Implementing open innovation: technological, organizational and managerial tools

The concept of open innovation (OI) has generated great interest in the last decade (Chesbrough, 2003); many articles have appeared and interesting special issues (SIs) in prestigious journals have been published (Enkel et al., 2009; West et al., 2014), while others are forthcoming (Corvello et al., 2017; Bogers et al., 2016). This means that OI has been and still is a “hot-topic,” with firms asking academics to help them define specific issues such as the “who” issue, i.e. with whom the collaboration should take place (Laursen and Salter, 2006), the “when” issue, i.e. which phase(s) of the innovation process should be opened (Lazzarotti and Manzini, 2009) and the “how” issue, i.e. how openness should be implemented. As regards the “how,” too little attention continues to be dedicated to the set of tools firms can use to support the implementation of OI and, hence, to how firms can create a positive environment that encourages people to leverage existing technological capabilities outside the boundaries of the organization (Hung and Chou, 2013; Aloini et al., 2015; Lazzarotti et al., 2015) or to capture and benefit from external sources of knowledge in order to enhance current technological developments (Huizingh, 2011), thus – achieving a positive impact on performance (Caputo et al., 2016). Building on literature on innovation and knowledge management, we define such a set as the emergent or intentional system of Technological (information and communication technologies (ICT)), managerial and organizational tools through which the firm influences the collaborative behavior of people inside the firm with the external partners, as well as the collaborative behavior of the partners along the innovation funnel, from the idea generation up to the commercialization phase. Basically the main question is: what are the technological, managerial and organizational (TMO) tools that firms can use along all the phases of the OI process?

It is from this perspective that this editorial will propose two interpretive lenses through which the contributions of this SI will be presented: the first concerns the TMO tools that support OI, and the second, the OI process along which the tools are adopted.

TMO tools

The first lens concerns the TMO tools supporting the OI process.

Technological tools (ICT) have much to contribute because of the pivotal role of digital technologies in enabling OI initiatives. Preliminary studies focused on the Free Open Source Software phenomenon (von Hippel and von Krogh, 2003), crowdsourcing platforms (Di Gangi and Wasko, 2009; Leimeister et al., 2009), web-enabled innovation brokers (Whelan et al., 2013), ICTs’ contribution to absorptive capacity (Chatterjee et al., 2002; Chircu and Kauffman, 2000), as well as new technologies for data mining, simulation, prototyping and visual representation supporting OI in new product development (NPD) (Dodgson et al., 2006).

Furthermore, organizational tools play a pivotal role in realizing OI (Beltz, 2011; Naqshbandi and Kaur, 2011; Huizingh, 2011). Researchers are discussing how organizational-structure theories can be coupled to the OI paradigm and which traditional concepts about organizational-structure and organizing-mechanism theories are in fact responsive to the needs of the open paradigm settings. Dimensions such as specialization, formalization and decentralization should be analyzed in order to investigate their influence on OI gains (Ihl et al., 2012).

The guest editors would like to thank all the reviewers that made this SI possible, as well as Professor Al-Mashari for giving us the opportunity to be the Guest Editor of the Business Process Management Journal.
Finally, managerial tools, intended as the combination of routines, practices and incentives to support the OI implementation process, need to be further explored to ensure a greater chance of success (Giannopoulou et al., 2011). Many organizations are still not entirely comfortable with these “open” collaborations and previous research on inter-organizational collaboration indicates a high risk of failure. Nevertheless, opening up an organization might compromise conventional steering and managerial tools (Ollila and Elmquist, 2011).

The OI process
As regards the second lens – the OI process – we will refer to the outside-in (inbound) process, which concerns the integration of external knowledge sources to increase a company’s innovativeness, and the inside-out (outbound) process, through which firms earn profits by bringing ideas to market, selling IP and multiplying technology by transferring ideas to the outside environment (Gassmann and Enkel, 2004). Obviously, although firms may adopt an outside-in process or an inside-out process, these two processes are not to be regarded as alternatives; rather, firms may choose to adopt both of them.

Deciding on the outside-in process as a company’s core OI approach means that this company chooses to invest in co-operation with potential partners, and then to integrate the external knowledge gained. Hence, the inbound OI concerns things such as identifying, sourcing and integrating innovation (West and Bogers, 2013). More exactly, firms can identify or search for external sources of innovation by collaborating with a variety of external stakeholders or seeking out specialists with useful knowledge (Ili et al., 2010; Tether and Tajjar, 2008) in order to add to or complement the firm’s internal knowledge base (Laursen and Salter, 2006; Witzeman et al., 2006). Firms may also passively obtain innovation that is “pushed” by external stakeholders (Spaeth et al., 2010). Researchers have identified specific sources of external knowledge including suppliers (Li and Vanhaverbeke, 2009), customers (Gassmann et al., 2006), competitors (Lim et al., 2010) or universities (Cassiman et al., 2010). Moreover, the inbound OI includes the integration of innovation (West and Bogers, 2013), which consists in the full integration of the innovations into the firm’s R&D activities. This requires a compatible culture in the R&D organization in order to overcome “not invented here” barriers, as well as the technical capability to assimilate innovations obtained from external sources. Organizational culture plays an important role in the willingness and ability of an organization to successfully profit from external sources of innovation (West and Bogers, 2013).

