THE EFFECTS OF ENTREPRENEURIAL ORIENTATION ON INNOVATION
PERFORMANCE, OPEN INNOVATION PROCLIVITY, AND OPENNESS

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This paper proposes a conceptual model of the effects of entrepreneurial orientation on innovation performance, open innovation proclivity, and organizational openness. We argue that high levels of entrepreneurial orientation increases innovation performance. Moreover, we posit that a higher degree of entrepreneurial orientation also positively affects the open innovation proclivity and the openness of a firm. The latter two constructs reinforce the suggested positive effects of entrepreneurial orientation. The article contributes to the ongoing dialog in the innovation and the entrepreneurship literatures, especially by suggesting open innovation proclivity as a missing link between the entrepreneurial orientation of a firm and its innovation performance levels.

Keywords: Open Innovation, Entrepreneurial Orientation, Innovation Performance, Openness
INTRODUCTION

In today’s high-paced economic environment, firms have identified organizational innovation not only as a desired element for growth (1991; Hsueh, Lin, & Li, 2010; Hurley & Hult, 1998), but increasingly a necessary factor for survival (Audretsch, 1995; Cefis & Marsili, 2005). As innovation spans from the development of new products (Peres, Muller, & Mahajan, 2010) over services (Djellal, Gallouj, & Miles) to business processes (Papinniemi, 1999), and administrative systems (e.g. see Lin & Chen, 2007), it provides organizations with the ability to advance performance, resolve complications, add value and create competitive advantage (Gloet & Terzirovski, 2004). Consequently, management literature has identified innovation as a pivotal facilitator for enterprises to generate value and sustain competitive advantage in an progressively complex and swiftly altering environment (Subramaniam & Youndt, 2005). Moreover research has shown that companies with higher levels of innovativeness are more effective in adjusting to shifting environments and in developing new capabilities that allow them to attain better performance (Montes, Moreno, & Fernández, 2004).

At the same time the innovation process is becoming increasingly difficult to handle (Vanhaverbeke, 2006): the complexity and costs of research and development (R&D) activities are continuously growing and technology life cycles are incessantly shrinking. Moreover, the worldwide knowledge base is more than ever widely dispersed among corporates, universities, and research institutions around the globe. At the same time stakeholders, such as suppliers and customers are becoming more sophisticated and the number and mobility of highly-qualified workers is on the rise. In view of the fact that innovation is pivotal to the success of
organizations, yet R&D has become an even more daunting task, numerous scholars as well as practitioners nowadays emphasize the importance of adopting an open innovation approach for firms (Chesbrough, 2003; Enkel, Gassmann, & Chesbrough, 2009).

In this paper we examine the potential impact of a firm’s entrepreneurial orientation on its innovation performance, its open innovation proclivity and on its organizational openness. Moreover, as innovation performance may also be contingent on the firms open innovation proclivity and organizational openness we also assess the impact of open innovation proclivity of an organization on its innovation performance.

Studying the antecedents of innovation performance is of large importance from a practical as well as theoretical perspective. As explicated above innovation has become a key driver of competitiveness in today’s business world. Understanding what drives innovation performance is therefore paramount to virtually any firm. Moreover, gaining a deeper understanding of the relationships between entrepreneurial orientation, open innovation proclivity, and openness on the one hand and innovation performance on the other may yield hands-on advice on how enterprises could enhance their innovation capabilities. From a theoretical perspective the effects of open innovation proclivity as well as openness on innovation performance have been a largely underresearched topic. In the context of open innovation, open innovation proclivity may turn out to be the missing link, relating the entrepreneurial orientation of a firm to a sustained innovation performance.

Open innovation is a rather complex topic. Hence, this study draws upon theories of organizational behavior, learning theory, and entrepreneurship theory. Integrating these research streams is important for it addresses the question how entrepreneurial orientation affects
innovation performance as well as open innovation proclivity and organizational openness. The latter two theoretical constructs are furthermore hypothesized to significantly affect innovation performance.

