Complementing open innovation practices in MNCs. The role of internal cross boundary knowledge flows

Thomas Moellers  
University of St. Gallen  
Institute of Technology Management  
thomas.moellers@unisg.ch

Camillo Visini  
University of St. Gallen  
Institute of Technology Management  
camilloluca.visini@student.unisg.ch

Mirella Haldimann  
Swiss Federal Institute of Aquatic Science and Technology (EAWAG)  
Department Environmental Social Sciences  
Mirella.Haldimann@eawag.ch

Abstract
Open innovation (OI) so far has mainly been understood as a process involving firm external partners. In this paper, we argue that such a focus limits our understanding of how multinational corporations (MNC) profit from internally applied open innovation practices. We thus build on the current OI literature by investigating and describing open innovation activities, conducted within the firm boundaries. Based on a multiple case study of 17 MNCs, our findings reveal five archetypical internal OI practices that vary in underlying management motives. Interestingly, we also find that internal open innovation consistently mitigates some of the fears and risks related to external open innovation and helps MNCs better leverage developments in ICT. Furthermore, we conclude that initial engagement in internal open innovation at MNCs increases the chance to succeed at external open innovation.
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Open innovation (OI) so far has mainly been understood as a process involving firm external partners. In this paper, we argue that such a focus limits our understanding of how multinational corporations (MNC) profit from internally applied open innovation practices. We thus build on the current OI literature by investigating and describing open innovation activities, conducted within the firm boundaries. Based on a multiple case study of 17 MNCs, our findings reveal five archetypical internal OI practices that vary in underlying management motives. Interestingly, we also find that internal open innovation consistently mitigates some of the fears and risks related to external open innovation and helps MNCs better leverage developments in ICT. Furthermore, we conclude that initial engagement in internal open innovation at MNCs increases the chance to succeed at external open innovation.

1. Introduction

In the past decades, MNCs have begun to look beyond firm boundaries to find means of increasing efficiency and effectiveness in their innovation processes. The prospect of additional innovation opportunities, profit growths, and time-to-market acceleration have constituted a trend towards the adoption open innovation (OI) practices (Chesbrough, 2003a). As companies increasingly open up their innovation processes to purposively manage knowledge flows across organizational boundaries (Chesbrough & Bogers, 2014; Piller & West, 2014). Foremost based on transaction cost economics and the resource-based view (see Vanhaverbeke & Cloodt, 2014), the literature describing OI has greatly developed since its emergence (see Dahlander & Gann, 2010). Here, different streams help for example to explain OI adoption (Mortara & Minshall, 2011), different OI processes (Dahlander & Gann, 2010; Enkel, Gassmann, & Chesbrough, 2009), necessary capabilities (Lichtenthaler & Ernst, 2009; Spithoven, Clarysse, & Knockaert, 2011; Vanhaverbeke, Van De Vrande, & Chesbrough, 2008), or its effects on performance (Ahn, Minshall, & Mortara, 2015; Huizingh, 2011).

A magnitude of this work has focused on established companies (Chesbrough & Bogers, 2014). Despite such attention, said literature has interestingly made little distinction between vertically integrated firms and their counterpart. In the former case, transaction cost economists can draw a clearer line between markets and hierarchies that constitute the permeable boundaries of the firm (Coase, 1937; Williamson, 1975). In the latter case, multi-business firms face the paradox of being one single entity while consisting of autonomous units which develop context specific resources and capabilities (Birkinshaw, Hood, & Jonsson, 1998; Birkinshaw, Hood, & Young, 2005). As a result the MNC itself is considered to be a diverse and international network, in which innovation can base on external as well as internal sources (Cantwell, 2009, 2013). Suggesting that the concept of permeability between firm boundaries and its environment may also extend to the company unit level within a MNC. As Cantwell (2013, p.2) puts it: “the boundaries between different units of a large firm can become as much of an issue as the boundaries between firms”. In this sense, OI practices could become important within the boundaries of large firms to drive innovation and deserves further attention in OI research.

