

# How firms use inbound Open Innovation practices over time: evidence from an exploratory multiple case study analysis

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**Firms are increasingly making use of Open Innovation in an attempt to get the most out of external ideas and knowledge in their innovation processes. The existing research on Open Innovation documents a broad set of practices that firms may use to implement inbound Open Innovation, which entail various degrees of integration with the external partner. There is also empirical evidence showing how firms move from a closed to an open approach to innovation over time. However, there is limited empirical work that documents if and how firms that start using open innovation change and evolve the practices through which inbound open innovation is implemented over time. This paper, relying on an exploratory analysis of nine case studies, adopts a temporal perspective to examine how and why firms use different practices for inbound open innovation over time, with attempts at offering a tentative explanation of the underlying drivers triggering this evolution. This paper contributes to the scholarly debate on the organisational enablers of Open Innovation and provides managers involved in open innovation activities with insights into the factors that may determine changes in their use of different inbound open innovation practices over time.**

## 1. Introduction

Open Innovation (OI) has become a dominant approach in innovation management over the last 10 years (Enkel et al., 2020). It was introduced by Chesbrough (2003) who popularised the idea that firms can – and should – seek out external sources of ideas and knowledge and look for new paths to market for their technologies in order to maximise their returns on their innovation efforts. Open innovation has quickly become one of the most hotly debated

topics in innovation research, with a vast number of papers generated over the years (e.g. Randhawa et al., 2016; Lopes et al., 2018).

The impact of OI has gone far beyond the academic realm, becoming a leading paradigm in innovation practise and influencing policymaking (Bogers et al., 2018). Scholars have even used it as an approach to develop research on the topic itself (Bogers et al., 2017). However, it still needs to be further explored and studied in spite of the many years of intensive research that has already gone into it (West and Bogers, 2017).

Even the definition of open innovation has become broader and more inclusive over the years, and today, OI is typically conceived as ‘a distributed innovation process based on purposively managed knowledge flows across organisation boundaries’ (Chesbrough and Bogers, 2014). Different knowledge flows characterise the two main typologies of OI: inbound and outbound. Inbound OI involves firms using external sources of knowledge, technologies and ideas as an input for their innovation process: these sources could include customers, suppliers and anyone that may be related to the innovation object (e.g. Chesbrough, 2003; Laursen and Salter, 2004; Dodgson et al., 2006). Outbound OI, meanwhile, requires firms to seek out new paths to market for their technologies (Chesbrough, 2003). Technologies that do not fit the current firm’s market or business model may still be valuable to other firms, segments or markets to which they can be transferred (Gassmann and Enkel, 2004; Piller and Walcher, 2006; Danneels and Frattini, 2018). Inbound OI is more common and more widely practised compared with outbound OI (e.g. West and Bogers, 2014; Cheng et al., 2020), and it represents the focus of this paper.

OI has challenged many firms’ long-established closed approaches to innovation over time. For instance, in the 1980s, Apple was a major example of the closed and vertical approach, in contrast with IBM, Intel and Microsoft (Cusumano and Gawer, 2002). Its strategy has since significantly changed, and the firm has started to practise different kinds of inbound approaches, such as the acquisition of start-ups, partnerships with competitors (Gomes-Casseres, 2014), and the creation of the app store, which enables any developer to advance the innovation of software for the iPhone (Parker et al., 2017). Scholars have studied this shift, highlighting the major dimensions involved during this process such as networks, organisational structures, evaluation processes and knowledge management systems (Chiaroni et al., 2010, 2011). As a result, there is some theoretical and empirical knowledge about how a closed approach to innovation can change into an open one over time (e.g. Bianchi et al., 2011; Buganza et al., 2011).

Very limited attention has been paid in scholarly research to understanding whether, once a firm has decided to use open innovation, it changes the practises used to implement OI. Interestingly, this is something that appears to happen in reality. Again, one example comes from the history of Apple: at the beginning of its open innovation journey, the firm mostly used in-licencing and acquisitions. It later created an innovation platform: the iPhone and the iOS system enable anyone to further innovation by building on existing advances, then distributing these

innovations through the App store. It is also true that firms start using open innovation cautiously, by experimenting with different OI practises over time (Van de Vrande et al., 2009). As such, it is very likely that they will evolve their approaches to OI on the basis of the results of these early experiments. That said, there is no research that aims to understand the patterns and logics of this kind of temporal evolution. Do firms start from simple approaches, such as calls for ideas, and then move on to more complex, capital-intensive practises, such as acquisitions? What are the drivers and implications of these evolutions? Understanding these patterns will provide managers with insights and an awareness of the possible patterns that their firm could follow over the years in its application of open innovation. From an academic perspective, this study will enhance our knowledge of the application of OI and its organisational determinants. The vast majority of OI research has only focussed on the processes firms go through when they shift from closed to open innovation, the organisational choices which enable the implementation of OI, and the practises used to put OI into action. However, this has largely been done by taking a cross-sectional approach, without paying enough attention to the temporal dimensions of the adoption of OI (Chiaroni et al., 2011; Dąbrowska et al., 2019). This paper aims to contribute to this scholarly debate and is based on an exploratory multiple case study analysis which sheds light on this peculiar evolutionary aspect associated with the adoption of OI. In summary, the goal of this study is to understand how and why the adoption of OI practises evolves within any given firm over time. The remainder of the paper is therefore structured as follows: Section 2 introduces and classifies the main practises used to implement inbound OI. Section 3 introduces the methodology. Sections 4 and 5 present the findings of the research and discuss them through the lenses of previous research, whilst Section 6 concludes the paper with a summary of the main contributions.

