THE INFLUENCE OF ECO-CONTROL ON ENVIRONMENTAL AND ECONOMIC PERFORMANCE: A NATURAL RESOURCE-BASED APPROACH

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Résumé

Alors qu'une littérature grandissante a examiné et démontré une influence directe de l'adoption des outils d'éco-contrôle sur la performance organisationnelle, peu de recherches ont tenté de comprendre la façon dont cette influence s'opérationnalise au sein des organisations. Se basant sur la Natural Resourced-Based View, l'objectif de cet article est d'ouvrir cette boite noire et d'examiner le potentiel des outils d'éco-contrôles à supporter les compétences environnementales et d'en analyser l'impact sur la performance environnementale et économique de l'organisation.

Mots clés : Outis d'éco-contrôle, Natural resourced-based view, compétences environnementales, systèmes de mesures de la performance environnementale, performance environnementale.

Abstract

While a growing body of literature has examined and demonstrated a direct influence of the adoption of eco-control on organizational performance, little is know about how this influence is operationalized within the organization. Building on Natural Resource-Based View, the aim of this study is to open this black box and examine the potential of the eco-control to foster environmental capabilities and to analyze its impact on environmental and economic performance of the organizations.

Key words: Eco-control, natural resource-based view, environmental capabilities, environmental performance measurement systems, environmental performance.

1. Introduction

While worldwide economic crisis and climate change are two major concerns for actual organizations, the question related to how conciliate these two issues is more than ever a fundamental question. In practices as well as in literacy, the economic impact for organizations of developing sustainable products and processes has been at the heart of numerous debates. Although some managers and scholars questioned the impact of adopting environmental strategies on organizational competitiveness (e.g. Walley and Whitehead, 1994; McWilliams and Siegel, 2000; Nidumolu, Prahalad et al., 2009), a growing body of literature has in contrast argued that they could lead to increase economic performance (e.g. Burnett & Hansen, 2008; Russo & Fouts, 1997; Al-Tuwaijri et al., 2004; Wagner & Schaltegger, 2004; Henri and Journeault 2009a). Certain authors even go farther by mentioning that the adoption of environmental-friendly strategy represents the key driver for creating value and stimulating innovation which are necessary to overcome the economic crisis (e.g. CEC, 2008; Clinton, 2009; Nidumolu, Prahalad et al., 2009). Hence, while a consensus on the financial benefits of improving environmental performance seems emerged, subsequent questions may reside to determine in which circumstances and how organizations may reach this win-win situation.

Recently, the environmental management accounting (EMA)[1] field has shed some light on these important questions by arguing that eco-control may represents one of the mechanisms that can be used by firms to help them to take advantage of the potential benefits related to environmental performance (Schaltegger & Burritt, 2000). As a specific application of management control systems (MCS), eco-control refers to formalized procedures and systems that use financial and ecological information to maintain or alter patterns in environmental activity (Henri and Journeault, 2009a: p.2). Among eco-control studies, some of them have empirically demonstrated that the adoption of eco-control practices can contribute to environmental and economic performance. For example, Judge & Douglas (1998) and Wisner, Epstein, & Bagozzi (2006) have find that the integration of environmental concerns within strategic planning contribute to and environmental and economic performance. Also, Henri and Journeault (2009a) have find that the use of performance measurement systems as well as the integration of environmental concerns within budget and incentive contribute to environmental and economic performance.

However, while these studies have considered a direct influence of the adoption of eco-control on both environmental and economic performance, little is know about how the influence of eco-control on environmental and economic performance is operationalized within the organization. Indeed, all the elements that may intervene between these factors

[1] EMA refers to the identification, collection, analysis and use of financial and non-financial information to support management activities in order to maximize environmental and economic performance and to achieve sustainable business (Henri and Journeault, 2009; IFAC, 2005; Bennett & James, 2000; Bartolomeo et al. 2000).

have been put into a black box. Consequently, the way that eco-control influence organizational development in order to contribute to environmental and economic performance remains an open question. The objective of this study is to offer a first enlightenment to this important question.

One possible avenue of the missing link between eco-control and environmental and economic performance can be provided by the Natural Resource-Based View (NRBV). NRBV represents a specific application of the Resource-Based View that rests on the principle that competitiveness is dependant of specific organizational capabilities controlled by a firm (Lengnick-Hall and Wolff, 1999). Hence, a central element of this perspective is that the development and the maintenance of organizational capabilities conferred to organizations the capacity to create more value than the least efficient competitor (Lengnick-Hall and Wolff, 1999; Peteraf and Barney, 2003). In other words, unique capabilities allow competitive advantage which in turn leads to economic performance improvement.

Several past research has used NRBV and have argued that environmental capabilities, a subset of organizational capabilities, are associate on one hand with firms sustainable development and management (Hart, 1995; van Kleef and Roome, 2007), pollution prevention (Russo and Fouts, 1997), and proactive environmental strategy (Sharma and Vredenburg, 1998; Aragon-Correa and Sanjay, 2003; Aragon-Correa, Hurtado-Torres et al., 2008) and the other hand with competitive advantage and economic performance. Although this research has shed a light on the operationalization of capabilities in a NRBV perspective, marginal support has been provided due to the lack of empirical support and replication. Moreover, while this literature may implicitly suggests that the development of particular capabilities by firms can contribute simultaneously to environmental and economic performance, few studies have specifically investigated this assertion[2].

