Empirical paper

Open innovation and its effects on economic and sustainability innovation performance

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A B S T R A C T

The increasing complexity of products and services, shorter life cycles, and rapidly changing market demands require new or different capabilities and management practices to successfully develop innovations and sustain a company’s competitive advantage. These capabilities include what is called ‘organizational intelligence’ enabling the company to learn from and about its environment (Lawson & Samson, 2001). The important role of the search for and integration of external knowledge in a corporate’s innovation success has been widely acknowledged (Stefan & Bengtsson, 2017). Elmqist, Fredberg and Ollila (2009), Ganiolis, Ellis and Secchi (2010), Huizingh (2011), and Giannopoulou, Yström and Ollila (2011), amongst others, have provided overviews. Whereas some authors consider the concept of open innovation (Chesbrough, 2003; Chesbrough, 2012; Gassmann, Enkel & Chesbrough, 2010) very promising, others raise criticism with respect to its conceptual ambiguity (Dahlander & Gann, 2010), lack of clarification regarding the parties primarily involved in such processes (Huizingh, 2011), and the collaboration partners’ influence on the company’s innovation performance (Brettel & Cleven, 2011; Stefan & Bengtsson, 2017). Potential disadvantages of open innovation include loss of control, increased managerial and organizational complexity, and, consequently, increased costs (Manzini, Lazzarotti & Pellegrini, 2017). Despite the existence of various forms of open innovation approaches, we know little about how companies innovate in external collaborations, benefit from their ingredients (Stefan & Bengtsson, 2017), and with whom and for what reasons they cooperate with outside partners (Huizingh, 2011). In particular, this applies in the context of sustainability innovations (Hossain, 2010; Mustaquin & Nyström, 2014) referring to the need to re-think and re-design products, processes, and services to meet the requirements of Sustainable Development, which are being demanded by different groups, such as customers, NGOs, and governments (Ketata, Sofka & Grimpe, 2015; Tsai & Liao, 2017).

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Introduction

The increasing complexity of products and services, shorter life cycles, and rapidly changing market demands require new or different capabilities and management practices to successfully develop innovations and sustain a company’s competitive advantage. These capabilities include what is called ‘organizational intelligence’ enabling the company to learn from and about its environment (Lawson & Samson, 2001). The important role of the search for and integration of external knowledge in a corporate’s innovation success has been widely acknowledged (Stefan & Bengtsson, 2017). Elmqist, Fredberg and Ollila (2009), Ganiolis, Ellis and Secchi (2010), Huizingh (2011), and Giannopoulou, Yström and Ollila (2011), amongst others, have provided overviews. Whereas some authors consider the concept of open innovation (Chesbrough, 2003; Chesbrough, 2012; Gassmann, Enkel & Chesbrough, 2010) very promising, others raise criticism with respect to its conceptual ambiguity (Dahlander & Gann, 2010), lack of clarification regarding the parties primarily involved in such processes (Huizingh, 2011), and the collaboration partners’ influence on the company’s innovation performance (Brettel & Cleven, 2011; Stefan & Bengtsson, 2017). Potential disadvantages of open innovation include loss of control, increased managerial and organizational complexity, and, consequently, increased costs (Manzini, Lazzarotti & Pellegrini, 2017). Despite the existence of various forms of open innovation approaches, we know little about how companies innovate in external collaborations, benefit from their ingredients (Stefan & Bengtsson, 2017), and with whom and for what reasons they cooperate with outside partners (Huizingh, 2011). In particular, this applies in the context of sustainability innovations (Hossain, 2010; Mustaquin & Nyström, 2014) referring to the need to re-think and re-design products, processes, and services to meet the requirements of Sustainable Development, which are being demanded by different groups, such as customers, NGOs, and governments (Ketata, Sofka & Grimpe, 2015; Tsai & Liao, 2017).

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Thus, this research investigates the relevance of external partners for achieving economic innovation performance (EIP) as well as sustainability innovation performance (SIP). By including a broader set of external stakeholders qualifying as potential open innovation partners than past research, managers get to know with whom they should strengthen their cooperation to achieve higher EIP and SIP. Furthermore, the paper explores the relationship between EIP and SIP to clarify for managers whether both performance dimensions can be pursued simultaneously or trigger a trade-off. Empirical evidence for the proposed relationships is provided by drawing on empirical field survey data of a cross-sectional sample and applying a benchmarking approach.

