
Available from: http://dx.doi.org/10.1108/14601061211272358

Copyright © Emerald Group Publishing Limited.

This is the author's version of the work, posted here with the permission of the publisher for your personal use. No further distribution is permitted. You may also be able to access the published version from your library. The definitive version is available at http://www.emeraldinsight.com.
Motivations towards environmental innovation:  
_A conceptual framework for multiparty cooperation_

Mohammad Yarahmadi  
PhD candidate, Faculty of Engineering and Industrial Sciences,  
Swinburne University of Technology, Melbourne, Australia  

Peter G Higgins  
Senior lecturer, Faculty of Engineering and Industrial Sciences,  
Swinburne University of Technology, Melbourne, Australia  

Abstract  
*Purpose* – The purpose of this paper is to examine the green innovation literature using a conceptual framework developed to explain the driving forces behind environmental cooperative activities of firms. The framework links motivations to the different type of partners in the context of environmental innovations.  

*Design/methodology/approach* – Literature on innovation, environmental innovation, sustainable development and strategic management is examined in order to build the conceptual framework.  

*Findings* – This paper suggests that firms cooperate with governmental agencies, NGOs, suppliers, customers and industry associations to comply with environmental laws and regulation, obtain legitimacy as well as acquire competency (i.e. access to resources such as funds, knowledge and skills). However, only competency-oriented motivation stimulates organisations to cooperate with competitors and knowledge leaders.  

*Research limitations/implications* – The model developed is conceptual and qualitative in nature. More research that is empirical needs to be conducted to test for the validity of the six formulated propositions.  

*Originality/value* – The significance of this paper is twofold. First, it integrates two different strategic management theories: resource-based and institutional theories in explaining cooperative environmental motivations. Second, it develops a framework that provides a basis for more theoretical and empirical studies.  

*Keywords* Environmental innovation, Cooperation, Partnership, Institutional theory, Resource-based theory  

*Paper type* Conceptual paper
I. Introduction

It is broadly accepted that businesses are responsible for many of our current environmental problems such as global warming and resource scarcity (Porter and van der Linde, 1995; OECD, 2009). This has created a demand from the society, government, interest groups and all other stakeholders to ask firms to shift from traditional practices to more innovative green practices (Azzone and Noci, 1998; Bansal, Pratima and Roth, 2000; Conceição et al., 2006). This includes change and revision in strategies, manufacturing practices, product designing methods, resource consumption and waste disposal techniques so as not to put further pressure on the natural environment.

Environmental management and innovation literature are both increasingly stressing on environmental innovation as a means of boosting a firm’s competitiveness while maintaining the environment and its valuable resources for the future generations (Cleff and Rennings, 1999; Rennings, 2000; Biondi et al., 2002; Frondel et al., 2008; Carrillo-Hermosilla et al., 2009; OECD, 2009; Potts, 2010). In many aspects, environmental innovation represents a separate sub-group of general innovation with a focus on reducing or avoiding harm to the environment (Rennings, 2000; OECD, 2009; Carrillo-Hermosilla et al., 2010). Some characteristics, however, make an environmental innovation different from a non-environmental innovation.

First, environmental innovation is not an open-ended concept as it characterizes innovation that explicitly stresses the reduction of environmental footprints, whether intended or not (OECD, 2009). Second, an environmental innovation creates two positive externalities. It provides knowledge during the research and innovation phases. It then reduces environmental effects and generates externality in diffusion phase, which is socially desirable. Where the private return on research and development in environmental technology is less than its social return, firms are not strongly motivated to invest in such innovation. Hence, to address this reticence, intervention by government has been advanced (Rennings, 2000; Mazzanti and Zoboli, 2005). Third, the scope of environmental innovation is broader than the non-environmental innovation. Extending beyond product and process innovation to encompass social and institutional structures, it entails alteration of social norms, cultural values and institutional structures (Rennings, 2000).

While there is still doubts for some corporate decision makers whether adoption of green innovations conflicts with their economic performance and competitiveness, for many environmental innovation is an opportunity to open up new markets and become market leader (Porter and van der Linde, 1995). Nevertheless, the complex nature of environmental innovation in most cases has made the green movement a multi-party task requiring the participation of more than an individual firm. Evidence has been found in the recent research emphasising the growing role of cooperative arrangements in advancing environmental innovations (Collins et al., 2007; Horbach, 2008; Vachon, S. and Klassen, 2008; Mazzanti and Zoboli, 2009; De Marchi, 2010; Posch, 2010).
Firms may have various reasons for forming environmental partnerships. For some, partnerships are one way of obtaining legitimacy from stakeholders and complying with environmental laws and regulations (Bansal, Pratima and Roth, 2000). These firms are motivated by concerns about their public image; avoidance of penalties; or seeking approval of their products from their business partners (Fiedler and Deegan, 2007). For others, a partnership is an opportunity to join evolving market for green innovations. Their motivations to enter into cooperative arrangements are access to new knowledge, sharing risk and pooling resources, each of which is essential to the gaining of competitive advantage (!! INVALID CITATION !!).

