

Open innovation management through strategic implementation

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There is wide agreement about the activities that encompass open innovation. However, little attention has been given towards the extent to which firms have strategically adopted open innovation within their organisation. The purpose of this paper is to explore the role of corporate strategy on this emergent paradigm. This paper therefore analyses two distinct cases of open innovation in practice from the oil and gas industry. Empirical data suggests that it is possible to provide countless examples of observed open innovation activity. However, these are not necessarily a direct cause of strategic intent towards implementing open innovation. Findings also show that if open innovation is to become a professionally managed activity, research needs to be aligned towards strategy of the firm. Open innovation is a change process that requires attention and commitment levels much like Lean and Six Sigma initiatives. This paper provides empirical evidence to show that open innovation should be concerned with the strategic transformation of an organisation through a shift in organisational culture that requires a managed process.

1. Introduction

Open innovation is by nature a business model (Chesbrough, 2003; Badawy, 2011), and even an organisational innovation in itself (Christensen, 2006). As noted by Frankenberger et al. (2014), research into open business models is still a relatively new area of enquiry. Their research specifically explores the antecedents that lead firms to open up their business model. Yet, our paper takes a slightly different approach to the open business model concept. Also, despite an earlier running debate in Technovation questioning the merits of open innovation (Groen and Linton, 2010;

Linstone, 2010; von Hippel, 2010; Badawy, 2011; Lichtenthaler, 2011; Van de Vrande and de Man, 2011; von Krogh, 2011), this paper introduces another consideration concerning what open innovation is and how it can be differentiated from openness in operations.

While understanding of the activities that encompass open innovation has grown and is fairly agreed upon across the board (Chiaroni et al., 2010; Bianchi et al., 2011), there are still question marks around what makes open innovation new. This research could not only help firms gain a better understanding for what open innovation is, but it might even improve their decision-making process

when asking themselves if open innovation is right for them.

This paper aims to propose an alternative viewpoint on open innovation, hopefully helping to make a distinction between what open innovation is and what it is not. To do this, we introduce the role of strategy in business model innovation. In this paper, we explore the question: what is the difference between openness and open innovation? From an in-depth innovation workshop in an oil and gas pipeline company, and a 15 month ethnographic study at a subsea oil and gas product design and manufacturing organisation, we find several factors that contest what existing literature suggests about open innovation. This is summarised across distinct themes, namely: (1) open innovation by observation, (2) openness rather than closed innovation, and (3) open innovation involving strategic organisational transformation.

This paper contributes to open innovation literature by presenting empirical evidence suggesting that it is not possible to engage in open innovation without strategically adopting the paradigm as the firm's *modus operandi*. This paper advances theory by arguing that open innovation is indeed open innovation if it has been embedded within the strategy of the organisation, driven from the top down, resulting in organisational transformation.

2. Theoretical background

2.1 *Open innovation model*

A business model 'describes the rationale of how an organization creates, delivers, and captures value' (Osterwalde and Pigneur, 2010, 14). At the initial inception of open innovation, Chesbrough (2003); (2006b) explicitly introduced two business models – closed innovation, and open innovation. The latter includes three prominent dimensions: (1) inbound activities, (2) outbound activities, and (3) coupled activities (Gassmann and Enkel, 2004). As highlighted by Mortara and Minshall (2011), these processes are not necessarily new to business operations, and tend to follow prior works of March (1991) (technology exploitation strategy), and Granstrand et al. (1992) (technological acquisition strategy) (Ying et al., 2008).

Inbound open innovation relates to movement of knowledge and technology into the business from external sources. This requires the firm to search external knowledge domains (Tidd et al., 2001; Laursen and Salter, 2006; Chesbrough, 2007;

Chiang and Hung, 2010) and establish relationships with others outside the business (Chiaroni et al., 2010; Xia, 2013). With this objective, von Hippel (1988) identified several potentially useful sources of knowledge: (1) customers and suppliers, (2) universities, government, and private labs, and (3) competitors. Essentially, this external orientation is one of the core innovation processes previously expressed by Tidd et al. (2001); Tidd and Bessant (2009). Once external opportunities are identified they must be analysed (Arora and Gambardella, 2010; Ili et al., 2010; Berchicci, 2013) before any can be seized upon and integrated within the organisation (MacKinven et al., 2013). Included within inbound open innovation are the various modes in which it can be executed e.g. in-licensing agreements, university collaborations, R&D contracts, joint ventures, and acquisitions (Bianchi et al., 2011).

Outbound open innovation, by contrast, is the reverse of the inward flow of knowledge and technology to the company. Here, the firm seeks to offload internally generated IP to an outside organisation that has a more suitable business model for the knowledge/technology (Chesbrough, 2003). This might involve the firm licensing-out IP, selling innovative projects, and even creating spin-out companies (Bianchi et al., 2011). The coupled process relates to engaging in both inbound and outbound activities through joined innovation and exploitation (Gassmann and Enkel, 2004).