Despite decreasing importance of vertical integration in today’s markets (see e.g., Birkinshaw et al., 2005; Langlois, 2003), mainstream OI literature on large firms has not considered purposively managed knowledge flows across different firm units. This is curious in so far that practitioners widely recognize the value and criticality of employees in regard to OI practices. Chesbrough and Brunswicker (2014) for example state: “Interestingly, internal employees were considered the most critical source of innovation ideas […] our data indicate that respondents consider employees a key element in their open innovation efforts” (Chesbrough & Brunswicker, 2014: 21). Shifting the focus within the boundaries thereby also allows to further investigate the innovation potential of employees outside the internal R&D department (see e.g., Cantwell, 2013; Füller, Hutter, Hautz, & Matzler, 2014).
We thus contribute to this research gap by exploring OI practices that take place within MNCs. Through a multiple case study of 17 MNCs in 13 industries, we integrate OI strategies discussed in the literature (Dahlander & Gann, 2010) in what has previously been referred to an internal OI context (see Füller et al., 2014). In doing so, we furthermore aimed to understand the management’s motivations behind the practices as well as the role of ICT in implementing them. Given the importance of ICT as an enabler for OI processes and performance (e.g. see, Dodgson, Gann, & Salter, 2006; Füller et al., 2014). The firms under study provided an ideal setting to study such practices, given that they pursued different OI strategies across functional or geographical units, yet within the same corporation.

The present study hence contributes to current open innovation literature by providing a complementary mode for opening up innovation processes within MNCs. Furthermore, we distinguish between archetypes based on the organizational level and type of OI process. In this context we confirm the major role of ICTs as an enabler of open innovation. However, we also conclude that their potential can be more effectively leveraged in the internal OI context due to higher trust levels among innovating entities. On a managerial level, these findings suggest that MNCs can profit from applying OI practices internally either as a stepping stone to boundary spanning OI or as a complementary activity to explore and exploit internal ideas better.

2. Theoretical background

The discussion around how firms manage their R&D processes and its consequences date as far back as the 1960s (Trott & Hartmann, 2009). Yet, OI as coined decades later specifically refers to a more recent paradigm shift taking place wherein firms cease to innovate in isolation in light of globalization and ICT developments (Chesbrough, 2003a). Instead, companies engage with different types of partners to draw on external ideas and paths to market to advance their technologies and stay ahead of competitive forces (Laursen & Salter, 2006). Such a perspective has hence stimulated questions about the role and degree of openness in innovation, in turn emphasizing the permeability of the firm’s boundaries where ideas, resources and also individuals flow in and out of (Dahlander & Gann, 2010). A recent definition articulates these views, defining OI as a distributed innovation process consisting of purposively managed knowledge flows across organizational boundaries, relying on non/pecuniary mechanisms in line with the organization’s business model (Chesbrough & Bogers, 2014).

Inquiring into the impact of firms’ OI practices, the conceptualization and scope of OI has evolved (West, Salter, Vanhaverbeke, & Chesbrough, 2014). OI despite being examined most commonly at the firm level takes place on different organizational levels and potentially between a broad set of stakeholders (Chesbrough & Bogers, 2014; Mortara & Minshall, 2011). Furthermore, OI practices have been identified beyond high-tech industries, on which OI research initially had focused on (Chesbrough & Crowther, 2006), commonly referred to as in-, outbound and coupled processes (Enkel et al., 2009). While inbound processes allow firms to increase innovativeness by extending their knowledge base through internalizing or acquiring knowledge (Laursen & Salter, 2006); outbound processes allow for commercialization or voluntary disclosure of knowledge (Fosfuri, 2006; Henkel, 2006; von Hippel & von Krogh, 2003); and coupled processes enable co-creation within a value network to both internalize and externalize knowledge among partners simultaneously (Enkel et al., 2009). Allowing firms to yield access to highly specialized knowledge or higher utilization rates of preexisting knowledge for example (Chesbrough, 2003b, 2007; Huizingh, 2011). Resulting in increased innovative performance, and overall financial performance shown in SMEs (Ahn et al., 2015) as well as large companies (Huizingh, 2011). Tested on large samples, this relationship appears to be more pronounced when firms adapt their coordination mechanisms according to the type of partner (Du, Leten, & Vanhaverbeke, 2014), and do not over search in terms of breadth (Greco, Grimaldi, & Cricelli, 2016).

