



**Knowledge co-creation in Open Innovation Digital
Platforms: processes, tools and services**

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Journal of Business and Industrial Marketing

Knowledge co-creation in Open Innovation Digital Platforms:

processes, tools and services

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Abstract

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Purpose: The purpose of this paper is to understand how Open Innovation Digital Platforms (OIDPs) can facilitate and support knowledge co-creation in Open Innovation (OI) processes. Specifically, it intends to investigate the contribution of OIDPs oriented to successfully implement all the phases of interactive coupled OI processes.

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Design/methodology/approach: The paper carries out an exploratory qualitative analysis, adopting the single case study method. The case here investigated is Open Innovation Platform Regione Lombardia (OIPRL).

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Findings: The case study sheds light on how OIPRL supports knowledge co-creation through its processes, tools and services as a co-creator intermediary. In its launch stage, the platform simply aimed at giving firms a tool to “find partners” and financial resources to achieve innovative projects. Now, however, the platform has developed into an engagement platform for knowledge co-creation.

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Research limitations/implications: One limitation lies in the particular perspective used to perform the case study: the perspective of the digital platform itself. Future research should focus on the individuals engaged in the platform to better investigate the processes, tools and services used to implement the Open Innovation approach.

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Practical implications: The paper suggests ways in which OIDPs could be used by firms for effective exploration, acquisition, integration and development of valuable knowledge.

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Originality/value: The study conceptualizes the role of OIDPs in shaping knowledge co-creation, assuming that the platforms act as Open Innovation Intermediaries. Specifically, OIDPs can be observed to function as “co-creator intermediaries” that define, develop and implement dedicated processes, specific tools and appropriate services for supporting knowledge co-creation activities.

Keywords: Digital Platforms, Open Innovation Intermediaries, Open Innovation Digital Platforms, knowledge co-creation, interactive coupled processes.

1. Introduction

The paper aims to examine how Open Innovation Digital Platforms (OIDPs) support knowledge co-creation in interactive coupled processes – the only sort that leads to value co-creation – run among individuals engaged in innovation processes in B2B markets.

The Open Innovation (OI) approach suggests that firms can use respectively inflows of knowledge to accelerate their internal innovation processes and outflows of knowledge to expand their markets, by making available knowledge, intellectual property rights and/or patents to help partners to innovate (Chesbrough, 2006). The approach highlights for firms the need of a new approach to strategy (Chesbrough and Appleyard, 2007) to increase the permeability of their organizational boundaries (Dahlander and Gann, 2010; Zobel and Hagedoorn, 2018) by enabling knowledge exchange with external knowledge sources.

Indeed, OI depends on knowledge flows being purposively managed by firms (Chesbrough and Bogers, 2014) following three different processes (Gassmann and Enkel, 2004; Enkel et al., 2009). Inbound OI processes involve the use of external ideas and technologies to improve a firm's knowledge base and enhance its innovation (Laursen and Salter, 2006). Outbound OI processes are related to earning profits by bringing ideas to market and selling IP and technology by transferring internal ideas or knowledge to the outside environment (Chesbrough, 2003). Coupled OI processes see inbound and outbound OI processes develop simultaneously, leading to alliances, cooperation, and joint ventures in which give and take are crucial for success (Enkel et al., 2009, p. 313). Put in another way, it can be said that in inbound and outbound processes, the knowledge flow is unidirectional and moves from the outside environment to the firm and from the firm to the outside

environment, respectively. In coupled processes, however, knowledge flow develops simultaneously in both directions, because these processes involve dyadic collaboration between firms and partners (West and Bogers, 2014). However, only interactive coupled processes lead to co-creation (West and Piller, 2014).

While inbound and outbound processes have been investigated repeatedly (Chesbrough and Crowther, 2006; Lichthentaler, 2009; Huizing, 2011; Spithoven et al., 2011; Huang et al., 2015; Cassiman and Valentini, 2016), “more is needed to develop the conception of coupled OI and to show how OI practices are similar (or different) in such network settings” (West et al., 2014, p. 809). This is true above all in B2B contexts, where innovation tends to result from on-going innovation-oriented relationships among different organizations (Håkansson et al., 2009). In this domain, several business actors have a valuable impact on the knowledge and innovation process (Rampersad et al., 2010), making the OI model a valuable alternative in knowledge creation and transfer (Fisher and Qualls, 2018). Indeed, as critical sources of innovation often reside somewhere in the company's surrounding business relationships (Björk and Magnusson, 2009), those relationships can be considered as an ideal setting for coupled processes, and especially for interactive coupled processes, in that they can lead to knowledge co-creation.

Furthermore, over the last twenty years, OI processes have developed rapidly (in number and importance) due to the ever-increasing availability of innovative tools and advanced technologies linked to Web 2.0, and due especially to the possibility of both firms and intermediaries creating and effectively running OIDPs. Specifically, OIDPs can be considered as “co-creators” – “oriented to activate co-creation processes in the dispersed innovation network by integrating and combining knowledge and by supporting interactions and relationships through digital tools and open services” (Aquilani et al., 2016). This role is possible thanks to the definition of a set of advanced web-based tools and services to support the platform's actors. Socio-technical systems are indeed more than mere mediators of B2B transactions shaping industrial marketing processes and outcomes in

significant ways and giving rise to altogether new industrial marketing opportunities (Paschen, and Pitt, forthcoming).

Given that Open Innovation Intermediaries use digital platforms to support Open Innovation processes OIDPs can be assumed as a specific kind of Open Innovation Intermediary (please see section 2.1 for more details). An OII is defined as an “organization [...] that provides a supportive role for collaboration between two or more parties during various stages of the innovation process” (Howells, 2006, p. 721), and such organizations have been recognised as being central to implement and maintaining a successful innovation ecosystem (Sieg et al., 2010; De Silva et al., 2018). In this respect, these organizations are capable of acting as knowledge repositories, fostering new combinations of knowledge (Howells, 2006).

Whilst past research has extensively investigated roles and contributions of Open Innovation Intermediaries by assuming a knowledge-based perspective (Randhawa et al., 2017, 2018; De Silva et al., 2018), there are no studies that investigate OIDPs particularly when individuals are engaged in knowledge co-creation through interactive coupled OI processes and especially in B2B markets.