2.2 *Moving from closed to open?*

A recent R&D Management article by Chiaroni et al. (2010) describes how four Italian firms operating in mature, asset-intensive industries adopted open innovation. Later, Chiaroni et al. (2011) published an article in *Technovation* specifically focusing on the Italcementi case to provide an in-depth account of the change process within the firm. Similar to Chesbrough (2003); (2006b), these papers started on the premise that the firms were operating under a model of closed innovation, as evidenced by Chiaroni et al., (2010, p. 222) stating: 'an issue that deserves further attention is the anatomy of the organizational change process through which a firm evolves from being a Closed to an Open Innovator.'

In communicating the journey from closed to open innovation, Chiaroni et al. (2010); (2011) utilise the change model by Lewin (1947) to describe each phase of unfreezing, moving, and institutionalising. Overall, there is wide agreement regarding the content of the article. For example, this paper agrees that parallels can be taken from characteristics of the organisational change process

and implementation of open innovation (Chiaroni et al., 2010). Additionally, overcoming the *Not Invented Here* (Katz and Allen, 1982; Burcharth et al., 2014) and *Not Sold Here* syndromes are critical to the success of implementing an open innovation business model (Chesbrough, 2003). We also agree that adopting open innovation will require new business processes and routines (Marshak, 1993; Eisenhardt and Martin, 2000; Chesbrough, 2006a; Helfat et al., 2007), new behaviours consistent with the new vision, extensive external networks (Simard and West, 2006), organisational systems to evaluate acquired knowledge, champions (Schön, 1963), knowledge management systems supporting knowledge sharing, and dedicated I.T. to support open innovation (Dodgson et al., 2006; Chiaroni et al., 2010). However, the one area that is in disagreement concerns the idea of a journey from closed to open.

Our paper is much more in favour of the view that innovation should be looked at in terms of a spectrum, whereby firms have varying degrees of openness (Dahlander and Gann, 2010). This thinking contests the authenticity of the closed innovation model (Trott and Hartmann, 2009) proposed by Chesbrough (2003). It is extremely difficult to imagine any firm operating under the closed model (past or present), in terms of succumbing to the closed model's principles that Chesbrough (2003) argues, but also not to have contact with the external environment as a closed model suggests. Even in the late 1960s, Allen and Cohen's (1969, p. 12) opening statement was 'no research and development laboratory can be completely self-sustaining. To keep abreast of scientific and technological developments, every laboratory must necessarily import information from outside.' Furthermore, Landes (2003) highlighted that specialist manufacturers throughout the United Kingdom during the 19th Century actively used external sources of knowledge to help them develop process technologies. Therefore, our perspective on the matter is that questions should not circulate around closed or open innovation, but around the differences between openness and open innovation.

The following section presents a detailed account of the data gathering process, from literature search, model building, case descriptions, and research tools.

3. Methodology

The objectives of this research were twofold: (1) to look for evidence of open innovation, and (2) to

look for evidence of a strategic and managed approach to open innovation. For this, we chose to pursue a mixed methods pragmatic approach and explored the research question deductively; the researchers utilised a pre-defined framework to assess the strategic adoption of open innovation. The mixed methods approach enabled the researchers to capture data about open innovation activity using a cross-section of methods, providing richness to the enquiry.

The research design for this investigation involved an extensive literature review over a two-year period (2011-2013). During this time, several themes related to open innovation were explored in order to expose researchers to the main concepts and academic thinking around the subject. Topics explored sit beneath Teece's (2007) dynamic capabilities framework.

For 'sensing', we explored a variety of topic areas including: internal knowledge search (Katila and Ahuja, 2002), innovation as an internal activity (Chandler, 1990), the search for external knowledge and technology (Laursen and Salter, 2006), location of external knowledge i.e. close/familiar or distant and unrelated industries (Nelson and Winter, 1982; Teece, 2007; Bessant and Tidd, 2008; Chiang and Hung, 2010; Duarte and Sarkar, 2011), exploratory and exploitive search intentions (March, 1991; Mudambi and Swift, 2014), search routines/processes (Paulk et al., 1993; Asakawa et al., 2010; Rohrbeck, 2010; Sofka and Grimpe, 2010), software (Dodgson et al., 2006; Van de Vrande et al., 2006), dedicated open innovation roles e.g. champions (Schön, 1963), gatekeepers (Allen and Cohen, 1969), technology scouts (Dodgson et al., 2006; Whelan et al., 2011), sources of knowledge e.g. suppliers, customers, universities, competitors, other nations (von Hippel, 1988; Rothwell, 1992; Cassiman et al., 2010; Schiele, 2010), relationship building and leveraging networks (Granovetter, 1973; Bianchi et al., 2011; Gronum et al., 2012), incorporation of external knowledge into strategy (Deal and Kennedy, 1982; Katz and Allen, 1982; Enkel et al., 2011), and open innovation metrics (Gassmann et al., 2010).

