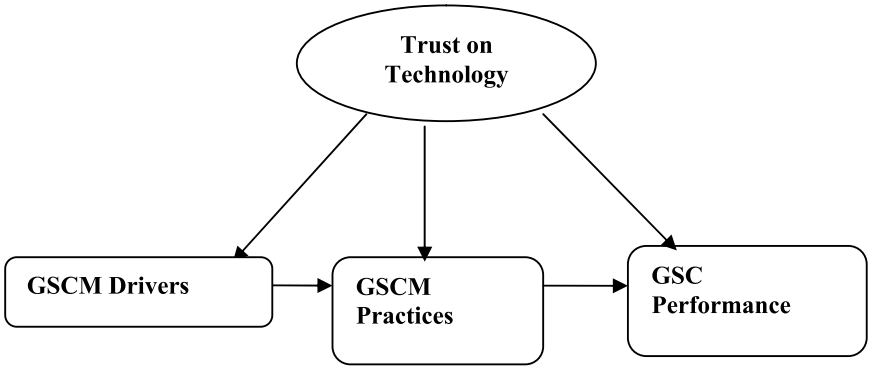

Figure no.1. A model linking trust on technology with GSCM drivers, practices and performances

Thus with the above framework in place and the formulation of the above hypotheses, the above study has contributed to the existing body of literature by incorporating the well known construct "Trust" because in many established works on supply chain and information technology it has been observed that trust plays an un-denying role in supply chain performance. This study by incorporating the trust in the realm of green supply chain drivers, practices and performance have given birth to a new framework along with a series of hypotheses which are to be tested in due course so as to give the proposed frame work an established footage.

Conclusion

Based on established works on the role of trust on technology and how the same is influencing any supply chain performance; complemented by logical reasoning, a framework has been proposed in the above study. The formulation of the above framework has also given rise to a set of hypotheses which demands testing in due course so as to give a practical validity and generalizability to the proposed framework. Based on past works and argument the hypotheses have been found to be positive. So it's clear that trust in the green supply chain regime also plays an equally positive role as achieving optimal supply chain performance.

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