A study of inter-organizational collaborations for sustainable performance through e-waste management

A proposed study

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Abstract

Green firms and their partners are keen on developing collaborative behaviors with upstream and downstream partners which is important in creating an environmentally sustainable supply chain. Research suggests that despite the popularity and benefits of inter-organizational relationships, not all of the evidence is positive. Several inter-organizational collaborations are unable to meet the expectations of their partners. In case of reverse supply chain management, coordination is far more important as the reverse flows emanate from the customers, it is almost completely uncertain and difficult to forecast. Also, it has imperfect product and packaging quality, many-to-one transportation, unclear disposal options, differences in nature and visibility of costs and decreasing time value of product.

In this proposed doctoral research, we study the implications of inter-organizational collaboration on sustainable performance in the context of reverse supply chain management. A inter-organizational collaborations in supply chain management are the activities that require varying level of interaction with partner organizations consisting of suppliers, retailers, customers, third party service providers, alliance partners and competitors. We focus on forms of collaboration depending upon the basis of the relationships undertaken by dedicated electrical and electronics firms and assess the contribution of cooperative ventures to sustainability. Achieving the social, environmental and economic benefits of triple bottom line are the key measures to evaluate the sustainability performance of the firm. We seek to map the inter-organizational arrangements of exemplars for sustainable operations of this emerging industry using case study methodology and explain the purposes served which is important in understanding the consequences of such relationships. Identification of the patterns of inter-organizational collaborations of reverse supply chain can help managers assign the resources and efforts toward managing the supply chain for having the maximum impact on a firm’s sustainable performance.

Keywords – Inter-organizational relationship, e-waste management, Sustainable performance
Introduction

Every day enormous amount of electrical and electronic devices ends up as waste, most of which is land filled, which is a serious environmental problem. As per data by “Solving the e-Waste Problem (StEP) Initiative”-a partnership of UN organizations shows all the end-of-life products with a battery or electrical cord such as TV, computers etc (called e-waste) worldwide was 48.9 million tonnes in 2012, and the trend is only increasing (http://www.step-initiative.org). Increasing volumes of e-waste, while obviously a growing problem facing the modern world, also provides an opportunity to be exploited by efficient management through the returns-management process. With the growing interest in sustainable supply chains, green firms and their partners are keen on developing environmentally friendly measures to achieve competitiveness as well as regulatory compliance. E-waste management is not a single firm’s business; it is evident from the previous research that sustainability challenges can be successfully addressed only through joint efforts from organizations (Gold et al. 2010, Vachon and Klassen 2008). In case of e-waste management, coordination is very important as complexity increases than forward flow. As the reverse flows emanate from the customers, it is highly uncertain and difficult to forecast. Also, it has imperfect product and packaging quality, many-to-one transportation, unclear disposal options, differences in nature and visibility of costs and decreasing time value of product.

E-waste management look for value from end-of-life products through reverse supply chain processes such as refurbishing, remanufacturing, recycling, and reusing (El korchi and Millet 2011). E-waste management encompasses activities involving reverse logistics as well as product stewardship (Savaskan and Wassenhove 2006) that entail varying levels of interaction with partner organizations in the supply chain such as suppliers, retailers, customers, third party service providers, alliance partners and nontraditional partners such as competitors, NGOs (Achrol et al. 1983, Carter and Carter 1998, Vachon and Klassen 2006, Vachon and Klassen 2008). The relationship between focal organization (OEM) and its partner organizations in reverse supply chain management has been demonstrated by many researchers (Achrol et al. 1983, Carter and Carter 1998, Vachon and Klassen 2006, Vachon and Klassen 2008), but how the relationship matter differently for different types of practices within end of their life cycle such as recycling, remanufacturing, and remarketing has received little attention. Evidence suggests that some companies like Xerox, Kodak, IBM, etc. are getting not only environmental but economic and social advantage thereby competitive advantage by effectively managing sustainable reverse supply chain management (Vaidyanathan and Luo 2007), but they are few. We extend the prior research by looking at the chain entirely, both traditional and non-traditional partners in reverse supply chain management. We concentrate on the research question: How do exemplars in sustainable e-waste management manage their inter-organizational relationships for effective end-of-life returns (e-waste) management?
Literature review