Also, a recent study of Henri (2006a) has showed that MCS can support the development of firms' capabilities. This research has argued that the use of MCS can foster organizational capabilities by focusing attention on strategic priorities and stimulating dialogue. However, notwithstanding the work of Henri (2006a), few studies have so far examined the influence of MCS on organizational capabilities. Furthermore, no attention has been specifically devoted to investigate the capacity of eco-control, as a subset of MCS, to support organizational capabilities in an environmental setting.

[2] Environmental management and/or proactive environmental strategy represent different concepts of environmental performance and are not automatically linked (Henri and Journeault, 2008; López-Gamero, Molina-Azorín, et al., 2009). Environmental management refers to the «technical and organizational activities aimed at reducing the environmental impact caused by a company's business operations » (Cramer, 1998: p.162). Proactive environmental strategy refers to «a pattern of environmental practices that went beyond compliance with environmental regulations» (Aragon-Correa and Sanjay, 2003: p.71). Environmental performance refers to the outputs or impacts of environmental strategy and management. Therefore results that applied for environmental management and/or for proactive environmental strategy may not be valid for environmental performance.

Addressing limitations and issues identified above within the environmental-economic performance, eco-control, and NRBV literature, the aim of this study is to examine the potential of the eco-control to support environmental capabilities and to analyze its impact on environmental and economic performance. More specifically, two research questions are investigated: (i) To what extent does eco-control support environmental capabilities? (ii) To what extent does eco-control contribute to the environmental and economic performance of the organization? This two research questions are test empirically using survey methodology to obtain data from Canadian manufacturing industries.

The remainder of this paper is organized as follows. The first section presents a review of the NRBV, environmental capabilities and eco-control. Thereafter, the presentation of the theoretical framework and the development of a set of hypotheses are presented. The next section presents a description of the survey design and a definition of the main constructs. The final section presents the theoretical contributions and practical implications.

2. Theoretical framework

2.1 Definition of constructs

2.1.1. Natural Resource-Based View and environmental capabilities

Resource-Based View has received considerable attention in last two decades in literature (Acedo, Barroso et al., 2006). It has become one of the most dominant and widely accepted theories in the field of strategic management (Powell, 2001; Priem and Butler, 2001). This theory is based on the principle that idiosyncratic and valuable resources and capabilities controlled by a firm can provide a competitive advantage (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Barney, 1986; 1991). The fundamental assumptions of this theory is that incomplete factor markets allow resources and capabilities to be heterogeneously distributed among firms and to be imperfectly mobile (Barney, 1991; Peteraf, 1993; Barney, 2001). Distinctive valuable resources and capacities that are imperfectly imitable and substitutable contribute to the firm's sustained competitive advantage that cannot be easily imitated by competitors (Barney, 1991; Amit and Schoemaker, 1993). A central element of this competitive advantage is the development and the maintenance of organizational capabilities that are characterized by complex, reliable, repeatable and distinctive problem-solving routines that combined unique resources of the firms conferring organizations to create more value than the least efficient competitor (Lengnick-Hall and Wolff, 1999; Peteraf and Barney, 2003).

Hart (1995) has been the first author to apply RBV in an environmental context. He developed a conceptual framework of NRBV that attempt to explicate the contribution of a proactive environmental strategy to the development of distinctive and valuable firm capabilities which in turn lead to the creation of competitive advantage. Since this seminal paper, several other studies have conceptually examined the role of environmental capabilities

to build competitive advantage in an environmental perspective (e.g. Aragon-Correa and Sanjay, 2003; Husted and Allen, 2007). However, few studies have empirically attempted to support these theoretical frameworks. Three notable exceptions can be found in the environmental management and strategic literatures. First, Sharma and Vredenburg (1998) have found that proactive environmental responsiveness is associated with the emergence of environmental capabilities. Second, Christmann (2000) has investigated the effects of the three best environmental management practices, namely pollution prevention technologies, innovation of proprietary pollution prevention technologies and early timing, on cost advantage; she found a significant relationship only between innovation of proprietary pollution prevention technologies and cost advantage. However, she found that process innovation and implementation acted as complementary assets that moderated the relationship between best practices and cost advantage. Third, Aragon-Correa, Hurtado-Torres et al. (2008) have found that environmental capabilities influence the development of a proactive environmental strategy which in turn leads to better organizational performance. Hence, marginal support has been providing so far on the capacity of environmental capabilities to contribute to competitive advantage in a NRBV perspective. Moreover, less attentions has been devoted to specifically investigate the contribution of environmental capabilities to environmental and economic performance.

This study investigated four of the most dominating environmental capabilities among the NRBV literature: eco-learning, continuous environmental innovation, stakeholder integration and environmental shared vision. First, based on the definition of organizational learning of Fiol and Lyles (1985), eco-learning refers to the development of ecological insights, knowledge and the associations between past ecological actions, the effectiveness of those actions, and future actions. Eco-learning is the process of change where organizations detect ecological problems and opportunities both within the organization and with the fit between the organization and its changing environment (Kloot, 1997). By improving environmental information within the firms at a faster rate than rivals do and by developing a path-dependent from unique interactions and activities over a long period of time, eco-learning is recognized as a difficult-to-imitate and to substitute capability contributing to the development of a sustainable competitive advantage (Sharma and Vredenburg, 1998; Henri, 2006a).

Second, continuous environmental innovation refers to the ability of firms to create new environmental ideas, products and processes (Hurley and Hult, 1998; Aragon-Correa, Hurtado-Torres et al., 2008). It is related to the entrepreneurial orientation, innovativeness and environmental strategic proactivity of the firm (Aragon-Correa, Hurtado-Torres et al., 2008). Hence, it encompasses the aptitude of firms to initiate strategic environmental changes in their policies and activities. Continuous environmental innovation is largely recognized as a critical factor needed to address both environmental and competitive issues (Hart, 1995; Porter and Van der Linde, 1995b; Hart, 1997). This competitive advantage is provided by constant corporate renewal which stimulates the development of invisible assets which allows organizations to stay a step ahead of competitors (Itami, 1987; Hart, 1995; Sharma and Vredenburg, 1998).