In order to fill this gap in the literature, this study first develops a theoretical framework focused on the role of OIDPs in interactive coupled processes (i.e., Gassman and Enkel, 2004; Enkel et al., 2009; Piller and West, 2014). Specifically, it investigates how OIDPs support the different phases – i.e., defining the problem and its relevant issues, finding participants, and collaborating – that characterize interactive coupled processes.

Secondly, the paper performs an exploratory analysis based on a single case study – Open Innovation Platform Regione Lombardia (OIPRL) – that sheds light on how OIDPs really support knowledge co-creation in coupled processes, focusing on processes, tools and services in a B2B context.

The paper is articulated as follows. First, OIDPs are introduced (2.1). Then, following a brief literature review, it explores the features of interactive coupled processes and the conditions under which they can lead to knowledge co-creation (2.2). The theoretical part of the paper ends by

analysing processes and services created and run by OIDPs. Next, the methodology (3) and the case study (4), are presented, followed by discussion (5) and conclusions (6).

2. Towards a framework for knowledge co-creation

2.1. Digital Platforms for Open Innovation

Information and communication technologies are considered to enable new approaches to how B2B firms create value in a variety of areas (Paschen, and Pitt, forthcoming). Albeit recent studies aimed to explore how different emerging technologies create value for B2B marketing and sales (Diba et al., forthcoming; Li and Zhang, forthcoming; Nath et al., forthcoming; Paschen et al., forthcoming), no many studies focused on the role specifically assumed by digital platforms in this context.

In recent times, the concept of digital platforms has become increasingly relevant for scholars and managers (De Falco et al., 2017; Hossain and Lassen, 2017). The main focus of past studies has been to investigate how digital platforms, with their tools and advanced web technologies, can open up new ways for organizations to collaborate with external sources in order to acquire and develop ideas, technologies and knowledge (Hossain and Lassen, 2017) and to create useful outcomes. The managerial task of searching and combining external knowledge across organizational boundaries is critical to firms' innovation activities (Lopez-Vega et al., 2016). Indeed, "the searching space can be local or distant as well as experiential or cognitive" (Hossain and Lassen, 2017, p. 55). From this perspective, digital platforms represent "an important carrier for searching external knowledge" (Hossain and Lassen, 2017, p. 55) and, as a consequence, for activating new combinations of knowledge and creating novel and useful solutions to innovation problems. They enable organizations to bring knowledge globally distributed to bear to solve problems that organizations cannot solve internally on their own (i.e., Jeppesen and Lakhani, 2010). In digital platforms, the heterogeneity of knowledge stimulates innovation, because the digital platforms tend to attract complementary innovators (Boudreau, 2010).

Even though a significant stream of literature focused on the investigation of the dynamics of two-sided platforms (Rochet and Tirole, 2003; Economides and Katsamakas, 2006; Hagi, 2009), Open Innovation Platforms - a specific kind of two-sided platform - (De Falco et al., 2017) represent a less investigated domain. These platforms can be described as virtual environments in which heterogeneous entities (i.e., experts, specialist companies, users, R&D laboratories, universities, etc.) are involved in knowledge transfer and integration processes to solve Open Innovation challenges (Sawhney et al., 2003; Jeppesen and Lakhani, 2010). In this respect, Open Innovation Platforms can be understood, essentially, as useful mechanisms to match seekers of solutions on one side with potential solvers on the other (Eisenmann et al., 2006). This is because Open Innovation Platforms foster continuous interaction and higher participation among all parties involved in them. For this reason, Open Innovation Platforms have “a far-reaching impact” (Hossain and Lassen, 2017, p. 55) on how actors collaborate and innovate together through networks, alliances and business ecosystems (West and Bogers, 2014).

From another angle, OIDPs can be understood as a specific kind of Open Innovation Intermediary (OII), by assuming a central role in stimulating, creating and maintaining a successful innovation ecosystem (Sieg et al., 2010).

Indeed, OIIs support and are involved in the handling and integrating of the knowledge base of innovation ecosystems (De Silva et al., 2018). In this domain, OIDPs perform tasks ranging from linking a large variety of parties for collaboration to setting up and mediating relationships and bridging a wide array of knowledge, competency and capability gaps (Howells, 2006; Daziel, 2010; Sieg et al., 2010; Agoguè et al., 2013; Mele and Russo-Spena, 2015; Aquilani et al., 2016; Randhawa et al., 2017, 2018; De Silva et al., 2018). Having “a better awareness of the needs, knowledge and competencies of a wide array of actors of a system of innovation and their institutional framework (...) which is termed (...) as ‘innovation ecosystem knowledge’” (De Silva et al., 2018, p. 73), these intermediaries are engaged in an array of diverse functions (Howells, 2006) and activities (Lopez-

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Vega, 2009; Diener and Piller, 2010; Lichtentaler, 2013; Colombo et al., 2014; Aquilani et al., 2016) to help firms in their exploration, integration, combination and exploitation of knowledge. OIDs thus can support not only inbound and outbound OI processes, but also, and especially, coupled processes, including the interactive coupled processes which can lead to knowledge co-creation.

2.2. Interactive coupled processes leading to co-creation

Piller and West (2014) highlight that coupled processes can be divided into two types: bi-directional and interactive. Bi-directional coupled processes see firms separately conducting efforts to innovate and then sharing the resulting knowledge. These processes are the ones that best match the definition of coupled processes proposed by Gassman and Enkel (2004), considering that each firm involved in the process takes advantage of its own knowledge derived through contracts, alliances and so on (Piller and West, 2014).

Interactive coupled processes are different from bi-directional processes in that knowledge creation and sharing occurs not inside firms but rather in a shared space; the innovative knowledge is the result of a collaborative process among actors (Chesbrough, 2011; Piller and West, 2014). Out of such cases emerges the concept of co-creation, or better knowledge co-creation, building on the studies of Prahalad and others (e.g. Prahalad, 2004; Ramaswamy and Ozcan, 2014). Interactive coupled OI processes differ from bi-directional process in terms of such factors as the nature of the external actors involved, the topology of the coupling, the *impetus* to collaboration, and the *locus* of innovation (Piller and West, 2014) (see Table 1).