'Seizing', the second capability of dynamic capabilities - we investigated: absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002; Xia, 2013), *Not-Invented-Here* syndrome (Katz and Allen, 1982; Burcharth et al., 2014), routines/processes for seizing external opportunities (Paulk et al., 1993; Teece, 2007), and internal networks (Powell, 1990; Dodgson et al., 2006; Chiaroni et al., 2010).

Finally, Teece (2007) used the term 'transforming' as the final capability of dynamic capabilities, however we adopt the word

‘integrating’ due to the importance of embedding the newly acquired knowledge or technology into the firm. Here, we studied the environment for collaboration with externals (Barney and Hansen, 1994; Zaheer et al., 1998; Bogers, 2011; West and Bogers, 2013), routines/processes for integrating external knowledge (Paulk et al., 1993; Winter, 2003; Bititci et al., 2008), intellectual property (IP) (Teece, 1986; Pisano, 2006; West and Gallagher, 2006; Hurmelinna-Laukkanen, 2011), and learning (Argyris and Schon, 1978; Senge, 1990; Hughes and Wareham, 2010).

From reading the above literature, there was a strong sense for what the main features of open innovation include, and what type of characteristics one might expect to find in a company that show evidence of working collaboratively with externals. As a result of the literature review, it was possible to construct a deductive based open innovation maturity model. This would ultimately enable the researchers to assess the degree of open innovation activity in the case study organisation.

Overall, the research is largely qualitative and case study driven; the quantitative aspect is essentially directed towards providing a metric to assess open innovation maturity (Paulk et al., 1993; Enkel et al., 2011; MacKinven et al., 2013). For this particular study, the researcher investigated two global oil and gas firms involved in the design, manufacture, and supply of subsea equipment to the offshore industry. These firms were chosen using a case study selection criteria framework – the most important aspect being that they showed openness in their operations. In addition, the open innovation literature requests research across all industries (Chesbrough and Crowther, 2006). Therefore, this study helps to explore the subject in alternative contexts.

To provide background information on each of the case study firms, we make use of the FAME database provided by the University of Strathclyde. This version of FAME provides information on companies in the UK and Ireland as long as they fulfil one of the following criteria: turnover > £1 million; shareholder funds > £1 million; profits > £75,000. The database also provides detailed information such as: profile information, P&L accounts, balance sheets, cash flow statements, lists of holding companies, directors and shareholders, and other activity information.

Case A deals with a technical partnership between oil and gas firm, Pipeline Co. and a pipeline construction firm based in Houston called Weld Tech. The trade description for Pipeline Co. listed by FAME is: the provision of high technology welding and construction for subsea and cross-country pipeline projects. Globally, the firm has a resource of over 12,000 people.

Furthermore, the trade description for Weld Tech is: the provision of technical solutions to help clients boost speed, efficiency, productivity and quality in the welding industry. The case was chosen as it provides an opportunity to explore a mode of open innovation in action.

To try and understand the difference between openness and open innovation, we make use of a deductive-based open innovation maturity model to investigate this technical partnership. For this, an Innovation Workshop was conducted with members of Pipeline Co.’s Senior Management Team involved in setting-up and implementing the technical partnership with Weld Tech. Participants involved in the workshop included the Managing Director, Technical Manager, and Commercial Manager. These individuals were tasked with describing their approach to the partnership, focusing on how they searched the external environment for knowledge and technology, how they eventually seized upon the identified opportunity, and how this solution was integrated within their operations. During this exercise, each person was asked to provide a metric against each innovation activity on a maturity scale (see appendix 1 for tool). At the end of the workshop all participants gave feedback on the strengths and weaknesses of each key open innovation activity. The workshop was facilitated by one of the academic researchers and conducted at Pipeline Co.’s Welding Development Centre. The session lasted over two hours.

Case B involved one of the researchers undertaking a 15-month ethnographic study at a subsea oil and gas product development firm. For confidentiality purposes, this firm will also adopt a fictitious case name, Tree Org. This name was chosen as the firm manufacture subsea trees. Their trade description is: a group engaged in the manufacture and marketing of oilfield and wellhead equipment, flow measurement and control equipment. The firm employs in excess of 18,000 people. During this industrial immersion, the researcher was exposed to manufacturing operations at the Subsea Manufacturing Facility. This site is responsible for the design and manufacture of subsea trees, wellheads, and associated equipment. This state-of-the-art facility employs LEAN manufacturing techniques, and is equipped with cutting edge machine tool technology. Moreover, the researcher spent the largest proportion of time at the firm’s Subsea Technology R&D Centre. This site is exclusively reserved for the innovation of well access and completion systems, and the research and development of optoelectronic sensors and communication technology.