The key processes for the reverse supply chain are product collection, reprocessing and remarketing (Mafakheri and Nasiri 2013). All these processes require some amount of coordination between the various actors and OEM. To support each member’s objectives with the sustainability performance, a way of coordination among supply chain members is essential (Corbett and Decroix 2001, Mafakheri and Nasiri 2013, Vachon and Klassen, 2006). We have analyzed the literature based on different basis for coordination such as economic, environmental and social performance of triple bottom line. Reverse supply chain activities, such as buy-back, revenue sharing and sales rebate gives economic benefits by various contracting mechanism (Govindan and Popiuc 2014, Jacobs and Subramanian 2012, Mafakheri and Nasiri 2013, Savaskan et al. 2004, Savaskan and Wassenhove 2006). Also, government’s pressure is responsible for increasing attention toward environmental protection. Collaborations with suppliers and customers gives sustainable supply chain (Carter and Carter 1998, Zhu and Sarkis 2004). Few studies found the Inter-firm management helps in minimizing the environmental impact of both of the upstream and downstream supply chain in reverse supply chain (Vachon and Klassen 2006, Vachon and Klassen 2008, Zhu et al. 2008). The value of the returns products are about hundred billion dollars per year in the United States (Shear et al. 2002). It can be used to create new jobs through reverse supply chains which is a social benefits hence, it is considered a constructive move for both environmental and social benefits, also can be a revenue (Mafakheri and Nasiri 2013, Sarkis 2003, Srivastava 2007).

John Elkington (1994) introduces the concept of triple bottom line. It says to reach sustainability, economic bottom line performance as well as environmental and social performance is required.“Sustainability is a concept of describing mankind’s ability to create a world for humans and nonhumans that environmentally, socially and economically provides for current population’s need without damaging ability of future generations to take care of themselves” (Blackburn 2012;pg. xiii). Still there are misconceptions that researchers and businesses have about the concept. Most researchers studied the concept focusing on either of the aspect of sustainability. “It cannot be denied that economic performance often lies at the top of company’s mind. But the question is like asking which is more important to human life? Air, water or food? Air to the human like money to the company which is urgently needed for survival but the person’s lack of water and food is like company’s inadequate social and environmental performance can eventually prove deadly as well”(Blackburn 2012; pg 21).

Research Gap

Most of the relationships in reverse supply chain management has been studied with the aim of having environmental and/or social and/or economic performance but not all the three aspects of sustainability (Govindan and Popiuc 2014, Sheu and Gao 2014). We would like to study how focal companies manage its relationships with other partners in reverse supply chain management for sustainable performance.
Methodology

For answering our research question, we adopted inductive qualitative research approach via a series of interviews from exemplars in sustainable e-waste management. Qualitative research enables us to answer both ‘why’ and ‘how’ questions and also provides in-depth explanations for phenomena (Barratt et al. 2011, Eisenhardt 1989).

Rationale for organization selection

Our objective was to investigate how leaders in sustainable e-waste are doing e-waste management differently. Hence we focused on exemplars. Identifying exemplars for sustainable supply chain was tricky (Pagell and Wu 2009) hence we took the help of ratings for sustainability given by a globally well-known third party NGO. From our initial list of organizations we collected data from two original equipment manufacturers (OEMs). To conceal the identities of these companies, we used fictitious names. We tried to use a name that captures some aspect unique to that particular focal company. Socioelectronics is the Indian electronics manufacturer having global presence with respect to manufacturing and marketing. It is in the first position of NOO’s international rating for Greener electronics. And Technoelectronics is the world’s leading computer systems company having fifth position in the same rating for Greener electronics. For our study, we focused on management of only few products such as laptops, Desktops and ultra-books. Data were collected during January to July 2014.

Data collection

We used a semi-structured interview. This allow us to focus on unique characteristics at each company. Our unit of analysis of study is the relation between the focal (OEMs) and partner organizations. The first point of contact at the focal company had member from top management team with title such as Sustainability Head or VP Supply Chain or Business Head from exemplar electronics firms. We explained initially and discus the context of the study with them. Then we interviewed the head/VP with the help of strategic part of interview protocol to understand their perspective about the e-waste management and letter on interviews branch out to their reportees. They gave us the idea about e-waste management at operational level and also introduced us the contacts of their e-waste partners. In addition to interviews, we used data from multiple sources such as archival, observations, website information, sustainability reports etc. Combining multiple data sources with interviews helped us in triangulation of data which help to alleviate biases thereby improving reliability and validity (Eisenhardt, 1989). The data will be collected phase wise – first, second and third. In first phase of data collection we had telephonic interview with the informants from two of the focal companies and also collected the contacts for reverse supply chain partners. We analyzed the data from the first phase. Accordingly in the second phase, we will visit both the focal and partner organizations to have an in-depth understanding about the relationships. In the third phase we will visit few more exemplars cases. The data will be collected phase wise – first, second and third. In first phase of data collection we had telephonic interview with the informants from two of the focal companies and also collected
the contacts for reverse supply chain partners. We analyzed the data from the first phase. Accordingly in the second phase, we will visit both the focal and partner organizations to have an in-depth understanding about the relationships. In the third phase we will visit few more exemplars cases. Number of the case studies will depend upon whether we are at the saturation point or reaching the amount of data which can be processed in the single study. (Eisenhardt, 1989) suggest three to ten cases can be used for multiple case study research.