Theoretical foundation and hypotheses

**Innovation performance**

Innovation has been commonly defined as the successful application of new ideas resulting from organizational processes in which different resources are combined (Dodgson, Gann & Phillips, 2014). This combination of various resources is a multi-stage process leading to improved or new products, services, or processes with which firms seek to differentiate themselves on the market (Baregheh, Rowley & Sambrook, 2009). In the context of open innovation, this multi-stage process includes collaboration with external partners (Chesbrough, 2003; Gassmann et al., 2010) representing sources of knowledge that can contribute to corporate innovation projects. Ultimately, such collaborations make sense if they pay off and act as drivers for corporate innovation performance. Traditionally, a strong focus has been placed on the economic performance dimension of innovation activities to evaluate success, measured in terms of revenue and margin growth, market share, or customer satisfaction (Adams, Bessant & Phelps, 2006; Griffin & Page, 1993; Manion & Cherron, 2009). However, the impact of innovation activities on the innovation program’s economic success fails to account for other performance aspects such as reductions in environmental pollution or resource efficiency although these sustainability aspects are becoming more and more important due to the given, increasing demands for sustainable products and changing legal requirements. Such sustainability innovations are defined as the creation of products, services, and processes resulting – from a full life-cycle perspective – in less negative environmental and/or increased social impact compared to relevant alternatives and consider the needs of future generations (Hall & Vredenburg, 2003; Kemp & Pearson, 2007). Therefore, the assessment of innovation performance also has to capture environmental and social domains of innovative outcomes.

Drawing on prior literature (Ketata et al., 2015; Schögl, Baumgartner & Hofer, 2014), we conceptualize SIP as the outcome of the firm’s innovation activities with respect to (a) a sustainable product design (e.g., low-impact material, life-cycle optimization), (b) process efficiency (e.g., reduction of resource input and deployment), (c) environmental pollution (e.g., reduction of pollution, waste, and resource deployment), and (d) social responsibility (e.g., improved health, safety, social, and ethical situations).

**Open innovation and economic innovation performance**

In general, it has been assumed that open innovation activities with a diverse range of collaboration partners positively influence a company’s innovation success (Chesbrough, 2003), because firms are limited in their possibilities to internalize all required knowledge and competencies (Michelino, Caputo, Cammarano & Lamberti, 2014). In particular, the use of external knowledge helps to sustain a firm’s competitiveness (Brettel & Cleven, 2011). Past empirical research has demonstrated positive correlations between collaborations with customers, universities and suppliers, and new product development performance (e.g., Brettel & Cleven, 2011; Inauen & Schenker-Wicki, 2011). Stefan and Bengtsson (2017) investigated the effects of appropriability mechanisms and openness depth on two types of innovation performance (efficiency, novelty) across different stages of the innovation process with eight different partners. Their findings show that universities, intermediaries, customers, suppliers, and competitors seem to be beneficial for achieving performance, depending on the different phases of an innovation process. Despite the potential risks associated with open innovation, we propose that firms reporting higher EIP are also engaged in more collaboration activities with external stakeholders. Besides the dominating set of open innovation partners (customers, suppliers, competitors, universities, experts) investigated in past research (e.g., Brettel & Cleven, 2011; Chesbrough, 2003), we draw on the stakeholder approach (Freeman, 1984; Gould, 2012) to identify further potential collaboration partners in the firm’s eco-system (intermediaries, NGOs, communes, public institutions) and suggest a positive economic performance impact resulting from their integration into the firm’s innovation activities.

**Hypothesis 1.** Higher economic innovation performance is associated with a higher collaboration intensity with external partners.

**Open innovation and sustainability innovation performance**

Collaboration with external partners seems to be particularly important with reference to social, organizational, and ethical issues in the context of innovation (Arnold, 2011; Medeiros, Ribeiro & Cortimiglia, 2014; Hossain, 2010). High levels of external integration of customers, suppliers, and research institutions, among others, are the most important competences enabling firms to execute sustainability innovations (Carrillo-Hermosilla, del Río & Könmölä, 2010; de Medeiros et al., 2014; Lee & Kim, 2011; Lozano, 2007), while partners such as local communes, intermediaries, and NPOs can also help to improve the market acceptance of innovation outcomes (Achterkamp & Vos, 2006; Holmes & Smart, 2009; Niinimäki & Hassi, 2011). In addition to the already well-known collaboration partners, such as universities or customers, sustainability innovations might particularly require different expertise and input and call for wider societal acceptance. Therefore, it is also reasonable to consider further partners coming from a company’s ecosystem. Based on prior open innovation research (Brettel & Cleven, 2011; Chesbrough, 2003) and the stakeholder approach (Freeman, 1984), an extended list of groups including customers, suppliers, competitors, experts, universities, intermediaries, communes, public institutions, and NGOs qualify as potential collaboration partners to achieve SIP. However, the relevance of additional collaboration partners to SIP has not yet been fully addressed (Hossain, 2010; Mustaqim & Nyström, 2014). Apart from the strategic decision to pro-actively search for innovation partners or collaborate with them in response to increasing pressures, it is not at all clear whether such collaborations pay off or if the role of innovations in fostering greater levels of sustainability is crucial (Crossan & Apaydin, 2010; Dangelico & Pujari, 2010; Horn & Brem, 2013; Snider, Hill & Martin, 2003). While many companies might have gained experience with the open innovation process, managing sustainability innovations might represent a new, but different, challenge. Past research reports that collaboration with external partners is beneficial in terms of sustainability product and service innovations (Arnold, 2017), but the necessary financial and time investments as well as the risks of unbalanced innovation portfolios need to be considered. We propose that those firms that intensively manage open innovation with multiple partners benefit from the collaborations in terms of achieving higher SIP at the program level.
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