Insert here Table 1

The actors involved in knowledge co-creation are individuals who may or may not belong to organizations and may or may not be grouped into communities. The individual perspective is a differentiating issue in the view of co-creation advanced by Prahalad and others, embracing the so-called “strategic perspective” (e.g. Ramaswamy and Ozcan, 2014). Indeed, co-creation is an approach

based on human experiences (Ramaswamy, 2011); experiences, thus, form the basis for co-creating knowledge. In this context, the *locus* of value, and of new knowledge, is in interactions among individuals, while the *locus* of co-creation is in engagement platforms (Ramaswamy and Ozcan, 2014). In this sense, all interactions can lead to innovative knowledge, which can be found in the engagement platform.

Firms, therefore, cannot control or manage knowledge flows as they develop on engagement platforms; they develop autonomously following the interests and goals of participating individuals, and they are nurtured by individual experiences and contributions, no matter whether the individuals belong to the firm or to other organizations. Indeed, knowledge flow in the engagement platform no longer follows a linear path, and the same is true inside the firm, because different employees – individuals – can participate simultaneously in the co-creation processes no matter what their role or status in the organization might be.

To make this point clearer, it is worth remembering that engagement platforms are not necessarily created by firms; individuals affiliated with firms can join engagement platforms already created by, for example, lead users, online communities, institutions, and so on. As a consequence, it is clear that firms can facilitate interactions, but they cannot fix goals unilaterally, nor coordinate processes towards their sole goals as they might be able to in other approaches to co-creation (e.g. Service-Dominant logic; Lusch and Vargo, 2004). This is also because co-creation, following the strategic perspective, is not only about the creation of products and services, but can encompass all of the firms' activities – including, for example, changing co-creation processes or rules which have to be co-created *per se*, changing approaches to production, defining different or new goals for the firm, changing particular aspects of organizations.

Firms can only actualize a part of the co-created value, also in terms of knowledge, in the engagement platforms rewarding the individuals participating in the co-creation process and can internalize it to use it on behalf of their goals. This is essential to encourage individuals to remain engaged in co-creation processes. Surely, this can happen only if firms ground their activities on *inclusivity*,

generativity, linkability and evolvability (Ramaswamy and Ozcan, 2014, p. 87), so that co-creation processes develop continuously in the engagement platform because “*co-creation is both the means and the end, in a continuous cycle*” (Ramaswamy and Gouillart, 2010, p. 29).

For this reason, it does not matter who starts the knowledge co-creation – offering the *impetus* to collaboration – nor which is the path followed by the co-creation process.

Given the above, OIDPs can be understood as a special kind of engagement platform (see Figure 1), besides offline platforms, such as, for example, meetings, call centres when organized to propose and share solutions, events (i.e. Ramaswamy and Ozcan, 2014) and temporary shops (Russo, Spena et al., 2012) as well as online ones – such as forums, social network sites (i.e. Ramaswamy and Ozcan, 2014).

Insert here figure 1

2.3. Knowledge co-creation inside Open Innovation Digital Platform: processes and services.

Piller and West (2014) have developed a process model for interactive coupled OI that includes four phases: problem definition, finding participants, external collaboration and leveraging the collaboration results. In the framework here proposed, the fourth stage has not been considered, because “leverage” is linked to value capture from each actor participating in the OI interactive process, and not to co-creation developed outside organizational boundaries (Piller and West 2014) (see Table 2). The first phase is represented by the definition of “the problem that it is seeking to address via engaging external partners in the co-creation effort” (Piller and West, 2014, p. 8). It involves the explanation of the institutions and the rules of engagement (i.e., control of IP rights; explicit procedures for OI) and, consequently, the definition of resources and of the level of internal commitment necessary to sustain the ongoing interactions and collaborations with external participants (Dahlander and Gann, 2010). The second phase is characterized by searching for suitable external participants with relevant knowledge. Different approaches can be taken to searching for qualified participants: open call, selective open call and open search (Diener and Piller, 2013). However, “both the search for and the acquisition of such knowledge will depend on understanding

and strengthening the motivations of partners to create and share their knowledge” (Piller and West, 2014, p. 8). In this respect, motivating participants to engage in collaborating with the firm (Dahlander and Gann, 2010) is an issue related to the provision of incentives (either monetary or non-monetary) (West and Gallagher, 2006; Dahlander and Gann, 2010). Finally, the collaborating phase is observed as the key co-creation phase in the model (Piller and West, 2014). This phase encompasses a variety of activities: the definition and implementation of the processes singled out for collaboration; the creation of tools, technologies and platforms to support the collaboration process; and the identification of the internal attitudes and capabilities needed to develop collaboration processes. In Table 2, the processes and activities are presented in the first two columns (Piller and West, 2014), while in the third column services to be created and run by OIDPs to support knowledge co-creation have been added, based on the literature on Open Innovation Platforms (Aquilani et al., 2014).

Insert here Table 2

3. Research methodology

Taking into account the novelty of the phenomenon to be investigated and the inductive nature of the research questions, this study adopts a qualitative, case-based method that enables the exploration of a phenomenon within its context, using a wide range of data sources (Yin, 2003). The case-based method is preferable in situations in which “the main research questions are “how” or “why” questions [and] a researcher has little or no control over behavioural events and the focus of the study is a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident” (Yin 2014, p. 216). The case selected is the *Open Innovation Platform Regione Lombardia* (OIPRL), a digital platform developed by the Italian Public Institution Regione Lombardia to support OI processes involving individuals acting in the engagement platform as representatives of firms, institutions, universities and research centres rather than as private citizens.

The selection of this case study was based on the combination of theoretical interests and ongoing research activities (Siggelkow, 2007). OIPRL represents a suitable context for answering the research

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question because it has undergone an interesting process of evolution since its launch on the market, moving from a platform that basically offered support for financing new projects to an engagement platform where individuals can co-create. The platform is now focusing on “collaboration” and has developed digital services and tools aimed at supporting knowledge co-creation. The qualitative data collection for this study was based on a variety of data sources, following Yin (2003). The use of multiple data sources represents a necessary element of the analysis because it ensures the variety of perspectives required by the constructivist principles on which qualitative analyses are based. The data collected includes both primary data (semi-structured interviews) and secondary data (desk analysis, internal reports and documents, dossiers and other printed materials).