Despite the copious research in the general field of innovation regarding the underlying drivers of partnerships, (Jorde and Teece, 1990; Tether, 2002; Fariaa et al., 2010; Zeng et al., 2010) such evidence is scant for environmental innovation. Moreover, existing environmental innovation and environmental management literature lacks clarity in identifying influential partners. Evidence is scarce for explaining the extent to which different partners contribute to the environmental innovations of a firm. These gaps in the literature lead to the following research questions:

1. What motivates firms to cooperate with other organisations in adopting, developing and implementing environmental innovations?

2. In the advancement of the environmental innovativeness, which organisations contribute and how do they do so?

Answering these research questions will clarify the debate surrounding the determinants of environmental cooperation and sheds more light on the role of different partners. These questions are answered in this paper via an extensive literature review and subsequent development of a framework, coupled with related research propositions based on the conceptual theory (Meredith, 1993; Wacker, 1998).

The paper is structured as follows. The importance of cooperation section underlines the importance of cooperation for innovation and examines motivations for environmental cooperation from resource-based and institutional theories. The Methodology section explains the importance of theory-building research and the method used to construct the conceptual framework. The Conceptual framework section explains how motivations for environmental partnerships links to different types of organisations, thereby providing the foundation on which propositions are formulated. The Summary and implications section provides discussion and implications for researchers, corporate managers and policy makers. The Future research section offers four theoretical and empirical research opportunities.
II. The importance of cooperation

Recent research on organizational innovation stresses the critical role of cooperative activities in advancing innovation within firms (Belderbos et al., 2006; Halila, 2007; Nieto and Santamaria, 2007; Tsai, 2009; Besser and Miller, 2010; Lambert and Schaeffer, 2010; Zeng et al., 2010; Barbara Bigliardi, 2012). Tether (2002, p.p.949) defines collaboration for innovation as:

“Active participation in joint R&D and other technological innovation projects with other organizations. It does not necessarily imply that both partners derive immediate commercial benefits from the venture.”

The argument supported by many scholars and practitioners is firms that shift their approach from internally focused R&D, closed innovation, to collaborating with multiple organizations, open innovation, are expected to achieve higher innovation results (Peña and Arroyabe, 2002; Chesbrough, 2003; Terziovski, 2003; Beyerlein et al., 2006; Mohannak, 2007; Soosay et al., 2008; Bigliardi et al., 2010). In an open innovation paradigm, firms may still obtain their innovation ideas from internal sources, but some ideas are generated through cooperation with external partners, which can also aid in developing and introducing those ideas to the market (Chesbrough, 2003; Barbara Bigliardi, 2012). Nieto and Santamaria (2010) argue that technological cooperation acts as an input to the innovation process and allows firms to bridge the innovation gap with their bigger counterparts. Belderbos et al. (2006), by a means of survey among large sample of innovative firms in Dutch, found an overall positive impact of R&D cooperation on productivity. Nevertheless, the degree of reliance on external partners varies from one industry to the other (Chesbrough, 2003). For example, the analysis by Tether (2002) of 1275 innovative manufacturing and service enterprises in UK shows that almost 50% have some form of relationship with external partners for innovation purposes.

In explaining the importance of cooperation for environmental innovation, we use two distinct but complementary theories from strategic management: resource-based and institutional theories. The selection of these two theoretical lenses is based on their strength in explaining and predicting inter-organisational relationships. A simple search in academic journals will demonstrate how management literature has benefited from using these two theories together or separately over the past few decades.

Institutional theory

Institutional theory posits that cooperation amongst firms may arise as a result of compliance with regulations (Oliver, 1991) and obtaining legitimacy or credibility from stakeholders (Dacin et al., 2007). The term “legitimation” is defined as the public acceptance of an actor or activity from a social perspective (Dacin et al., 2007). The motivation to form partnerships are sets of institutional norms, values, rules and external pressures (Bansal, Pratima and Roth, 2000). Institutional theory suggests that the institutional constituents (Oliver, 1991), which include government, society, interest groups,
and the public, impose considerable pressures on firms to rationalise their business and strategic practices and outputs. Environmental protection agencies, for example, determine a variety of procedures that firms are obliged to follow. Having conformed to these norms and rules, organizations increase their legitimacy and reduce the risk of receiving public criticism and financial penalties for non-compliance (Oliver, 1991).

Bansal and Roth (2000), in a case study of fifty-three firms in UK and Japan, found out that legitimacy issues threaten a firm’s reputation or it’s long term survival. For example, in reply to the motivation for being environmentally responsive, one interviewee said, “We wanted to improve the image … and make it easier for us to operate” (Bansal, Pratima and Roth, 2000, p.725). Bansal (2005) argues that firms motivated by legitimation are more concerned about their influential stakeholders on whom the actors depend for physical, human, financial, or reputation capital. The more broadly diffused are institutional expectations or practices, the higher the likelihood that organizations will conform to these expectations (Oliver, 1991). Supply chain partners, regulators, industry constituents, and public environmental groups exert such pressures (Hartman and Stafford, 1997; Dacin et al., 2007).

