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Mediating effects of green innovations on interfirm cooperation

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ABSTRACT

Previous empirical research has largely neglected the mediating role of green innovations on the top management commitment-customer cooperation relationship. This study examines effects of green process innovation and green managerial innovations on this relationship. An empirical analysis with a sample of 181 ISO 14001 Turkish manufacturing firms suggests that top management commitment positively affects customer cooperation, process innovation and managerial innovation. Green process innovation mediates the positive association between top management commitment and customer cooperation, whereas green managerial innovation does not. These findings suggest that green process innovation facilitates business partners to mitigate the external negative impact on environment. By contrast, green managerial innovation has a stronger in-house orientation and facilitates business firms to minimize their carbon footprints.

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1. Introduction

A variety of global environmental policies directives such as WEEE (waste electronics and electrical equipment) and RoHS (the restricted use of hazardous substances in electrical and electronics equipment) demonstrate the growing need to reduce environmental pollution at the world level (Barry and Kanematsu, 2016; Sakai et al., 2011). The recent Paris Agreement on Climate Change further demonstrates the high level of global mindfulness and commitment to fight the threat of climate change. Better environmental awareness of international customers has similarly compelled firms to become more environmentally sustainable, resulting in green products and brands. Development of international rules and increasing consumer consciousness for environmental protection has required firms to integrate environmental sustainability into their business models. Such strategic environmental integration provides an opportunity for business firms to green their innovation process (Porter and Reinhardt, 2007).

Recent research (Albort-Morant et al., 2016) suggests that firms gain competitive advantage when they implement green innovations. For instance, when business firms initiate innovations, they enjoy several opportunities associated with “first move advantage” such as higher prices, enhanced corporate images, and new market

access (Chen et al., 2006). Green innovations also help business firms to attain superior performance and profitability (Chen, 2008). When companies foresee that they can achieve financial and operational benefits, they implement green practices (Bowen et al., 2001). For successful environmental management, firms seek partners that are compliant with sustainable business practices (Lee and Lam, 2012). Accordingly, a company's ultimate goal is to seek and strengthen customer cooperation through green innovations because these innovations simultaneously enhance the firms' environmental image and competitive capabilities.

Studies (Wong, 2013; Chen, 2008) using empirical datasets from singular industries show that implementation green innovations improve customer cooperation. However, the efficiency of green innovation in reducing firms' environmental footprint and enhancing customer cooperation is dependent on a number of factors. For instance, research (Agi and Nishant, 2017) indicates that contextual elements such as the industry sector, dependence, and durability of the relationship affect green practices. Due to similar reasons, the motivation to become greener varies across industries. For instance, the clothing industry is the second largest polluter in the world, but the emergence of better environmental awareness among consumers has forced many clothing companies to implement green innovations to make their supply chains sustainable (Sweeny, 2015).

This study frames green innovations as a subset of the sustainable efforts pursued by the firm. Firms that pursue sustainability outcomes address the ecological, social, and economic performance (Elkington, 1997). By contrast, efforts to enhance green

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innovations focus on the ecological merits of the firm. We examine the firm's commitment to sustainability as the driver of green innovations. The firm's use of green process and managerial innovations should influence the level of cooperation in supply chain relationships.

Green innovations focus on mitigating or minimizing environmental damage due to different business activities. In the evolving environmental friendly business scenario, green innovations are critical for developing and maintaining customer satisfaction, as customers are likely to purchase a greater number of environmentally friendly products. For business firms, green innovations open opportunities for new products and business markets. Green innovations result in superior value creation for customers as well as firms and consequently, equalize the cost of environmental investments. In this way, investing in green innovations is a win-win game. For all these reasons, it is important for business firms to study how green innovations can simultaneously improve their environmental efficacy and customer satisfaction.

Empirical evidence (Hoejmose et al., 2012) suggests that comprehensive commitment by top management plays a key role in implementing green innovations as well as achieving customer cooperation. Chiou et al. (2011) illustrate how green innovations provide a clear solution to overcoming customers' pressures regarding compliance with environmental regulations. In this manner, firms anticipate that green innovations may help meet customers' demands and achieve better customer cooperation.