## 2. Theoretical background

Inbound OI is recognised as an ‘outside-in process’, which refers to opening up the innovation process to seeking out and making use of external sources of knowledge, typically found in collaboration with suppliers, customers, universities, research centres and consultants (Gassmann and Enkel, 2004; Cheng et al., 2020). The main advantages of inbound OI relate to a reduction in R&D costs and the time-to-market of innovation projects, the increased innovativeness of the newly developed

products and services (Cheng and Huizingh, 2010) and the opportunity to leverage external knowledge through better external relationships (Marullo et al., 2021). One of the potential drawbacks of inbound OI is a reduction in the firm's R&D capabilities, as the firm focusses more on internalising and assimilating external knowledge and technologies rather than its own in-house developments. As such, three evident limitations emerge, namely: difficulties in the evaluation and assimilation of knowledge developed by third parties (Katila and Ahuja, 2002); potential conflicts between different corporate cultures, the so-called 'culture clash' (Mortara et al., 2009) and high transaction costs linked with developing relationships (Laursen and Salter, 2006; Stuermer et al., 2009). A wide array of practises used to implement inbound OI have emerged over time. The most relevant practises in this regards are described and categorised in the following sections.

### 2.1. Practises used to implement inbound OI

Over the years, several practises for the implementation of inbound OI have emerged and are documented in the literature (e.g. Chesbrough and Crowther, 2006; Lichtenthaler, 2009; Trabucchi et al., 2018). Six main groups of practises stood out from the literature review.

The most typical way to implement inbound OI is to involve external sources – which may be users, suppliers, students or employees, among others – to propose ideas for a specific innovation challenge (Dell'Era et al., 2018; Randhawa et al., 2019). This practise also has significant implications in product design, by pointing out – for instance – the role of modularity (Naik et al., 2021). Recent contributions have also underlined the role that radical circles – i.e. groups of people taking 'radical' positions in the firm – may have in providing input and knowledge to define new directions for innovation (Dell'Era et al., 2020).

Inbound OI may also involve in-licencing Intellectual Property (IP), thus relying on pre-existing knowledge developed outside the firm's boundaries that may be relevant to the ongoing innovation process (Laursen et al., 2010; Bianchi and Lejarraga, 2016).

Another way to implement inbound OI is to develop dedicated relationships with external partners to develop knowledge collaboratively: these alliances may take various forms. For instance, joint research alliances, which can involve private corporations and/or universities, is one possible

nuance for this practise (Deschamps et al., 2013). Both alliances and networking may take place across industries (Chesbrough and Schwartz, 2007; Enkel and Gassmann, 2010) or involve some form of competition (Cassiman et al., 2009; Bouncken et al., 2015).

Establishing connexions with external knowledge in order to implement inbound OI may also require directly investing in fresh ideas that are being crafted in the start-up sphere – for example through Corporate Venture Capital investments (Wadhwa et al., 2016) – or by bringing those ideas in-house by means of Corporate Incubators (Mortara and Minshall, 2011).

Establishing a separate business entity with an external partner through a joint venture is another way to implement inbound OI. It incorporates the knowledge of the external partner into the new business entity, thus merging it with the capabilities of the firm (Dittrich and Duysters, 2007; Chesbrough and Brunswicker, 2013).

Finally, the option of completely embedding an external organisation within the firm through an M&A transaction is also considered by many scholars to be an inbound OI practise (Mawson and Brown, 2016).

### 2.2. Varying goals and integration levels for inbound OI practises

The various inbound practises identified above suggest, on the one hand, that OI can be implemented in different ways and in particular with different levels of integration with the external sources of knowledge. Indeed, the various practises require different levels of integration with firms' operational activities, ranging from crowdsourcing – in which the participant in the call may not have any kind of interaction with the firm besides submitting their idea – to an acquisition, which would change the entire structure of the organisation. We can therefore classify inbound OI practises in relation to the issue of institutionalising the collaboration between the parties for effective implementation of OI. Elmquist et al. (2009) identify two key dimensions that characterise OI compared with other innovation processes: (i) the *locus* where the innovation process is realised and (ii) the degree of collaboration between the firms. With regards to the locus, OI can take place either inside or outside the firm's boundaries, involving various parties along the entire value chain. Figure 1 summarises the main practises presented above, showing a growing level of relative integration in the firms' operations moving from left to right.

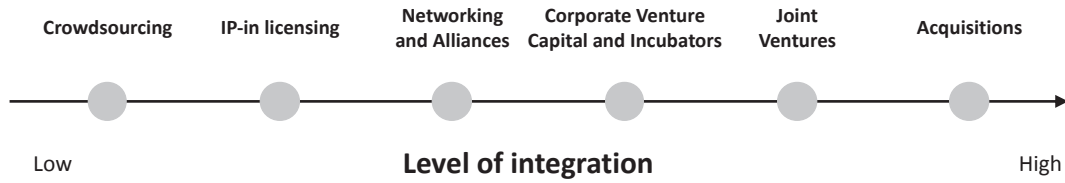


Figure 1. Levels of integration of various OI practises.