The initial ethnographic period was spend within

Well Access Systems, and later within the Optoelectronics Group where it was possible to observe an R&D partnership between the group and researchers from an academic institution. Throughout the 15-month investigation, the researcher seized upon a variety of knowledge sharing opportunities. This resulted in participating in a discussion on the subject of innovation in oil and gas as part of a two-day session on intellectual property that was arranged for two visiting IP specialists from the firm's Norwegian office. There was also opportunity to deliver a presentation on open innovation to the Optoelectronics Group Leader and a specialist consultant who is Professor of Photonics. Moreover, there was chance for informal conversations with a variety of employees including the Product Engineering Manager, Applications Engineering Manager, Senior Design Engineers, Research Engineers, and Lead Engineers. In addition to speaking with employees and general observation, reading literature (Intranet searches, and company reports and documentation) was an important aspect for gaining a thorough understanding of the firm's position on innovation.

During the course of the empirical fieldwork and data analysis, understanding about open innovation evolved, requiring the researchers to revisit and question existing theoretical understanding about what open innovation is. Therefore, due to this refining process, it is more appropriate to classify the entire works as abduction (Dubois and Gadde, 2014).

4. Results and discussion

This section will present evidence from each case in turn, separating the discussion between internal and external activities. We begin by presenting data gathered from the Innovation Workshop with Pipeline Co. before moving on to discuss the Tree Org. case. Each case will start by giving an overview of the firm's innovation strategy and key innovation message.

4.1 Pipeline Co. and Weld Tech technical partnership

Pipeline Co. holds innovation and collaboration as part of their vision and values set-up. The innovation message is centred on an investment in people, technology, operations, and processes, while collaboration is angled towards their employees working together and sharing knowledge across geographical regions. During a discussion with the Managing Director he said, "I

think it's below Project Managers where innovation sits. It's people down on the tools who are tasked with achieving it." He also mentioned, "it's very much down to an individual thinking this is a good idea and it's up to his levels of enthusiasm, persuasive power to get that idea more widely circulated around the company and get support for it." From this, it is possible to gauge a sense for where innovative ideas emerge. In terms of their technology strategy, the firm mentions that they work closely with suppliers, clients and partners to deliver technical solutions. Therefore, despite the strategic message mentioning close collaboration with supply chain members, there is no direct reference towards open innovation as a mode of operation.

As mentioned in the case description, for Pipeline Co. we specifically focus on a mode of open innovation activity – a technical partnership. Therefore, we present information for the company solely based on this case. According to the Technical Manager, Pipeline Co. was trying to address some technical difficulties when they entered into the Weld Tech partnership. The idea for a technical partnership was something that the Managing Director saw from motorsport and thought it would be appropriate for them. The main rationale for the partnership was that Pipeline Co. wanted to gain the ability to do pipeline welding and coating that would allow them to expand the business. In order to source suitable candidates, the Commercial Manager said, "we did go outside, we went to France and outside of our own sphere." As highlighted by the Managing Director, "we had three companies we approached." However, the Commercial Manager mentioned that there was not too much to differentiate all three companies technically, therefore it came down to the cultural fit between both parties. To quote the Commercial Manager, "the key to me was the culture of the company we chose, and that fact was a key element in our decision making."

In order to disseminate a shared understanding for the structure of this partnership with other senior members of staff, the Management Team from Pipeline Co. was able to make reference to a prior collaboration with another oil company. The only difference was that the company roles were reversed. Previously Pipeline Co. was looking to establish itself as somebody who could be seen to partner in subsea oil and gas. The other business was looking for someone with a specific offshore capability – they chose Pipeline Co. as their partner. In contrast for this case with Weld Tech, Pipeline Co. was seeking someone with technical capability – Weld Tech had the capability and wanted to grow as a welding contractor but had no business, no track record, and no revenue coming

from offshore oil and gas. The attractiveness was that if Weld Tech was to partner with Pipeline Co. it would immediately give it access to a lucrative market.

The challenging aspect of this partnership was communicating its purpose internally. The Managing Director commented, "I would say that initiatives like this take time to be understood throughout the organisation. As a team who put it together we understood it very well...I think it is very hard to get a level of understanding – you can get it horizontally across five or six of the Management Team, but to get it communicated vertically down through the organisation can be very different." This statement was reflected in the fact that some people left the company over the concept of taking on a third party. However, there were also a number of other underlying reasons why this solution met resistance. Internally, there is evidence to suggest that the benefits and how the partnership would work were not appropriately communicated throughout the organisation. This fact is compounded by comments from the Commercial Manager, "maybe it (the partnership) wasn't explained as well as it could have been initially to the people". Due to this, there was not a clear understanding for why the firm decided to bring in an external knowledge source. For some, this was interpreted as a criticism to their work, others felt that their job security was under threat, and others thought that Weld Tech were going to take over. Therefore, as confirmed by the Technical Manager, the cultural aspect of getting people within the business on-board to the idea of a technical partnership took some time.

