

A 3M Case study on the Value of Open Innovation Activities in Exploration and Exploitation Strategies

1ZM90 - Open Innovation 03-06-2020
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Abstract

This paper studies the innovation activities of 3M to learn about the added value of open innovation comparing exploration and exploitation strategies. First, an elaboration on the differences between exploration and exploitation strategies is given, then the relation of these strategies to open innovation and the different stages of the innovation funnel is described. Next, a case study on the innovation activities of 3M is done to learn where open innovation is most relevant. The findings of the 3M case study provide evidence that open innovation activities can be more fruitful in exploration strategies than in exploitation strategies.

1. Introduction

Exploration & Exploitation

An important concern for managing innovation relates to the successfulness of adaptive processes in balancing the exploitation of old products and services with the exploration of new opportunities for the future (March, 1991). The challenge is to shift between optimizing the revenue from existing propositions and developing new propositions for future business opportunities. A firm's ability in balancing these tensions between exploration and exploitation is critical for a firm's survival and is commonly referred to as organizational ambidexterity (Andriouopoulos & Lewis, 2009; O'Reilly, Harreld & Tushman, 2009). Establishing an appropriate balance is challenging since both activities require different skills and entail different activities (March, 1991). Exploration and exploitation strategies globally differ by their purpose. Where exploration is about finding new knowledge for the long term, exploitation is about optimizing current knowledge for the short term.

Open Innovation

In the past three decades, the innovation landscape has changed tremendously. Due to various erosion factors, the strategic and competitive advantages of closed innovation models deteriorated (Chesbrough, 2007). The increasing pace of innovation together with the growing costs of technology development have made closed innovation models less effective over time. In contrast, Chesbrough (2003, 2006) proposed the open innovation model which considers more pervious boundaries of R&D. To expand innovation opportunities, it allows for inflow of external knowledge as well as outflow of internal knowledge. Dahlander & Gann (2010) clarify the openness of innovation by categorizing it based on the direction of knowledge and the presence of a financial transaction. When knowledge is moving inside or outside the firm this is referred to inbound or outbound innovation and pecuniary or non-pecuniary describe whether there is a financial transaction for the exchanged knowledge. Open Innovation can create additional revenues through outsourcing knowledge to other firms or reduce R&D expenses by insourcing the knowledge of others (Chesbrough, 2003, 2006). Thanks to these benefits, open innovation is often described as the next paradigm in innovation.

Open Innovation at 3M

A large enterprise that successfully leverages open innovation practises in both exploration and exploitation strategies is 3M. 3M is often noticed as one of the most innovative companies in the world and received a plethora of awards for their innovation capabilities. Around the turn of the century started 3M leveraging the benefits of open innovation by shifting towards resources that build on external networks and communities (Lee, Hwang & Choi, 2012). In the mid 1990s 3M's top managers noticed that a large part of the company's growth was coming from incremental innovations. The amount of radical innovations was stagnating and the time between successful radical innovations increased. In response, general management set the objective that 30% of sales should come from products that were launched in the previous four years. This bold incentive sparked a search for novel approaches on innovation. During the same time, innovation researchers found that many important products are initially prototyped by users rather than manufactures. For 3M, this resulted in a shift of focus towards lead user innovation (von Hippel, Thomke & Sonnack, 1999). Alongside the connection with users, 3M is an example for other successful integrations of open innovation practises.

Ambidexterity and Open Business Models

The benefits of open innovation have been widely debated in innovation literature, since besides its advantages, the costs can exceed its benefits (Laursen & Salter, 2006). The success of open innovation activities depends on the match with the business. Therefore, it is important that

firms align their internal organizational aspects with their business models to integrate open innovation and reap the benefits of the new paradigm (Saebi & Foss, 2015). To make sure that the costs do not exceed the benefits of open innovation it is important that managers establish a strategic balance between exploration and exploitation activities. When deciding upon a strategy it is important to understand what open innovation practises could be best implemented for which strategy.

Value of open innovation in exploration and exploitation

To clarify what are successful approaches of integrating open innovation practises for ambidexterity, this paper draws upon the innovation activities of 3M to learn about the value of different open innovation practises with regard to exploration and exploitation strategies. By analysing the value of different open innovation activities related to explorative and exploitative strategies the goal is to learn for which strategies open innovation practises are most relevant. In a case study on 3M the following hypothesis is addressed:

H: Open innovation is more relevant for explorative technology projects compared to exploitative ones?

Open Innovation Strategies

Various activities and strategies can be considered when opening up a firm's innovation process by looking at the goal of the innovation activities. Saebi and Foss (2015) propose four types of open business models by addressing the depth and breadth of external knowledge search. Dahlander & Gann (2010) propose four open innovation strategies by describing pecuniary and non-pecuniary approaches for inbound and outbound innovation. Chesbrough and Prencipe (2008) describe various open innovation activities corresponding to the stages of technological development which range from exploration towards exploitation. Van de Vrande et al. (2009) propose a selection of open innovation practises that are distributed by the relevance for exploration and exploitation strategies. Since Chesbrough & Prencipe and van de Vrande et al. connect their open innovation strategies to the exploration exploitation continuum, this case study builds upon their findings.