Government exerts pressure through strict rules on polluting industries by using such methods as carbon prices. Those firms that fail to meet the minimum standards receive the risk of non-compliance penalties, plant shutdown, and media attack (Hartman and Stafford, 1997; Lin and Darnall, 2010). Therefore, firms may align with regulatory stakeholders to obtain legal approval. In a similar way, large corporations who receive input from many suppliers could force their suppliers to comply with some specific norms and standards. Take the example of a small size supplier and a large size customer, where the supplier is highly dependent on the large company to sell the goods. If the customer insists that the supplier have to create outcomes with environmentally friendly specifications, it is unlikely that the small firm will avoid the imposition (Oliver, 1991). Thus, small firms may align with their customers in a supply chain to reduce the risk of being replaced by less environmentally harmful competitor.

The institutional pressure arising from public interest groups, local communities, and occupational and professional associations is another driver for partnerships (Lin and Darnall, 2010). In pursuit of social legitimacy, a firm may establish cooperation with these groups to increase its legitimacy as a socially responsible company. This is most likely to occur when constituents of the firm’s environment are vigilant in monitoring business behaviour and when firms operate in industries where social and public issues are especially salient. Disregarding public and society may result in product de-selection by the marketplace, boycotts, sanctions, loss of opportunities for state contracts as well as missing the opportunity to receive subsidies (Dacin et al., 2007).
Dacin et al. (2007) argue that small firms have even a greater need to obtain legitimacy compared to the large organizations whose past performance provides legitimacy and access to resources for them. When the motivation for cooperation is compliance with institutional norms and rules, we call it a “compliance–oriented” partnership.

**Resource-based theory**

The resource–based theory asserts that firms could gain competitive advantage if they own resources and capabilities that are valuable, non-substitutable, rare and not imitable by their competitors (Barney, 1991; Hart, 1995). According to Barney (1991, p.101) a firm resources include “all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness”. Das and Teng (2000) classified resources to property-based or knowledge-based. Property-based resources refer to legal properties possessed by firms, including financial capital, physical assets, and human resources, while knowledge-based resources are a firm’s intangible knowledge and skills. Unlike property-based resources, knowledge-based resources are hardly imitable due to the knowledge and information barriers (Das and Teng, 2000; Bakar and Ahmad, 2010).

Drawing on the resource-based theory, partnerships can benefit firms in several ways. Firstly, partners may access heterogeneous resources (property-based) that do not exist within a single firm (Barney, 1991; Mesquita and Lazzarini, 2008), but essential for environmental innovations (Brió and Junquera, 2003; Carrillo-Hermosilla et al., 2010; Gavrónski et al., 2011). By pooling resources, firms can considerably reduce the cost of environmental innovations. Biondi et al. (2002) give the example of ceramic tile industry, where firms within the same geographic area have been sharing expensive equipment to recycle broken tiles. Examples are abundant for vertical cooperation with buyers (or Vis versa with sellers). Environmentally innovative solutions in areas such as waste minimisation, energy efficiency, material and packaging optimisation have shown to be efficient in reducing operating costs for participants and have lead to higher performance levels (Geffen and Rothenberg, 2000; Rao and Holt, 2005; Vachon, S. and Klassen, 2008).

Secondly, a partnership advances the corporate learning through a reciprocal flow of knowledge and information, which shares the risk and learning of environmental innovations (Lin and Darnall, 2010). Firms with a higher knowledge and understanding of the environment are more likely to identify market opportunities and establish technological innovations, which can then be shared to their partners. The continuous interaction among partners creates a capability for continuous environmental innovation that leads to a sustained competitive advantage (Sharma and Vredenburg, 1998). Carter and Rogers (2008) expand this view to the resources of a supply chain. The knowledge that is transferred...
among supply chain members is more technical, less transparent, takes longer time, and therefore is more difficult to be replicated.

Thirdly, partnerships could also enable firms to move towards entirely new clean technologies or reformed business models where sustainable practices replace old and environmentally unfriendly ones (Moore and Manring, 2009). They play an important role at every stage of the development of these technological innovations. Partners provide appropriate information in the early stages when critical decisions have to be made. For radical innovations such as clean technologies, firms need to have structured R&D (Biondi et al., 2002). Therefore, they have to rely on their partners. Examples observed, have included competitor firms sharing advanced technological resources such as experimental plants, and laboratories to test and develop environmental innovations. Given the complexity of some new technologies, the implementation phase requires substantial support from various experts (Biondi et al., 2002).

The resource-based theory suggests that the underlying principle for partnerships is the value that can be obtained from resources when contributors pool together (Das and Teng, 2000). When the driver to forming a partnership is resource-based, it is entitled a “competency-oriented” partnership (Lin and Darnall, 2010, p.236).

III. Methodology

Literature on innovation and literature on environmental management are both increasingly focusing on environmental innovation as a means of boosting a firm’s competitiveness while maintaining the environment and its valuable resources for the future generations (Cleff and Rennings, 1999; Rennings, 2000; Biondi et al., 2002; Frondel et al., 2008; Carrillo-Hermosilla et al., 2009; OECD, 2009; Potts, 2010). Despite evidence of theoretical development in the literature of innovation (Lee and Om, 1994; Markard and Truffer, 2008; Gnyawali and Park, 2011) and environmental management (Vastag et al., 1996; Zsidisin and Siferd, 2001; Tony, 2008; Marques et al., 2009), there is little research into theory building in environmental innovation. This is particularly so concerning conceptual frameworks that allow the formulation of testable hypotheses and propositions.