From analysing this case, we can see that from the outside looking in, there was observed open innovation activity via a technical partnership. Although, once inside the organisation, and despite the firm looking outside their own operating industry for a partner (Laursen and Salter, 2006; Bessant and Tidd, 2008; Chang et al., 2012), the empirical data shows no clear evidence of the firm strategically operating by the open innovation business model, even although this partnership is an open innovation activity. Furthermore, as can be seen from the struggle encountered by the Management Team for others within the organisation to accept an external technology, the firm does not operate in such a way whereby you would expect an open innovation organisation to openly embrace outside knowledge entering the business (Katz and Allen, 1982; Chesbrough, 2003; Chesbrough et al., 2006). Consequently, we believe that this firm is not an open innovator; instead they operate with varying degrees of openness.

4.2 Observed open innovation activity at Tree Org.

During an exchange with the Applications Engineering Manager, he mentioned that innovation is one of the firm's core values, of which is being driven by the Vice President of Technology in Houston. Overall, the firm's innovation is centred on three main areas: disruptive technology, after market care, and execution processes (making things better and improving processes). Additionally, based on company documentation, both innovation and collaboration is listed as part of the firm's vision and core values. In terms of the innovation core value, typical phrases are mentioned, such as creating an environment for innovation, seeking new ideas, and sharing best practice. Underneath the collaboration core value there is an indication of openness and cooperation throughout the firm and also with suppliers and customers. Yet, it does not reference open innovation as strategy. According to the VP of Technology, their strategy for obtaining key enabling technologies is through internal development, acquisition or partnering.

The firm's internal innovation set-up is well defined and managed accordingly. For example, Tree Org. has a collaborative internal portal where employees can post technical problems they may have on an online message board. This facility enables anyone across the internal network to provide potential solutions to the problem, utilising the firm's global knowledge domain, but also reducing duplication of research efforts if a similar project has already been completed at another location. If questions fail to be answered, there are dedicated personnel within the firm who will encourage others to submit suggestions.

Another enabling innovation mechanism Tree Org. has is a newly established domain specifically for employees to submit new product ideas that align to the company's business goals. This internal application system has been purposely built to manage the innovation process in a more structured way to create a professional innovation culture. Therefore, this system is heavily driven by employee creativity to identify technology needs. In order to select applications to proceed into the New Product Development Stage-Gate Process, the firm has defined weighting criteria enabling the Technology Managers to critically evaluate the commercial merits of each proposal.

Further to supportive online systems, Tree Org. also has dedicated Centres of Excellence and R&D Centres across the globe. Whilst speaking to the Optoelectronics Group Leader at the Subsea Technology R&D Centre, he said that the company was doing quite a bit of recruitment at that period

of time. It transpired that a lot of these new hires came from backgrounds outside the oil and gas industry e.g. shipbuilding, electronics, aerospace, power generation, and pumps. Therefore, at a company level, the acquisition of knowledge is not necessarily done through searching external knowledge sources, but by employing individuals who have experience and expertise from other industries.

The other side to innovation is obtaining knowledge from outside the business. Tree Org. achieve this in a number of different ways. For example, the R&D Centre supported a number of MEng students from universities to work on collaborative projects across their engineering groups. The firm also funded several PhD studentships to focus on optical sensor technology. In addition to this, Tree Org. is engaged in a university R&D partnership, allowing the firm to pursue additional research projects. Furthering the notion of academic engagement, the firm offers an annual Technology Programme to approximately twelve engineering and business students where they work collaboratively on a real-world problem specific to the company.

Tree Org. also pursue other traditional forms of open innovation. There is evidence of customer engagement i.e. listening to customer needs to develop the firm's technology strategy, and developing technology systems in collaboration with customers. Also, while the Manufacturing Facility was re-organising itself to incorporate LEAN principles, employees recognised the importance of working closely with suppliers to increase cell efficiency. As recognised in the literature, acquisitions form part of the make-up of open innovation. Tree Org. have made a number of acquisitions over the years to advance their technological capability. One acquired firm in particular was able to share knowledge and expertise with Tree Org. to help reduce the cost and weight of one of their subsea products, despite the firm being acquired for their technological capability in a completely different space.

Finally, and what is especially interesting for the open innovation literature is that in a niche technological area of the firm (disruptive and emerging technologies), a small R&D group explicitly states open innovation under their mission and vision section - open innovation in terms of applying its principles using internal and external resources e.g. partnerships, university collaborations, government funding, partnerships, and spin-outs. This insight is extremely interesting because open innovation is not mentioned as strategy by the VP of Technology, nor under the innovation or collaboration core value that the firm holds. Therefore, we may find that open innovation

is even more specific than industrial context. It could be that open innovation is more acutely reserved for specific groups within a business, as it is evident that open innovation does not occur through global strategy, but through the strategy held by a specific technology group engaged in a very exclusive technology area. Having said that, after speaking to the Lead Research Engineer in the R&D Group, there is in fact no defined, documented or managed process for open innovation. He did however comment that everyone in the group is tasked with identifying potentially useful external technology. What these observations lead us to believe is that the way in which open innovation is thought about needs to be re-examined.