The preliminary desk research that the study performed to collect secondary data was helpful in the design of the interview protocols used in the collection of primary data and in illustrating the context for the interpretation of the data gathered by interviews. The analysis was focused on the services and tools offered through the platform. The study used archival data (mainly reports and presentations), as well as public and internal company material.

Semi-structured interviews were conducted with significant key informants, and these constituted a significant portion of the data collected. As reported in Table 3, the interviewees were selected in Regione Lombardia as well as in other organizations involved in the development of the platform: Lombardia Informatica S.p.A. and Finlombarda S.p.A.

Lombardia Informatica is an in-house company of Regione Lombardia, engaged in the development of information systems and digital solutions for the departments and regional system agencies; it supported Regione Lombardia in developing the digital tools of the platform. Finlombarda S.p.A. is the in-house financial company of Regione Lombardia, offering financial services to the companies that operate in the Lombardia area.

During phone calls just one consultant or manager was contacted, whereas during conference calls and face-to-face interviews two or more people from the different institutions were involved. Each phone call, conference call or face-to-face interview lasted between 60 and 80 minutes.

The interviewees were chosen on the basis of their level of involvement and their knowledge and experience. The total number of respondents was sufficient to achieve theoretical saturation (Glaser and Strauss, 1967).

The study outlined an interview protocol that would address topics relating to the research questions while at the same time leaving room for both the respondent and the researcher to extend the discussion to unexpected issues (Yin, 2003). In this way, it was ensured that the respondents were free to interpret each question from their own perspectives, as required in this type of research. Some questions were added to capture issues that surfaced during discussions in the interviews. The interviews were recorded to minimize data loss and were then immediately transcribed for later analysis and shared with research members in both full and excerpted forms. In some cases, informal follow-up questions were sent to respondents, often via e-mail, to clarify issues that emerged during the transcription.

Insert here Table 3

The information derived from the interviews has been triangulated with secondary data, following the recommendation of Eisenhardt (1989). The triangulation of different data sources was used to mitigate the risk of informant bias, control for the subjective judgments of individuals and thus increase construct validity (Gibbert et al., 2008). The OIPRL was continually monitored to remain abreast of available activities and projects. The deeper analysis of the institutional platform supported a better comprehension of this phenomenon and its main rules and mechanisms.

4. Findings

4.1. *The case study: Open Innovation Platform Regione Lombardia*

OIPRL is one of the tools of the Intelligent Specialization Strategy adopted by Regione Lombardia, which aims, through this platform, to *i)* stimulate connectivity among universities, research centres and firms by creating a network between different kinds of individuals; *ii)* promote growth, leveraging

resources, know-how, and human and social capital; *iii*) support innovative best practices and cases sharing; and *iv*) create new knowledge.

The OIPRL was launched under ERDF Regional Operational Programme 2007-2013 Priority 1 “Innovation and knowledge economy” and developed under ERDF Regional Operational Programme 2014-2020. The OIPRL was started in 2013, and, after a developing and testing phase, was opened to the public in 2015. In 2014, there were 50 actors involved, while in 2015 there were 525.

The OIPRL integrated another platform supported by Regione Lombardia and named “QuESTIO” (*Quality Evaluation in Science and Technologies for Innovation Opportunity*), a business network involving only business partners (companies and competence centres) aiming to help firms looking for new partnerships to gain access to public financing (European programs, etc.). When the OIPRL was launched, QuESTIO was integrated within it.

In the OIPRL only individuals – not organizations – can participate, and QuESTIO, embracing the individuals’ perspective, originated about 2,000 profiles deriving from organizations and 600 profiles deriving from competence centres. As a consequence of this transformation, individuals belonging to firms or to other organizations are still today the core of the OIPRL, so that the core of the platform is made up of interactions developing among firms and/or other organizations. Since its origin, the platform has matured. To date it has attracted over 10,000 participants, launched 1,200 news and discussion threads, connected 2,000 organizations, collected 400 expressions of interest in project ideas, and launched 11 public consultations. Among the participants, 58% are representatives of enterprise, 22% of research organizations, 18% of public administration and only 2% of civil society. After this general introduction to the OIPRL, the main findings, in terms of tools and services supporting each phase of OI interactive processes leading to knowledge co-creation, will be presented.

4.1. Contribution to “defining” stage

To support the “defining” phase, the OIPRL provides a toolkit for developing projects and managing them. As noted by one senior manager who was interviewed:

“The platform is composed of tools aimed at supporting individuals to find partners, cooperate and realize projects. The reason is that the Platform was born as a place aggregating experts”
(6).

Originally, it was a place where regional projects developed, but exclusively related to calls issued by the Regione Lombardia. Then, the platform developed into a virtual space where enterprises could scout potential partners and engage them in every kind of project. Over time, the OIPRL evolved, widening its boundaries and joining the *Enterprise European Network* (ENN).

In this way, the platform transformed from a space “*aggregating experts developing projects*” to a place for “*transferring to citizens the business projects*” (6).

Thus, the OIPRL aims at transferring to citizens the business projects’ value and towards this aim develops specific tools to engage non-expert individuals.

The choice not to focus on problem formulation as a key activity is part of the strategy of Regione Lombardia; it is aware of the risk this choice entails in terms of competition with other institutions (such as universities, incubators, agencies, associations, etc.) that focus their expertise on these services. However, Regione Lombardia, aware of the value of such services, involves them in the OIPRL as “*multipliers*” or “*sounding boards*”. The engagement of these experts potentially generates a reciprocal benefit: Regione Lombardia can widen its engagement platform, benefiting from the role of “*catalyst*” assumed by these institutions, and these institutions can expand their target accessing to the OIPRL. In this respect, one interviewed Senior Manager (3) explained:

“We don’t do this accompanying activity, but we want to give a strong and clear message to those who do it on the territory. This platform aims to facilitate them and to help them do it amongst themselves. So, in practical terms it means that, for example, a person from the Confartigianato institution can interact with a person who works in the university, trying to

share and co-create resources to work on issues of common interest, each on behalf of its own projects but generating a mutual cross-fertilization.”