**Analysis and discussion**

Following the procedure given by Eisenhardt (1989) and followed by Wu and Choi (2005), we first conducted within case analysis. We identified relationship dynamics between focal and partner organization and their strategy and then cross case analysis was conducted.

*Within case analysis*

Within case analysis offer the detailed description of two cases studied- Socioelectronics and Technoelectronics. Each case is written through data triangulation by using interview data and archive data such as information from company websites, reports simultaneously. Each case begins with some background information, companies’ vision and mission and then it proceeds to product characteristics, focal companies’ strategic objective, focal and partner organization relationships.

Socioelectronics is a multinational IT Consulting and System Integration services company in India. As of 2014, the company has market capitalization approximately $20.8 billion, and seventh largest IT services firm globally. Spirit of Socioelectronics is in integrality to win with sensitivity all the time. Socioelectronics was one of organisations that lead the way in solving the e-waste problem through Extended Producer Responsibility (EPR). They started their operations for take back program in 2007. It provides convenience to the customers through about 300 approved collection centers. Detailed information is provided to on e-waste management process through dedicated website. Reported annual recycling rate of about fifty percent in comparison to its sales seven years ago and they provide data on monthly collection and recycling of e-waste. The whole process chain is depicted below: All e-waste from the collection centers is segregated for reuse or recycle. First process is ‘data wiping’ before it is sent for further processing. All the components checked thoroughly and sent for respective processing. The balance material-waste is forwarded to an approved e-waste recycling dealer.

*Technoelectronics* is an US based multinational computer company, that manufacturers and repairs computers and related products. The company has revenue of $14.1 billion 2014. They believe in “Listen, Learn, And Deliver.” They worked toward creating an innovative closed-loop supply chain to introduce plastics from used electronics back into our new products. To lay the foundation for a full program launch, they on boarded a new partner for e-waste collection and has state-of-the-art proprietary technology to sort plastics from the rest of the waste stream. To grow the take-back collection they are taking help of expansion into developing countries and also ensuring the proper environmental management of the products. One of the collections points located within Nairobi operates on a microfinance model. A loan from the OEM funds the...
collection point’s operations, and a woman entrepreneur and her all-female staff collect e-waste from local businesses and homes and all workers receive proper job training and safety equipment. They also receive a steadier income than the informal recycling sector provides and are paid via secure mobile payments. Also, to maximize the lifetime use of the products, they worked with nonprofit partner to establish a donation program that offers the customers in Europe the option to donate their used electronics for reuse by youth education programs in developing countries. Nonprofit partner manages the transport and setup of all donated equipment working and after a defined period of time, the systems come back to nonprofit partner and are recycled.

Cross case analysis
Each case described above views sustainability in reverse supply chain management with different perspective. The characteristics of the relationship and each company’s viewpoints are captured in Table 1. The table lists and compares strategic intent of both focal and partner companies in a relationship, way to achieve this strategic intent through relationship, relationship characteristics, and its implication on sustainability from both the partners point of view.

Discussion
E-waste management can enhance the profit through collaboration with bulk consumers as a part of product stewardship strategy. It provides the maintenance service to the product through annual maintenance contract thereby decreasing product complaints which not only decreases the complaint handling cost but also increases revenue by increasing repeat customers due to product satisfaction. Also, because of regular product service, life span of product increases which means rate at which product go to the landfill decreases which saves the environment. Whereas, collaboration with recyclers is useful to provide social benefit in terms of employment and spreading awareness. Also, training and development programs help in empowerment of unauthorized recyclers. Also, decentralized processing of e-waste decreases the logistics cost. Collaboration with online partners acts as single point of contact for e-waste collection and remarketing. It is beneficial for customers as well as for OEMs in terms of information visibility, thereby economically helpful in coordination and logistics. Also, online partners and NGOs are useful in increasing brand visibility and reach for OEMs. Collaboration of governments with industry experts can help government to form strategies for e-waste management to fulfill the legislation. Advantage being, it will act as level playing field so that no one can free ride with others efforts of e-waste management. Data suggest organizations with social strategic intent are more successful in achieving sustainable supply chain. It is observed that such organizations try to partner with nontraditional partners such as NGOs, online resellers in addition to traditional partners such as third party logistics, retailers etc. Sometimes it is zero sum game with the partners; still they are into relationship for society as well as environment. Through NGO and resellers, product can be made available to under privilege section of the society. Apart from these advantages, OEMs face some dilemma with some of the relations. While collaborating with third party remanufacturers, for remanufacturing the product under the original brand, OEM’s has to share know-how with the remanufacturing companies which they are not comfortable with. In this case, coordinating with company’s own sub venture, which is into remanufacturing, helps. Also, in case of remarketing the product under the OEMs brand, they fear dilution of brand or may get wrong identity because of quality of remanufactured product and on the other hand fear of cannibalization if they do not remanufacture under the same brand.
### Main Results and Managerial Implications