Clearly, all of the above examples of external engagement fall under the existing umbrella of open innovation (Huizingh, 2011). However, because open innovation has not been adopted into corporate strategy as an operating business model, it suggests that the firm is more appropriately positioned to sit within what Dahlander and Gann (2010) classify as openness. We believe that there is a clear distinction to be made between openness and open innovation.

5. Conclusions

This paper has sought to examine what open innovation means. Through the process of an extensive literature review and empirical research, we provide evidence to contest how open innovation is currently described in the literature.

Unless the firm has strategically adopted open innovation as a mode of operation, resulting in internal organisational transformation of the innovation culture (using both internal and external knowledge to create value), the adoption of open innovation business processes, the introduction of specific open innovation job roles, and the development of open innovation performance metrics – only then can a firm be said to be doing open innovation. All other notions can be reserved for openness. This distinction helps us to identify the firms who have objectively adopted the open innovation paradigm, physically use it as an operating business model to gain value, rather than it simply being an array of observed activities. Obviously, this is an alternative viewpoint to how we may consider what open innovation means, but if we do not think about new concepts in different ways and provoke discussion, theory will not develop in an appropriate manner. Future works are encouraged to debate the perspective on open

innovation as described in this paper.

6. References

- Allen, T. J. and Cohen, W. M. (1969) Information Flow in Research and Development Laboratories. *Administrative Science Quarterly*, **14**, 12-19.
- Argyris, C. and Schon, D. (1978) *Organizational Learning: Theory, method and practice*. London: Addison Wesley.
- Arora, A. and Gambardella, A. (2010) Ideas for rent: an overview of markets for technology. *Industrial and Corporate Change*, **19**.
- Asakawa, K., Nakamura, H. and Sawada, S. (2010) Firms' open innovation policies, laboratories' external collaborations, and laboratories' R&D performance. *R&D Management*, **40**, 109-123.
- Badawy, M. K. (2011) Is open innovation a field of study or a communication barrier to theory development?: A perspective. *Technovation*, **31**, 65-67.
- Barney, J. B. and Hansen, M. H. (1994) Trustworthiness as a source of competitive advantage. *Strategic Management Journal*, **15**, 175-190.
- Berchicci, L. (2013) Towards an open R&D system: Internal R&D investment, external knowledge acquisition and innovative performance. *Research Policy*, **42**, 117-127.
- Bessant, J. and Tidd, J. (2008) *Innovation and entrepreneurship*. Chichester, West Sussex: John Wiley & Sons Ltd.
- Bianchi, M., Cavaliere, A., Chiaroni, D., Frattini, F. and Chiesa, V. (2011) Organisational modes for Open Innovation in the bio-pharmaceutical industry: An exploratory analysis. *Technovation*, **31**, 22-33.
- Bititci, U., Ackermann, F., Ates, A., Davies, J., Gibb, S., MacBryde, J., Mackay, D., Maguire, C., van der Meer, R., Shafti, F. and Bourne, M. (2008) Manage Processes - What are they? *SIOM Research Paper Series*.
- Bogers, M. (2011) The open innovation paradox: knowledge sharing and protection in R&D collaborations. *European Journal of Innovation Management*, **14**, 93-117.
- Burcharth, A., Knudsen, M. P. and Søndergaard, H. A. (2014) Neither invented nor shared here: The impact and management of attitudes for the adoption of open innovation practices. *Technovation*, **34**, 149-161.
- Cassiman, B., Di Guardo, M. C. and Valentini, G. (2010) Organizing links with science: Cooperate or contract? A project-level analysis. *Research Policy*, **39**, 882-892.
- Chandler, A. D. J. (1990) *Scale and Scope: The Dynamics of Industrial Competition*. Cambridge, MA: Harvard University Press.
- Chang, Y.-C., Chang, H.-T., Chi, H.-R., Chen, M.-H. and Deng, L.-L. (2012) How do established firms improve radical innovation performance? The organizational capabilities view. *Technovation*, **32**, 441-451.
- Chesbrough, H. (2003) *Open innovation: The new imperative for creating and profiting from technology*. Boston, Massachusetts: Harvard Business School Press.
- Chesbrough, H. (2006a) *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston: Harvard Business School Press.
- Chesbrough, H. (2006b) Open Innovation: A New Paradigm for Understanding Industrial Innovation. In: Chesbrough, H., Vanhaverbeke, W. and West, J., eds. *Open Innovation: Researching a New Paradigm*. New York: Oxford University Press.
- Chesbrough, H. (2007) Why companies should have open business models. *MIT Sloan Management Review*, **48**, 22-28.
- Chesbrough, H. and Crowther, K. (2006) Beyond high tech: early adopters of open innovation in other industries. *R&D Management*, **36**, 229-236.
- Chesbrough, H., Vanhaverbeke, W. and West, J., eds. (2006) *Open Innovation: Researching a New Paradigm*. New York: Oxford University Press.
- Chiang, Y. H. and Hung, K. P. (2010) Exploring open search strategies and perceived innovation performance from the perspective of inter-organizational knowledge flows. *R&D Management*, **40**, 292-299.
- Chiaroni, D., Chiesa, V. and Frattini, F. (2010) Unravelling the process from Closed to Open Innovation: evidence from mature, asset-intensive industries. *R&D Management*, **40**, 222-245.
- Chiaroni, D., Chiesa, V. and Frattini, F. (2011) The Open Innovation Journey: How firms dynamically implement the emerging innovation management paradigm. *Technovation*, **31**, 34-43.
- Christensen, J. F. (2006) Wither core competency for the large corporation in an open innovation world? In: Chesbrough, H., Vanhaverbeke, W. and West, J., eds. *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press, 35-61.
- Cohen, W. M. and Levinthal, D. A. (1990) Absorptive capacity: a new perspective on learning an innovation. *Administrative Science Quarterly*, **35**, 128-152.
- Dahlander, L. and Gann, D. M. (2010) How open is innovation? *Research Policy*, **39**, 699-709.