Flynn et al. (1990) emphasise that empirical research always has a theoretical foundation, whether it is theory building or verification. Meredith (1993) argues that a balance between inductive and deductive reasoning is attainable by means of developing theoretical frameworks, something that is often overlooked by both researchers and journals (Colquitt and Zapata-Phelan, 2007). According to Meredith (1993, p.7):

“A framework is essentially a pre-theory and may well substitute in many ways for a theory. That is, like theory it may identify relevant variables, classify them, describe their interactions, and allow a mapping of items (such as the existing literature or research studies) on to the framework.”
Conceptual research assists in the development of a valid theory using a framework for analysis that includes different viewpoints on the same topic (Meredith, 1993; Wacker, 1998). Through the logical building of relationships and the interplay of competing theories, researchers can develop new insights that may reveal deeper theoretical meaning. By integrating analytical and empirical testing within an integrated body of knowledge, researchers may more consistently and effectively develop the understanding of a field through clear scientifically founded explanations (Wacker, 1998): in our case, motivations towards environmental innovation.

The aim of this paper is to develop an integrated conceptual framework that clarifies the relationship between partnerships with different organisations for developing environmental innovations and a firm’s motivations for such partnerships. The method for developing the framework is through building logical relationships with carefully selected concepts (Wacker, 1998). This objective is sought by reviewing studies within the arenas of environmental innovation, environmental management, strategic management and sustainable development. The process entails summarising the similarities and differences of the arguments advanced in these studies, on which new theoretical constructs are built, which Meredith (1993, p.8) calls “Philosophical Conceptualization” and Wacker entitles (1998, p.373) “Analytical conceptual research”.

Following a systematic approach to support the framework, a list of keywords that relates to the literature was established. Keywords were drawn mainly from documented research including conference and journal papers, doctoral theses, books, websites and speaking to experts in the field. The selected keywords were categorised into three groups: theories (e.g., resource-based theory, institutional theory, conceptual framework, etc.); environmental innovation (e.g., environmental innovation, green innovation, sustainable innovation, eco-innovation, etc.); and cooperation (e.g., green partnership, green cooperation, green collaboration, environmental partnership, environmental cooperation, environmental partnership, Government, NGO, competitor, supplier, customer, industry association, university, technology centre, etc.). An extensive search of academic databases (e.g., “ScienceDirect”, “EBSCOhost”, “Emerald”, “Scopus” and “Google Scholar”) was conducted using various combinations of keywords from these three groups. The linkage between papers helped to find other relevant literature.

Once papers were collected, they were examined, and classified into seven groups. The first group was labelled theories and frameworks, and each of the remaining six groups were labelled according to the type of partner (e.g., government, NGOs, etc). This was an iterative process over a period of 15 months from May 2010. It required reading, finding patterns, discussing with colleagues, collecting additional literature, synthesising, and revising the framework. The literature used for this paper is from 1990 onwards when the debate on the environmental impacts of businesses became a major stream of academic studies. Regarding the scope of literature, publications that were very technical
such as mathematical modelling or highly focused on ecological aspects were excluded from the review.

IV. The conceptual framework

This section presents a framework based on the type of organisations that a firm cooperates with for environmental purposes, follows by propositions. Six types of organisations identified in this paper: government, NGOs, knowledge leaders, suppliers and customers, competitors and industry associations. Environmental cooperation cases are included to support the propositions.

Cooperation with governmental agencies

Along with technological development and demand factors, government intervention would trigger firms to move towards environmental innovations. According to Porter and van der Linde (1995) government environmental regulations oblige firms to give up harmful technologies and processes and find ways to improve their environmental performance. Government might overcome firm’s inertia to adopt or develop more environmentally friendly mechanisms (Kivimaa, 2007; Eiadat et al., 2008). Government policies also can affect more environmentally sound technologies in the development or diffusion phase or stop certain technological innovations by imposing rigid environmental laws (Kivimaa, 2007).

Nevertheless, the results of a number of research (See Eiadat et al., 2008), indicates that regulations are not enough to prompt all firms to adopt environmental innovations. In fact, many environmentalists believe command-and-control regulations, especially in form of mandating specific technologies, confine the innovative ability of firms. Furthermore, government regulations may change with political movements, making them uncertain (Hartman and Stafford, 1997).

Realising the limitation of strict environmental regulations, governmental agencies nowadays devote more resources and R&D funds to incentive and collaborative programs. Sustainability Victoria, a state Government's agency in Victoria, Australia for instance, through various programs works closely with individuals and organisations across both the private and public sectors aiming to inspire and assist them to improve their environmental, social, and economical performance (Sustainability Victoria, 2010). Kivimaa (2007), through several case studies shows how government technological push via public R&D funds encourages firms in pulp, paper and packaging industries to develop environmentally friendly product and process innovations. Another example is the cooperation between the Ministry of International Trade and Industry (MITI) in Japan and a private corporation, Taiheiyo to produce eco-cement made from waste products. It was almost impossible for Taiheiyo or other corporations to initiate such an environmental initiative that requires substantial investment on research and development without government support.
Voluntary policies, and within them those based on cooperation, are the most stimulating for the adoption of proactive environmental practices, especially those more innovative practices that may even extend beyond legal regulation (César, 2010; Laura et al., 2010). For example, motivated to share environmental knowledge and increase the awareness of firms about sustainable practices, public and private sector formed a network, so called “Green Network” in Denmark in 1994. Since its establishment, more than 300 companies and public institutions have actively worked together for greater sustainability (Lehmann et al., 2010). Fiedler (2007), through a series of in-depth interviews with representatives of building and construction firms, found that forming environmental partnerships helps to satisfy the concerns of main stakeholders, particularly government to a great extent.