Prior research categorizes green innovations under different aspects such as technology, managerial functions, manufacturing processes, product design, and production processes (Chen, 2008; Chiou et al., 2011; Tseng et al., 2013). This study considers *green process innovation* (GPI) and *green managerial innovations* (GMI). *Green process innovation* (GPI) refers to adaptation or innovations made to improve existing processes or/and developing new ones to minimize the negative impact of hazardous materials waste, operational pollution, hazardous emissions and energy consumption on environment (Tseng et al., 2013). Green process innovation addresses incremental enhancements to products and services designed to lower resource usage. For instance, firms engaged in green process innovation may replace shop-floor incandescent lamps with LED lighting. *Green managerial innovation* (GMI) refers to action undertaken to redesign and refine current operations, products, and services in order to meet internal green management efficiency considerations (Tseng et al., 2013). Green managerial innovation enables a firm to formulate and re-design internal processes that address environmental standards or criteria. For example, firms engage in green managerial innovations when they redefine operations and production processes to ensure internal environmental efficiencies.

In this study, we frame *top management commitment* as internal pledges and support made by top management to pursue sustainable operations (Chiou et al., 2011). We examine *customer cooperation* as the extent to which a customer is willing to work with a trading partner to achieve sustainable outcomes (Sancha et al., 2014). Although ample research has examined these topics (e.g., Morgan and Hunt, 1994), scant efforts examine how different green innovations affect the top management commitment-customer cooperation relationship.

The goal of this study is to contribute to the study of green innovations in interfirm relationships. We examine the direct relationship between top management commitment and customer cooperation, and subsequently examine the mediating influence of green innovations on this relationship. The next section provides the conceptual framework and hypotheses. We subsequently present the research methodology followed by an empirical assessment of the model. We conclude by addressing the implication of this study.

2. Conceptual framework and hypotheses

According to green management literature (Chiou et al., 2011; Zhu et al., 2013), green innovations and top management commitment are part of a firm's internal environmental management practices. Green innovations consist of adopting of new technologies or processes that mitigate environmental damage. Existing literature examines the role of green innovations in different contexts such as environmental performance and competitiveness (Chiou et al., 2011; Chen et al., 2006), internal and external green supply chain practices (Zhu et al., 2013), uncertainty (Tseng et al., 2013), green competence and firm's green image (Chen, 2008) and operational practices and performance (Zhu and Sarkis, 2004).

Prior research contributes significantly toward our understanding of environmental management, green innovations, and corporate environmental performance. Within the context of sustainable supply chains, however, few studies (Zhu et al., 2013) provide empirical evidence about the direct relationship between top management commitment and customer collaboration. Scant research has examined the mediating role of green innovations in inter-firm relationships. Chen (2008) shows that process innovation partially mediates the relationship between green core competences and green images of firms. To the best of the knowledge of authors, however, no other study has examined the mediating role of green innovations on the relationship between top management commitment and customer collaboration. This study addresses the research gap.

This paper introduces a conceptual model that identifies structural relationships linking the internal management practices, top management commitment and green innovations, with one external management practice, customer cooperation. Our model recognizes that initially the firm must make a commitment to sustainability. This commitment to sustainability should foster the development of green innovations. Managerial commitment and innovation enhance the level of customer cooperation. Fig. 1 summarizes the model.

2.1. Top management, green innovations, and customer cooperation

Prior research (Zhu et al., 2013) indicates that top management commitment is a key factor in achieving successful sustainable management. The reason is simple: top management commitment creates and nurtures the necessary vision and organizational vigor to achieve sustainability. Zhu and Sarkis (2004) indicate that getting a commitment from top management plays a crucial role in the successful implementation of green managerial practices. Top management commitment is essential to developing a firm's organizational structures (Daily and Huang, 2001) and securing the support necessary to undertake and achieve sustainability (Hoejmose et al., 2012).

Generally, a firm's top management is encouraged by ethical and commercial motivations to implement sustainability into their operations (Testa and Iraldo, 2010). Under the ethical motivation perspective, top management employs an environmental focus as a motivation to innovate and achieve better sustainability. The firm's vocal commitment to sustainability, however, has limited influence on a business partner's efforts to become more sustainable. When environmental ethics is a key part of business firms' culture, it acts as the driving force for green innovation (Peng and Lin, 2008). The commercial motivation perspective argues that firm's top management should execute sustainable strategies that reduce the cost of production and hazardous materials and generate operational and economic benefits (Ittner et al., 2003).

Top management has an important influence on innovations pursued by the firm. Bansal (2003) indicates that top management ecological concerns are associated with the speed and scope

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