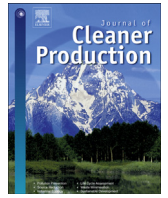


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Sustainability as a driver of green innovation investment and exploitation

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ABSTRACT

This paper examines what drives green innovation investment and exploitation with regard to sustainability. The specific focus of this paper is on company valuations of different dimensions of sustainability and their relationships to green innovation. Empirical data were gathered from a cross-section of horse industry companies located in Finland. The scientific value of the paper lies in showing that certain dimensions of sustainability lead to the exploitation of and investment in green innovation, while other dimensions do not. The results of this study's regression analyses show that the more a company values economic, institutional, and social sustainability, the more likely it is to invest in green innovation. Further, a high valuation of institutional and economic sustainability increases the willingness to exploit green innovation. The valuation of environmental sustainability was not found to affect the willingness to invest in or exploit green innovation. Our results suggest that green innovation is driven by economic and institutional pressures, and that such innovation can create value in terms of social sustainability.

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1. Introduction

Sustainable development has been receiving growing attention from academics, industry representatives, and policy-makers. One of the key areas tackled by the sustainable development discourse is the role of sustainability in enhancing innovation (cf., [Qi et al., 2010](#); [Albort-Morant et al., 2016](#)). [Boons and Lüdeke-Freund \(2013\)](#) argue that for a sustainable value proposition, business–society dialogs must identify trade-offs between optimal products and service performance (e.g., convenience, low costs) and improved social and environmental effects (e.g., dematerialization, better working conditions). This situation is even more critical in natural-resources-intensive sectors, such as the horse industry, which has a significant environmental impact. Thus, enhancing green innovation should be a top priority for the industry companies. In comparison with traditional innovation, the study of green innovation is relatively new in the academic field, even though researchers' interest in green innovation has grown in recent years (e.g., [Chen, 2008](#); [Cuerva et al., 2014](#); [Albort-Morant et al., 2016](#)). Whereas traditional innovation relates to the

development of new products, materials, processes, services, and organizational forms in order to gain competitive advantage ([Baregheh et al., 2009](#)), green innovation refers to the generation of new ideas, goods, services, processes, or management systems that can be used to deal with environmental problems ([Rennings, 2000](#); [Li et al., 2017](#)). Green innovation refers to innovations related to, for example, technologies for energy saving, pollution prevention, waste recycling, green product design, and corporate environmental management ([Chen et al., 2006](#)). According to [Kemp and Pearson \(2007\)](#), green innovation can effectively reduce environmental pollution and the negative impacts of resource (and energy) use processes, thus leading to sustainable development.

The establishment of a new role for companies requires a broad understanding of the drivers of green innovation. Hence, firms must generate a variety of sustainability dimensions as drivers that reflect the benefits of adopting green innovation. Previous research has identified that drivers such as environmental commitment ([Chang and Chen, 2013](#); [Chang, 2016](#)), managerial concern ([Qi et al., 2010](#); [Huang et al., 2016](#)), customer pressure ([Horbach et al., 2012](#); [Huang et al., 2016](#)), environmental regulations ([Cai and Zhou, 2014](#); [Zailani et al., 2015](#); [Hojnik and Ruzzier, 2016](#)), and cost savings ([Horbach et al., 2012, 2013](#); [Del Río et al., 2015](#); [Hojnik and Ruzzier, 2016](#)) facilitate green innovation initiatives. All in all, little empirical research addresses the question of what drives green innovation ([Albort-Morant et al., 2016](#)), especially in terms of

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sustainability. In this study, the drivers for sustainability and sustainable development are examined in terms of the environmental, social, institutional, and economic dimensions of sustainability (Brundtland, 1987; Vos, 2007; Choi and Ng, 2011).

The empirical part of this study was executed in the Finnish horse industry, which plays a significant role within society even though the roles of horses have shifted from the warhorse and agriculture to leisure activities, horse races, and ways of living (Raento, 2016). As in other European countries, in Finland, the location of horse industry companies has moved from the countryside to urban areas over the past few decades, causing more sustainability and environmental challenges (Liljenstolpe, 2009), such as manure handling and hygiene. These challenges lead to the continuous generation of new types of innovations seeking to utilize the business potential of horse companies. Green innovation can thus be an appropriate approach to overcome the highlighted challenges.

Reflecting the call being made by society for further investments and initiatives from organizations, educational institutions, and governments to adopt innovative multidisciplinary approaches to resolve current sustainability challenges (Lozano et al., 2013; Almeida et al., 2013), this study attempts to narrow the above-mentioned research gap by examining the link between sustainability and green innovation. The focus of this paper is the companies' valuation of the dimensions of sustainability (identified by several authors, e.g., Mamede and Gomes, 2014; Khan et al., 2016) and on its relationship to the investment in and exploitation of green innovation. Thus, the aim of this paper is to examine what drives green innovation investment and exploitation in terms of sustainability.