Third, stakeholder integration refers to the ability to establish trust-based collaborative relationships with a wide variety of internal and external stakeholders (Sharma and Vredenburg, 1998). A stakeholder is defined by Freeman (1984: p.46) as «any group or individual who can affect or is affected by the achievement of the organisation's objectives». Therefore, stakeholder integration capability is related to the ability to coordinate functional groups within the firm and to efficiently integrate the requirements, expectations and perspectives of primary external stakeholders, such as investors, customers, and suppliers, and secondary external stakeholders, such as local communities, regulators, and non-governmental organizations (NGO), into a firm's environmental decisions and practices (Clarkson, 1995; Hart, 1995). It involves the development of collaborative relationship with stakeholders involving joint problem solving, information sharing, and negotiations (Sharma and Vredenburg, 1998; Hillman and Keim, 2001; Hart, 1995). These firm-specific relationships are recognized as providing a sustainable competitive advantage by constituting a socially complex, difficult-to-imitate and to substitute capability (Hart, 1995; Sharma and Vredenburg, 1998; Hillman and Keim, 2001; Aragon-Correa, Hurtado-Torres et al., 2008).

Fourth, environmental shared vision refers to the existence of collective values and beliefs about the organizational objectives and mission (Oswald, Mossholder et al., 1994). Environmental shared vision is related to the environmental vision of the top management and its dissemination among all employees by close interaction and communication (Aragon-Correa, Hurtado-Torres et al., 2008). By establishing goal clarity and shared responsibility, it entails a shared feeling of the importance and appropriateness of the firm's environmental objectives and that all the members of the organization may contribute to defining and achieving them (Aragon-Correa, Hurtado-Torres et al., 2008). While such a consensus is difficult to establish and maintain (Hart, 1995), environmental shared vision is recognized as unique firm-specific capabilities contributing to developing a sustainable competitive advantage (Hart, 1995; Aragon-Correa, Hurtado-Torres et al., 2008).

While the NRBV literature provided conceptual and empirical support of the capacity of these four environmental capabilities to create competitive advantage in an environmental perspective, the elements composing these capabilities have also been identified in more general manner as determinants of environmental proactivity and performance within environmental management literature (e.g. learning (Epstein and Roy, 1997; Nidumolu, Prahalad, et al., 2009), environmental innovation (Porter and Van der Linde, 1995a; 1995b), collaborative capacity and stakeholder integration (Dechant, Altman, et al., 1994; Nidumolu, Prahalad, et al., 2009), environmental corporate values and top management leadership (Berry and Rondinelli, 1998; Bansal, 2003)). Hence, considering their potential to contribute to environmental and financial performance, these four environmental capabilities are investigated in this study.

2.1.2 Eco-control

Different eco-control systems may be used by the organization, such as environmental performance measurement systems (EPMS), budget, and incentives (Henri and Journeault, 2009a). Among these eco-control systems, the literature have largely recognized EPMS as a