Designing effective e-waste management system has vital implications for firms and the society. One of the contributions of this study is to recognize the appropriate e-waste management structure for OEMs for sustainability. We show that firms can plan the e-waste management to boost the profits, demand, and can also increase social and environmental performance. To better achieve the above intend, suggested coordination mechanisms is by having social strategic intent by OEM rather than solely economic intent. Also, this study makes a contribution to the inter-organizational relationship literature with the context of e-waste management, by identifying the relational characteristics underlying such systems required for sustainable performance. We conclude that firms make a preference of supply chain partners, which may be appropriate in diverse environments, depending on the strategic intent of the organization.

Secondly, study shows cooperation between OEMs and e-waste members can collectively enhance their performance. Crucial partners include recyclers, bulk consumers, online

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**Table 1: Details of cross case analysis**

<table>
<thead>
<tr>
<th>Company name</th>
<th>Partner / Collaboration with and Coordination basis</th>
<th>OEM’s Strategic intent</th>
<th>Partner’s strategic intent</th>
<th>Coordination mechanism</th>
<th>Type of collaboration</th>
<th>Implication on sustainability to OEM</th>
<th>Implication on sustainability to partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioelectronic</td>
<td>Recyclers</td>
<td>Employment for all</td>
<td>Economic benefit</td>
<td>Decentralization of recycler Training/development program for unauthorized recycler’s</td>
<td>Cordial working</td>
<td>Zero cost model</td>
<td>Get the business, empowerment</td>
</tr>
<tr>
<td>Bulk consumers</td>
<td>Product stewardship</td>
<td>Environmental, legislative</td>
<td>AMC, Buy back</td>
<td>Contractual</td>
<td>Customer retention</td>
<td>Extended life for equipments</td>
<td></td>
</tr>
<tr>
<td>Technoelectronics</td>
<td>Online partners</td>
<td>Single point of contact</td>
<td>Economic benefit, Visibility</td>
<td>Joint programs</td>
<td>Subsidiary</td>
<td>Reach to maximum</td>
<td>Reputation economic benefit</td>
</tr>
<tr>
<td>Third party logistics</td>
<td>Product stewardship, legislation</td>
<td>Product acquisition</td>
<td>Service centers, Microfinance, Revenue sharing</td>
<td>Contractual</td>
<td>Reduction in landfill volume</td>
<td>Economic benefit</td>
<td></td>
</tr>
<tr>
<td>Customers</td>
<td>Value for all</td>
<td>Value, service</td>
<td>AMC, Buy back</td>
<td>Contractual</td>
<td>Customer retention</td>
<td>Economic benefit</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>Legislation for all</td>
<td>Developing a strategy</td>
<td>Information sharing, Joint policy making</td>
<td>Financial support, Employee volunteering</td>
<td>Legislation</td>
<td>Level playing field</td>
<td></td>
</tr>
<tr>
<td>NGO</td>
<td>Reach</td>
<td>Social Benefit</td>
<td>Use of donation sites</td>
<td>Provides existing set up</td>
<td>Increase in Recovery volumes</td>
<td>Helping the community</td>
<td></td>
</tr>
</tbody>
</table>
remarketing partners, NGO and governments. Coordination mechanism such as cordial working relationship and alliance partnership is more suited with recyclers. It is seen as more trusted mechanism with the customers both in terms of data security for used product and reusing or disposing product in environmentally friendly way. In case of nontraditional partners such as government and NGO, cordial working relationship and financial support is essential for the relationship. Whereas OEM’s subsidiary is more appropriate for remarketing as it helps in building reputation and confidence for resale product among customers. Additionally, a cooperative e-waste management can increase the competitiveness of all chain members, create profit by sharing environmental responsibility. It develops e-waste management processes which are needed to protect the environment, thereby enhancing competitiveness. Also, research shows that to create a win-win condition it is not necessary for both the partners to have direct economic benefit. Most of the sustainable businesses see these partnerships as benefit for the society thereby indirectly getting benefitted through customer retention and through abiding with the legislation. This research allows managers better understanding of the characteristics of sustainable business partners for end-of-life returns management.
References