Despite the advantages of cooperation between corporations and governmental agencies, some problems still keep the relationship at a low level, especially for medium and small size firms. They include the complexity of environmental regulations; different government bodies at the local, state and federal levels with different responsibilities; and low level of trust and communication between public and private sector (Laura et al., 2010).

Firms engage in cooperative activities with government agencies to obtain legitimacy for their operations and obtain resources, especially funds that individually do not possess. Therefore, we advance the following proposition:

**P1**: Cooperation with government is positively related to both competency and compliance–oriented motivations and advances the environmental innovation.

**Cooperation with NGOs**

Over the last few decades, the number of Non-Governmental Organizations (NGOs) around the globe has increased noticeably. Nowadays, they have more power and the scope of their activities has been expanded (Schneidewind and Petersen, 1998; Mantel et al., 2007). NGOs are now actively involved in many programs that once used to be handled by governments (Bendell, 2000). In regards to the environmental issues, NGOs endeavour to play a role at local, national and international levels. NGOs have shifted from only being reactive observers to active partners who greatly influence the environmental performance of the firms (Tilley, 1999; Horbach, 2008). NGOs have changed the way they used to interact with enterprises. Instead of attacking firms for their unawareness of environmental issues, they now offer them consultation services on how to become green. Environmental groups, as facilitators, assist firms to be aware of ecological issues by providing information. Companies can access new forms of expertise and ideas externally by working with NGOs that have a wealth of knowledge in their respective areas of interest (Bendell, 2000).
There are numerous successful examples of cooperation between businesses and NGOs. For instance, Greenpeace, an internationally prominent environmental NGO, publicly supported the World Business Council for Sustainable Development in its bid to persuade global action on climate change at the 2002 Earth Summit held in Johannesburg. Greenpeace also allied itself with Foron, an almost bankrupt German appliance maker, to assist its development and marketing of “Greenfreeze”, an ozone-safe hydrocarbon refrigerator. Foron, was not only rescued from bankruptcy, but made considerable profits as an “early mover” compared to its opponents (Schneidewind and Petersen, 1998). The cooperation between McDonalds and the Environmental Defence Fund (EDF) is another case of successful NGO-business cooperation. The partnership resulted in the replacement of polystyrene clamshells with quilted-paper wrappers, which in turn improved McDonald’s image and lowered the costs (Hartman and Stafford, 1997). In another example, World Wildlife Fund (WWF) allied with Coca-Cola to preserve priority river basins worldwide and introduce environmental innovations into the company’s practices and products. Other gigantic firms such as Dole, Adidas, Wal-Mart and IBM have been also working with WWF to improve or transform their practices (Matthews, 2011).

Environmental advocacy groups assist firms to be aware of environmental issues by providing information. They also mobilise popular support in the implementation of government’s green policies, and socialise green values (Zhu and Geng, 2010). While they may cooperate with a company on one issue, they may publicly criticise it on other issues, thanks to the new information technologies (e.g., Internet). NGOs, nowadays, can organise campaigns, send out information about environmental issues, and stop the progress of environmentally unfriendly projects, even at the very end of a company’s complex supply chain (Bendell, 2000). That is why their role as guardian still is very important for companies. For example, concerning about environmental impacts of the method used for extracting oil, Greenpeace Australia stopped the Stuart Shale Oil Project. The project cost was more than AU$ 360 million and was a partnership between Suncor Energy from Canada, Southern Pacific PetroleumN/L and Central PacificMinerals N/L (Fiedler and Deegan, 2007). Nevertheless, NGOs have limitation on what they should address because they have inadequate financial resources that are very much dependent on public and private sectors, their members and donors (Hall, 2001; Mantel et al., 2007).

Firms form partnerships with NGOs to avoid non-compliance risks as well as to receive consultation services. Thus, we advance the following proposition:

**P2**: Cooperation with NGOs is positively related to both competency and compliance–oriented motivations and advances the environmental innovation.
Cooperation with suppliers and customers

There is a growing literature focusing on environmental concerns within supply chains (Simpson et al., 2007; Seuring et al., 2008; Zhu et al., 2008; Tate et al., 2011) coined “green supply chain management (GSCM)”. Srivastava (2007) defines GSCM as “integrating environmental thinking into supply-chain, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life”. Nevertheless, the cooperation of buyer-suppliers on environmental issues dates back to decades ago when cost saving opportunities encouraged both parties to eliminate the waste from the production processes and improve the efficiency of their processes and equipments (Sarkis et al., 2011).