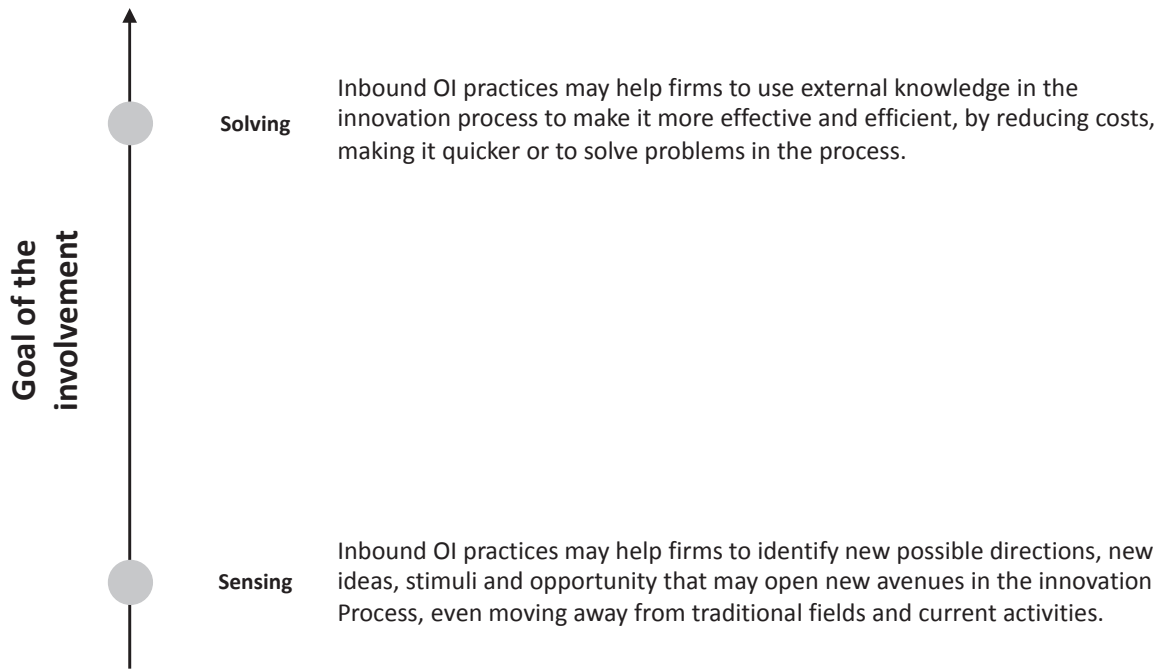


Figure 2. Goals of the involvement of external partners.

On the other hand, the literature also shows how inbound practises can be used for different purposes.

Inbound OI can help firms when they stall following the early success and fail to move past ordinary activities, providing new stimuli from the outside. A great deal of research has been done from this perspective: openness allows firms to strike up relationships with individuals, established firms, start-ups and several other sources of ideas and inspiration (e.g. Chesbrough and Schwartz, 2007; Alberti and Varon Garrido, 2017) and, in doing so, exposes them to new trends and technological opportunities that may help them to identify new directions for innovation (Del Vecchio et al., 2018; Trabucchi et al., 2018). This means that inbound OI practises are often used for sensing goals in order to observe what is happening in different fields (e.g. Herzog, 2008; Grimaldi et al., 2013).

Still, this is not the only reason why firms use inbound OI practises. Opting to use external knowledge in the innovation process tends to make the innovation process more efficient (e.g. Chesbrough and Crowther, 2006; Enkel et al., 2009), for example

by reducing costs or speeding up the process. This second view identifies another peculiarity of inbound OI practises, namely the possibility of using them as a problem-solving approach, to find solutions to any problems which emerge during the innovation process more quickly or even to tackle radical discontinuities (Filiou, 2021). This brief overview presents the two major goals of involving external resources that firms may pursue through inbound OI: sensing and solving (Figure 2). In this case, there is no direct link with a single practise – indeed, the same practise may be used for both goals (consider, e.g. crowdsourcing, which can be used to solve a specific challenge, as in the case of InnoCentive, but also as a general call for ideas to draw in external stimuli and open up new avenues) – but rather two different types of goals that can be pursued through a variety of inbound OI practises.

This brief overview of the literature suggests that firms use various approaches to implement inbound OI, each with different characteristics and purposes. Are firms using inbound OI practises for sensing or

solving goals? Are they looking for a high or low level of integration of the external partners in their operations? This space enables firms to adopt one or more of these practises over time for different reasons and in different ways. As highlighted above in these papers, there are studies documenting the processes through which the shift from closed to open innovation happens over time (e.g. Chiaroni et al., 2010; Bianchi et al., 2011; Buganza et al., 2011). Still, there is a dearth of studies in the current literature which take an evolutionary perspective, shedding light on the evolution of the practises that firms adopt for the implementation of inbound OI over time. Based on these premises, this paper aims to address the following question: how does the adoption of inbound OI practises evolve over time within any given firm? What are the drivers and implications of these evolutions?

### **3. Methodology**

In answering our research questions, we aim to enrich the existing knowledge stock with new insights from real-world cases, using cases as inspiration for new model development (Eisenhardt, 1989; Siggelkow, 2007).

This paper employs an exploratory multiple case study analysis of nine firms operating in different industries and varying in size, market share and organisational structure. The research approach is consistent with the goal of the paper, namely to answer a ‘how’ question (Yin, 2013).

The selection of the cases is based on the theoretical framing approach (Yin, 2013): in setting up the multiple case study, we have selected firms that (1) have staff dedicated full-time to innovation and (2) have an innovation process that involves openness to external collaboration. Firms were then filtered with the aim of retaining only those that have been implementing OI practises for years and that are, therefore, more likely to have experienced an evolution of the practises used over time. The sample was created by sensing through LinkedIn and compiling an initial set of 200 firms, 47 of which responded with interest to our request to participate in the study. Through desk research, we selected the most suitable of these for the research, relying on two further sampling criteria: (i) clear evidence that the organisation has been using OI practises for more than a decade and (ii) a heterogeneity of different industries, so as to take into consideration possible evolutionary patterns due to context-specific variables (e.g. Urbinati et al., 2019). As presented in Table 1, given the variety of industries involved, we are generally dealing with large

organisations that are using OI. The final sample contains nine firms.

The chance to gather rich data from a relatively small set of companies is coherent with the usage of multiple case studies that can be meaningfully used as an inspiration for new ideas (Siggelkow, 2007). Indeed, we are using qualitative research to generate new models that use data as a valuable starting point.

The data were mostly collected through direct interviews conducted between April 2018 and December 2020. All the respondents are innovation managers or professionals with a comparable job title. The number of interviews was determined according to the criterion of theoretical saturation – that is interviews were conducted until the information gathered was considered sufficient and no further relevant information could be garnered through additional interviews (Corbin and Strauss, 2008). We used semi-structured interviews, organised into three main parts: (i) the firm’s innovation approach, to understand their innovation strategy and possible links with the field they work in; (ii) the factors triggering the use of inbound OI practises, to highlight in particular the needs and goals that led the sampled firms to adopt an open approach to innovation and finally, (iii) the different types of inbound OI practises used over time, mainly aiming to uncover the rationale that would explain temporal evolution in the use of these approaches.

A total of 20 interviews were conducted, and we have had the opportunity to contact the respondents with follow-up emails to obtain missing details. The use of a standard and replicable interview protocol and the opportunity to conduct a cross-case analysis has allowed us to increase the external validity of the study (Yin, 2013).