The remainder of the paper is structured as follows. The next sections deal with the open innovation concept in general and introduce the constructs included in the proposed research model. Potential relationships among these constructs are presented. After deriving the research model in detail, the implications of this model are discussed. Next, the paper addresses the limitations of this research. Finally, the paper provides a conclusion on the research.

**OPEN INNOVATION**

Open innovation can be defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively.” (Chesbrough & Crowther, 2006: 1). It can thus be seen as a continued and structured way of employing a search process that seeks after new product/service inputs and integrates them across organizational boundaries. Being a very rich concept, evidence from the extant body of literature shows that open innovation has proved to be a valuable concept for numerous firms and under varying circumstances making it an important constituent of innovation management (Huizingh, 2011).

In its original form open innovation encompasses both types of movements: outside-in and inside-out flows of technologies as well as ideas (Chesbrough, 2003; Lichtenthaler, 2008; van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009). In this paper, however, we will focus on outside-in open innovation, respectively on external information inputs to a company’s
new product/service development process (Chesbrough & Crowther, 2006) as this type of flow fosters the creation of the new products and/or service close to its core (Chesbrough & Garman, 2009). Considering that a series of scholars have established that new products and/or services are pivotal for a firm to gain and sustain a competitive advantage vis-à-vis its competitors (Calantone, Cavusgil, & Zhao, 2002; Langerak, Hultink, & Robben, 2004; Tellis, 2008) this outside-in perspective of open innovation is adopted for the purpose of this study.

THEORETICAL FRAMEWORK

Although useful, prior research attempting to explain the antecedents of innovation performance does not comprehensively describe the underlying factors. This paper therefore builds on this earlier research by identifying and assessing additional potential linkages, such as open innovation proclivity and openness and synthesizing them into a single comprehensive model.

The investigation into the antecedents of innovation performance unfolds in five sections along all five hypothesized relationship in the model. First, grounded in organizational behavior theory we define innovation performance and describe the effects that entrepreneurial orientation may have on it. Second, building on the rather recent findings from the field of open innovation we discuss how entrepreneurial orientation may influence the construct of open innovation proclivity. In the third segment, it is discussed how open innovation proclivity potentially effects innovation performance. The fourth part deals with the effects of entrepreneurial orientation on organizational openness. Building on organization learning theory, the fifth section is concerned
with the effects of organizational openness on organizational innovation performance. A model of the antecedents of innovation performance as explained herein is presented is in Figure 1.

Innovation Performance

As innovation has become a widely recognized research topic, the interest in innovation performance has increased, too. Being interpreted as a connecting concept between business processes on the one hand and a firm’s general performance on the other, innovation performance can provide a clearer understanding of the mechanisms of causes and effects within organizations (Alegre, Lapedra, & Chiva, 2006). In a similar vein and drawing on the findings of Yeoh and Roth (1999), Lim and Peltner (2011) state that organizational innovation performance is “a representation of the capabilities of enterprises to achieve superior economic and strategic performance through acquiring, exploiting and managing their unique resources and capabilities” (Lim & Peltner, 2011: 286). Hence, it is not surprising that prior research has provided supported for the notion that innovation performance and firm performance are positively linked (Calantone, Vickery, & Dröge, 1995; Capon, Farley, & Hoenig, 1990; Zahra & Das, 1993).
**Effects of entrepreneurial orientation on organizational innovation performance**

The entrepreneurial orientation (EO) of a firm refers to the processes, actions, methods, policies, practices, and decision-making styles within an organization (Lumpkin & Dess, 1996; Mintzberg, Raisinghani, & Théorêt, 1976). As such, it equips enterprises with a foundation for entrepreneurial decisions and actions (see e.g. (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2003).