However, research has also pointed to significant challenges in implementing OI in light of defensive behavior and risk attitudes on the employee or management level. In practice, inbound open innovation implementation often is accompanied with managing not-invented-here attitudes (Savitskaya, Salmi, & Torkkeli, 2010), the tendency of employees or project groups to reject new ideas from outsiders (Katz & Allen, 1982). Moreover, management or employees may fear that adopting outbound practices may be cause for diffusion (Kline, 2003), involuntary leakage (Cassiman & Veugelers, 2002; Heiman & Nickerson, 2004) or theft (Laursen & Salter, 2014) of knowledge. These perceived risk factors may also explain why a growing body of empirical findings suggests that firms are more inclined to perform inbound than outbound activities (e.g., Bianchi, Caivale, Chiaroni, Frattini, & Chiesa, 2011; Chiaroni, Chiesa, & Frattini, 2011). Suggesting that firms fail to capture potential benefits of a fairly large magnitude (Lichtenthaler, 2010; Vanhaverbeke et al., 2008). In turn, such difficulties of value appropriation exert a negative impact on the willingness to engage in OI on the whole (Helfat & Quinn, 2006; Lichtenthaler & Lichtenthaler, 2010).

The phenomenon that engaging in OI necessitates the initiator to reveal some of his own knowledge to external actors which in turn have the chance to act opportunistically and utilize the knowledge single-handed is termed as the paradox of openness (Laursen & Salter, 2014) or disclosure paradox (Dahlander & Gann, 2010). For example, Veer and colleagues show that this fear is justifiable because R&D cooperation show high correlations with imitation problems (Veer, Lorenz,
& Blind, 2016). In response to that firms require to employ governance mechanisms (Laursen & Salter, 2014), which in practice reveal varying effectiveness (Veer et al., 2016). Implying that essentially large firms engaging in ‘external’ open innovation face considerable transaction costs (Coase, 1937) related to the search for information, the actual knowledge transfer and governance enforcement (Gambardella, Giuri, & Luzzi, 2007; Laursen & Salter, 2014; Lichtenhaler & Lichtenhaler, 2010). Examining MNCs, we identified an additional mode of OI applied to a) circumnavigate associated challenges to traditional external OI; b) mitigate associated costs to overcoming such challenges and c) better leverage internal but fragmented knowledge bases.

3. Methodology

This study sets out to explore OI practices within MNCs. We undertook the present study as the companies in question were taking on difficult strategic challenges, yet faced in unusual ways. Based on the success of these organizations, this ‘anomalous’ management, strongly resembling OI practices, could not be explained with existing theories or concepts found in the mainstream OI literature. This prompted us to theoretically sample these organizations (see Glaser, 1978) to explore the complex nature of the practices employed among organizational units in terms of knowledge exchange, underlying interests, hierarchy levels involved, as well as the role of ICT.

Given the limitations in theory development related to the phenomenon of internal OI, the chosen research approach can be described as a multiple case study (see Eisenhardt, 1989; Yin, 2014). This method allowed us to illustrate the different practices MNCs applied within the firm boundaries but across regionally or functionally diverse units in their natural environment (see Denzin & Lincoln, 1994; Gephart, 2004). It also enabled us to draw upon pre-existing concepts as they became salient throughout the research. Allowing for theoretical synthesis and mid-range theory generation (see Eisenhardt, 1989; Siggelkow, 2007). This method thus fostered a vital mix of depth and breadth, allowing to report on a detailed, study of why and how MNCs that apply OI practices firm-internally.

We sampled 26 cases from 17 firms that are multi-business corporations with a high diversity in development of technologies and products as well as firms that are “global players”, having established a presence throughout many countries, each division comprising of a set of unique expert knowledge. These were able to report on specific knowledge flow processes across organizational units. As the firms differ in size, age and industry, the sample represents a maximum variation sample (see Lincoln & Guba, 1985). Based on a replication logic (Yin, 2014), the set of characteristics helped increase the generalizability of the research outcome (Eisenhardt & Graebner, 2007).

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1 In the following we refer to external open innovation as the OI complement of internal open innovation.
Table 1. Description of case firms