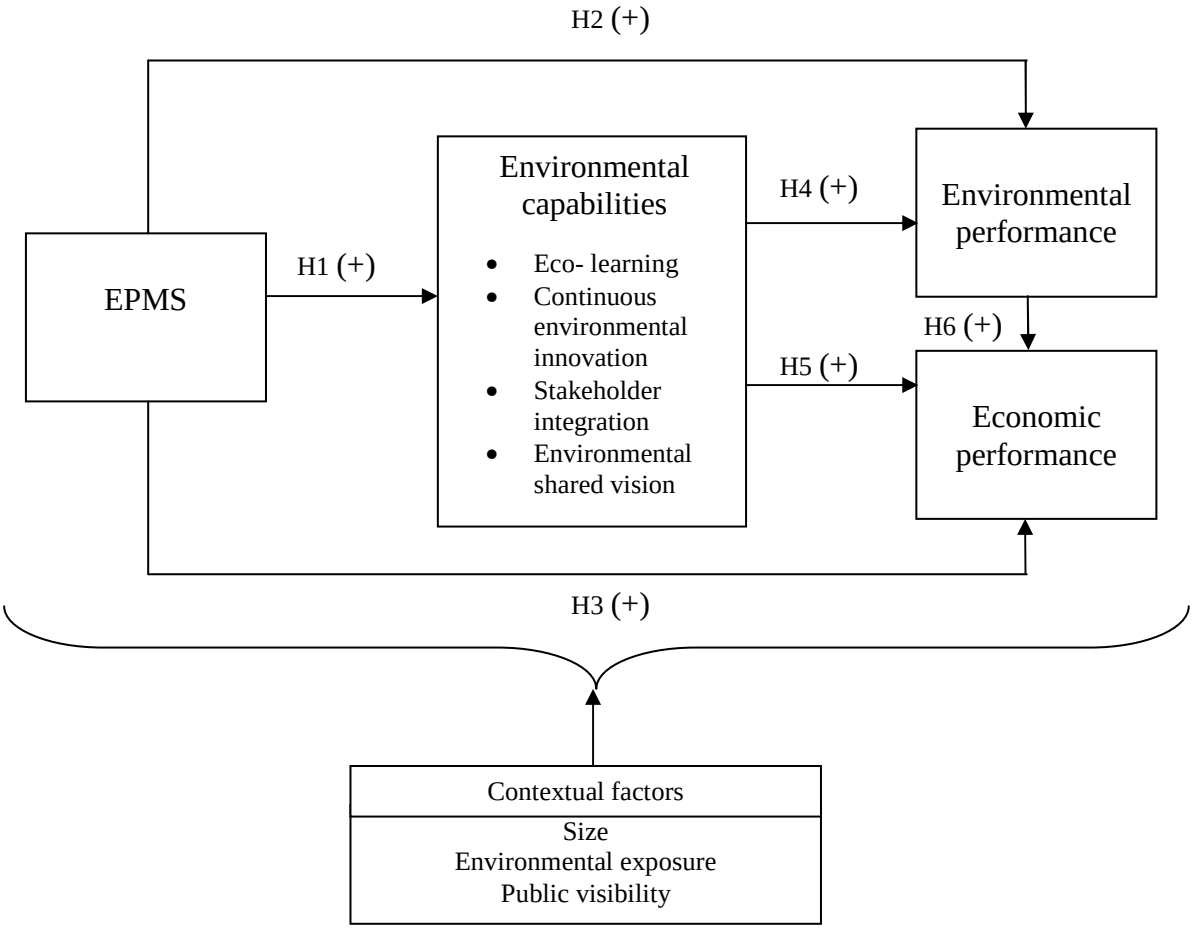
central element of environmental management in organizations (e.g. Tyteca, 1996; Figge et al, 2002; Schaltegger and Burritt, 2000; Epstein, 1994). Also, numerous studies have demonstrated that performance measurement systems are effective tools for fostering business capabilities as well as improving environmental and organizational performance (e.g. Hoque and James, 2000; Baines and Langfield-Smith, 2003; Ittner et al, 2003; Said et al, 2003; Henri 2006a; Henri and Journeault 2009a,b). Hence, the use of EPMS is specifically investigated in this study. EPMS encompass numerical measures that provides key information related to environmental issues (Henri and Journeault, 2008) and about the effectiveness and efficiency of environmental actions (Neely, Gregory et al., 1995). The use of EPMS refers to the extent to which these systems are used by managers to monitor progress and results of organizational activities, to support decision-making in all activities aspects, and to focus attention on environmental issues from inside and outside the organization.

2.2. Overview of the theoretical model

Figure 1 presents a summary of the theoretical model that reflects the relationships among EPMS, environmental capabilities, environmental and economic performance. EPMS is expected to have a positive and direct influence on each of the capabilities of eco-learning, continuous environmental innovation, stakeholder integration and environmental shared vision (hypothesis 1). The model also reflects a direct and positive relationship between EPMS and environmental performance (hypothesis 2) as well as with economic performance (hypothesis 3). Moreover, EPMS is expected to have an indirect positive relationship with environmental performance (hypothesis 4) and economic performance (hypothesis 5) through environmental capabilities. Finally, environmental performance is expected to contribute positively to economic performance (hypothesis 6).

This study includes size, environmental exposure and environmental visibility of organization as contextual factors in order to assess the specificity of different industries and type of firms. Sub-group analyses is performed to assess cross-sample validation and to reinforce the hypotheses tests. Two sub-samples are created and compared by splitting the sample at the median for each of these contextual variables.

Figure 1: Theoretical Model



2.3 Hypotheses development

2.3.1. Relationship between EPMS and environmental capabilities

EPMS represent an informational framework that provides data and feedback related to environmental processes that help to foster environmental capabilities. While EPMS are largely recognized to support the attainment of pre-established environmental goals and monitor deviations (Simons, 1990, 1995; Henri and Journeault, 2009a), these feedback systems generate information on the level of success of the routines and process embedded within environmental capabilities (Epstein, 1996b; Burritt, 2004). Moreover, this cybernetic feedback confers organizational skills and memory to repeatedly execute productive activities without trouble (Ethiraj, Kale et al., 2005), contributing to reinforce environmental capabilities. Also, by revealing cause-and-effect relationships among environmental operations, strategy and goals (Atkinson, Waterhouse et al., 1997; Chenhall, 2005), EPMS help managers to support their strategic decision-making and providing knowledge and understanding necessary to foster firms' capabilities (Teece, Pisano et al., 1997).

More specifically, EPMS can contribute to support eco-learning capability. First, by providing feedback regarding the differences between goals and outputs, allowing the correction of errors and the achievement of pre-set environmental objectives, EPMS facilitates adaptive, or single-loop learning (Argyris and Schön, 1978). Also, following the work of Simons (1995), it is argued that EPMS allows the perception of when the timing is right for seizing new environmental opportunities and strategic orientation. Hence, by offering a framework that support dialogue and debate on the current results of the organization and encourage the employees to scan and search for new ecological opportunities and threats from a changing environment, EPMS offers an informational framework supporting generative, or double loop-learning (Argyris and Schön, 1978). Therefore, EPMS can contribute to support eco-learning capability by ensuring that they continuously provide the right and adequate environmental information necessary to support both adaptive learning in order to attain pre-set organizational goals and generative learning which allows emergent strategy management, new ideas and processes development as well as organizational change.

EPMS can contribute to foster continuous environmental innovation capability by providing information about environmental impacts, costs and benefits of products and processes and helping operating employees to execute continuous improvements in order to enhance environmental-related aspects of such products and routines. Furthermore, EPMS provides an agenda and a forum for regular face-to-face debate and dialogue supporting the development of new environmental initiatives (Henri and Journeault, 2009a). Following the work of Simons (1995), environmental cost reduction, the development of new green processes and products, and the adoption of new technologies can be fostered by creative and inspirational forces of EPMS. Therefore, EPMS plays a double role to foster continuous environmental innovation capabilities by supporting continuous incremental improvement in green routines and products and by allowing more complex and fundamental changes via rethinking and reinventing such routines and products.

