Extending environmental management beyond the firm boundaries: An empirical study of Dutch food and beverage firms

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ABSTRACT

Consumer demand for environmental sustainability and for affordable prices calls for cooperation and information exchange in food chains to reduce joint environmental impact, known as externally-oriented environmental management (E-EM). E-EM is increasingly regarded as a management tool to simultaneously improve environmental, operational, and business performance. Understanding the factors that influence managers to develop E-EM helps to design environmentally and economically sustainable food chains. The prior research regarding these factors is not exhaustive and demanded a multi-period approach. This study expands the understanding of the factors that influence managers to develop E-EM with a multi-period empirical research. We address the effects of external institutional pressures (regulative, normative, and culturally-cognitive) and the level of in-company environmental management (I-EM) on E-EM, which involves information exchange in the chain, cooperation with suppliers and customers. The analysis relies on survey data of 255 and 96 Dutch food and beverage (F&B) processors from 2002 and 2010 respectively. The findings indicate that respondents have considerably improved I-EM over time. I-EM requires in-company pzrocedures ranging from environmental strategy formulation to the managerial review of achieved results to assure continuous improvement of environmental performance. F&B processors that had already achieved a high level of I-EM are more likely to develop E-EM. Also growing normative and culturally-cognitive pressures from supply chain partners and increasingly from long-term public–private environmental covenants significantly influenced E-EM implementation. However, regulative pressure from public authorities had no impact. It appeared that E-EM is influenced mostly by institutional pressures when the firms are less experienced with I-EM.

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1. Introduction

Nowadays the food industry is confronting two major challenges: environmental and economic sustainability (Vermeulen et al., 2012). Urged by the current state of the natural environment, food processors are increasingly pressured to reduce environmental impact by societal groups, by tightening environmental regulation, and by customers and consumers down the supply chain. At the same time, consumers demand food chains to deliver products at affordable prices. Consequently, food processors are challenged to increase the environmental sustainability of their operations without compromising the costs or ideally even gaining cost savings.

Environmental impact of the final product depends on the whole supply chain and calls for cooperation and information exchange with supply chain partners to reduce their joint environmental impact. The latter is defined as externally-oriented environmental management (E-EM). Prior research refers to different practices associated with E-EM such as joint environmental planning, working together with supply chain partners to reduce environmental impact, and developing the shared understanding of responsibilities (De Giovanni and Esposito Vinzi, 2012), the assessment of suppliers′ environmental performance (Testa and Iraldo, 2010), collaboration with customers to change product specifications, for green packaging, green transportation channels, and reverse logistics (Ageron et al., 2012; Azevedo et al., 2011; Manzini and Accorsi, 2012; Zhu et al., 2008a). Cooperation in the supply chain for environmental management (EM) is considered "an effective management tool and philosophy" (Zhu et al., 2008b) for manufacturing organisations. This is due to its potential to improve environmental performance via reduction of waste, emissions, and decrease in the use of natural resources (Azevedo et al., 2011; De Giovanni and Esposito Vinzi, 2012; Testa and Iraldo, 2010) and to benefit operational performance (Vachon and Klassen, 2008; Zhu et al., 2005), especially in terms of higher product quality (Azevedo et al., 2011; Vachon and Klassen, 2008). There is a growing body of evidence in favour of E-EM′s contribution to business performance indicated by cost savings,

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higher profit and market share (see e.g. De Giovanni and Esposito Vinzi, 2012; Zhu et al., 2010; Azevedo et al., 2011; Testa and Iraldo, 2010). These findings evidence the promising potential of E-EM as a tool to design food supply chains that are both environmentally and economically sustainable. Therefore, it is particularly important to investigate the factors that influence managers to develop E-EM.

In this paper, we investigate the joint effects of external institutional pressures (from public authorities, local communities and environmental organisations, supply chain partners, branch organisations, and environmental covenants) and the level of internal EM development on the implementation of E-EM in Dutch food processing firms. Our findings regarding E-EM determinants can support managerial decision making with respect to the implementation of E-EM practices, which require information exchange in the supply chain as well as cooperation with customers and suppliers. By cooperation, they can improve environmental and economic sustainability in food chains and make these chains more competitive.