<table>
<thead>
<tr>
<th>Case firm</th>
<th>Industry</th>
<th>Employees</th>
<th>Case description(s)</th>
<th>Interviewee(s)</th>
</tr>
</thead>
</table>
| Automotive| –        | >100,000  | (a) Business Innovation Community: Open discussion with employees about new business opportunities. After evaluation, the most promising ideas are picked up by the business innovation division.  
(b) Car Division R&D: Car division R&D specialized in material and production technologies transferred this expertise to other divisions.  
(c) 3D Printing Project: Collaboration of the business innovation unit with employees from different divisions to empower them with 3D printing technologies. | Senior Position in Production Technologies, Senior Position in Group Research, Position in Business Innovation |
| BMW      | Automotive| >100,000  | (a) BMW Motorcycle Division: Exploitation of technologies from the car division by the motorcycle division.  
(b) BMW Central R&D: Independent innovation development by centralized R&D units, subsequent dissemination to divisions. | Project Lead BMW motorcycle division |
| Bühler   | Process Engineering | 10,000–50,000 | (a) Innovation Challenge: Biennial internal idea competition, employees are asked to submit and develop ideas.  
(b) Corporate Technology: Coupled innovation process involving corporate R&D and several divisions. | Senior Position in Process Technology |
| Chemical | –        | >100,000  | (a) Crowdsourcing Platform: Crowdsourcing an ad-hoc tool to look for ideas addressing a certain market-specific need and to evaluate submissions.  
(b) Technology Incubator: Development of a light management technology by the internal technology incubator and porting to other divisions. | Senior Position in Innovation Management |
| Clariant  | Chemicals | 10,000–50,000 | (a) Idea Management Platform: Idea management platform to enable employees to take their project from idea to implementation.  
(b) Technology & Innovation: Collaborative innovation development between R&D function and divisions. | Manager Open Innovation and New Technologies |
| Cytec    | Aerospace | <10,000  | Process Engineering: Common process development by geographically separated units and subsequent diffusion throughout the company. | Supervisor in Process Safety and Engineering |
| Deloitte | Professional Services | >100,000  | (a) Measurement Division: Exploitation of technologies from the medical division by the measurement division.  
(b) Garage: Annual ideation challenges as a bottom-up approach to bring employees’ ideas into the company’s innovation funnel. | Functional Manager |
<p>| General Electric | Conglomerate | &gt;100,000  | (a) Measurement Division: Exploitation of technologies from the medical division by the measurement division. | Functional Manager |</p>
<table>
<thead>
<tr>
<th>Company</th>
<th>Division</th>
<th>Revenue Range</th>
<th>Description</th>
<th>Key Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holcim</td>
<td>Building Materials</td>
<td>&gt;100,000</td>
<td>▪ BMI Group: Enhancing the development of business model innovations and subsequently promoting them throughout the company for internal scaling.</td>
<td>Head of Innovation Management, Innovation Manager</td>
</tr>
<tr>
<td>Merck</td>
<td>Pharma</td>
<td>50,000–100,000</td>
<td>▪ Think Tank: Corporate function collaborating with employees from different divisions to develop technologies applicable throughout all divisions.</td>
<td>Head of Innovator Academy, Facilitator at the Innovation Center, Project Manager</td>
</tr>
<tr>
<td>Nestlé</td>
<td>Food Processing</td>
<td>&gt;100,000</td>
<td>▪ Science Technology Network: Find quick solutions to problems by asking the internal workforce through an internal knowledge management tool.</td>
<td>Head of Strategies and Performance</td>
</tr>
<tr>
<td>Roche</td>
<td>Pharma</td>
<td>50,000–100,000</td>
<td>▪ Ideation Challenge: Use of Roche’s global employees’ expertise to develop a specific technology, facilitated through an exchange of ideas via a social network. Aimed towards finding a solution to a specific problem as well as to develop an entrepreneurial mindset in its workforce.</td>
<td>Senior Legal Counsel, Head of Innovation and External Affairs, Head of CIP Management</td>
</tr>
<tr>
<td>SAP</td>
<td>Enterprise Software</td>
<td>50,000–100,000</td>
<td>▪ Business Model Management: Creation of a business model development and innovation methodology by a centralized function, subsequently distributed internally to several business units.</td>
<td>Senior Project Lead</td>
</tr>
<tr>
<td>Siemens</td>
<td>Conglomerate</td>
<td>&gt;100,000</td>
<td>(a) Building Technologies Division: Exploitation of automation technologies and industrial controls originating from the digital factory division by the building technologies division.</td>
<td>Senior Manager Innovation and Patent Coordination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) Corporate Technology: Development of innovations by R&amp;D function and subsequent exploitation by multiple divisions.</td>
<td></td>
</tr>
<tr>
<td>Swisscom</td>
<td>Telecom</td>
<td>10,000–50,000</td>
<td>▪ Flux/Looping: Crowdtesting platforms to let employees evaluate internally developed prototypes through voting and feedback</td>
<td>Senior Product Manager</td>
</tr>
<tr>
<td>Thomson Reuters</td>
<td>Mass Media</td>
<td>50,000–100,000</td>
<td>(a) Catalyst Fund: All employees throughout the company can hand in their ideas every month. Consists of a proof-of-concept- and prototype phase.</td>
<td>Strategy Manager in Open Innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) Challenge Driven Innovation: Internal crowdsourcing challenge as an ad-hoc tool to solve a defined problem.</td>
<td></td>
</tr>
<tr>
<td>Unilever</td>
<td>Consumer Goods</td>
<td>&gt;100,000</td>
<td>▪ Global Innovation: Development of innovations through input of different parties with the aim of application throughout the company.</td>
<td>Country Managing Director, Strategy Marketing Manager</td>
</tr>
</tbody>
</table>
For a small number of firms, the industry instead of the company name was used throughout this analysis, as some interviewees requested the respective case to be published in anonymized form. Thus, we refrained from stating these firms’ exact employee counts and the job position of the interviewed executives. An overview of this study’s underlying case sample is displayed in Table 1. For every firm, we added ancillary information to augment the rendering of the respective context, as well as a brief description of the individual cases.