To allow this “cross-fertilization” between individuals, OIPRL has created the following roles:

1. The “facilitator”, an individual engaged in the platform and belonging to an organization, who has expertise in research and innovation. He or she takes charge of individuals new to the platform and supports them from the very beginning – the registration moment. Newcomers, when inside the platform, can also ask to change their “facilitators”.
2. The “community manager”, responsible for creating a new community and managing it. Thus, individuals willing to develop their own projects can create and manage their own communities, using the OIPRL’s features to attract new participating individuals.
3. The “influencer”, someone “*who has certain competencies on certain topics, an authority*”, who will be hired with the aim of disseminating the culture of OI. These influencers will be selected on the basis of their ability to attract individuals outside the platform and to fruitfully engage them in the OIPRL.

Besides creating the new roles above, the OIPRL has implemented other activities for supporting “strategic commitment”, such as:

1. Open events promoted by various institutions.
2. A sort of “tutorship” designed to guide individuals to approach the OIPRL and to launch their projects effectively on the platform. Individuals are invited to issue a call for proposals consisting of a project abstract and various forms reporting the main insights of the project, the name of the project manager and a short organization profile. This step supports individuals to be more open-minded and to share information readily with partners. Specifically, the Senior Project Manager (7) emphasised:

“they are a bit directed, as many users are not ready to throw themselves into the platform, but after writing the project form, filling out the organization profile and identifying a project manager, it’s a done deal. I’m a bit more engaged in the platform; I’m not a stranger anymore, and I’m ready to approach other tools.”

This activity has been successful since the launch of the OIPRL, and the participant firms' openness through its employees seems to have developed:

"...some signal has emerged. At the beginning there was just a proud closure...It is interesting to see how sometimes even small projects have a very strong openness" (3).

4.2. Contribution to "finding participants" stage

In order to support the activity of "finding participants", in the launch stage Regione Lombardia promoted an invitation to tender to assign incentives for micro, small and medium enterprises and/or research centres in order to create and develop communities within the OIPRL. An example was the downstream applications from the satellite. In this case, a CNR expert was responsible for engaging individuals and supporting interactions among them, assuming the role of "community manager".

Thanks to this experience,

"we have learned a lot, and it was good to increase the audience of participants (...) so they managed to compress, to accelerate this initial phase that would never be started if there were not enough people. This first step has led us to about 2,000 participants who are the heart of those who are still active participants" (3).

Moreover, the OIPRL is starting to support the activity of finding the right participants from the registration stage, making all individuals provide specific information about their skills, knowledge and activities. Each individual must create an account and complete the following five steps before accessing the services of the OIPRL:

1. Introduction section: The individual is asked to complete his or her profile. A warning message reminds the individual of the goals of the OIPRL: *"the collaborative platform is an ecosystem supporting innovation. Here you can start up collaborations, take part in discussions and interact with firms, institutions and other participants."* Moreover, the individual is reminded that carefully completing his or her profile will enable the platform to provide customized information according to personal and professional interests.

2. Presentation section: The individual has to describe himself or herself using 140 characters and to upload a photo, as well as to provide demographical information.
3. The new participant in the OIPRL is encouraged to select his or her role and just one area of interest from a list of macro-industries including electronics and microelectronics, industrial manufacturing, other industrial technologies, energy, physical and exact sciences, biological sciences, agriculture and marine resources, agri-food, and so on.
4. New participants are invited to express their interests, selecting from two lists: the first includes various technological fields, while the second includes strategic regional topics (aerospace, agri-food, eco-industry, creative and cultural industry, health industry, advanced manufacturing, sustainable mobility, smart cities and communities).
5. Individuals are encouraged to identify their prevailing collaborations in terms of the organizations they work for.

The support provided by the OIPRL during the “finding” stage continues, after registration, with the offering of services shown on the dashboard as, for example, “projects” (“my projects”, “all projects”) and “partnership proposals” (“my interest proposals”, “all proposals”). Each service available on the dashboard is designed to allow individuals to identify the right participant, evaluating his or her characteristics based on the information gathered during the registration process and made available on the platform.

Once the right individual is identified, the seeker can easily connect with him or her by clicking “connect” in his or her personal profile. Accessing the right partner is easy, given that participants are divided into “validated”, “all”, “community managers” and “facilitators”. The “validated users” are selected according to the participants’ personal interests, while “all users” includes all individuals on the platform; “community managers” are users responsible for the communities in specific interest areas. As a result, this section allows individuals to select participants sharing their interests, but also to identify participants with other interests. Within the “projects” and “partnership proposal” sections, all projects and proposals are available, divided into “projects/partnership proposals in my own

interest areas” and “all projects/proposals”. Here, individuals can collect information about projects (general descriptions, expressions of interest) and express their own interest.

4.3. Contribution to the “collaboration” stage

Other sections of the OIPRL are designed to foster collaboration, such as, for example, “communities” (divided into “my communities” and “all communities”), “discussions” (divided into “discussions in my area of interest” and “all discussions”), “documents” (divided into “my documents” and “all documents”) and “news” (divided into “my news” and “all news”).

In each section, individuals can find information about what has been published by other individuals and actively post their own messages, create their own communities, participate in or activate discussions and upload documents.

Recently, the need has emerged for a monitoring service to track individuals’ activities and linked performances. An interviewed Senior Project Manager (7) said:

“Today we are thinking about a set of indicators that can support the next step of the platform development; so we are at the moment releasing some tools for projects’ formalization rather than tools to monitor the projects that will help us both to improve and to get feedback on how projects born on the platform are developing.”

Indeed, some monitoring activities of this kind are currently being carried out on projects:

“An analysis can be made of how much these projects lead to results over time; (...). The platform will serve as an example for these partnerships to share the steps following the end of the project and will allow us to see how the projects that are started in the field of regional financing have evolved; this will give us the possibility to allow other institutions and organizations to make their projects known with the help of the platform” (7).