Buyers, especially large organisations, are often holding accountable from a wide range of stakeholders for environmental performance of their suppliers. Poor environmental performance of suppliers can expose the buyer to high levels of environmental risk. Dropping environmentally incompetent suppliers from the procurement list could be sometimes costly and risky; therefore, their involvement is a better decision (Hall, 2001). Using three case studies of US assembly plants, Geffen and Rothenberg (2000) showed how the engagement of suppliers resulted in successful innovative environmental technologies for automobile manufacturer. They argue that closer buyer-supplier relationship increases the knowledge of suppliers about the operations of buyers; therefore, suppliers can better serve the needs of buyers. A survey conducted by Rothenberg (1999) on automotive assembly plants in North America and Japan proved that suppliers could be useful sources of innovative ideas for environmental improvements. Suppliers often have business with several customers within related industries; as a result, they have greater access to external information and more experienced with different technologies.

From a supplier’s perspective, motivations of cooperating with corporate customers are different. While small clients may have limited control over their suppliers, large clients dictate their needs and wants to their suppliers in a hierarchical fashion. That is, small suppliers may have no substitute, but to engage in what is deemed appropriate for the customer firm. They are increasingly under pressure from business customers and consumers to reveal the information about environmental impacts of raw materials and substances used in delivered products. Customers want to know how products are made and distributed and what ecological effects they have; they ask for evidence of organisational innovations (e.g., ISO 14001); they monitor environmental performance of suppliers through regular audits (Revell and Blackburn, 2007; Vachon, Stephan, 2007). Interestingly enough that HP, one of the largest IT companies in the world, declared that in 2004, $6 billion of new business depended in part on answers to customer questions about the environmental and social performance of the company.
These demands reshape markets, create new business risks, and generate opportunities for those prepared to respond (Esty and Winston, 2006).

For some suppliers, the importance of cooperation is not only the influence of customers, but the market opportunities that exist in such cooperation (Tate et al., 2011). Customers are main sources of market signals because they are closer to final consumers (Azzone and Noci, 1998). When consumers demand products with less environmental impacts, those suppliers who already established close relationships with the customer firms have a higher chance of being able to deliver consumers’ demand. In addition, large customers have resources such as human expertise, or funds that small supplier firms do not have. A few examples of the areas that suppliers and customers may work together include (Green Business Network, 2001; Simpson et al., 2007; Bala et al., 2008; Eiadat et al., 2008; Zhu et al., 2008; Martin-Tapia et al., 2010):

- Cooperation on green design and manufacturing projects;
- Sharing tools used for environmental improvements;
- Jointly finding ways to use equipment and processes that have lower life cycle impacts;
- Devising ways to take back and recycle or refurbish end-of-life items and packaging

Firms cooperate with supply chain members to fulfil their requirements as well as to acquire resources and competencies (Siu and Bao, 2008; Vachon, S. and Klassen, 2008). Therefore, we advance the following proposition:

\[ P3: \textbf{Cooperation with supply chain members including suppliers and customers is positively related to both competency and compliance-oriented motivations and advances the environmental innovation.} \]

**Cooperation with competitors**

Cooperation among supply chain actors (vertical relationship) is easier to grasp because it is mainly based on the transaction of materials and commodities. Partnering with competitors, knowledge leaders and industry associations (horizontal relationship), on the other hand, is more informal and invisible (Maria Bengtsson, 1999). The traditional notion is those who compete cannot cooperate (Maria Bengtsson, 1999). However, recent research shows that while firms struggle to obtain more market shares to make profit (Belderbos et al., 2006; Tsai, 2009; Varis and Littunen, 2010), they can also share some useful resources with their competitors that enable them to become more competitive (Fariaa et al., 2010). An eco-advantage of even one single competitor can change the competitive playing field. Some businesses take advantage of their environmental innovations and enhance the public awareness so that people would not like to buy products from other companies that do not meet some particular environmental requirements. In response, competitors may cooperate to reduce the
risk of first movers (Lin and Darnall, 2010). In 2006, about 68 Competitors, in the office furniture industry in West Michigan (USA), for example, came together and worked closely to establish nationally-recognised sustainability standards that enable the whole industry to gain competitive advantage while preserving the environment and contributing to greater societal benefits.

There are times that competitors work together on environmental issues not because they seek market advantage, but simply they want to avoid competitive disadvantages (Azzone and Noci, 1998). Nevertheless, cooperation with competitors has always been controversial. While they may lead to economic and environmental benefits, they might also facilitate collusion (Maria Bengtsson, 1999).

Cooperation with competitors is considered to enhance firms’ knowledge and capabilities of environmental innovations (Tsai, 2009). Therefore, we advance the following proposition:

**P4:** Cooperation with competitors is positively related to competency-oriented motivations and advances the environmental innovation.

**Cooperation with knowledge leaders**

Knowledge leaders such as technology centres, research institutes, and universities help firms to acquire rare resources and capabilities (Belderbos et al., 2006). Interaction with universities assists firms to stay in touch with the cutting edge of evolving issues, especially, environmental matters (Mohannak, 2007; Nieto and Santamaria, 2010; Zeng et al., 2010). This cooperation mainly revolves around research and development initiatives to improve different technical qualities such as material or energy efficiency, or to introduce novel products. However, the linkage is not all about ecological matters. It also provides companies with sources of new and innovative ideas that enable firms to gain competitive advantage. Along with the flow of knowledge that exists in such relationship, companies are in contact with educated experts that could be prospective employees.

