Inter-organizational Relationship Co-evolution in Green Supply Chain Management

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Abstract

This paper proposes that transactional governance and knowledge governance are intertwined in the determination of firm green supply chain management relationships. We try to identify the key mechanisms and co-evolutionary consequences of transactional governance and knowledge governance in green supply chain management. Applying on the supplier and customer relationship context, our primary focus is on the green supply chain management relationship of Taiwanese OEM suppliers in order to maintain the global sustainable competitive advantage. The paper hereby provides insights into how an organization is able to successfully and strategically align its supplier relationships with its environmental programs.

Keywords: inter-organizational relationship, co-evolution, green supply chain management
1. Introduction

The outstanding performance of Taiwanese OEM suppliers creates the economic miracle of Taiwan as well as becomes the driver of industrial development and structure transformation in Taiwan. Moreover, Taiwanese OEM suppliers still play important roles in worldwide production network in many of the important global industries. Since globalization dramatically increased and global environmental issues have caught attention of academic literatures, scholars in the strategy field and practitioners during this decade, most enterprises face a great deal of pressure from rivals, customers and suppliers respectively in the ever-changing landscape. Specifically, complying with requirements of customers within the industrial network, most enterprises need to follow regional, national and international laws and regulations. Environmental issues cross boundaries from enterprise to customers, suppliers, rivals, the community and the environment itself. Maintaining a working ‘industrial ecosystem’ for industrial technology-based products needs to occur throughout the supply chain, particularly for enterprises with operations in countries that have varying levels of environmental regulations (US AEP 2002). Therefore, environmental supply chain management becomes a key competitive issue for enterprises.

Under the context of OEM suppliers are part of the global specification, the relationship between OEM suppliers and overseas brand-name customers is a typically “supplier – customer” inter-organizational relationship (Ernst, 2000). Base on the above arguments, our primary focus is on the “green” inter-organization of Taiwanese OEM suppliers in order to maintain the global sustainable competitive advantage.

The main purpose of this paper is trying to find out: (1) the content of dual governance and the main theoretical interpretations; (2) How transactional governance and knowledge governance co-evolves together and create green relationships?

2. Green Supply Chain Management

This section briefly introduces the definition of SCM and GSCM originated from the previous literatures we survey during the last decades. Handfield & Nichols (1999) proposed that supply chain encompasses all of the activities associated with the flow and transformation of goods from raw materials (extraction), through the end users, as well as associated information flows. As we have noted, the circular and systemic philosophy of “ecosystem” thinking (Shrivastava, 1995) is not merely explicitly included but not considered central to its definition in the integration of the full cyclical supply chain. We thus, thereby review a lot of previous research of the supply chain
literature in general. Admittedly, a number of possible definitions of GSCM have been put forth over the past decade including Green et al., (1996) posited that Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment. In additions, Narasimhan & Carter (1998) stated that environmental supply chain management consists of the purchasing function’s involvement in activities that include reduction, recycling, reuse and the substitution of materials. The practice of monitoring and improving environmental performance in the supply chain … (Godfrey, 1998). The term ‘supply chain’ describes the network of suppliers, distributors and consumers. It also includes transportation between the supplier and the consumer, as well as the final consumer . . . the environmental effects of the researching developing, manufacturing, storing, transporting, and using a product, as well as disposing of the product waste, must be considered (Messelbeck & Whaley, 1999). Since review the definitions of GSCM through the previous literatures, we indeed have a clear somewhat understanding on the nature of GSCM. The definition of the purpose of green supply chains, which ranges from reactive monitoring of general environmental management programs to more proactive practices such as the 4Re’s (e.g. recycling, reclamation, remanufacturing, reverse logistics) of environmental management and incorporating “innovations,” also seem to differ.

In this paper we both consider and define the GSCM practices dimensions and items (internal environmental management, external GSCM, investment recovery, and eco-design or design for environment practices respectively) are based on previous literature that addressed various elements of GSCM (e.g., Carter et al., 1998; Zsidisin & Hendrick, 1998; Walton et al., 1998; Zhu & Cote, 2002; Zhu & Sarkis, 2004). All four major GSCM practices are integrative and need cross-functional cooperation rather than oriented towards a single function or sole department.

Internal environmental management is a key to improve enterprises’ performance (Carter et al., 1998). Besides, external GSCM relationships (e.g. supplier certification) and eco-design (also defined as design for the environment) are two emerging approaches in evidence in the developing countries (Zhu & Cote, 2002). Furthermore, United States and European enterprises have also take the investment recovery into consideration for a critical aspect in green purchasing and GSCM (Zsidisin & Hendrick, 1998). Investment recovery is a traditional business practice, but it can also be considered a green practice since it can reduce waste that may have otherwise been disposed.
3. Implications of Inter-organization Governance in Green Supply Chain Management

Drawing on the research that call for IORs, much of the literature focus on inter-organizational exchange activities and production activities, and interactive relationship types of these activities (Grandori, 1997b, p. 903).