Having its roots in strategy as well as entrepreneurship literature (Covin & Slevin, 1991; Miller, 1983; Miller & Friesen, 1978, 1983; Mintzberg et al., 1976; Venkatraman, 1989) it draws on various concepts from both academic fields. Using Miller’s (1983) classification of firms as a starting point, three dimensions of EO have been frequently identified and regularly been used in research (Miles & Arnold, 1991; Morris & Paul, 1987; Smart & Conant, 1994).

The first one is innovativeness. Innovativeness represents the tendency of an organization to introduce new products and/or services by the means of creativity and experimentation as well as its propensity to strive for technological leadership via R&D; it expresses “a firm’s tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes” (Lumpkin & Dess, 1996: 146).

The second dimension is proactiveness. Proactiveness describes a firm’s opportunity-seeking and forward-looking posture. A proactive firm seeks to introduce new products and/or services ahead of competition and acts in anticipation of future demand. Proactiveness thus captures the propensity of an organization to identify market opportunities and to act upon them in order to influence their competitive position and to proactively shape their environment.
The third component is risk-taking. Risk-taking reflects a company’s propensity to engage in risky operations. This dimension takes especially into account bold actions of a firm by venturing into the unknown, heavy borrowing, and/or committing significant resources to undertakings in uncertain environments.

Lumpkin and Dess (1996) suggested adding two further dimensions to those three established dimensions of EO: competitive aggressiveness and autonomy. Competitive aggressiveness reflects the intensity with which an organization strives to outperform its rivals. Firms with a high competitive aggressiveness display a strong offensive posture and respond aggressively to competitive threats. Autonomy refers to the independent actions taken by entrepreneurial leaders or groups with the aim of bringing creating a new venture and growing it.

Prior findings from the field of organizational behavior suggest a significant linkage between EO and the levels of innovations. Pérez-Luño, Wiklund and Cabrera (2011), for instance, showed that proactivity and risk taking were positively linked to the number of innovation generated by a firm. Citing numerous other scholars Avlonitis and Salavou (2007) present an entire string of arguments and empirical evidence that yields support to the idea that the EO has a significant positive effect on the innovation levels of a company: Miller and Friesen (1982), for example, posit that entrepreneurial firms, unlike traditional ones, display a bold innovative behavior and are willing to accept considerable risks in business endeavors. Other scholars in the filed such as Miller, Vries and Toulouse (1982) argue that producing significant innovations demands organizations to display higher degrees of risk-taking proactivity. In a similar vein Salavou and Lioukas (2003) suggest that EO positively affects product innovation. The works of Khan and Manopichetwattana (1989) furthermore yielded empirical support for the notion that a particularly innovative group of enterprises which they had labeled as Young Turks
and Blue Chips, displayed a far greater risk-taking proclivity and market leadership intentions than non-innovative peer groups. Avlonitis and Salavou (2007) moreover cite a study among Greek SMEs conducted by Salavou and Lioukas (2003) which reported a positive effect of EO on product innovativeness as well as work published by Zhou, Yim and Tse (2005) who argue that EO has a positive effect on breakthrough innovations and thus corroborated earlier findings of Hamel and Prahalad (1994) who emphasized the importance entrepreneurial foresight and Tellis and Golder (2001) who highlighted the role of vision in generating breakthroughs. Building on these findings finding, we offer the following:

**Proposition 1. The more pronounced the entrepreneurial orientation of a firm is, the higher is the level of its innovation performance**

**Effects of entrepreneurial orientation on open innovation proclivity**

Open innovation proclivity can be described as the inclination or predisposition of organization towards using elements of open innovation in the R&D process. As such "[o]pen innovation proclivity assesses the company's inclination to utilise external ideas to complement its business model to profit from innovations" (Hung, Peng, Chiang, & Hwa, 2010: 257).

In their pioneering work on the effects of open innovation proclivity Hung, Peng, Chiang and Hwa (2010) investigated the question whether EO positively moderates the relationship between open innovation proclivity and firm performance. The empirical research among 122 Taiwanese electronic product manufacturers yielded indeed support for the notion EO positively moderates the relationship between open innovation proclivity and firm performance. This
finding gives rise to the question whether EO may not also have a significant direct effect on innovation proclivity.