EPMS provides an effective framework to support stakeholder integration capability. It represents a means to monitor, evaluate and improve the effectiveness of routines and products to meet the environmental expectations of internal and external stakeholders (Hart, 1995; Henriques and Sadorsky, 1996; Buysse and Verbeke, 2003; Sharma and Henriques, 2005; Husted and Allen, 2007). For example, EPMS may encompasses the monitoring of regulations compliance in order to meet the requirements of regulators, the evaluation of green performance of processes and products throughout the value chain in order to satisfy the expectations of green consumers, and to control waste and emissions in order to ensure good relations with local community and non-governmental organizations (NGOs). Also, EPMS provides an agenda to exchange and debate about the stakeholders' changing expectations and requirements and serve as basis to support the establishment of a trust-based collaborative relationship with stakeholders involving joint problem solving, information sharing, and negotiations (Sharma and Vredenburg, 1998; Hillman and Keim, 2001). Moreover, by integrating and communicating key information through goals setting and objectives about stakeholders' new requests and needs, EPMS can contribute to rebuild and reconfigure processes and products to meet them. Hence, EPMS can contribute to foster stakeholders' integration capability by providing an agenda to exchange and collaborate with stakeholders,

by considering their new expectations in strategic decisions, by allowing process and product transformations necessary to integrate new requirements, and by ensuring their achievement with constant monitoring and corrective actions.

Finally, EPMS can contribute to foster environmental shared vision capability. First, information provided by EPMS allows top managers to confirm their current vision or to rethink and transform it in order to face new environmental challenges and opportunities. Also, EPMS represent a framework helping to the dissemination of environmental vision defined by top managers to all employees by setting and communicating goals and objectives throughout the organization. Hence, EPMS communicate a unified purpose and reason for being to all employees (Simons, 1995; Leuthesser and Kohli, 1997). In other word, EPMS promulgating the environmental strategic agenda to all employees, identify the scope of business operation (Pearce and David, 1987: p.109), and help to focus on what really matters (Ireland and Hitt, 1992: p.34). Therefore, EPMS allow collective unification within organization (Campbell and Yeung, 1991: p.145; Palmer and Short, 2008: p.455) and contribute to foster environmental shared vision.

In sum, EPMS represents an effective framework to support environmental capabilities. Formally stated:

Hypothesis 1a: EPMS are positively associated with eco-learning capability.

Hypothesis 1b: EPMS are positively associated with continuous environmental innovation capability.

Hypothesis 1c: EPMS are positively associated with stakeholder integration capability.

Hypothesis 1d: EPMS are positively associated with environmental shared vision capability.

2.3.2 Direct relationship between EPMS and environmental performance

Following the work of Chenhall (2005), EPMS, just like traditional performance measurement systems, provide a picture of the firm's environmental activities and help the organization to identify, map, measure and communicate throughout the organization the effects of environmental initiatives on environmental performance. They contain a set of indicators providing an understanding of cause-effect linkages among environmental operations, strategy and goals, as well as among environmental issues and various components of the value chain (Henri and Journeault, 2009a). By clarifying and translating vision and strategy, EPMS direct managers to critical areas of environmental concerns and communicate the associations between employees' actions and environmental goals (Kaplan & Norton, 1996; Nanni, Dixon, and Vollmann, 1992).

Also, EPMS support the attainment of pre-established environmental goals and closely monitor deviations from regulations (Simons, 1990,1995). This feedback system allows

managers to direct their attention to drivers that must be reviewed, monitored and corrected in order to realize the firm's environmental objectives. Also, by clarifying expectations, reducing ambiguity associated with tasks to achieve environmental strategies, and providing a coherent reflection of environmental priorities, EPMS enhance environmental performance (Chenhall, 2005; Henri and Journeault, 2009a). Moreover, EPMS becomes one vehicle in promoting environmental goal congruence between individuals and the organization by guiding individual and group actions (Flamholtz et al., 1985; Cyert & March, 1963). These systems motivates people to align their behaviour with the environmental goals of the organization and to exert additional effort, which in turn should improve environmental performance (Bonner et al., 2000; Epstein, 1996a).

EPMS have also the capacity to support environmental performance by focussing organizational attention toward environmental concerns (Henri and Journeault, 2009a). By communicating environmental objective, EPMS send a clear message to all employees that environmental performance is important to the firm (Epstein, 1996a). Also, these systems provide an agenda and a forum whereby discussion, debate, and exchanges of information are promoted (Simons, 1990). Hence, this continuous dialogue among the firm's managers and subordinates allow to focus attention on environmental issues and contribute to undertake actions and initiatives which lead to environmental performance improvement.

Furthermore, the information provide by EPMS support managers' analytical processes et decision making concerning environmental issues (Langley, 1990). While managers need a considerable amount of information to support decisions related to cost reduction, process and production efficiency, regulatory compliance, and product improvement (Epstein, 1996b; Burritt, 2004; Eckel et al., 1992), EPMS are used as a facilitator during the decision-making process and may contribute to environmental performance.

In sum, by providing a complete picture of environmental activities and their link with other operations of the firm, by fostering goal congruence between the organization and their employees, by providing feedback on the firm' level of performance, by focussing attention, and by supporting decision-making, EPMS contribute to environmental performance. Formally stated:

Hypothesis 2: EPMS are positively associated with environmental performance.