Our research was informed by primary and secondary data. In terms of primary data we conducted semi-structured interviews with several executives which were potentially able to offer insight into internal innovation processes in their own firm, resulting in one to two interviews per case with an average duration of 50 minutes. Nearly all interviews were recorded. In some cases, we had to rely on written notes based on the request of the interviewee. In order to further improve the reliability of the data and increase internal validity, we triangulated the interview outcomes with internal and external company materials including follow-up emails, internal documents or press releases. To further increase the internal validity of the study, we sourced information until all researchers involved felt knowledgeable about each case. Through analysis we transitioned from raw data toward the identification of specific OI processes and their management. Our research process was informed by Gioia, Corley, & Hamilton (2012), in which iterative comparisons of data, emerging categories and eventually existing literature aided theory development.

4. Findings

Based on our cross-comparison of the selected cases and the revealed patterns, we were able to elaborate our cases with previously established types of OI processes: Inbound, outbound and coupled processes. According to our data, these internal OI practices take place on two distinct organizational levels: the individual level and the functional unit. The outcome is a framework of five archetypical internal OI processes (see Figure 1)².

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² Differentiating between levels of analysis the ‘coupled process’ remains ambiguous by definition. In our framework we respond to that by referring to the focal point of the innovation activity in determining the organizational level.
The comparison between the cases allowed us to depict common themes for each type but also to uncover subtle differences within each type that indicate contextual contingencies for implementation. We further analyze the cases in respect to opportunities and challenges followed by the role of ICT. Therefore we present the findings differentiating by the type of open innovation practice. Figure 2 provides a first overview of the three internal open innovation process types with particular focus on the typical problems we observed.
4.1 Inbound Process

A predominant setting observed in our case sample was the inbound process. The overarching objective is the efficient exploitation of existing resources commonly to reduce time-to-market. Inbound processes typically feature a direct ‘customer’ (receiving entity) and ‘supplier’ (sharing entity) relationship between the parties involved. While in some instances brokers facilitate the contact between the entities, respectively the innovation process itself, their contribution to the innovation output is marginal. Within inbound processes we identified the Knowledge Sourcing and the Idea Incubation archetype, taking place on the individual respectively the functional level.

Knowledge Sourcing innovation practices take place on the individual level and in the scope of our study typically as crowdsourcing activities. This archetype mainly targets to find a solution to a specific business problem by leveraging the crowd. The resource exploitation therefore is directed mainly on the exploitation of expertise or ideas and individual creativity. This may take place in the setting of a temporary ideation campaign such as was the case of Automotive, Chemical and Roche. We also observed permanent settings motivated by secondary objectives, that is, establishing an ‘internal innovation network or community’ or promoting an innovation culture towards employees. Automotive and Roche are exponents from these firms.

The Idea Incubation archetype represents the equivalent on the functional level. These internal OI practices are driven by the potential to leverage synergies mainly directed to decrease development costs and time-to-market. Hence, we identified the resource exploitation to be directed at sourcing full resource bundles, typically technologies. With BMW, we observed the motorcycle division benefiting from regular exploitation of novel technologies originating from the car division. While examining the cases of Siemens and General Electric, similar patterns emerged.
Contrasting traditional R&D, the sourcing of different company-internal resources facilitates leveraging synergies that positively affect development costs and innovation cycles. Applying internal inbound activities may have cultural as well as operational reasons. A common motive for the internal inbound process appears to be the possibility to rely on established processes and governance mechanisms (e.g. intra-company billing or resource transfers). The latter aspect also implies that internal processes allow to better address critical problems and leverage of confidential knowledge. Frequently, all involved units consent to sharing internally existing IP. Our interview partners also mentioned this aspect observing more open communication among internal innovators. ‘Internal crowdtesting’ represents a particularly useful setting to test innovations in a diverse but shielded environment and receive feedback quickly. Eventually, internal inbound processes are considered as a mean to foster innovation culture among employees.