As explicated above EO consist of several items, among them innovativeness and proactiveness. Since innovativeness captures the propensity of an organization to apply creativity and experimentation on its quest for new products/services (Lumpkin & Dess, 1996), it can be expected that EO is positively related to innovation proclivity. Proactiveness on the other hand, reflects a firm’s attitude in terms of its opportunity-seeking behavior and forward-looking posture. As proactiveness describes the propensity of an organization to identify market opportunities and to act upon them it can be expected that this item, too, is positively linked to open innovation proclivity. The logic presented above suggests the following proposition.

Proposition 2. The more pronounced the entrepreneurial orientation of a firm is, the more pronounced is its open innovation proclivity

Effects of open innovation proclivity on organizational innovation performance

In their research on the role of open innovation proclivity Hung, Peng, Chiang and Hwa (2010) further investigated the question whether open innovation proclivity is positively related to firm performance. Drawing on the findings of Chesbrough (2006) they argued that in view of increasing R&D costs and shortening life cycles it becomes increasingly difficult to develop required technologies in-house. Moreover and citing Chesbrough and Appleyard (2007) the authors point out that due to the increased number of knowledge workers and their heightened
mobility it becomes an more and more a viable option for firms to not commercialize technology themselves, but to sell the idea to partner firm. Their empirical results yielded strong support for the notion that open innovation proclivity is positively related to firm performance.

Using this positive relationship between open innovation proclivity and firm performance as a starting point, this research sets out to investigate this relationship in a more detailed fashion. Whilst it has been established that open innovation proclivity positively effects firm performance, it has not been assessed yet which effects open innovation proclivity has on innovation performance. As open innovation proclivity (merely) captures the inclination or predisposition of an organization towards using elements of open innovation, no statement can be made about the actual effects on innovation performance, which may or may not influence the overall firm performance. Hence, this work intends to investigate this ‘missing link’ by assessing the direct effects of open innovation proclivity on innovation performance.

Adopting an open innovation approach is likely to result in substantial benefits for an organization, mainly due to two reasons. First, by applying open innovation firms manage to capture a much broader wealth of knowledge for creating new intellectual property and subsequently developing new products and/or services (Sisodiya, Johnson, & Grégoire, 2013). Hence, this approach permits for a faster and more sustained new product/service development process, potentially with higher success rates. Due to the fact that open innovation broadens the possibilities to source input for new service/product development process, it furthermore increases innovation and presents an occasion to build-up knowledge and to further enhance the new product/service development process itself (Calantone et al., 2002; Narasimhan, Rajiv, & Dutta, 2006).
Secondly, companies can gain from improved efficiency levels and reduced costs when a firm decides to pool its existing knowledge base as well as product/service development capabilities with knowledge gathered from outside sources (Dittrich & Duysters, 2007). Amalgamating a firm’s proprietary resource and knowledge base with outside knowledge will leverage its product/service development capabilities as well as its efficiency levels (Chesbrough, 2003). Moreover, open innovation spurs the more efficient use of underutilized resources, in consequence increasing business performance (Chesbrough, 2003).

Should a company display a high proclivity to open innovation, we can assume that it at ceteris paribus benefits from the advantages that this approach may bring along. Therefore the following is suggested.

*Proposition 3. The more pronounced the open innovation proclivity of a firm is, the higher is the level of its innovation performance*

*Effects of entrepreneurial orientation on organizational openness*

A firm’s innovativeness is tightly linked to its capacity to employ its knowledge base (Subramaniam & Youndt, 2005) as it entails the acquisition, diffusion, and usage of new and existing knowledge (Damanpour, 1991; Moorman & Miner, 1998). Over the past years an increasing number of companies employed ‘open innovation’ approaches (Chesbrough, 2003), using a wealth of external stakeholders and knowledge sources to facilitate their innovation
process. In the wake of this process the integration of knowledge external to the company has received heightened attention as it is key to the process. Yet, even more fundamental to this process is organizational openness. Without the necessary degree of openness, no acquisition of outside knowledge is conceivable.