- Deal, T. and Kennedy, A. (1982) *Corporate Cultures: the Rites and Rituals of Corporate Life*. London: Penguin Books.
- Dodgson, M., Gann, D. and Salter, A. (2006) The role of technology in the shift towards open innovation: the case of Procter & Gamble. *R&D Management*, **36**, 333-346.
- Duarte, V. and Sarkar, S. (2011) Separating the wheat from the chaff – a taxonomy of open innovation. *European Journal of Innovation Management*, **14**, 435-459.
- Dubois, A. and Gadde, L.-E. (2014) Systematic combining - A decade later. *Journal of Business Research*, **67**, 1277-1284.
- Eisenhardt, K. M. and Martin, J. A. (2000) Dynamic capabilities: what are they? *Strategic Management Journal*, **21**, 1105-1121.
- Enkel, E., Bell, J. and Hogenkamp, H. (2011) Open innovation maturity framework. *International Journal of Innovation Management*, **15**, 1161-1189.
- Frankenberger, K., Weiblen, T. and Gassmann, O. (2014) The antecedents of open business models: an exploratory study of incumbent firms. *R&D Management*, **44**, 173-188.
- Gassmann, O. and Enkel, E. (2004) Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*. Lisbon, Portugal.
- Gassmann, O., Enkel, E. and Chesbrough, H. (2010) The future of open innovation. *R&D Management*, **40**, 213-221.
- Granovetter, M. (1973) The Strength of Weak Ties. *American Journal of Sociology*, **78**, 1360-13680.
- Granstrand, O., Bohlin, E., Oskarsson, C. and Sjöberg, N. (1992) External technology acquisition in large multinational firms. *R&D Management*, **22**, 111-133.
- Groen, A. J. and Linton, J. D. (2010) Is open innovation a field of study or a communication barrier to theory development? *Technovation*, **30**, 554.
- Gronum, S., Verreyne, M.-L. and Kastle, T. (2012) The Role of Networks in Small and Medium-Sized Enterprise Innovation and Firm Performance. *Journal of Small Business Management*, **50**, 257-282.
- Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J. and Winter, S. (2007) *Dynamic Capabilities: Understanding Strategic Change in Organizations*. London: Blackwell.
- Hughes, B. and Wareham, J. (2010) Knowledge arbitrage in global pharma: a synthetic view of absorptive capacity and open innovation. *R&D Management*, **40**, 324-343.
- Huizingh, E. K. R. E. (2011) Open innovation: State of the art and future perspectives. *Technovation*, **31**, 2-9.
- Hurmelinna-Laukkanen, P. (2011) Enabling collaborative innovation - knowledge protection for knowledge sharing. *European Journal of Innovation Management*, **14**, 303-321.
- Ili, S., Albers, A. and Miller, S. (2010) Open innovation in the automotive industry. *R&D Management*, **40**, 246-255.
- Katila, R. and Ahuja, G. (2002) Something Old, Something New: A Longitudinal Study of Search Behaviour and New Product Introduction. *Academy of Management Journal*, **45**, 1183-1194.
- Katz, R. and Allen, T. J. (1982) Investigating the not invented here syndrome: a look at the performance, tenure and communication patterns of 50 R&D project groups. *R&D Management*, **12**, 7-19.
- Landes, D. S. (2003) *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*. Cambridge: Cambridge University Press.
- Laursen, K. and Salter, A. J. (2006) Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, **27**, 131-150.
- Lewin, K. (1947) Frontiers in group dynamics. *Human Relations*, **1**, 5-41.
- Lichtenthaler, U. (2011) Is open innovation a field of study or a barrier to theory development? A contribution to the current debate. *Technovation*, **31**, 138-139.
- Linstone, H. A. (2010) Comment on 'Is open innovation a field of study or a communication barrier to theory development?' *Technovation*, **30**, 556.
- MacKinven, S., MacBryde, J. and Wagner, B. (2013) A framework for measuring open innovation maturity levels. *20th EurOMA Conference: Operations Management at the Heart of the Recovery*. Dublin, Ireland.
- March, J. G. (1991) Exploration and exploitation in organizational learning. *Organization Science*, **2**, 71-87.
- Marshak, R. J. (1993) Managing the metaphors of change. *Organizational Dynamics*, **22**, 44-56.
- Mortara, L. and Minshall, T. (2011) How do large multinational companies implement open innovation? *Technovation*, **31**, 586-597.
- Mudambi, R. and Swift, T. (2014) Knowing when to leap: Transitioning between exploitative and explorative R&D. *Strategic Management Journal*, **35**, 126-145.
- Nelson, R. R. and Winter, S. (1982) *An Evolutionary Theory of Economic Change*. Cambridge, MA: Harvard University Press.
- Osterwalde, A. and Pigneur, Y. (2010) *Business Model Generation*. Hoboken, New Jersey: John Wiley & Sons.