The collected data were analysed in isolation for each case and later condensed into a case write-up. The analysis of the transcribed interviews was carried out through an iterative process consisting of three main phases: reading, coding and interpreting (Saldaña, 2015). Following the recommendations of Corbin and Strauss (2008), we have used an open coding process (identifying key sentences from the documents and sorting them into first-order categories), which was then combined into higher-level categories through an axial coding process, thus identifying the relationships between them and the analysed literature. The first two authors went through the coding process independently and discussed it together, relying on investigator triangulation (Patton, 2002) to increase the robustness of the analysis. The coding tree is shown in Figure 3. The use of multiple sources of evidence to create chains of evidence, along with the ability to ask interviewees to review their case,



Table 1. Information about the sampled firms

| Organisation (dis-guised names) | Industry                   | Sources                                    | Respondents  | Length of the interview | Revenue (Bln) | Employees (×1,000) | R&D expenditure | % R&D expenditure |
|---------------------------------|----------------------------|--|--|-------------------------|---------------|--------------------|-----------------|-------------------|
| Charmen Pharma                  | Pharmaceutical             | Three direct interviews + follow-up emails | <ul style="list-style-type: none"> <li>Research and Innovation Manager (2)</li> <li>Senior Knowledge Transfer Specialist</li> </ul>                                  | 2 hr 10'                | 0.45          | 0.8                | 0.068           | 15.0%             |
| Energetic                       | Electricity                | Three direct interviews + follow-up emails | <ul style="list-style-type: none"> <li>Head of Innovation and Sustainability</li> <li>Head of Start-up Portfolio (2)</li> </ul>                                      | 50'                     | 4             | 7                  | 0.100           | 2.5%              |
| Raw Materials Inc.              | Recycling of raw materials | Two direct interviews                      | <ul style="list-style-type: none"> <li>Innovation Manager (2)</li> </ul>   | 1 hr 30'                | 0.06          | 0.9                | 0.002           | 3.3%              |
| Transport & Logistics Inc.      | Transportation             | Two direct interviews                      | <ul style="list-style-type: none"> <li>Marketing and Innovation Manager (2)</li> </ul>   | 1 hr 30'                | 0.17          | 0.9                | <0.001          | 0.6%              |
| Jacobsen Pharma                 | Pharmaceutical             | Three direct interviews + follow-up emails | <ul style="list-style-type: none"> <li>Innovation Manager</li> <li>Director of External Innovation (2)</li> </ul>  | 2 hr 3 hr               | 43            | 100                | 5.800           | 13.5%             |
| Budget Air                      | Airline                    | 1 One direct interview + follow-up emails  | <ul style="list-style-type: none"> <li>Head of Innovation</li> </ul>   | 1 hr 15'                | 0.7           | 3.3                | 0.003           | 0.4%              |
| White Goods Inc.                | Domestic appliances        | Two direct interviews + follow-up emails   | <ul style="list-style-type: none"> <li>Digitalisation and Open Innovation Manager</li> </ul>   | 3 hr 20'                | 1.2           | 4                  | 0.060           | 5.0%              |
| Marie Curie Hospital            | Healthcare                 | One direct interview + follow-up emails    | <ul style="list-style-type: none"> <li>Manager, Innovation Operations</li> </ul>   | 50'                     | 6.4           | 30                 | 2.900           | 45.3%             |
| Engineering and Drilling Inc.   | Drilling                   | Three direct interviews + follow-up emails | <ul style="list-style-type: none"> <li>Ex-VP Strategy and Innovation</li> <li>Innovation Factory Manager</li> <li>Corporate Head of Technology Innovation</li> </ul> | 1 hr 40'                | 9.1           | 32                 | 0.079           | 0.9%              |

has helped us to increase the construct validity of the research (Yin, 2013).

We subsequently asked the interviewees to review their cases, which enabled us to complete the write-up and eliminate some of the biases associated with retrospective interviews.

Table 1 summarises the sample, highlighting the heterogeneity of the industries and showing the key respondents involved for each firm; the names have been anonymised for reasons of confidentiality.

This section is structured as follows: each case will be introduced in a short paragraph which provides preliminary information about the firm and its industry and also identifies the factors that have led these firms to dynamically change the inbound OI practises they use over time. Subsequently, Table 2 provides an overview of the results of the cross-case analysis, showing how the various themes presented in the coding tree (Figure 1) emerge in the different cases. With a view to limiting the length of the paper, many quotes are only reported in Appendix 1 in supplementary information.

## **4. Findings**

### *4.1. Charmen Pharma*

Charmen Pharma is an Italian firm operating in the pharmaceutical industry, mainly developing prescription drugs and over-the-counter medicines. Their first approach to Open Innovation was related to problem solving and was implemented through the development of ad hoc alliances and partnerships with suppliers or universities, with the aim of speeding up the development process.

However, in recent years, the industry has undergone significant changes, requiring a clear shift in tactics: 'Our world is changing very rapidly; an open approach to innovation is the strategy a firm has to apply to be capable of quickly responding to this continuous, unstoppable growth' – (Research and Innovation Manager). In parallel with the central role that molecules have always played, other kinds of products or features have also gained relevance as a source of competitive advantages, such as medical devices for drug delivery and the digitalisation process, with a push towards personalised treatments, ease of use and the ability to ensure adherence to molecular therapy. All these dimensions and product types require skills and technologies that are quite different from those possessed by the firm.

As such, inbound OI became a way to feel out the market, sensing for new opportunities in order

to increase critical mass, speed up the new product development process and lower innovation risk.

However, after using integrated approaches to explore the market, the remainder of the development process tends towards a higher level of integration in order to bring external competencies and assets into the firm so as to improve the ongoing process and take control of it.

### *4.2. Energetic*

Energetic is a multinational firm which produces and distributes electricity, headquartered in Italy. Their use of Open Innovation dates back to 2014; it was mainly related to the efficiency of the innovation process and scouting the market in search of technologies and opportunities to solve innovation-related problems. However, over the last few years, the rise of sustainability as a compelling trend ('the overall scope of the firm is no longer investing in fossil fuels and generation but moving all the CAPEX to renewables' – Head of Innovation and Sustainability) changed its inbound OI approach, with it becoming more clearly aimed at finding new business models to remain valuable and relevant in the future. They started scouting the market in order to identify start-ups and new opportunities, foster their development, and then absorb those that showed the greatest potential. The development process became extremely agile, centring on external competencies and leveraging their structures.