Using two Danish sustainability innovation network case studies, Lehmann et al. (2010) analysed the role of universities. They gave emphasis to the intermediary role of universities in cooperative ties. Their research showed that universities contribute to sustainable innovation in various ways ranging from knowledge leaders and basic research to technology transfer and dissemination. In a collaboration between engineers at UCLA and a private sector, polymer solar panels are about to be developed that are more efficient than what is currently on the market (Science Today, 2011). Another good example is the partnership between the Caravan and Camping Industry Association (CCIA) of NSW, Australia and the University of Western Sydney. This partnership provided a mechanism for the program leaders to be audited and to be required to listen to their members concerning barriers to implementation and assistance required. The Gumnut Awards was designed with the assistance of the university researcher to encourage the members of the society to identify the gaps in their
environmental performance and find environmentally innovative solutions to reduce the environmental impacts of their parks.

Sometimes the role of university researchers is more than basic research or design, and includes set of services too, like the Mitka case. Mitka stands for “mobility solution for individual transport over short distances” and is a “roofed, three-wheeled, human-powered vehicle with an electric engine that doubles human pedalling power” (Berchicci, 2009, p.94). This was a project conducted by the Dutch Institute of Industrial Technology (TNO) in cooperation with Gazelle, a major bicycle company, and The Design for Sustainability (DfS) group at Delft University of Technology. The university role was to design detailed features of the Mitka concept and to conduct consumer research, examine user acceptance of the Mitka and to design different Mitka accessories through students’ projects (Berchicci, 2009).

While universities may not be completely involved in ecological initiatives because their main purpose is to train educated experts for future careers, research centres have the ability to work on ecological issues with more focus and resources. Azzone and Noci (1998) report the collaboration between Fiat group, an Italian car manufacturer, and external research centres in removing polyurethane from car bumpers, so that recycling process becomes viable. In another case, four companies in the Finland paper industry jointly with the Finnish Funding Agency for Technology and Innovation, Tekes, funded a research project that was conducted by VTT Technical Research Centre. The aim of the project was to develop an ecological paper that uses less fibre, is recyclable and have a better quality (Kivimaa, 2007).

The dependency of environmental innovations on knowledge leaders is partially because green innovations are often characterised by rather new technologies such as renewable energies where research that is more fundamental is needed. Therefore, we advance the following proposition:

**P5**: Cooperation with knowledge leaders is positively related to competency-oriented motivations and advances the environmental innovation.

**Cooperation with industry associations**

The reputation of any single corporation is at least partially linked to the industry in which it operates. A bad image of one company may shift criticism to the whole industry. Take the example of the explosion of carbide’s facility in Bhopal, India in 1984- known as “Bhopal gas tragedy”. This Catastrophe caused 3,787 deaths due to the gas release (Mishra et al., 2009). After this, the entire chemical industry was seriously under pressure to respond. This caused a set of actions from government and the public to limit the industry’s operation. Therefore, it is sensible why industries also reflect on their members’ environmental performance (Esty and Winston, 2006; Troshani and
Reputation is not the only factor that inspires firms to cooperate with industry associations. Industry associations usually lobby with political groups and establish relationships that influence policies in favour of their members (Esty and Winston, 2006). In addition, industry associations offer a wide range of educational programs such as environmental courses for their members. For example, the Vinyl Council of Australia is advancing the sustainability of the vinyl or PVC industry in Australia through sharing information on, and working closely with stakeholders regarding the life cycle of PVC (Vinyl Council of Australia, 2010).

One main barrier for companies to implement environmentally innovative solutions is the high cost and the high risk of failure. Industry association through their strong connections with government bodies can apply for funds and overcome this problem for their members. Industry associations also provide a platform for members to cooperate with each other on environmental agenda. Australian Industry Group, a peak industry association in Australia, for example, in cooperation with Sustainability Victoria, a government agency, developed a two-year program called ‘The Resource Smart Business Industry Pilot’ to encourage and help companies in two food supply chains to identify environmental opportunities and develop innovative solutions. This Pilot helped participants to develop a shared understanding of environmental issues; provided a platform for ongoing communication; and aid them to identify business opportunities associated with developing environmental innovations as well as being aware of risks that may affect their businesses by carbon pricing ("A supply chain based Approach to carbon Abatement: pilot study," 2011). Therefore, we advance the following proposition:

**P6**: Cooperation with industry associations is positively related to both competency and compliance–oriented motivations and advances the environmental innovation.