2. Analysis

Difference Between Exploration & Exploitation

Exploration, is the search and development of knowledge, experimenting with novel ideas that shape the variation which is needed for radical innovation (Andriouopoulos & Lewis, 2009). Amongst others, exploration entails concepts such as search, variation, risk taking, experimentation, play flexibility, discovery and innovation (March, 1991). The goal of these activities is to explore opportunities for future business and is therefore a process of uncertainty focussing on long-term rewards. In contrast, exploitation cultivates existing knowledge with the goal to increase efficiency and improvements that enable incremental innovations (Atuahene-Gima, 2005). The exploitation of existing propositions is associated with concepts such as refinement, choice, production, efficiency, selection, implementation and execution (March, 1991). Since the purpose of exploitative activities is to optimize the benefits from established propositions, these activities focus on the short-term rewards.

Exploration Exploitation Continuum

The differences between exploration and exploitation, however, are not binary. In a literature review, Lavie, Stettner & Tushman (2010) advocate for the use of a continuum to capture a balance in exploration and exploitation. In addition, Chesbrough & Prencipe, (2008) propose a continuum that is linked to the process of development where the focus gradually shifts from

exploration towards exploitation as different states of development demand different activities. This continuum of exploration up to exploitation can be connected to the process of an innovation funnel.

The first phases of the innovation funnel demand a level of organizational flexibility that allows the firm freedom to search broadly since it is not clear where promising new ideas may be found. According to Dittrich & Duysters (2007) new insights often arise from interactions with others from different lines of business as these give access to a different knowledge base. However, firms should avoid rigid partnerships in this phase since it is uncertain if an innovation can be profitable (Duysters & De Man, 2003). Therefore, these phases are characterised by weak ties with deep knowledge partners, followed by stronger ties with complementary asset holders (Chesbrough & Prencipe, 2008; van de Vrande, Lemmens & Vanhaverbeke, 2006).

The last phases of the innovation funnel demand more certainty and rigidity to ensure that a portion of the value that is generated by the knowledge can be captured by the firm. This requires the firm to orient on the exploitation of current partnerships to establish economies of scale. These phases are characterized by strong ties among complementary asset holders and long-term collaborations (Chesbrough & Prencipe, 2008; van de Vrande, Lemmens & Vanhaverbeke, 2006)). When connecting to the phases of technological development, it becomes apparent that exploration and exploitation strategies operate on a continuum which corresponds to the innovation funnel. Throughout the stages of development, activities and alliances change accordingly ranging from a focus on flexibility and freedom in exploration towards a focus on certainty and rigidity in exploitation.

Dividing Open Innovation Practises

To study the effect of open innovation practises over the exploration exploitation continuum, a selection of practises needs to be established. Van de Vrande et al. (2009) propose open innovation practises that are used in either exploration or exploitation strategies. For exploration strategies, customer involvement, external networking, external participation, outsourcing R&D and inward licensing of intellectual property are selected. For exploitation strategies, the selected activities are venturing, outward licensing of intellectual property and the involvement of employees from non-R&D departments. This split of activities is used in to divide the innovation activities of 3M in the case study.

3. Case Study 3M

Exploration Strategies

With regard to exploration strategies, van de Vrande et al. (2009) propose several practises that enable firms to gather external new knowledge and technologies. These practises being, customer involvement, external networking, external participation, outsourcing R&D and inward licensing of IP. The following paragraphs discuss the activities at 3M that relate to these practises.

Customer involvement is an important replacement for regular innovation processes and, instead of being mere recipients of technology, users are increasingly approached as active co-creators of innovation (Von Hippel, 2005). Firms can largely benefit from the ideas of users in their innovation process for example through lead users. For 3M, the innovation process changed drastically in the 1997s as they started adopting lead user innovation processes. Lead user innovation takes a different approach by gathering knowledge about needs and solutions from the most advanced parts of the market and markets struggling with comparable challenges

in extreme forms. Lilien, Morrison, Searls, Sonnack & Hippel, (2002) studied the effect of lead user idea generation processes at 3M showing several benefits. Their findings show that the sales forecast of funded lead user projects was up to eight times higher than those of regular projects, which is an average of \$146 million annual in sales against \$18 million. Moreover, the projects that arose from 3Ms lead user studies scored a higher novelty rate whilst establishing newer customer needs and having a higher projected market share (Lilien, Morrison, Searls, Sonnack & Hippel, 2002). Nevertheless, as the lead user process demands a certain openness, it can be challenging to protect the intellectual property of ideas. Since the lead users own the rights to the ideas that are developed by them and they can reveal these ideas elsewhere. 3M allows lead users to keep the rights to the ideas that are generated before the last phase of the lead user process.