2.3.3. Direct relationship between EPMS and economic performance

EPMS are expected to contribute positively to economic performance in three ways: (i) by supporting effective resources management, (ii) by encouraging desirable behaviour and guarding against undesirable one, and (iii) by providing data for external reporting.

First, as argued by Henri and Journeault (2009a), EPMS can support effective resource management by aligning environmental strategy with business strategy and by allowing the identification of value drivers that supports these strategies. This is due to the capacity of EPMS to integrate environmental issues within business processes and to provide a quantification of environmental actions (Henri and Journeault, 2009a). Hence, EPMS force managers to focus on specific activities that contribute to both environmental performance and value creation (Lothe et al., 1999; Gabel & Sinclair-Desgagné, 1993). Also, EPMS can fostered this alignment by connecting business and environmental information systems, goals and objectives, resources allocation and performance evaluation to these value drivers (Ittner et al., 2003). Moreover, while EPMS provide frequent information feedback that compares environmental results with initial expectations, this framework «allows managers to adjust actions or strategies when results fall below expectations, improve communication of specific actions required to achieve those expectations, motivate performance against value drivers, direct managers to areas of critical concerns, and better understand the links among objectives, actions and results» (Henri and Journeault, 2009a: p.5).

Second, by communicating strategic priorities and goals throughout the organization, EPMS encourage desirable environmental actions and guard against undesirable behaviour (Merchant, 1982). By setting environmental priorities at the top of all employees' agendas (Bansal and Hunter, 2003), EPMS focus attention and sustain motivation to address environmental issues and initiate actions in order to improve economic performance. Also, EPMS conveyed environmental values and consolidated them over time which directs employees' behavior and initiatives to seize economic opportunities. Therefore, EPMS guide environmental actions that can have important impact on economic performance by supporting sales improvement, by responding to green consumers' demands, as well as by reducing costs associated with material and energy, process and production, and regulatory compliance (Henri and Journeault, 2009a).

Lastly, EPMS may also contribute to economic performance when used to provide data for external reporting. Numerous studies have argued that organizations disclose environmental information to stakeholders in order to increase their corporate image, reputation, and legitimacy (e.g. Gray, Kouhy et al., 1995; Neu, Warsame et al., 1998; Wilmshurst and Frost, 2000; Deegan, Rankin et al., 2002; Bansal and Clelland, 2004; Cho and Patten, 2007). The improvement of firm's reputation and prestige can increase the loyalty of customers (Ambec and Lanoie, 2008), attract and retain skilled employees (Brown and Deegan, 1998; Boiral and Jolly, 1992), facilitate the access on stock market by satisfying green shareholders from ethical and ecological mutual funds (Klassen and McLaughlin, 1996; Bansal and Clelland, 2004) and reduce the likelihood of costly public policy actions against the organization (Neu, Warsame et al., 1998).

In sum, by contributing to resource management, guiding environmental behaviour, and providing data for external reporting, EPMS foster economic performance. Formally stated:

Hypothesis 3: EPMS are positively associated with economic performance.

2.3.4 Indirect relationship between EPMS and environmental performance through environmental capabilities

A growing body of literature has demonstrated that capabilities of eco-learning, continuous environmental improvement, stakeholder integration and environmental shared vision play an important role in proactively managing environmental issues (Hart, 1995; Sharma and Vredenburg, 1998; Aragon-Correa and Sanjay, 2003; Aragon-Correa and Rubio-Lopez, 2007). While environmentally proactive organizations are commonly recognized for improving their environmental performance by broadly integrating environmental issues within managerial functions and by having extensive involvement and commitment at all firm levels (Ullmann, 1985; Wartick and Cochran, 1985; Hunt and Auster, 1990; Roome, 1992; Henriques and Sadorsky, 1999), the environmental capabilities may constitute key factors needed to attain superior environmental performance.

More specifically, eco-learning capability involve the development of different interpretations of new and existing information resulting in the development of a new understanding of events (Fiol, 1994). Learning processes contribute to major reorientations that involve changed norms, values, and frames of reference (Argyris and Schön, 1978). Eco-learning capability provide key environmental information concerning the effectiveness of past environmental activities (Fiol and Lyles, 1985) allowing environmental awareness (Dechant, Altman et al., 1994) and supporting interpretation and decision-making (Daft and Weick, 1984; Ginsberg and Venkataraman, 1992; Ginsberg and Venkataraman, 1995; Kloot, 1997) of future deployment of processes, products and technologies in order to reach superior environmental performance.

Continuous environmental innovation capability allows the creation of new environmental ideas, processes, and products necessary to improve environmental performance (Hart, 1995; Porter and Van der Linde, 1995b). This capability can lead to the adoption of greener operational practices, such as product and process redesign, disassembly, substitution, reduction, and remanufacturing (Davenport and Short, 1990; Allenby, 1992; 1993; 1994; Dechant, Altman et al., 1994; Shrivastava, 1995b; UNEP, 2007; Henri and Journeault, 2009b) contributing to the reduction of energy and material consumption, waste and emissions. Continuous environmental innovations can also lead to the development and adoption of greener technologies that can reduce environmental impacts (Shrivastava, 1995a; Klassen and Whybark, 1999; Allenby, 2000b).