The challenges of internal inbound activities appear to mainly concern effective incentives to tap existing knowledge sources. Particular for the functional level is the existence of NIH attitude, despite it being lower than for external inbound activities. Notwithstanding perceived process advantages compared to external OI, efficient resource sourcing is challenging to achieve, particularly when revolving around complex technologies. Thereby, we also observed dependencies to occur. Alongside resource complexity, the required complementary knowledge related to resource usage and modification increases, resulting in dependencies especially for smaller units lacking resources to tailor innovations to their specific use.

4.2 Outbound Process

Most prevalent on the functional level we observed internally conducted outbound activities. Knowledge transfer to other internal entities primarily aim to facilitate growth potential on a broad scale through the systematic rollout of locally developed innovations. Customer-supplier relationships are uncommon for internal outbound processes. However, it can result of cross-functional responsibilities by single members of the sharing unit. More typical is the identification of opportunities for an internal audience because the most suitable recipients are unknown. This in some cases may be achieved by raising upper management attention.

For the outbound process, we identified the Technology Brokerage archetype. Here, the R&D department commonly acts as a driver for the units’ innovation processes, proactively promoting technologies comprising the potential for
applications in the focus of the respective unit(s). We observed this for instance in the case of Automotive, where the R&D department of the car division specialized in material and production technologies subsequently transferred this expertise to several other divisions. The cases involving Siemens’ and Chemical’s R&D function exhibit similar characteristics.

Internal outbound innovation allows MNCs to quickly distribute locally developed innovations across the organization. The activities primarily aim to facilitate growth potential on a broad scale by systematically distributing the latest developed innovations. However, this in return is typically further accompanied by economies of scale. Leveraging innovations internally protects the integrity of the involved IP.

Despite these advantages we observed high difficulties to find suitable innovation recipients. Many of our interview partners emphasized high efforts related to the communication and initiation of the innovation transfer.

4.3 Coupled Process

Coupled processes take place on the individual as well as functional level and seek to facilitate innovation leaps resulting in two different archetypes, the Incentivized Ideation and the Cross-fertilized Innovation. Most commonly coupled processes are established as permanent settings, however we also observed project based collaborations.

The first archetype is commonly found in the setting of so called ‘internal idea contests’ or ‘innovation challenges’, aimed at discovering opportunities with breakthrough potential within the crowd and mutually develop it to a commercial end. Alternatively, it seeks to ideate on new products or services following a broad industry trend, or to foster new business initiatives from employees. The firms Deloitte and Bühler organize periodical ideation challenges calling upon employees for new business ideas. Likewise, in Thomson Reuters’ ‘catalyst fund’, cross-functional internal teams are encouraged to hand in their ideas, receiving support during the proof-of-concept and prototype phase.

We also identified several coupled processes, where the involved units engage in sharing proprietary knowledge by means of inter-unit collaboration, with the goal of introducing and commercializing new innovations. Bühler and Cytec revealed this kind of coupled process. By driving innovation in close collaboration with multiple divisions simultaneously, an R&D function figuratively acts as a nucleus of boundary spanning innovation, transforming ideas into solutions for current and future markets across several divisions. In such coupled processes, the centralized department identifies the potential of upcoming trends and derives new applications which can be employed throughout the company. The firms Clariant, Merck and Unilever are exponents where we uncovered coupled processes involving a central R&D department working in close collaboration with a single or an array of different units.

Internally conducted coupled processes appear to be particularly well suited to identify new business opportunities and to foster innovation culture. In many cases, we saw cross-fertilization through exchange of knowledge and know-how to break down silos while building on the ideas of others. For instance, Thomson Reuters considers the internally available knowledge and skills of employees to be vast enough for crowdsourcing initiatives to be successful without any form of external input. Today the firm, even though it can look back on successful external crowdsourcing campaigns, by considering cultural factors is therefore focusing on internal innovation projects involving their workforce. Another potential lies in developing innovations that might not be fully related to the existing business focus, for instance, the development of disruptive technologies that can take place in a shielded environment in the setting of this cross-unit initiative.