### *4.3. Raw Materials Inc.*

Raw Materials Inc. is a European supplier of upcycled raw materials whose goal is to increase the quality and value of the raw materials it sells. Over the last years, its main focus has been finding new applications for its products and spreading knowledge to end-users in order to encourage the use of upcycled materials: 'We have invested in other markets [that are] completely different from the tyre market in order to find new applications [for our recycled material] and prove it is safe and convenient to use' (Innovation Manager). The need to explore new markets pushed the firm to employ OI practises, mainly as a means to search for new ideas, new possible applications and new opportunities by exploring the market. The firm – with a pragmatic approach – shifted from partnerships with universities to horizontal collaborations with private research centres and potential end-users. Externalising R&D allowed the firm to leverage a wide spectrum of skills, research infrastructures and tools as well as to drastically reduce the innovation risks.

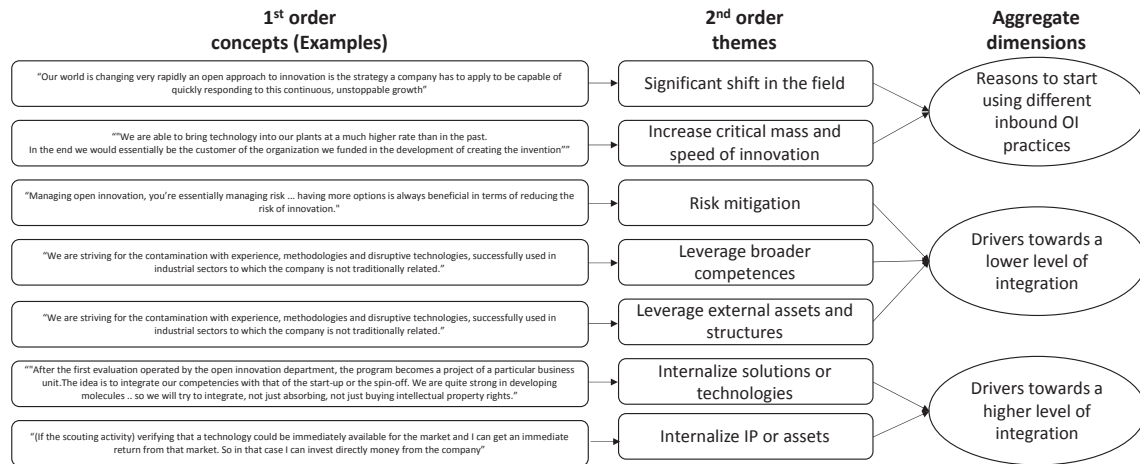


Figure 3. Coding tree.

#### 4.4. Transport & Logistics Inc.

Transport & Logistics Inc. is an organisation that offers innovative solutions in the transportation field, working in intermodal transportation and integrated logistics.

Its innovation model is fully externalised, which is largely due to the slim margins involved in the industry and the lack of facilities and resources needed to conduct in-house R&D.

Historically, it has used inbound OI practises in a very simple way, that is by involving external partners to solve specific issues and improve development processes. In recent years, however, its field of operation has changed significantly: many complex services have emerged as a result of the aggregation of new, smaller players, whilst the focus on sustainability has grown massively. ‘Most of the projects we are dealing with are linked to sustainability’ – (Marketing and Innovation Manager), which – in turn – is linked to the perception held by its customers, who increasingly value sustainability, in line with public opinion: ‘Some of our clients are open to guaranteeing us more work under long-term agreements if we implement low-emission technologies’ – (Marketing and Innovation Manager). Consequently, they tend to increase the critical mass of their services by creating the right conditions for technology to develop, for example by entering into long-term agreements with a liquified natural gas supplier. A fully externalised approach such as this consistently reduces risks whilst making innovation possible, even in a slim-margin industry.

#### 4.5. Jacobsen Pharma

Jacobsen Pharma is a British multinational pharmaceutical firm. As in the previous case, the reason the

firm started to use inbound OI practises was related to a solving goal aimed at managing the critical challenges that arise during the development process. However, in recent years, the industry they operate in has changed dramatically, mainly due to the exponential spread of digital technologies: ‘The healthcare industry is growing incredibly fast, especially from a digital perspective. Big firms [are] creating their own health teams – just think of Apple or Amazon’ – (Innovation Manager). As a consequence of this development, a variety of skills and capabilities that had not previously been required became fundamental in the field. The result was that the firm’s inbound OI practises shifted towards an approach of scouting the market by identifying trends and opportunities to increase its critical mass, as well as to speed up the development process for new products.

Here, too, a low level of integration may suffice as a means of completing innovation projects, but – in the case of products that are strictly related to the firm’s core business (e.g. a new drug molecule) – a higher level of integration with the firm’s operations (by means of an acquisition, for example) is preferred so that efficiency and control can be guaranteed whilst the firm exploits the acquired technology.

#### 4.6. Budget Air

Budget Air is a low-cost European airline. Its journey with open innovation began with networking. The head of Budget Air’s Innovation Lab believes that networking and unstructured interactions with a range of different institutions and individuals allowed the organisation to be exposed to a wider variety of ideas, innovations and potential partners. However, this was a relatively new approach for the organisation, as historically speaking, collaboration with external stakeholders during the innovation process



Table 2. Drivers towards the use of different inbound OI practises

|                               | Reasons to start using different inbound OI practises |  | Drivers towards a lower level of integration |                               |   | Drivers towards a higher level of integration |                          |
|-------------------------------|---|--|--|-------------------------------|---|---|--------------------------|
|                               | Significant shift in the field                        | Increase critical mass and speed of innovation | Risk mitigation                              | Leverage broader competencies | Leverage external assets and structures | Internalise solutions or technologies         | Internalise IP or assets |
| Charmen Pharma Energetic      |   |  |  |                               |   |   |                          |
| Raw Materials Inc.            |   |  |  |                               |   |   |                          |
| Transport & Logistics Inc.    |   |  |  |                               |   |   |                          |
| Jacobsen Pharma               |   |  |  |                               |   |   |                          |
| Budget Air                    |   |  |  |                               |   |   |                          |
| White Goods Inc.              |   |  |  |                               |   |   |                          |
| Marie Curie Hospital          |   |  |  |                               |   |   |                          |
| Engineering and Drilling Inc. |   |  |  |                               |   |   |                          |

The grey shaded positions means that the practice on the column emerged in the interview(s) with the company on the line.

was almost entirely limited to technical details as part of a solving goal, mainly through ad hoc collaboration projects.