V. Summary and implications

The general absence of theoretical frameworks in innovation literature (Shrivastava, 1994; Rennings, 2000; Etzion, 2007) leads to a call for the publication of theoretical works incorporating environmental thinking to address this gap. The few conceptual frameworks that are available have limitations. Some are limited in scope, in that they examine only supply chain partners (Carter and Rogers, 2008; Seuring and Müller, 2008; Van Bommel, 2011). Others lean towards a particular discipline or direction (Bronder and Pritzl, 1992; Tippet et al., 2007; Pagell, 2009). This paper fills this gap by examining the motivations for environmental cooperation and developing a framework that links these motivations to different type of partners in the context of environmental innovations. Theoretical and practical implications are discussed below.
**Theoretical implications**

This paper elucidates the drivers of business cooperation for environmental innovation. The argument presented is that in adopting or developing environmental innovations, firms could benefit from cooperating with partners in two ways. From the perspective of institutional theory, they may receive the support of partners to manage common problems such as complying with new environmental regulations as well as obtaining legitimacy or credibility from influential stakeholders. From the perspective of resource-based theory, partnerships may help them access diverse resources and capabilities not existing within a single firm.

The conceptual framework links the motivations for environmental cooperation to six types of partners (government, NGOs, knowledge leaders, suppliers and customers, competitors and industry associations). The framework resulted in the formulation of six propositions stating that firms cooperate with governmental agencies, NGOs, suppliers, customers and industry associations to comply with environmental laws and regulations, obtain legitimacy as well as acquire competency (i.e. access resources such as funds, knowledge and skills). However, only competency-oriented motivation stimulates organisations to cooperate with competitors and knowledge leaders.

**Practical implications**

From an institutional-theory perspective, there is an ever-increasing pressure from public and private sector demanding shifts in business practices towards more environmentally sustainable practices. Disregarding this demand could create problems for companies: loss of reputation, penalties, and in some extreme cases company shut down. Nevertheless, proactive corporation can turn the institutional pressures to market opportunities by collaborating with other organisations.

From a resources-based theory point of view, for firms, tackling environmental innovations on their own is not an easy task. It requires skills, capabilities and knowledge of different disciplines. Besides, environmental innovations in form of advanced clean technologies are high-risk investments. Therefore, firms may decide to cooperate with other organisations.

Corporate managers are often unaware or in doubt about the benefits, they may gain from cooperation with other organisations. For example, some business managers may avoid working with NGOs or governmental agencies because they think these organisations only exert pressure and perceive their roles as “watchdogs” (Mantel et al., 2007). This paper, however, shows how NGOs together with other organisations could benefit corporate environmental innovativeness, through funding, and provision of skills and knowledge. Furthermore, corporate decision makers may find our framework useful, especially those with limited human, capital and financial resources, because it can
help them to allocate resources according to their expectation from each relationship, whether it is competency or compliance.

For policy makers, perhaps the most significant implication arising from our study is the need to strengthen existing environmental regulations with a focus on a policy framework that encourages and supports firms in forming partnerships. Governments themselves should act as role models in forming such partnerships. Although, some evidence was found for government-industry partnerships, this evidence is still scarce. According to Eiadat et al. (2008, p.143) “The stick being waved by the regulator seems to be insufficient to trigger firms to adopt environmental innovation strategies.”

VI. Future research

This framework could be used for further theoretical and empirical research. One area of research would be to test the validity of our tentative propositions. Validity can be tested by either conducting a survey using questionnaires (Green et al., 1994; Kemp and Arundel, 1998) or performing multiple case studies (Maxwell, 1996; Yin, 2011). Case studies, in the form of examining motivations in dyad relationships (e.g., a firm and governmental agencies or NGOs, etc.) or within a supply chain (e.g., buyer and first and second tier suppliers) have the advantage of getting in-depth understanding, which is essential for this emerging field of research. On the other hand, quantitative studies, based on large sample sizes provide a holistic view, which is useful for generalisability and comparative analysis objectives.

The aim of this paper is to advance understanding of environmental cooperation motivations using two well-established theories. Future research could enrich our framework by examining the motivations for environmental partnerships through other organisational theories: Transaction Cost Economics (TCE), Resource Dependence, Stakeholder, Ecological Modernization, Social Network, Complexity; and Information theories (Zsidisin and Siferd, 2001; Carter and Rogers, 2008; Sarkis et al., 2011; Tate et al., 2011).

Our expectation is that firms motivated to work with other organisation on a competency base are more likely to achieve higher-level environmental innovations, beyond pollution control technologies. Being more innovative means a greater likelihood of reaching higher environmental and economic performance (Eiadat et al., 2008). The next stage of our research examines these relationships from evidence collected regarding differently motivated partnerships in supply chains.

An interesting question for researchers and practitioners is whether the relationship between organisational cooperation and environmental concerns should be studied separately with its own framework, or, as we believe, it should be integrated into the existing innovation models to create more integrative frameworks and theories. While the importance of cooperation has been examined and studied by innovation scholars from many angles, it seems there is a lack of interest when it comes
to considering the natural environment. This unwillingness towards including the environment was also observed by Srivastava (2007) in operations management research. A possible reason might be the cross-disciplinary nature of environmental innovation that requires a thorough understanding of innovation itself and environmental management issues.

VII. Acknowledgment

We would like to thank Ms. Jo Brownlee from Sustainability Victoria for valuable comments on an earlier version of this paper. We are also grateful to two anonymous reviewers for stimulating discussions and constructive comments and suggestions.

VIII. References

(!!! INVALID CITATION !!!).


OECD (2009), *Eco-innovation in industry : Enabling green growth*, OECD, Paris


Yin, R.K. (2011), Qualitative research from start to finish, Guilford Press, New York, NY.