However, the effectiveness of such collaborative innovation efforts strongly depends on the preexisting culture that affect the incentive mechanisms needed to motivate a critical mass of employees to participate (repeatedly). Another difficulty related to knowledge transfer is the reconciliation of newly developed innovations and day-to-day operations independent from the organizational level. This may be due to the distance between innovation applicability and current business operations but also by the limitations to set employees free from daily operations. Finally, especially on the functional level we identified resource dependence issues and coordination of the diverse inputs as a significant challenge.

4.4 The Enabling Role of ICTs

The enabling role of ICTs in the context of internal OI practices majorly refers to the negotiation of a geographically, culturally and functionally dispersed workforce. Our findings provide support for this intuitive insight, however the situative type of OI process strongly determines the nature of this potential.

Inbound processes. Within inbound processes, ICTs allow problem holders to connect with solution holders in near-real time, often without incurring any significant transaction costs. Through digital, centralized knowledge repositories, individuals can source information related to a defined problem previously hidden inside a specific domain, or broadcast a problem to an audience consisting of internal employees via crowdsourcing initiatives. Unaided by ICTs, the described mechanisms would prove less efficient or even impossible. Notably on the functional level, we identified a decrease in latency of exploitation through other units, because the IP consisting the innovation, or information related to the innovation crucial to implementation (e.g. documentation) could be simultaneously transmitted.
Examining our case data, Chemical relies on a third-party online platform for inbound crowdsourcing. However, ICTs are not solely limited to internal crowdsourcing. As previously discussed, they may be observed extensively as an enabler of inbound processes on the functional level. BMW noted that the increasing digitalization substantially reduced the delay between innovation development by the car division and subsequent exploitation by the motorcycle division. Nestlé stressed the importance of digital knowledge flows between its twelve business lines, in form of transversal, internet-based research networks. In short, reports about completed projects are filed in a centralized database, which serves as a portal for employees, enabling them to directly contact key personnel involved in projects related to current problems they are facing.

Therefore, we argue that employing ICTs within the setting of inbound processes primarily increases the exploitation rate of resources (e.g. knowledge, technologies). Individuals looking for a solution to a specific problem may draw from the vast internal knowledge base, by broadcasting open calls, or by consulting centralized repositories, which aggregate and index internal knowledge.

Outbound processes. In the outbound process, units seeking to transfer their innovations to other units may benefit from ICTs as cost-efficient, typically instant communication channels. Therefore, the main benefit of employing ICT lies in reducing transaction costs or increasing the efficiency of the innovation process. Any online-platform that is deployed to facilitate units to proactively transfer innovations to other units acts as a broker, and therefore its quality and costs exert decisive influence on its potential. Automotive is an advocate of digital communication channels to facilitate interdivisional knowledge exchange, resorting to the usage of social media platforms or virtual conference meetings, in this case due to increasing dissemination of units in R&D and production across different continents.

Coupled processes. Within coupled processes, ICTs can be observed in form of platforms enabling individuals and units to share and collaboratively develop ideas. Thereby, we found practices to differ in line with the situative MNCs’ requirements. Deloitte uses an enterprise-grade solution for this purpose. In contrast, Thomson Reuters employs an internally developed and tailored platform for internal crowdsourcing. The latter described the transition from several distributed, slow, spreadsheets to a centralized platform as particularly beneficial to harmonize crowdsourcing initiatives throughout their lifecycle. Furthermore, on the functional level, Clariant, with its 5000 employees and 60 R&D labs, considers online communication as instrumental for boundary-spanning collaboration involving its units, embedding its employees in a ‘digital workplace’.

5. Discussion

This study focuses on the identification of OI practices taking place inside MNCs and analyzes the role of ICT in this context. With few exceptions, OI has exclusively focused on practices with external innovators (Füller et al., 2014). In this respect our research holds contributions for practitioners as well as management research in MNC’s. To our knowledge, the study is the first research approach that systematically explored the phenomenon of internal open innovation.