Stakeholder integration capability represents an effective way of solving environmental issues and accomplishing environmental goals (Dechant, Altman et al., 1994; Hart, 1995). Environmental improvement may arise through the establishment of collaborative relationship with various organizational stakeholders and through the integration of their requests and expectations within products and processes. For example, by establishing partnerships and

alliances with suppliers, organizations can have access to greener components for their final product (Handfield, Walton et al., 1997) and be involved in an industrial ecology network allowing for the reduction of waste and emissions by closing the loops (Erkman, 1997; Allenby, 2000a). Also, the integration of customers' needs and expectations help the organization to identify environmental improvements that must be accomplished and can stimulate environmental innovation in order to reach these requirements (Freeman, 1974; Handfield, Walton et al., 1997). Furthermore, the establishment of a partnership and an agreement with the government can help organizations to receive financial and technical support to help improve their environmental performance (Dechant, Altman et al., 1994).

An environmental shared vision represents a key capability to generate the internal pressure and enthusiasm needed for environmental improvement (Hart, 1995). To attain a high environmental performance, a critical mass of people throughout the organization who share a common vision and are empowered to act on it is essential (Dechant, Altman et al., 1994). Creating such consensus toward the importance of environmental issues assists in focusing organizational attention, clarifying environmental goals and sharing the responsibility to achieve them (Aragon-Correa, Hurtado-Torres et al., 2008). Hence, an environmental shared vision capability stimulates environmental actions and commitment throughout the organization contributing to the improvement of environmental performance.

EPMS have been linked to eco-learning (hypothesis 1a), continuous environmental innovation (hypothesis 1b), stakeholder integration (hypothesis 1c), and environmental shared vision (hypothesis 1d) capabilities. It has been argued above that environmental capabilities are expected to influence positively environmental performance. Thus, EPMS are expected to have indirect implications for environmental performance by contributing to environmental capabilities which in turn improve environmental performance. Therefore, the following hypotheses are proposed:

Hypothesis 4a: EPMS are indirectly associated with environmental performance through their contribution to eco-learning capability.

Hypothesis 4b: EPMS are indirectly associated with environmental performance through their contribution to continuous environmental innovation capability.

Hypothesis 4c: EPMS are indirectly associated with environmental performance through their contribution to stakeholder integration capability.

Hypothesis 4d: EPMS are indirectly associated with environmental performance through their contribution to environmental shared vision capability.

2.3.5 Indirect relationship between EPMS and economic performance through environmental capabilities

Following a RBV, idiosyncratic and valuable capabilities controlled by a firm can provide a competitive advantage leading to improvements in economic performance (Penrose, 1959;

Rumelt, 1984; Wernerfelt, 1984; Barney, 1986; Barney, 1991). Eco-learning, continuous environmental innovation, stakeholder integration and environmental shared vision have been recognized as distinctive, valuable, imperfectly imitable and substitutable capabilities and previous studies have provides empirical evidence showing that they contribute to the economic performance of the firm (Sharma and Vredenburg, 1998; Henri, 2006a; Aragon-Correa, Hurtado-Torres et al., 2008).

While EPMS have been linked to environmental capabilities (hypotheses 1a to 1d) and it has been argued above that these capabilities have a positive influence on economic performance, EPMS are expected to have indirect implications on economic performance by contributing to environmental capabilities. Therefore, the following hypotheses are proposed:

Hypothesis 5a: EPMS are indirectly associated with economic performance through their contribution to eco-learning capability.

Hypothesis 5b: EPMS are indirectly associated with economic performance through their contribution to continuous environmental innovation capability.

Hypothesis 5c: EPMS are indirectly associated with economic performance through their contribution to stakeholder integration capability.

Hypothesis 5d: EPMS are indirectly associated with economic performance through their contribution to environmental shared vision capability.

2.3.6. Relationship between environmental performance and economic performance

Numerous empirical studies have validated and supported the association between environmental and economic performance (Russo and Fouts, 1997; King and Lenox, 2001b; 2002; Al-Tuwaijri, Christensen et al., 2004; Burnett and Hansen, 2008; Henri and Journeault, 2009a). Literature has argued that environmental performance can contribute to economic performance by reducing cost and increasing revenues (e.g. Shrivastava, 1995b; Ambec and Lanoie, 2008; López-Gamero, Molina-Azorín et al., 2009).

First, numerous studies have suggested that the improvement of environmental performance can reduce costs (e.g. Schmidheiny and Zorraquin, 1996; Al-Tuwaijri, Christensen et al., 2004; Burnett and Hansen, 2008). These cost reduction may arise from the adoption of practices that improve production's eco-efficiency (Porter and Van der Linde, 1995b; Burnett and Hansen, 2008; Henri and Journeault, 2009b) such as process redesign (Dechant, Altman et al., 1994; Porter and Van der Linde 1995a; Davenport and Short, 1990), disassembly (Shrivastava, 1995b), and substitution (Melnyk, Sroufe et al., 2003). Cost reduction can also be realized by reducing at source energy and material inefficiency (Young, 1991; Hart, 1995). Moreover, organizations can reduce costs from waste management and product liabilities by adopting a life-cycle perspective (Parkinson, 1992; Shrivastava, 1995b). Furthermore, better environmental performance can reduce costs associated with fines and litigation (Ambec and

Lanoie, 2008). In addition, environmental performance can reduce financial cost related to bank loans and insurance (Wagner, 2007; Ambec and Lanoie, 2008).

Second, numerous studies have argued that environmental performance would increase firms' revenues by satisfying the needs of green consumers (Hart, 1995; Mainieri, Barnett et al., 1997). It could be achieved through differentiation strategy by gaining first-mover advantage of the development of product that includes green features that are hard to imitate by competitors and that are perceived more valuable by customers (Shrivastava, 1995b; López-Gamero, Molina-Azorín et al., 2009). Also, environmental performance could lead to new sources of revenues by helping firms to gain access to certain markets, such as green purchasing from public sector or supply chain of ISO 14001 organizations (Ambec and Lanoie, 2008). Moreover, firms that have developed pollution-control and other green technology may have the opportunity to increase their revenues by selling these equipments and knowledge to other firms (Ambec and Lanoie, 2008).