Analyzing the findings of Chesbrough (2003), Helfat (2006), and Laursen and Salter (2006), Dahlander and Gann (2010) come to the conclusion that the questions “How does openness influence firms’ ability to innovate and appropriate benefits of innovation?” lie at the heart of recent research on innovation“ (Dahlander & Gann, 2010: 699).

Further to this line of evidence Roper, Youtie, Shapira and Fernández-Ribas (2008) established the significance of organizational openness when they assessed the impact of external links, both forward and backwards linkages, for manufacturing firms from various regions in the US as well as Europe.

For the purpose of this paper and following the notion of Laursen and Salter (2006) we define organizational openness as a firm’s openness to external search strategies. Laursen and Salter (2006) built on the findings of Cohen and Levinthal, who suggested that the capacity to exploit outside knowledge is an essential component of innovation performance (Cohen & Levinthal, 1990). As such, the organizational openness becomes increasingly important in the context of open innovation. Based on the previous arguments the following is posited.

**Proposition 4.** The more pronounced the entrepreneurial orientation of a firm is, the higher is the degree of its organizational openness
Effects of organizational openness on organizational innovation performance

Research on innovation over the past decades indicates that the innovation process has become increasingly interactive. Innovators hardly innovate unaccompanied, but “band together in teams and coalitions […] nested in communities of practice and embedded in a dense network of interactions” (Laursen & Salter, 2006: 132). Consequently, knowledge sharing became of heightened significance in this context as it can lead to increased levels of organizational innovativeness (Kogut & Zander, 1992; Szulanski, 1996; Tsai, 2001; Tsai & Goshal, 1998). As knowledge sharing can be described as the dissemination of knowledge among different individuals or units within organizations (Chen & Huang, 2009) or across even across organizations (Dyer & Singh, 1998), openness to external search strategies became of paramount importance.

In their study on the effects of technological acquisitions on the subsequent innovation performance of acquiring firms Ahuja and Katila (2001) found evidence that the size of an acquired knowledge base has a significant effect on innovation output of the acquiring firm. The authors argue that the larger the acquired knowledge base is in absolute terms, the better is the innovation performance. Putting these findings in an open innovation context and leaving legal considerations aside, it becomes obvious that the implementation of a pure-bread open innovation system may theoretically increase the size of the acquirable knowledge base to the absolute maximum.

Laursen and Salter (2006) investigated the effects of open search strategies on innovation performance among UK manufacturing firms. They found support for a curvilinear relationship between external search breadth and innovation performance which takes an inverted U-shape.
Hence, in the beginning of the quest for innovation the innovation performance increases with the number of external sources used in the search. Yet, the marginal benefits are shrinking and when more than 11 external sources are being used, the innovation performance is on the decrease. The authors provide similar findings for the relationship between external search depth and innovation performance. Here, too, they found support for a curvilinear relationship which takes an inverted U-shape. If more than 3 external sources are deeply used in a firms search for external knowledge, the innovation performance is likely to shrink. The authors attribute “great importance to openness of firms to external sources in the development of new innovative opportunities”, yet also point out the significance “of understanding the costs of such search efforts” (Laursen & Salter, 2006: 146).

In a study among Chinese SMEs Zeng, Xie and Tam (2010) used the ”open innovation” paradigm as a starting point to assess how various constituents of the open innovation idea may impact the innovation performance of a firm. Various factors were identified to have significant positive effects on innovation performance. Among them were a close inter-firm cooperation, close collaborations with intermediaries and a close cooperation with research institutions.