Therefore, platform managers are becoming even more aware of the need to understand what goes on in the OIPRL and what results have been or could be generated through it:

1
2
3 “Monitoring the platform means staying on the follow-up, to really understand once the report
4 is completed what the territory has received from this project, who has benefited from it and
5 who eventually will benefit from it later on” (6).
6
7
8
9

10 Regione Lombardia continue to develop new tools to foster collaboration inside the OIPRL, such as,
11 for example, the “conference call” plugin, a specific section for project management and a service to
12 support participants with event organization. Indeed, the OIPRL already offers the opportunity to
13 customize tools. Each individual can create new content (i.e., discussions, newsletters, communities,
14 projects, partnership proposals) and select individuals to start interacting.
15
16
17
18
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20 The interactive tools of the OIPRL are continually upgraded in order to enhance their efficiency and
21 usability.
22
23
24
25

26 In this domain, the OIPRL recently made available to its participants a “unique experience”:
27

28 “The external part of the platform will be completely revised in order to offer a “unique
29 experience”; so once I am in the platform, I look for information, I understand, I see, and,
30 consequently I want to do something for myself, to write, to comment, to try to say my opinion
31 rather than to propose to me as a partner” (6).
32
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38 Accordingly, the internal part of the OIPRL has been upgraded:
39

40 “It was also a little more dated because it was born with different objectives as a pure work
41 tool. Today we understand that the path to involve citizens more and more and then participate
42 in it starts with facilitating the experience not only in terms of language but also in terms of
43 usability. In order to reach this aim, the internal part was radically simplified and some
44 sections were grouped” (6).
45
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51 The newsletter is going to be revised in the coming months, as well. From the “classic newsletter” –
52 a list of information – the newsletter will be completely redesigned to make immediately clear to
53 participants what information is encompassed within it (i.e., if it is about the technical equipment of
54 the platform or about news, or new services to be activated, etc.).
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In the context of collaboration, the need for a well-designed monitoring activity has emerged. Indeed, the great challenge in the future will be to understand whether the best projects completed have led to concrete results for participants and for other individuals.

“We evaluate the follow-up. If this leads to a cooperation or an international partnership, this is triple goal (...), no matter if a project led to national collaborations with other regions, with other companies in other regions, this becomes secondary. The result has been achieved” (6).

“... let's say that what we strongly focused on are the regional strategic priorities; after that what is developed also in terms of skills is good” (3).

Surely, if results are achieved, individuals will be more motivated to participate, but also to engage other individuals to collaborate:

“The fact of having about 200 projects in process highlights the virtuous mechanisms in terms of added value in participating in these initiatives. This goes beyond the financial benefit (...); so the reason why we are doing a lot of work is above all this: it is not to provide us with an instrument for the detection of what are the results of the projects, but the goal is to work on disseminating the added value of the projects” (3).

5. Discussion

This case study sheds light on how the OIPRL facilitate and supports knowledge co-creation through its processes, tools and services.

Embracing the idea that co-creation is an approach based on human experiences (Ramaswamy, 2011), and adopting an individual perspective (Prahalad, 2004), the OIPRL can be defined as a *locus* of co-creation (Ramaswamy and Ozcan, 2014) involving individuals – who may or may not belong to organizations or be grouped into communities. Within the OIPRL, firms can neither control nor manage knowledge flows; these develop autonomously following the participating individuals' interests and goals and are nurtured by individual experiences and contributions. Individuals choose which projects to participate in and which other individuals to be connected to, as well as the areas

in which they prefer to be engaged. Indeed, the OIPRL acts mainly as a “facilitator” of the interactions, as is evident, for example, in the validation activity, in which executives of the OIPRL validate individuals as they register as well as newly created communities.

The OIPRL has changed dramatically in recent times and now can be considered as a co-creator intermediary (Aquilani et al., 2016, Randhawa et al., 2017, 2018; De Silva et al., 2018). Indeed, whereas in the launch stage the platform simply aimed at giving firms a tool to “find partners” and financial resources to achieve innovation projects, now the platform is focused on “collaboration”, offering a wide range of digital tools to promote knowledge co-creation.

The OIPRL does not help in defining problems as other OIIs do; the only aim of the OIPRL is to support partners to connect in order to develop projects to be financed in the context of strategic regional topics – a key point given the institutional nature of the OIPRL.

However, the OIPRL makes clear the roles each individual can assume within the platform (“user”, “facilitator”, “community manager”, etc.) and supports him in managing the main interaction tools to co-create. In this sense, it can be said that the OIPRL makes clear the engagement rules as well as the desired commitment of each individual and, as a consequence, the resources he or she makes available for collaboration (Dahlander and Gann, 2010).

Regarding the process of searching for suitable external participants with relevant knowledge, the OIPRL actually offers a wide range of digital tools supporting this phase (see Table 4). In terms of incentives, which are essential to encourage and motivate external participants to collaborate (West and Gallagher, 2006; Dahlander and Gann, 2010), it can be said that the OIPRL has used monetary incentives in the past, but would now like to shift to non-monetary incentives. Indeed, making available data on the performance of past projects can act as a sort of social incentive, motivating new participants to be engaged in the platform.

Finally, regarding collaboration as the key co-creation phase in the Piller and West (2014) model, the platform executives in the last few years have invested in developing digital tools aimed at effectively

enhancing collaboration (see Table 4). This activity will continue with the introduction of “influencers”.

Insert here Table 4

6. Conclusions

The theoretical contributions of this paper can be summarized as follows. First, the research on interactive coupled OI processes has received little attention in the literature until now (Piller and West, 2014). This study enriches this stream of literature, focusing on knowledge co-creation through interactive coupled processes, especially in B2B markets. Second, past studies have investigated Open Innovation Platforms as virtual environments in which different entities are concretely involved in knowledge transfer and integration processes to solve specific OI challenges (Sawhney et al., 2003). This paper suggests that OIDP can be considered as a specific kind of OII that facilitates and supports firms in their efforts to define and implement interactive OI coupled processes to co-create knowledge.