Based on these arguments, the following hypothesis is proposed:

Hypothesis 6: Environmental performance is positively associated with economic performance.

3. Research method

3.1 Research design

Data will be collected from a survey administered to a random sample of 1500 Canadian manufacturing firms from Scott's Manufacturing database. In this study, 'firm' is a fully autonomous entity or a subunit of a larger firm. In all cases, they appeared as separate entities in the database. Organizations with 100 employees or more, and reporting sales of over $20 million will be selected. These criteria are intended to ensure that organizations are large enough for organizational variables to apply (Miller, 1987) and that management control systems are sufficiently developed (Bouwens and Abernethy, 2000).

The questionnaire will first be validated using a pre-test administered to five academics and ten managers. This pre-test will confirm the understanding of each of the measurement instruments. The questionnaire will then be sent to the CEO or another member of the top-management team (COO or senior vice-president) of each firm along with a letter explaining the purpose of the study and a self-addressed stamped envelope is included with the questionnaire. A second-mailing follow-up will be done to guarantee a high response-rate.

3.2 Measurement of constructs

All measures are drawn from existing instruments. Appendix 1 shows the questionnaire items. EPMS use is measured using the adaptation of two instruments developed by Henri (2006a) and Henri and Journeault (2009a). Respondents where asked to indicate to what extent their organization relies on environmental indicators to fourteen purposes, whereby a higher score indicate a greater use of EPMS by the organizations.

Four different validated scales are used to measure environmental capabilities. Eco-learning is measured using an instrument developed by Hult (1998) and validated in several other studies (Henri, 2006a; Widener, 2007). Continuous environmental innovation is measured using an instrument developed by Naman and Slevin (1993) and Burke (1989) and adapted to the environmental context. Environmental shared vision is measured using an instrument developed by Aragon-Correa, Hurtado-Torres et al. (2008). For each of these three instruments, respondents will be asked to rate the extent to which items related to each capability describe their organization (1=not descriptive, 7= very descriptive). Answers will be measured using a seven-point Likert-type scale and an average score will be computed whereby a higher mean score indicates a higher degree of eco-learning, continuous environmental innovation, and environmental shared vision. Stakeholder integration is measured using an instrument developed by Buysse and Verbeke (2003) whereby the respondent will be asked to indicate the extent to which pressures resulting from sixteen different stakeholders influence decisions related to environmental management within the organization (1=no influence at all, 7=very strong influence).

Environmental performance is measure using an instrument developed by Wagner and Schaltegger (2004). Respondents will be asked to indicate, on a seven-point Likert-type scale, the extent to which environmental management has contributed to various environmental impact reductions over the past twelve months (1=no reduction, 7= very strong reduction). An average score will be calculated on the twelve items and a higher score indicates a better environmental performance.

Economic performance will be measured using a subjective instrument including three indicators: (i) return on investment (ROI); (ii) operating profits, and (iii) cash flow from operations. The respondents will be asked to indicate the performance of their organization over the past twelve months compared to their leading competitors based on a seven-point Likert-type scale (1=well below average, 7=well above average). A higher score indicates better economic performance.

Finally, the three control variables will be measured as follow. Size is measured using the natural log of the number of employees. Environmental exposure is measured using the data from NPRI to identify low and high polluting industries[3]. Finally, public visibility is

[3] Data will be collected from the National Pollutant Release Inventory (NPRI) provided by the federal government of Canada. This database contains information on more than 300 pollutants released and transferred from individual facilities across Canada (air, water, land and injected underground and transferred off-site to disposal, treatment, sewage, energy recovery and recycling).

measured using ownership as proxy. Using a dichotomous variable, private firms are associated with low public visibility while public ones are associated with high visibility.

3.3 Data analysis

Structural Equation Modelling (SEM) will be used to test our hypotheses. SEM consists of a set of linear equations that simultaneously test two or more relationships among endogenous and exogenous variables (Bollen, 1989; Bollen and Long, 1993).

4. Contributions

This study will contribute to the environmental-economic performance, eco-control, and NRBV literature in a number of ways. First, this study contribute to the growing body of literature that investigated the capability of eco-control to support a win-win situation, that is to say, to contribute simultaneously to the environmental and the economic performance of organizations. Furthermore, this study get inside the black box and demonstrated that the development of environmental capabilities may represent the missing link between the adoption of eco-control systems and their impact on both environmental and economic performance of the firm.

Also, this study attempts to demonstrate that the development of environmental capabilities, such as eco-learning, continuous environmental innovation, stakeholder integration, and environmental shared vision, may contribute not only to economic performance of the firms, but also their environmental performance. More specifically, in an ecological setting, these capabilities allow the organization to improve their environmental performance which in turn improved their economic performance.

This study also has important implications for management practices. This study illustrated the potential of eco-control to improve both economic and environmental performance. The strategic importance for managers to adopt eco-control is emphasized by its capacity to support the development of environmental capabilities, such as eco-learning, continuous environmental innovation, environmental shared vision, and stakeholder management, which in turn contribute not only to create sustainable advantage but also contribute to environmental improvement. Hence, it gives a strong indication to managers that the adoption of these systems may represent a cornerstone to face the challenges put by the world economic crisis and the climate changes.

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