This study contributes to existing knowledge on the dimensions of sustainability that drive green innovation investment and exploitation by showing that certain dimensions lead to the exploitation of and investment in green innovation, whereas others do not. First, we contribute to the sustainability literature by showing the differing roles of sustainability when investing in and exploiting green innovation. Second, we contribute to the innovation management literature by providing a full model of the different sustainability dimensions that drive green innovation. The structure of the paper is organized as follows: Section 1 presents the introduction, including the study's identified research gap and aim of the paper. Section 2 offers a literature review that covers concepts of green innovation, dimensions of sustainability, and the development of the study's hypothesis. In Section 3, the study's methodology is presented, including empirical setting, the sample and data collection, and measures. In Section 4, the descriptive statistical analysis and the results of regression analysis are discussed. In Section 5, the results of the study are discussed and compared with those of the prior literature. Section 6 concludes by discussing the contributions of the study to the literature and recommendations for future research.

2. Literature review

2.1. Green innovation

Research that combines the terms innovation and sustainability has increased significantly during the last two decades (e.g., Franceschini et al., 2016). For this reason, the four main terms of eco-innovation, environmental innovation, green innovation, and sustainable innovation have been promoted (Schiederig et al., 2012). It is important to understand how these terms differ from each other, because terms and forms of language may play a powerful role because they can be used to shape meanings and

identify areas of interest to the different communities involved (Nicolini, 2012; Franceschini et al., 2016).

Some prior studies suggest that eco-innovation, ecological innovation, green innovation, and environmental innovation are interchangeable (Halila and Rundquist, 2011; Schiederig et al., 2012; Hojnik and Ruzzier, 2016); for example, Schiederig et al. (2012) suggest that the terms can be used interchangeably, even though sustainable innovation includes a social dimension as well as an ecological dimension. However, the commendable bibliometric study of Franceschini et al. (2016) provides new insights into the definitions of the terminology of sustainability-related innovation. They found overlaps between the terms eco-innovation and environmental innovation by identifying them as referring explicitly to innovations aiming at reducing environmental impacts, in the attempt of operationalizing the sustainable development premises (e.g., Carraro and Siniscalco, 1992; Johansson and Magnusson, 1998; Lanjouw and Mody, 1996; Pickman, 1998). However, the studies of Charter and Clark (2007) and Franceschini et al. (2016) made a distinction between eco-innovation and sustainable innovation, showing that eco-innovation only addresses environmental and economic dimensions while sustainable innovation embraces these as well as the broader social and ethical dimensions. While the sustainable innovation approach carries a strong sociological component, green innovation is strongly related to objectives of management and competition (Franceschini et al., 2016).

Although being a relatively new concept in the sustainable development discourse, the amount of research on this topic is rising (e.g., Chen, 2008; Cuerva et al., 2014; Albort-Morant et al., 2016). Chen et al. (2006) suggest that green innovation can refer both to green products and green processes. These can concern, for example, technologies for energy saving, pollution prevention, waste recycling, green product designing, and corporate environmental management (Chen et al., 2006). Similarly, green innovations have been seen to refer to those innovations in products, processes, and management that can lead organizations to achieve sustainable competitive advantages in an eco-effective way (Porter and Van der Linde, 1995; Schiederig et al., 2012; Huang et al., 2016). In the view of Chang and Chen (2013), green innovation is essential for a firm's business management and efficient management can create value, leverage a competitive advantage, and increase the firm's performance. According to Albort-Morant et al. (2016), green technologies provide two main benefits for organizations: the commercial rewards from creating environmentally sustainable products, and financial benefits that can increase competitiveness. They assert that green innovation is a strategic need for firms, which offers a great chance for meeting customers' demands without harming the ecosystem. Relating to the firm performance, green innovation performance can be defined as achievements in the environmental, market, financial, and knowledge fields at all stages of the implementation of green innovations (Pereira-Moliner et al., 2012; Cai and Zhou, 2014; Li, 2014; Huang et al., 2016).

In summary, it can be stated that whereas traditional innovations relate to the development of new products, materials, processes, services, and organizational forms in order to gain competitive advantage (Baregheh et al., 2009), green innovation aims to generate new ideas, goods, services, processes, or management systems that can be used to deal with environmental problems (Rennings, 2000; Li et al., 2017). Lai et al. (2003) suggest that meeting stakeholders' environmental requirements can lead to green innovation and increased environmental performance. Li et al. (2017) argue that green innovation is not only an important means for enterprises to gain competitive advantage in the future, but a basic requirement to hold legitimacy.

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