One of 3Ms strengths is in the culture and the way how they treat employees. 3M offers a variety of incentives and motivations for employees to generate ideas and develop them (Govindarajan & Srinivas, 2013). To spur creativity, 3M allows employees to spend 15% of their time pursuing other opportunities than their daily line of work. In regard to external networking and external participation 3M offers multiple ways to interact with both consumers and colleagues to explore new opportunities. 3M launched customer innovation centres all around the globe with the purpose of connecting with users, learning about their problems. These centres gather insights and explore ideas together with users to find potential new innovation opportunities. Alongside consumer interactions, 3M also hosts various forums and councils that provide an internal networking platform for scientists, engineers and other employees to share knowledge and build relations. When stumbling upon an interesting concept, 3M provides, internal funds so that employees can take their ideas to the next level. Employees can request various capitals internally and they can assemble their own team to work on new ventures. Considering the aforementioned aspects, it is evident that 3M focuses on creativity in the organizational culture by building on users' insights and cultivating (internal) social interactions.

Exploitation Projects

Regarding exploitation strategies, van de Vrande et al. (2009) describe three type of open innovation activities that enterprises can engage in to optimize their use of internal knowledge. The activities being venturing, outward licensing of intellectual property and the involvement of employees from non-R&D departments.

Considering intellectual property, 3Ms Office of Intellectual Property Counsel (OIPC) is one of the nation's largest corporate IP departments. The OIPC issues more than 600 patents yearly. Patents are an important means to protect 3M's large investments in research and development (6% of annual sales). In 2014, 3M filed their 100.000th patent (Alexander, 2014). Nevertheless, 3M is not actively focussed on selling or out licensing their patents. Perhaps because 3M expects that these innovations can be commercialized at a later time or in combination with a new technology. Since 3Ms intellectual property protection is extensive, knowledge can flow more openly between partners.

In contrast, venturing is an important element of 3Ms innovation culture. Various investment funds are set up for both internal funding and external investments. The goal of the venture department, 3M Ventures, is *"to advance 3M innovation by creating growth options in areas of strategic interest through minority equity investments, leveraging the global entrepreneurial and venture community"* (3M, 2020). 3M is open to collaboration in any stage of the process with entrepreneurs, start-ups or other innovative organizations that fit to their strategy. These

venturing strategies provide 3M with novel business opportunities or market insights that can spark new technological developments.

Looking at the involvement of non-R&D employees in innovation projects, 3M is very active. As described in the previous paragraph there are various platforms that allow employees to engage in activities outside of their regular line of work without risking their previous function (Govindarajan & Srinivas, 2013). The large variety of internal knowledge platforms and networking activities help to shape interactions that can lead to different ideas and collaborations. This strong focus on organizational innovation culture decreases rigidity and supports a culture of creativity.

Synthesis

The strategy of 3M is highly ambidextrous and holds a critical balance between present and future concerns. The incentive that 30% of revenue should come from products that are introduced in the last four years and the 15% culture that allows employees to freely pursue insights that lie outside their regular line of work. The cultivation of autonomy at individual level as well as business units' level, shapes a flexible, adaptable and responsive enterprise that experiences limited barriers from hierarchical structures (Conceição, Hamill & Pinheiro, 2002). In regard to the balancing of exploration and exploitation, the entire research structure of 3M is built upon three time horizons. Business Unit Laboratories work on close to market solutions, Sector Laboratories work on solutions for in 3-10 years and Corporate Laboratories work on research looking up to 20 years ahead (Govindarajan & Srinivas, 2013). Altogether it can be said that the innovation success of 3M is largely a result of the firms' strong focus on their innovation culture together with the highly effective implementation of lead user processes.

4. Discussion

When considering the added value of open innovation related to exploration and exploitation strategies. Based on the case study, one could argue that 3M is mostly profiting from open innovation in their exploration activities. The effective implementation of the lead user process yielded 3M incredible growth compared to regular innovation processes and is a large driver behind their strong innovation capability. Moreover, the investments in internal networking, and social interactions with external parties allows for a large variety in shared knowledge and creative ideas which can be further developed internally. However, the focus on shaping a creative and innovative organizational culture reaps benefits over the complete continuum from exploration to exploitation. Moreover, the case of 3M might not give a compelling example since 3M does not actively engage in outlicensing of intellectual property. Considering the large collection of patents, this could provide an interesting additional income. Moreover, it is impossible to speculate what the effects of stronger open innovation activities in the exploitation phase would do to the innovation capabilities of 3M. Therefore, a larger number of cases is needed to build towards a stronger reasoning. Also, van de Vrande, de Jong, Vanhaverbeke & Rochemont, (2009) found that SMEs mostly benefit from exploitation strategies with their open innovation activities. This shows that further research is needed on the effects of size on successful implementation of open innovation activities.

5. Conclusion

When looking at the case study of 3M, it can be said that the innovation success is largely the result of the lead user focus together with the strong investments in an innovative and creative organizational culture with high social interaction. These insights lead to believe that 3M gained the most benefits of their open innovation activities in exploration strategies which confirms

the hypothesis: *Open innovation is more relevant for explorative technology projects compared to exploitative ones.*

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