This case study shows how an OIDP can support knowledge co-creation in B2B domains involving individuals, who may or may not be affiliated with firms or other organizations, in effective innovation interactions (Möller and Halinen, 2017). This case study supports the main insights embedded in the framework – which is to say that in order to stimulate knowledge co-creation, an OIDP has to act as an engagement platform (Ramaswamy and Ozcan, 2014) and has to create specific tools and services supporting the key processes of “defining”, “finding participants” and “collaborating” (Piller and West, 2014). Even though the OIPRL was initially focused on knowledge-transfer, now it is progressively moving toward knowledge co-creation (Aquilani et al., 2016; Randhawa et al., 2017, 2018; De Silva et al., 2018). While at the beginning, the intermediary supported match-making between innovation demand and supply, recently the need has emerged to widen services to allow individuals engaged in the platform to effectively run collaborations. This has meant that digital platforms have widened the range of tools and services offered to support the

initial steps of “defining” and “finding” participants, but above all to support “collaboration itself” (Piller and West, 2014).

This paper has managerial implications for OIDPs and firms using them for effective exploration, acquisition, integration and development of valuable knowledge. It suggests that OIDPs have to develop mechanisms and practices to support firms in knowledge co-creation processes by using advanced digital platforms. This would imply that OIDPs have to develop and reinforce their services for individual engagement and participation. They also have to enhance collaboration and participation, activating suitable interactions leading to co-created innovative solutions to various innovation problems.

Looking at the case study, many challenges in the development of OIDPs toward knowledge co-creation in coupled processes emerge, especially regarding the need to spread the culture of OI among firms, above all when they operate in B2B markets where this innovation model is less studied and applied, missing the opportunity to involve individuals not pertaining to firms and/or other institutions in knowledge co-creation. This suggests the need to invest more in specific tools aimed at really stimulating an open mindset toward platforms, but also requires that firms be ready to open their boundaries to seize the opportunities for co-creation, even if they operate in B2B markets.

This study has several limitations that should be recognized in order to stimulate further research in the same area. Firstly, although the case study selected here is appropriate to the exploration of the growing phenomenon of OIDPs, relying on a single platform for the study is a limitation. Future qualitative research could use a multiple-case-study method with the idea of exploring similarities and differences between cases involved. Additionally, future quantitative research could further test the framework developed here to try to better assess the findings of this study. In this way, the study could obtain confirmatory empirical evidence by the use of representative samples of platforms. However, the findings presented here can be regarded as a first step in extending the body of knowledge about interactive OI coupled processes developed thanks to OIIs. Secondly, the study is mainly focused on the OIPRL perspective for exploring activities, tools and services created and

implemented to stimulate and sustain coupled OI processes, and this certainly represents another limitation. An intriguing direction for future research would be to involve a wide range of participants (i.e., engaged individuals) with different characteristics and market requirements, to gain a better understanding of the contribution of the platform to knowledge co-creation, while also gaining a more precise idea of the specific benefits participants have obtained.

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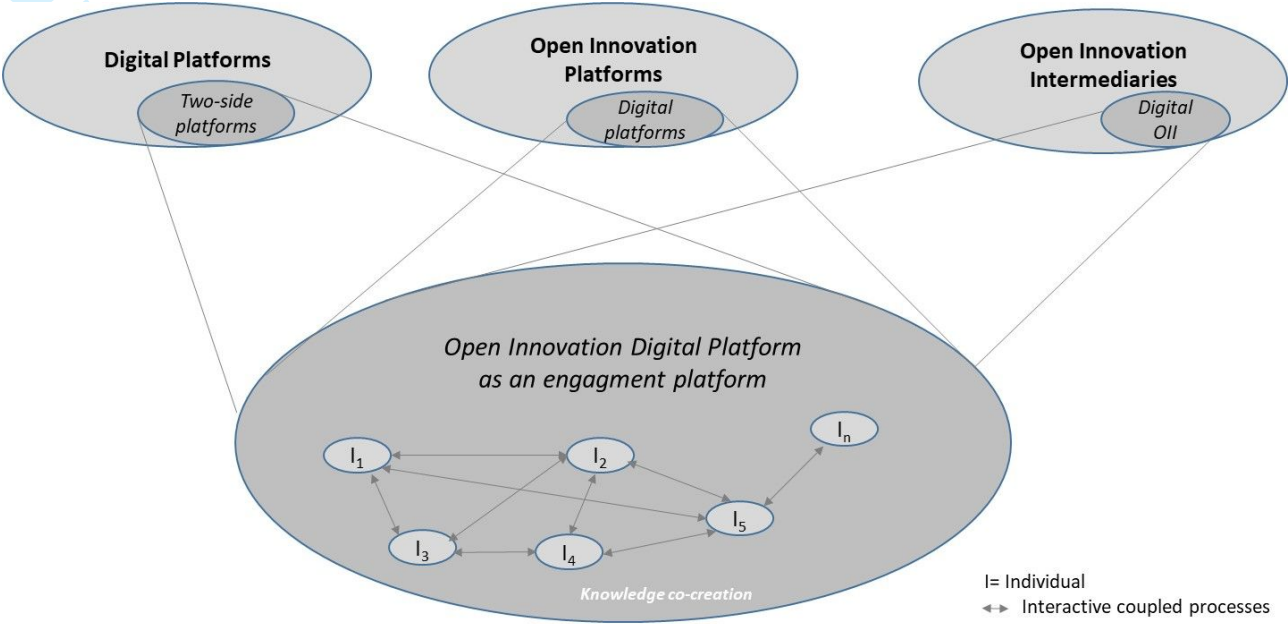
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Figure 1. Open Innovation Digital Platforms and interactive coupled processes for knowledge co-creation



Source: our elaboration.