Prior research regarding the factors that drive firms to extend environmental management towards the supply chain is not exhaustive. We noticed two substantial gaps and will address them in the present paper. First, little empirical research investigated the relative contribution of external institutional pressures and internal factors to E-EM (Wu et al., 2012). Among internal factors, according to the natural resource based view (NRBV) of Hart (1995), there is a path dependency of environmental practices from internal environmental practices towards environmental practices involving external partners such as supply chain actors. This implies that E-EM implementation is influenced by the extent of adoption of the in-company EM (I-EM) (Bremmers et al., 2007; Darnall et al., 2008). I-EM is based on the Deming cycle of continuous improvement (Deming, 1986) and targets environmental impact reduction of a specific manufacturing location. The presence of I-EM alone might not be sufficient to progress to E-EM, because I-EM does not explicitly prescribe the evaluation of environmental impact of whole supply chain. External pressures might be required to make the step from I-EM towards E-EM. Prior research from the perspective of neo-institutional economics (DiMaggio and Powell, 1983; Hoffman, 2001b) identified external institutional pressures from public authorities, supply chain partners, and societal groups as one of major drivers for E-EM adoption (see e.g. Walker et al., 2008; Zhu and Sarkis, 2007; Wu et al., 2012). Therefore, our first contribution rests in adopting an integrative approach to investigate the joint effects of external institutional pressures and the level of I-EM development on the implementation of E-EM in food supply chains.

Second, a need for multi-period research is recognised by earlier studies. For instance, Carter and Rogers (2008) call for a longitudinal research to get insight into the evolution and the implementation of E-EM. Also Zhu et al. (2008a) notice that E-EM's early stage of adoption and dynamic nature require a longitudinal research. Within the last decade, when E-EM came to the research agenda, changes in environmental governance, institutional pressures, and firms' experience with environmental management may have affected the relative importance of the factors that influence E-EM adoption. We did not come across any quantitative studies that analyse the factors that influence the implementation of E-EM in a multi-period setting. Consequently, such research is necessary. To narrow this gap, the present paper investigates the factors that influence the implementation of E-EM by analysing empirical data collected in 2002 and 2010 from Dutch food and beverage (F&B) processors.

The Dutch F&B industry can provide an instructive example how to increase environmental and economic sustainability in food chains for F&B firms in other countries. This is because the Netherlands falls in the top 10 of the world countries with the highest ecological foot-print per capita (WWF et al., 2012). The food and beverage (F&B) industry is one of the largest industries in the Netherlands in terms of employment and turnover. This is also one of the most polluting industries (Statistics Netherlands, 2012). However, F&B processors have been progressively reducing their environmental impact during the last decade (Statistics Netherlands, 2012) and contribute to environmental sustainability of food chains.

As for economic sustainability, Dutch consumers enjoy one of the lowest food prices in Western Europe due to intensive supply chain cooperation for efficiency and increasing up-scaling (ING, 2012). Supply chain cooperation in Dutch F&B industry is intense due to high pressure on the price and profit margins from retailers at the end of the chain. Also environmental sustainability is an important theme for supply chain collaboration, not least because of industry initiatives. For instance, Dutch-based multinational Unilever works with their tomato suppliers to reduce the water usage in the chain by introducing drip irrigation. Coffee processor Douwe Egberts cooperates with technology suppliers to develop energy saving coffee machines and advices their customers on the usage of these coffee machines to save energy. Meat processor VION provides farmers with information regarding technical characteristics of the slaughtered animals via a web-based information system (farmingnet) so that farmers can adjust to the optimal level of feeding and reduce inputs.

The paper proceeds as follows. In the next section, we provide a theoretical foundation of the study: an overview of the E-EM concept, a literature review and formulation of hypotheses linking external institutional pressures and internal factors to E-EM through the lens of neo-institutional economics and the NRBV. The research method and survey design are presented in Section 3. In Section 4 the hypotheses are discussed through empirical analysis of survey results. The last section is devoted to a discussion of theoretical contributions, the conclusions, and managerial implications.

2. Theoretical foundation and research hypotheses

2.1. Externally-oriented environmental management (E-EM) concept

During the last decade, E-EM emerged as a complex and integrative approach to the design of sustainable supply chains by involving upstream and downstream supply chain partners in the reduction of environmental impact. The analysis of prior research regarding the factors that influence managerial decisions to develop E-EM is complicated by differences in definition, measurement, and theoretical perspective. These differences make the interpretation and comparison of scientific results difficult.

Extension of environmental management beyond the boundaries of the individual firm towards the supply chain is not expressed in a single concept. It has been referred to as green (environmental) purchasing (Min and Galle, 2001), green supply chain management (Srivastava, 2007), sustainable supply chain management (Gold et al., 2010), externally-oriented EM (Bremmers et al., 2007), environmental collaboration (Vachon and Klassen, 2008), external environmental management (De Giovanni, 2012), and environmental supply chain cooperation (Zhu et al., 2010), depending on the focus of the research. Though these terms are often used as interchangeable, this is not always justified.

For instance, some studies consider I-EM as an E-EM facilitator (e.g. Arimura et al., 2011; Vachon and Klassen, 2008; Darnall et al., 2008), whereas others consider I-EM as a part of E-EM (e.g. Zhu et al., 2005). I-EM requires manufacturers to develop an environmental policy or strategy, to set environmental impact reduction targets and objectives, to establish an implementation and operation system (including, among others, training and education of employees and procedures for control of environmental impact) and a system of