- Paulk, M. C., Curtis, B., Chrissis, M. B. and Weber, C. V. (1993) Capability Maturity Model, Version 1.1. *Software Engineering Institute*, 18-27.
- Pisano, G. (2006) Profiting from innovation and the intellectual property revolution. *Research Policy*, **35**, 1122–1130.
- Powell, W. W. (1990) Neither market nor hierarchy: network forms of organization. *Research in Organizational Behaviour*, **12**, 295-336.
- Rohrbeck, R. (2010) Harnessing a network of experts for competitive advantage: Technology scouting in the ICT industry. *R&D Management*, **40**, 169-180.
- Rothwell, R. (1992) Successful industrial innovation: critical factors for the 1990s. *R&D Management*, **22**, 221-239.
- Schiele, H. (2010) Early supplier integration: The dual role of purchasing in new product development. *R&D Management*, **40**, 138-153.
- Schön, D. (1963) Champions for radical new inventions. *Harvard Business Review*, **41**.
- Senge, P. (1990) *The Fifth Discipline: The art and practice of the learning organization*. London: Random House.
- Simard, C. and West, J. (2006) Knowledge Networks and the Geographic Locus of Innovation. In: Chesbrough, H., Vanhaverbeke, W. and West, J., eds. *Open Innovation: Researching a New Paradigm*. New York: Oxford University Press.
- Sofka, W. and Grimpe, C. (2010) Specialized search and innovation performance - evidence across Europe. *R&D Management*, **40**, 310-323.
- Teece, D. J. (1986) Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, **15**, 285-305.
- Teece, D. J. (2007) Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, **28**, 1319–1350.
- Tidd, J. and Bessant, J. (2009) *Managing Innovation: Integrating Technological, Market and Organizational Change*. Chichester, England: John Wiley & Sons Inc.
- Tidd, J., Bessant, J. and Pavitt, K. (2001) *Managing Innovation: Integrating Technological, Market and Organizational Change*. Chichester, England: Wiley.
- Trott, P. and Hartmann, D. (2009) Why 'open innovation' is old wine in new bottles. *International Journal of Innovation Management*, **13**, 715-736.
- Van de Vrande, V. and de Man, A.-P. (2011) A response to “Is open innovation a field of study or a communication barrier to theory development?”. *Technovation*, **31**, 185-186.
- Van de Vrande, V., Lemmens, C. and Vanhaverbeke, W. (2006) Choosing governance modes for external technology sourcing. *R&D Management*, **36**, 347-363.
- von Hippel, E. (1988) *The Sources of Innovation*. New York: Oxford University Press.
- von Hippel, E. (2010) Comment on ‘Is open innovation a field of study or a communication barrier to theory development. *Technovation*, **30**, 555.
- von Krogh, G. (2011) Is open innovation a field study or a communication barrier to theory development? A commentary. *Technovation*, **31**, 286.
- West, J. and Bogers, M. (2013) Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, **31**.
- West, J. and Gallagher, S. (2006) Challenges of open innovation: the paradox of firm investment in open-source software. *R&D Management*, **36**, 319-330.
- Whelan, E., Parise, S., de Valk, J. and Aalbers, R. (2011) Creating Employee Networks That Deliver Open Innovation. *MIT Sloan Management Review*, **53**, 37-44.
- Winter, S. (2003) Understanding dynamic capabilities. *Strategic Management Journal*, **24**, 991-995.
- Xia, T. (2013) Absorptive capacity and openness of small biopharmaceutical firms – a European Union–United States comparison. *R&D Management*, **43**, 333-351.
- Ying, L., Vanhaverbeke, W. and Schoenmakers, W. (2008) Exploration and Exploitation in Innovation: Reframing the Interpretation. *Creativity and Innovation Management*, **17**, 107-126.
- Zaheer, A., McEvily, B. and Perrone, V. (1998) Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science*, **9**, 141-159.
- Zahra, S. A. and George, G. (2002) Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, **27**, 185-203.