Table 1. Dimensions of interactive coupled processes leading to knowledge co-creation

Dimensions of all coupled processes	Alternatives	Dimensions of interactive coupled processes
External actors	Firms; other organizations; individuals.	Individual perspective for all actors, even if they belong to companies or other organizations.
Topology of coupling	Dyadic; network; community.	Each type of interaction that is unravelled within the engagement platforms, where individuals may or may not belong to organizations – of whatever type – or groups (e.g. lead users, consumers)
Collaboration <i>impetus</i>	Top-down; bottom-up	Not relevant; it is important that each participant plays an active role and obtains benefits from his or her participation.
Innovation <i>locus</i>	<i>Bidirectional</i> (innovation created within organization boundaries); <i>Interactive</i> (innovation created across organizational boundaries)	Interactive

Source: Aquilani (2016, p. 210)

Table 2. Processes and services of Open Innovation Digital Platforms to support knowledge co-creation

Process Stage	Key activities	Open Innovation Digital Platforms' services to support knowledge co-creation
Defining	- Problem formulation - Institution and rules - Resource allocation and strategic commitment	- support in finding aspects and/or projects to invest in; - acceptance and preparation of texts and the revision of post; - preventive analysis of requests/problems; - evaluation of existing and emerging technology to aid the firm in innovating; - monitoring innovation.
Finding participants	- Identifying participants with the right characteristics - Motivating and retaining a critical mass of collaborators - Selecting the right participants	- definition of a range of awards/benefits; - communication and integration into the engagement platform; - expert support for specific requests/projects; - research for specialized collaborators identified by firm requirements; - creation of <i>ad hoc</i> groups for problem solving; - search for partners for venture capital operations.
Collaborating	- Governance of collaboration process: organizing, monitoring, policing - Interaction platform and other tools - Openness of firm attitudes, structure and processes	- guides for shared innovation; - services to improve existing technologies within the firm or as integration (e.g., applying norms or vertical integration); - organizational and financial consulting; - training and coaching; - services facilitating information-sharing between individuals in the engagement platform; - services enabling efficiency and ease of platform use for participating individuals; - services relaying communities' perceptions of firms' engagement practices; - services developing holistic individual knowledge and skills in the engagement platform; - services mirroring goals and values of individuals; - services motivating firm leadership team to embrace engagement platform; - services to support the building of motivation inside firms to help individuals effectively participate and share in engagement platforms to co-create knowledge.

Source: our elaboration, based on Piller and West (2014) and Codini et al. (2018).

Role	Organization	Interview's protocol	Main contributions
Consultant (1)	Lombardia Informatica S.p.A.	Phone interview – 60 minutes	Technical description of platform's digital tools and services
Consultant (1)	Lombardia Informatica S.p.A.	Conference call – 80 minutes	Technical description of platform's digital tools and services
Consultant (2)	Lombardia Informatica S.p.A.		
Senior Project Manager (3)	Finlombarda S.p.A.	Phone interview – 60 minutes	Platform development and launch on the market
Executive (4)	Regione Lombardia	Face-to-face interview – 60 minutes	Platform development and launch on the market – focus on collaboration tools and services
Official (5)	Regione Lombardia		
Senior Manager (6)	Finlombarda S.p.A.		
Executive (4)	Regione Lombardia	Face-to-face interview – 80 minutes	Platform contribution to co-creation (different stages)
Official (5)	Regione Lombardia		
Corporate executive (6)	Regione Lombardia		
Senior Manager (6)	Finlombarda S.p.A.		
Senior Project Manager (3)	Finlombarda S.p.A.		
Senior Project Manager (7)	Finlombarda S.p.A.		

Table 3. Details of the interviews performed

Note: Numbers in column one are used to identify interviewed people. Indeed, some of the managers or executives were asked to contribute to different parts of the case study performing more than a single interview.

Table 4. Platform contribution to knowledge co-creation

Process Stage	Key activities	Digital tools	Services	Contributions to co-creation
Defining:	Problem formulation			Being aware of the risk in terms of competition with other institutions (such as universities, incubators, agencies, associations, etc.) that focus their expertise on these services, Regione Lombardia, involves them in the OIPRL as “<i>multipliers</i>” or “<i>sounding boards</i>” assigning them a specific role. The engagement of these experts potentially generates a reciprocal benefit: Regione Lombardia can widen its engagement platform, benefiting from the role of “<i>catalyst</i>” assumed by these institutions, and these institutions can expand their target accessing to the OIPRL.
	Institution and rules	Organizational roles		
	Resource allocation and strategic commitment	Project forms Influencers blogs		
Finding participants:	Identifying participants with relevant characteristics		▪ definition of a range of awards and benefits; ▪ communication and integration into the engagement platform; ▪ expert support for specific requests and projects; ▪ research for	To support the activity of “finding participants”, in the launch stage Regione Lombardia promoted an invitation to tender in order to assign incentives to create and develop communities within the OIPRL. The OIPRL supports the activity of finding the right participants from the registration stage, making all individuals provide specific
	Motivating and retaining a critical mass of collaborators			

	Selecting the right participants	My profile Participants Organizations Discussions Documents News Projects Surveys	specialized collaborators identified by firm requirements; ▪ creation of ad hoc groups for problem solving.	information about their skills, knowledge and activities. Paying attention to the registration section as to the information provided makes the step of finding new participants more effective.
Collaborating:	Governance of collaboration process: organizing, monitoring, policing	Organizational roles Community Discussion Documents News Collaboration opportunities Own projects Project forms	▪ guides for shared innovation; ▪ financial consulting; ▪ services facilitating information-sharing between individuals in the engagement platform; ▪ services enabling efficiency and ease of platform use for participating individuals; ▪ services relaying communities' perceptions of firms' engagement practices; ▪ services developing holistic individual knowledge and skills in the engagement platform; ▪ services mirroring goals and values of individuals; ▪ services motivating firm leadership teams to embrace engagement platform; ▪ services supporting building motivation inside firms to help individuals effectively	Today the OIPRL is releasing some tools for projects' formalization rather than tools to monitor the projects that will help both to improve and to get feedback on how projects born on the platform are developing. This should highlight the virtuous mechanisms in terms of added value in participating in the initiatives promoted in the platform, that go beyond the financial benefit. So the reason why the OIPRL is investing in monitoring the projects it is not to provide with an instrument for the detection of what are the results of the projects, but to disseminate the added value of the projects.
	Interaction platform and other tools	Community Collaboration opportunities Own projects Programmes, projects and results Newsletter		
	Openness of firm attitudes,	Project forms		

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	structure and processes		participate in engagement platforms to co-create knowledge.	
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