Nowadays, this industry – much like many others, including some previously mentioned – perceives the need to pursue sustainability as a priority: ‘Airlines are one of the most polluting industries in the world, and people are starting to realise that. People are searching for alternative ways to travel, like Hyperloop and trains, all the other things being built now... these are our real competitors’ – (Head of Innovation). This change is pushing the firm towards a sensing direction, seeking out any kind of stimuli coming from outside. After the scouting phase, ideas and projects are developed collaboratively, involving the external party (the start-up, incubator, university or enterprise) to leverage both their competencies and their facilities, up to the testing and implementation phases. This process is flexible, as collaborations are structured differently according to the needs of any given project. However, the end goal is to pilot and internalise the innovation – and, if successful, scale it up.

#### 4.7. White Goods Inc.

White Goods Inc. is an Italian home appliance manufacturer. Previously, their approach to open innovation was largely similar to the starting point of the previous cases: it was intended to either solve emerging challenges or exploit the sorts of skills offered by partners that they did not have within the firm. However, this is another case in which the last few years have seen a major change of direction: ‘There was a big shift from the idea that a white goods manufacturer sells iron or metal to the fact that we sell clean clothes or clean homes’. This shift in their customers’ standpoint required not only new competencies and technologies but also a different outlook on the world. ‘So you’re servitising your business and adding layers to your business, adding services and software on top of the metal’ – (Digitalisation and Open Innovation Manager). As a consequence, the kinds of collaborations undertaken have also changed, turning into more horizontal partnerships with the goal of meeting emergent needs and trends in the market and mitigating the risks involved in pursuing new business opportunities. In this case, too, the firm feels the need to follow a path of vertical integration of external competencies. The Innovation Manager has just started an internal discussion to shape this process.

#### 4.8. Marie Curie Hospital

Historically, the Marie Curie Hospital mainly focussed on searching for the right partner for

an innovation project to address a lack of internal knowledge or skills. In other words, there was a marked tendency towards a solving goal, solving internal problems through external knowledge. However, over the last few years, the hospital has developed an Innovation Hub to devise innovative solutions for the healthcare industry: ‘The methodology that we use for Human-Centred Design projects is an open-source approach called Listen, Imagine, Do’ – (Manager, Innovation Operations). This shift points to a clear move towards a sensing goal, which employs inbound OI practises to incorporate stimuli from outside. The firm does not have the facilities to internally scale up and industrialise new products. The variety of methods of integration is still limited and is focussed on medium-integration modes such as networking and joint R&D.

#### 4.9. *Engineering and Drilling Inc.*

Engineering and Drilling Inc. is a service firm that operates in the energy and infrastructure sectors, especially in drilling operations. As in the previous cases, inbound OI practises were mainly included in their innovation process with the aim of solving challenges and issues in innovation projects by means of specific alliances. In recent years, however, something has changed: ‘Then, the drop in demand for aggregates caused an oil glut: a surplus of oil products in the world. In this situation, our firm has only one option: to halve the cost of its projects, otherwise, the break-even point will be too high to encourage investments’ – (Ex-VP Strategy and Innovation). The firm’s OI approach therefore had a new goal: to use technologies and methods from different fields in order to increase efficiency. OI has become a sensing tool, directed at seeking out new technologies and industrial processes outside of the firm, enabling it to explore new opportunities and paths.

Historically, the firm had always had a vast R&D team which often collaborated with universities, consultancy firms or industrial partners by creating ad hoc partnerships. The evolution in the competitive and market scenario has also led to changes from an organisational perspective: ‘Our intention was to create a hotbed of disruptive innovation. We assembled a cross-functional team by selecting people within the firm according to their propensity for innovation and cooperation and called on them to apply their experience, knowledge, skills and – above all – creativity’ – (Innovation Factory Manager). In a new setting such as this, everyone involved is driven to search for solutions outside the boundaries of the organisation and to engage in light collaborations aimed at leveraging external competencies and developing innovation

‘guided by the concept of “fail fast, fail cheap”’ – (Innovation Factory Manager).

#### 4.10. *Cross-case analysis*

Table 2 briefly summarises the empirical evidence that emerges from each case, identifying and mapping in particular the drivers pushing each firm towards the use of a particular approach to inbound OI. Specifically, the information provided in the table refers to the reasons for using different inbound OI practises and the drivers towards lower and higher levels of integration of the practises used for inbound OI. There is a second table included in the Appendix with a selection of quotes for the high-level codes that emerged from the analysis of the data.

### 5. Discussion

In this section, we will discuss the findings of our study, focussing first on the paths and drivers underpinning the temporal evolution of OI practises, and then on the organisational implications of this evolution.

#### 5.1. *Evolution of inbound OI practises: paths and drivers*

The exploratory empirical analysis on which this paper is based allows us to form an idea of the anatomy of the temporal process by which a given firm changes the types of inbound OI practises it employs over time.

At the start of their evolutionary process in the adoption of inbound OI, the firms included in the sample selected and used practises with an intermediate level of integration, mostly networking and alliances (Chesbrough and Schwartz, 2007; Enkel and Gassmann, 2010). The main goal underpinning this choice was to exploit knowledge from outside the firm’s boundaries (Chesbrough and Bogers, 2014). This type of approach is integrated enough to both facilitate the co-development of the innovation and allow the firm to guide the process and reach a feasible solution. This may not be the case when using a practise characterised by a lower level of integration such as crowdsourcing. At the same time, the intermediate approach also enables the firm to easily return to its previous (closed) approach to innovation, should the process fail to lead to the expected results.