OI literature has elaborated and synthesized previously disparate literature streams (Chesbrough & Bogers, 2014). By a similar token, this study elaborates on external OI research by connecting it to another mode of OI that occurs within the boundaries of the firm (Füller et al., 2014). This study extends on prior OI work by identifying different types of processes - despite a change in empirical context - and provides a framework of internal archetypes. Thereby showing that inbound, outbound innovation and coupled processes of open innovation exist between entities of the same MNC and that internal OI practices in such processes vary at the individual and organizational unit level. Additionally, such an intra-firm level of analysis contributes to a more fine grained understanding of different sets of potential partners (Chesbrough & Bogers, 2014; Chesbrough, Vanhaverbeke, & West, 2006; Vanhaverbeke, Chesbrough, & West, 2014) and structure the varying management motives behind engaging in OI practices. Suggesting that further research could investigate the coordination of internal and external OI activities in practice (Mortara & Minshall, 2011).

These findings also further position internal open innovation within the broad context of open innovation. By inquiring into internal open innovation we enrich the discussion on varying degrees of openness (Dahlander & Gann, 2010). Thereby not only aiding the understanding of internal open innovation across intra-firm levels of analysis (Chesbrough et al., 2006), but also in terms of moderating effects on open innovation, particularly related to costs and benefits (Foss, 2003). Through the implementation of internal OI firms mitigate risks related to the revelation of IP and cultural barriers such as NIH syndrome commonly mentioned in OI literature (Chesbrough & Crowther, 2006; Mortara & Minshall, 2011). Consequently internal open innovation features lower transaction costs due to enhanced access to knowledge and congruence in administrative issues. Whilst OI literature focuses on reduced development costs (Chesbrough, 2003a), internal OI additionally emphasizes the potential for synergies in later stages (such as cost reduction of parts due to higher purchasing volume). Moreover, this study showed that internal OI practices improved cooperation within the decentralized MNC, fostering organizational ties, stimulating an innovative culture and intra-organizational learning in contrast to inter-organizational learning (Chesbrough et al., 2006). This effect in particular also encompasses the common
characterization of internal coupled innovation practices as a shielded, a more error tolerant ‘playground’ in which novel venues can be explored. Hence, internal OI represents a complementary mode to open up the MNC’s innovation funnel, holding a similar richness of practices while featuring a distinct set of advantages and disadvantages. However, these benefits may require consequent management commitment to reconcile short- and long-term requirements.

Finally, our findings also provide further insight into the role of ICT in internal and external OI. Prior research has emphasized their essential role to enhance inbound, outbound and coupled processes on a large scale (Chesbrough & Bogers, 2014; Enkel et al., 2009). Our research confirms these findings. ICT enables innovators to overcome functional and geographical distances. Thereby two main themes can be observed. First, ICT affects innovation processes through the reduction of transaction costs. Second, it affects resources (e.g. ideas, technologies, knowledge) through increase in their exploitation rate. This holds true also for also for external open innovation (De Jong, Vanhaverbeke, Kalvet, & Chesbrough, 2008). However, we identify IP issues and firm culture as moderators giving cause for major differences in the effect of ICT between internal and external OI. Due to higher mutual trust and legal disclosure between the innovating entities we conclude that internal OI profits stronger from application of ICT than external open innovation. This insight corresponds with the related discussion on open versus close trade-offs in research on platforms (Gawer & Cusumano, 2014). Proprietary knowledge is considered to facilitate potentials for revenue to a certain extent. Internally higher information and knowledge quality is provided because the occurring benefits remain inside the organization. The growing importance of digitized knowledge repositories has been acknowledged in recent OI literature (De Jong et al., 2008). While the ability to search for knowledge determines the effectiveness of open innovation (Afuah, 2016), it is likely to leverage automated data search and analysis better internally because sources can be searched more deeply.

Consequently we further consider internal open innovation as a promising as well as critically important initial mean to succeed in external OI. Following the process model in the adoption of open innovation (Chiaioni, Chiesa, & Frattini, 2010) we relate our idea to the requirements of an experimental field for the ‘moving’ phase. Higher effectiveness and efficiency of knowledge flows due to less moderating effects may overcompensate available knowledge potential leading eventually to greater realized benefit of the OI activities. This in turn is likely to decrease NIH symptoms and create a culture less reluctant to opening up innovation activities. Further it generates experience in handling IP issues. This reduces the moderating effects of IP and organizational culture and diminishes the difference in effectiveness and efficiency of knowledge flows between internal and external partners. Further research could specify this set of cause-effect relationships. We consider internal open innovation to be critically important because external OI may indeed open the divisional silos to external partners (Keupp & Gassmann, 2009). However growing relative effectiveness and efficiency of external knowledge flows may at a certain point undermine the reason for existence of the MNC (Ambos & Ambos, 2009).

References

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