In a subsequent study which covered a larger sample firms of all sizes Xie, Zeng and Tam (2013) found further support for their previous findings and identified additional factors that had a positive impact on innovation performance: close cooperation networks within the firm, close cooperations with universities and a tight cooperation across regions. Hence and according to Xie et al. (2013), organizational openness observed on various levels, from intra-organizational, to inter-organizational to cross-regional, had a significant positive impact on innovation performance.
Thus, there are reasons to expect that a higher degree of organizational openness fosters the degree of innovation of an organization. It can be argued that the more permeable the organizational boundaries are the higher are the firm’s levels of innovativeness. Hence, we posit the following:

*Proposition 5. The higher the degree of organizational openness of a firm, the higher is the level of its innovation performance*

**DISCUSSION OF IMPLICATIONS**

**Implications for Theory**

Our study offers several implications for theory. First, this study suggests applying a finer grained perspective to assess the antecedents of innovation performance. More specifically it proposes investigating the potential causes of innovation performance by assessing constructs on two levels: on the EO level as well as on the innovation proclivity- and organizational openness-level. Second, the present study is the first identifiable literature that suggests a significant linkage between open innovation proclivity and innovation performance. Being aware of this potential relationship is important because it may eventually lead to further empirical evidence that provides scientific insights on the phenomenon of open innovation.
Implications for Practice

Our model provides insight into some key contingencies that potentially effect innovation performance. We suggest that managers who seek innovation performance should first and foremost see to it that company attains the necessary levels of EO. At the same time, however, they should see to it that the organizational proclivity for open innovation grows and that corporate boundaries become more permeable. If managed rightly, these measures can yield significantly higher levels of innovation performance for the firm.

LIMITATIONS

Boundary Conditions of the Model

The causes and effects of entrepreneurial orientation and innovation performance are manifold (Dosi, 1988; Wang, 2008). Should researchers intend to investigate the implications of the suggested model, they ought to consider the boundaries of the model that has been derived and control for critical factors not accounted for. In this context different types of variables deserve particular attention, most importantly the industry type and the time component.

Open innovation is, for instance, far more widely spread in the manufacturing industry than in banking. Hence, any empirical application of the suggested research model should strictly control for the industry type. Secondly, innovation is a process that evolves over time. Consequently the time span to measure the model variables has to be chosen diligently. Is the time span too short, the results may not be meaningful.
Suggestions for Future Research

Noting the limitations of our contribution may provide ideas for extension and improvement. One of the contributions of this research is to provide testable propositions that advance entrepreneurship theory in the context of open innovation. While some evidence exists regarding the effects of entrepreneurial orientation on innovation in general (Pérez-Luño et al., 2011; Salavou & Lioukas, 2003) a key implication of the foregoing analysis is that greater attention ought to be paid to the factors of open innovation proclivity as well as on organization openness. So far several case studies have shed light on the underlying mechanisms of open innovation. Huizingh (2011), however, called for more “quantitative studies involving large samples to determine the relative importance of factors, to build path models to understand chains of effects, and to formally test for context dependencies.“ (Huizingh, 2011: 2). Hence, investigating open innovation proclivity as well as organization openness empirically holds promise for fruitful new research.

Beyond testing the propositions of the suggested model, this research also identifies several additional areas for research. In particular, the two main boundary conditions stated above indicate promising avenues for extension. For example, how do industry characteristics as well as the time component affect the relationships proposed in the model? Understanding these mechanisms would contribute to theory in both the entrepreneurship and innovation fields.
CONCLUSION

The extant body of literature has documented the wide-spread application of open innovation practices. This paper enhances our knowledge about this phenomenon, contributing to the existing entrepreneurship, innovation, and organizational behavior research. The article offers a model on the effects of entrepreneurial orientation on innovation performance, open innovation proclivity, and organizational openness. In addition it suggests significant linkages between open innovation proclivity and openness on the one hand on innovation performance on the other. Considerable potential exists for research at the crossroads of entrepreneurship, innovation, and organizational behavior research theory. This work provides a starting point for such theoretical developments and enhancements.
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Figure 1: A model of the antecedents of innovation performance