The case analysis highlights additional aspects: at first, firms mainly tend to open the boundaries of their innovation process up to external partners in order to solve specific, clearly-defined innovation

problems (Chesbrough and Crowthe, 2006; Enkel et al., 2009). Their aim is to improve their process, accelerating development and tackling emergent challenges by leveraging their partners' knowledge (Figure 4, point 1).

However, all the firms in our sample clearly show a tendency towards also embracing different types of practises over the years.

A second evolutionary step in the way our sampled firms have adopted different inbound OI practises relates to significant changes taking place in the sectors in which these firms operate, such as shifts towards sustainability, servitisation and digitalisation.

The resulting need to access knowledge bases that are far removed from their core competencies pushes the firms to adopt boundary-spanning practises characterised by a sensing goal (Lopez-Vega et al., 2016).

According to our observations, the ability to access different kinds of competencies, technologies and business models also leads firms to change the extent to which the practises they use are integrated into their operations, moving towards practises with a lower integration level such as crowdsourcing and technology scouting (Figure 4, movement towards point 2).

Our case analysis highlights three main drivers that push firms to move from point 1 to point 2 (Figure 4): (i) the opportunity to mitigate innovation risks, (ii) the opportunity to leverage external, more unfamiliar competencies and (iii) the option of relying on external facilities or tools.

In many cases, the evolutions of inbound OI practises stop here, whilst other cases tell a longer story.

In particular, in sectors characterised by higher R&D intensity, such as pharmaceuticals, firms tend to continue by returning to very high integration levels (e.g. acquisitions) and internalising the acquired knowledge, shifting back to a solving goal (Figure 4, point 3a). In particular, our data show that when – through practises used for sensing – the firm identifies a new opportunity that is highly consistent with and close to its core business, it tends to rely on practises with a high integration level to regain control of it, like in the case of Charman Pharma. Indeed, the main drivers that guide the transition from 2 to 3a (Figure 4) are as follows: a desire to acquire a higher degree of control over the innovation process, a need to integrate new solutions or technologies into the firm and a desire to internalise specific competencies.

Other firms tend to move towards highly integrated practises, with the sole aim of exploiting the results of the sensing goal (Figure 4, point 3b). The main driver in this case is a desire to exploit assets and IP whilst also relying on the firm's established NPD and innovation processes.

The direction of the final patterns of the temporal evolution process, which pass through 3a or 3b, seems to be largely explained by the distance between the firm's knowledge base and the technology being integrated. When the technology to be integrated is close to the firm's core competencies – for example, in the case of the development of a new molecule for a pharma firm – the firm can rely on its own in-house product development capabilities and processes. It subsequently tends to internalise the technology in order to consolidate its background and exploit the results more efficiently.

Our study is a contribution to the academic discourse on the temporal processes underpinning the adoption of OI over time. Despite the efforts of existing research undertaken from this perspective to disentangle the process through which firms shift from closed to open innovation (e.g. Chiaroni et al., 2010, 2011; Bianchi et al., 2011; Buganza et al., 2011), this study is one of the first to document the changes in how OI is adopted after the critical shift from closed to open innovation has taken place.

Interestingly, our exploratory analysis suggests that this temporal evolution and adaptation of the practises used to implement inbound OI – whilst common to all the firms in our sample – can take different forms and follow different patterns: a testament to the complex and varied nature of OI (West and Bogers, 2014; Randhawa et al., 2016).

Of course, the model in Figure 4 does not aim to be prescriptive; rather, it is a descriptive representation of the exploratory results of this study.

## *5.2. Organisational implications of the evolution of inbound OI practises*

Although it is not the main focus of our study, this paper suggests that the evolutionary process that leads firms towards the adoption of different inbound OI approaches requires the activation of different enabling organisational variables. In particular, two actions that the firms in our samples have taken to support the transformation process represented in Figure 4 are (i) relying on Open Innovation Intermediaries (OIIIs) and (ii) changing the culture of the organisation.

When the firms in our sample moved from solving to sensing goals, they needed to bolster their scouting capabilities, and this is often achieved by partnering with OIIIs. According to our key respondent from Energetic, for instance: 'For scouting, we started using different channels: we have our people who scout technologies, and we have also hubs which are managed in partnership with external institutions like Technology Transfer Offices, Incubators or Venture

Capitals. We use crowdsourcing platforms and now also have our own innovation platform which we use to launch our challenges’ – (Head of Start-up Portfolio). In the second stage of the evolutionary process, specifically the integration phase, firms often lack the necessary facilities to test and implement some of the knowledge, contributions and solutions obtained externally. As a result, they once again rely on intermediaries to help them find assets and partners capable of furthering the innovation project they are working on. Again, our respondent at Energetic says: ‘We do not have, within our organisation, laboratories for testing innovative technologies, but we can test some new technologies directly on-site, in our plant. The appeal of some Open Innovation facilitators is that they can supplement any competencies and facilities we may not have when we are integrating an innovative technology’ – (Head of Start-up Portfolio).

This evidence suggests that innovation intermediaries – a phenomenon that has been widely studied in the OI literature (e.g. Alexander and Martin, 2013; Janssen et al., 2014) – can play a key role in supporting firms at different stages in the temporal evolution in the use of inbound OI over time by providing different contributions. OIIs in particular can help firms pursuing both sensing and solving goals (Lopez-Vega et al., 2016) as well as supporting the integration process for innovative technologies (Howells, 2006).

The second organisational implication refers to the cultural dimension of OI. As a firm moves towards low-integration practises with a sensing goal, employees are asked to contribute themselves (for example through calls for ideas) or, at the very least, to embrace ideas coming from outside the firm, thus requiring the development of a mindset oriented

towards innovation at all levels of the organisation. Our respondent at Charmen Pharma says that ‘the call for ideas is becoming a tool for innovation inside the firm’. In explaining the shift to a sensing goal, the respondent at Budget Air says: ‘We are trying to organise some challenges and introduce tools so that employees can share their ideas and get some time to work on their ideas. Also – in terms of a top-down approach – we are inviting people in to give inspirational talks’ – (Research and Innovation Manager).