Inter-organizational governance is one of the most important researches for IORs researchers. However, governance is a multidimensional concept (Heide, 1994); different theoretical frameworks make different assumptions about the nature of governance. The arrangement of information flow and resource flow, which also refers to the organizing and planning of the quantities, quality and directions of information or knowledge, is the most important implication in the definitions of inter-organizational governance (Sobrero & Schrader, 1998; Ring & Van de Ven, 1992; Heide, 1994). The former determines the efficiency of communication, coordination and problem solving in organizations as well as the appropriations of collective outcome (Zaheer & Venkatraman, 1995; Sobrero & Schdler, 1998; Subramani & Venkatraman, 2003). This perspective is in step with the transaction / contract governance concept of transaction cost theory. The purpose of knowledge flow arrangement is emphasizing the effectiveness of specific value activities through inter-organization knowledge transferring and sharing. It is associated with knowledge governance perspective in knowledge-base view (Foss, Husted, Grabler, 2004; Mahnke & Pedersen, 2004). These two perspectives in IORs research are complemented (Amin & Cohendet, 2000; Foss & Mahnke, 2000; Nooteboom, 2004). Table one presents the details of the above discussions.

Table 1: Transaction governance and knowledge governance

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<th>TRANSACTIONAL GOVERNANCE</th>
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<td>I BOUNDED RATIONALITY</td>
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<td>I KNOWLEDGE IS AN INPUT</td>
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<td><strong>NATURE OF GOVERNANCE</strong></td>
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Source: this study

(1) Transactional governance perspective in GSCM

Based on the behavioral assumption of opportunism and the transactional contract context, traditional transaction governance researchers emphasize the design of safeguard mechanism in order to lower transaction cost (Williamson, 1991; Rindfleisch & Heide, 1997; Gulati, 1998). This paper will only focus on the implication of relational governance. Relational governance is a governance mode maintaining with mid-term or long term relationship under specific context (Ring & Van de Ven, 1992; Heide, 1994; Zaheer & Venkatraman, 1995; Joshi & Campbell, 2003). The rationale of relational governance is in line with social perspective instead of economic perspective (Zaheer & Venkatraman, 1995). International OEM relationship emphasizes social norm to implement the purpose of safeguard, bilateral adjustment and mutual understanding to underlie inter-organization coordination (Joshi & Campbell, 2003), and on-going relationship maintenance decision–making standard to be the basic of inter-organizational adjustment (Dyer & Singh, 1998; Joshi & Campbell, 2003).

In GSCM context, researches argued interfirm linkages are facilitated the
transactional governance and lead to improvements in the environmental performance (Frosch, 1994; Gregory, 2004). Florida (1996) states that closer bonds between suppliers and customers, which can facilitate cleaner production, are the trend in manufacturing as leading firms need such close relationships with suppliers to incorporate management strategies such as just-in-time, continuous improvement and total quality management. Closer ties to suppliers are also likely to facilitate diffusion of innovation approaches to environmental management, and environmental performance can be an added benefit of lean management initiatives as suppliers and customers share the responsibilities for improved efficiency and waste minimization (Florida, 1996). Geffen and Rotherenberg (2000) build on the work of Frosch (1994) and Florida (1996) by showing the environmental benefits of collaborative relations with suppliers. Dyer and Singh (1998) argue that interfirm relations provide formal and informal mechanisms that promote trusts, reduce risk and in turn increase innovation and profitability.

(2) Knowledge governance perspective in GSCM

As compared to opportunism-based, transactional governance perspective, knowledge base view researchers take bounded rationality (limited cognitive ability) as a point of departure to build research (Conner & Prahalad, 1996). In addition, because of strategic organizational knowledge used to be tacit and sticky manifestations of knowledge, the arrangement of inter-organizational knowledge flow is an important issue for knowledge management. In contrast to transaction cost approach, KBV researchers view knowledge as necessary input of organization task and decision making as well as output of task and decision implementation (Amin & Cohendet, 2000). Indeed, the creation, exchange and accumulation of organizational knowledge are taken place simultaneously (Foss & Mahnke, 2000). Therefore, compare to information flow base transactional governance perspective, knowledge governance is more complex and dynamic.

The major rationale of inter-organizational knowledge governance perspective is the achievement of organizational learning, knowledge acquiring, knowledge creation and accumulation by structural arrangement of inter-organizational knowledge flow. Drawing on the GSCM literature reviews, firms transfer knowledge through their supplier chain and support the notion that environmental learning occurs within the firms’ supply chain (Gregory, 2004).