This reveals how the shift towards a different kind of innovation goal in the spectrum of OI, and the ensuing use of different inbound OI practises, may go hand in hand with a change in the culture and mindset of the organisation. In order to allow the OI practises to flourish and have a tangible impact on the firm’s innovation process, employees need to own, be involved with and be engaged in the innovation process (Trabucchi et al., 2020), especially at large firms, which may be more resistant to change (Remmeland Wikhamn, 2020). This also means creating a culture of experimentation that can embrace failure as a possible way of learning how to face innovation challenges. Indeed, our respondent at Engineering and Drilling Inc. says: ‘We encourage people to generate the highest possible number of ideas, even if only 3% of them end up being put into practice. We also celebrate failure’ – (Corporate Head of Technology Innovation). This argument resonates with both the emergence of agile practises outside the software world and the need to have an innovation mindset spread within the organisation (Bäcklander, 2019; Pellizzoni et al., 2019). There is a strong link between the need for agile approaches and the concept of risk management which often emerged during the interviews. Indeed, the probability of moving towards less

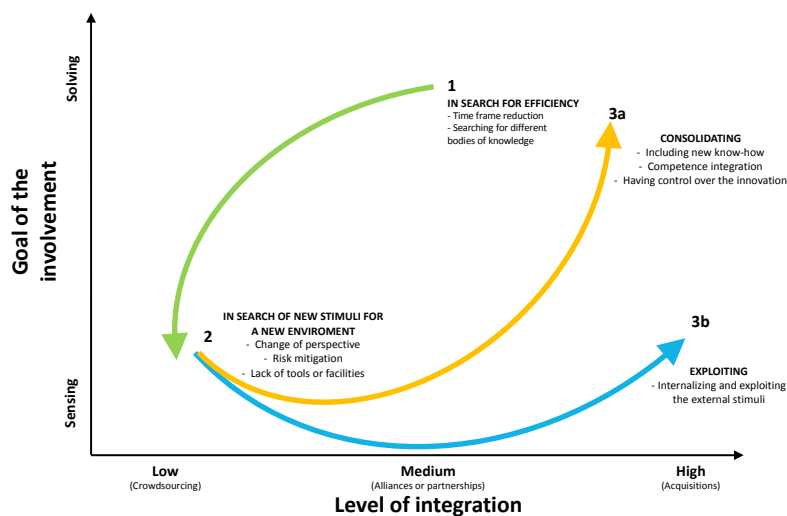


Figure 4. Evolution over time.



integrated inbound OI practises is largely reliant on a firm's ability to mitigate the risks that characterise the innovation process, for instance by testing ideas and projects on the market with users (e.g. Trabucchi et al., 2018) or by leveraging pre-existing knowledge (Laursen et al., 2010; Bianchi and Lejarraga, 2016). However, this process might prove challenging for firms that are confronted with a set of different culture clashes (Mortara et al., 2009). Similarly, firms express a willingness to integrate specific competencies into their own organisations, thus still moving towards more highly integrated practises. The end goal is to have them as a fully fledged part of the organisation.

## 6. Conclusion

This study has contributed to our understanding of how firms adopt inbound OI, focussing in particular on the temporal process by which firms evolve the inbound OI practises they use over time.

From a theoretical perspective, this research provides a sound contribution to the ongoing academic discussion around OI. The vast body of literature on OI has documented the use of different practises to implement inbound OI and has shown that the shift from closed to open innovation is often an articulated process which takes place over time (e.g. Chiaroni et al., 2010; Bianchi et al., 2011; Buganza et al., 2011). Nevertheless, to the best of our knowledge, no studies have focussed on the evolution in the adoption of OI practises within the same firm. This paper develops and offers an inductive framework that addresses this limitation, explaining the underlying drivers and patterns of this evolutionary pattern (West and Bogers, 2014; Randhawa et al., 2016).

From a managerial perspective, the contribution of this study is twofold. First of all, we have provided evidence to innovation managers that the process of adopting inbound OI practises is non-linear or time independent. Once inbound OI has been introduced into a firm as an approach, innovation managers need to dynamically consider how to make it evolve over time, as using the same practise for the same goal will not yield results indefinitely. Secondly, practitioners need to be aware of the wider picture of the various practises (e.g. as regards integration levels and the different goals they might pursue) so that they can be ready to shift to a different practise when needed. Finally, the drivers and the implications that have emerged from the study may help managers to verify the coherence of the practises they are using with the phase they are in and the goals they are pursuing.

Whilst it must be said that this research has its limitations, these represent avenues for future

research. Firstly, this paper is based on an exploratory study, and as such its results cannot be statistically generalised to fit the populations of any firms or markets. However, they cast light on an interesting phenomenon with thought-provoking implications for future theoretical and empirical discussion on OI. As such, one interesting avenue for future research could be conducting further empirical research – in different industries and perhaps employing confirmatory research designs – in order to verify whether the findings of this paper can be generalised beyond the sample of our multiple-case study and/or modified and expanded. Secondly, another limitation is related to the unit of analysis: we analysed the use of inbound OI at a macro-organisational level, without taking into account the role of individuals. Future studies may explore the micro-foundations of the various practises. Similarly, we mainly explored internal factors as driving forces present throughout the evolution, whereas external factors influencing the evolution may be relevant for future studies (such as the actual availability of external knowledge or technological opportunities). One last comment on the decision to focus on inbound practises: outbound practises are less widespread and therefore less interesting to look at from an evolutionary perspective within the same firm; however, future studies may explore if and how our findings change as we move into the outbound spectrum of OI practises.

## Acknowledgements

The authors would like to thank Sophie De Santana Snowden for the great contribution in the early phases of this research.

## Author's contribution

All the authors contributed to the research and paper development.

## Conflict of interest

The authors have no conflict of interest.

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