4. Coevolution of Inter-organizational Relationship in GSCM

The co-evolutionary perspective is emerging as an important organizing framework for inquiring into organizational conduct and outcomes as a joint function of
managerial efforts and selection pressures imposed by the environment (Lewin and Volberda, 1999; Volberda and Lewin, 2003).

According to Lewin and Volberda (1999), the properties of co-evolution includes: (a) Multilevelness/Embeddedness; (b) Initial condition and consequence (Doz, 1996; Hite & Hesterly, 2001; Inkpen & Currall, 2004; Jacobides & Winter, 2005); (c) Positive feedback and recursive bidirectional causality (Volberda & Lewin, 2003); (d) Multidirection causalities; (e) Nonlinearity. Base on the above points, this study is trying to interpret the requirements of the perspective of co-evolution in GSCM.

(1). Multilevelness: Co-evolutionary effects take place at multi levels within firms as well as between firms. This approach recognizes that process of variation, selection and retention operate within the organization and interact with similar processes operating at the population level. This paper focus on the inter-organizational transaction between supplier and customer will impact the knowledge governance of focal firm (supplier) and reveal as co-evolutionary relationship cross IOR and firm level.

(2). Evolutionary mechanisms: A Central idea of the co-evolution framework is that organizations and their environment co-evolve by a process characterized by multidirectional influences amount an organization, its environment and other interacting organizational populations (Baum, 1999; McKelvey, 1997).

Adaptation is specifically viewed to take place through idiosyncratic exploration and exploitation process at the organization level. Both exploration and exploitation are deemed critical from the viewpoint of organizational survival and prosperity (March, 1991). Due to this study is focusing on the dual governance coevolution in GSCM; we will describe the evolutionary mechanisms. In transactional governance, the drivers are: (a) re-evaluation: further understand of the existing or potential partners (Inkpen & Cullar, 2004) and evaluation of the contract relationship (Doz, 1996). (b) selection and Retention: select and keep the contract relationship (Jacobides & Winter, 2005). (c) adaptation/re-adjustment: base on the perspective of TCE, incomplete contract is caused by environmental uncertainty and bounded rationality. The transaction process is re-negotiation and re-adjustment process and affects the relationship change (Doz, 1996; Rindflesch & Heide, 1997; Inkpen & Currall, 2004). On the other hand, the drivers of knowledge governance are: (a) generative variation: after receiving the order from customer, supplier scan outside knowledge as well as recombine existing knowledge and in turn generate variation; (b) internal selection: after gaining outside knowledge or technology, supplier evaluate and select useful knowledge and skill; (c) replicate: diffuse useful knowledge and skill and conduct in each department; (d) enactment the best practice and routinization.
(3). Evolution consequences: The evolve consequences of transactional governance and knowledge governance in GSCM practices are: (a) environmental requirement by customers are set up as practices such as purchasing requirements, employee training and certifications under the ISO 14000 series (Green et al., 1996), (b) environmental information sharing will be in the form of new product design, R&D and supplier selection practices (Gregory, 2001; Zhu & Geng, 2001) (c) environmental collaboration ranges from sharing personnel and equipment to co-developing recyclable products and cleaner process by substituting materials or reducing waste and energy (Walton et al, 1998). Research framework is showing as follow:

![Fig. 1: Dural governance co-evolution in GSCM](image)

5. Implications and Conclusion

This strategic perspective of coevolution of interorganizational relationship implies firm can co-evolve by means of leveraging inter-organizational relationship and obtain knowledge resource and asset. Moreover, reciprocal relationship allows performance benefits to increase not only on the virtual profit but also the invisible value. Specifically speaking, firm builds necessary and adequate relational capital (Kale et al., 2000), relational capability (Zaheer & Venkatraman, 1995), networking learning (Powell, Kogut & Smith-Doerr, 1996; Gulati, 1999) and social capital (Nahapiet & Ghoshal, 1998; Yli-Renko, Autio, E. & Sapienza, 2001) through IORs is able to generate benefits (value creation) and prevent disadvantages (value appropriation), and then accumulate inter-organizational competitive advantages (Dyer & Singh, 1998) as well as co-evolve.

The most important implication of above IORs strategic perspectives in GSCM for this paper is the Taiwanese OEM suppliers should devote to maintain specific GSCM
supplier-buyer relationship with their international dominant buyers (Heide, 1994). Thus, international dominant buyers can recognize the value of Taiwanese OEM supplier and enhance their understanding of joint value creation and co-evolve in the GSCM environment (Subramani & Venkatraman, 2003). In summary, this paper extends understanding of how Taiwanese OEM suppliers (vulnerable suppliers), who typically do not have the bargaining power to neither lower their safeguarding cost nor increase capability of value creation, though greening relational governance and knowledge governance that presented in previous section as dual governance coevolution.

**References**


[42] Volberda, H. W. and Lewin, A. H., C., "o-evolutionary dynamics within and