Companies that choose the inside-out process as a key process focus on externalizing the company’s knowledge and innovation in order to bring ideas to market faster than they can through internal development. The inside-out process consists in bringing ideas to market, out-licensing and/or selling IP and multiplying technology through different applications (Gassmann and Enkel, 2004). In the literature, there are no integrated models supporting the outbound OI process; for this reason we propose to split the OI outbound process into two phases: the search for technology users and the commercialization phase.

SI outcomes
The aim of this SI is to publish cutting-edge, rigorous research that addresses the above research gaps. The result of a stringent process of selection of numerous quality submissions on the part of many experts in the field, this issue showcases both quantitative and qualitative research methodologies in the form of conceptual, case-based or empirical papers.

This collection of papers addresses recent developments in the field and revisits some past questions by examining them through a different theoretical lens, leading to some new insights and ideas. In particular, by crossing the two interpretive lenses above, we have put together a framework (Figure 1) in which the manuscripts selected for this SI may be positioned. In this way we have been able to feature 12 papers.
The framework in Figure 1 highlights two main things. First, most of the articles propose a blended approach, i.e. an approach which includes at least two tools (Patrucco et al., 2017; Massa and Testa, 2017; Verbano and Venturini, 2017), or both the two OI processes (Bessant and Trifilova, 2017; Ramirez-Portilla et al., 2017; Lamberti et al., 2017), or even the concurrent use of several tools in both the inbound and outbound processes (Burchart et al., 2017; Battistella et al., 2017). As far as the lens connected with tools is concerned, this blended approach means that openness implies the use of tools which pertain to different spheres, or, to put it differently, that the “how” issue of OI requires a set of ingredients to make the recipe work, and that the use of one tool in many cases is not enough for the opening of the organizational borders. As far as the lens connected with the OI processes is concerned, the possibility in this issue of analyzing a coupled approach made up of the inside-out and inside-in processes is amazing, given that most of the extant literature regards the inbound process.

Second, Figure 1 identifies an uneven distribution of the manuscripts in this SI within the framework, which is rather crowded in specific areas and empty in others: indeed, if we look at the vertical dimension (the lens connected to the TMO tools), the managerial and organizational tools are the areas that have been covered most, while if we look at the horizontal dimension (the lens associated with the OI process), the most investigated area is the inbound process. This distribution reflects the main trends overall in extant literature, which undoubtedly concentrates on the organizational and managerial tools which support firms in their inbound process. Hence, from an overview of the distribution of the articles, what emerges is the existence of “virgin” spaces for further investigation.

In the following, the contribution of each of them is explained.

In crossing the borders of both inbound and outbound OI with an organizational perspective, the first paper, by Bessant and Trifilova (2017), opens the discussion by developing a conceptualization based on the organizational routines necessary for exploiting recombinant innovation in an open context; i.e. on how to enable the company to create bridges across different boundaries. The authors focus on recombinant innovation, intended as “the case in which knowledge which has been learned and deployed effectively in one field can be transferred to another,” highlighting how this type of innovation is much more powerful and promising in an open context. This leads the authors to hypothesize three sets of routines (around abstract-driven search, brokerage and cyclic adaptation) capable of supporting the company in building the absorptive capacity necessary for exploiting recombinant innovation.

The other contributions collected in this SI offer a wide-ranging and integrated perspective on the theme of OI implementation. In the following, we give a brief synthesis of their content.

**Figure 1.**
The framework for the positioning of the special issue manuscripts
The technological dimension is specifically addressed by Faullant and Doulfuss (2017): while analyzing the dark side of crowdsourcing tools, the authors deal with a widely adopted technology-driven tool for OI. As with many issues in OI, crowdsourcing has potentially many advantages, but also several risks and drawbacks. They adopt a discriminating approach in investigating crowdsourcing and give interesting insights about the possible negative effects deriving from such a tool. Reference is made to a case study on a European crowdsourcing platform in order to identify negative behavior and provide some guidelines for managing the social interaction among contestants.

With regard to the organizational dimension, the paper by Lassen and Laugen (2017) investigates how to configure an optimal balance between different actors in the various phases of the innovation process, which is a key organizational issue in implementing OI. They analyze how different OI collaboration patterns affect the development of incremental vs radical innovation projects in existing organizations. In particular, the authors test the effect of the internal and external collaboration approach, depending on the internal functions and external partners involved in the process. The results draw on a large sample of Danish engineers and show that the type of internal/external actors involved in the OI process really matters. Effects seem to vary significantly, depending on the OI process objectives. Thus, this evidence stresses the importance for managers of putting together a project team that is purpose-built-for the desired goal in the innovation project.

Agostini et al. (2017) also adopt an organizational perspective on inbound OI, focusing on the role of relational capital in influencing the customer performance of OI and studying the moderating role of absorptive capacity. The relevance of this paper is twofold. First, it investigates a topic which is recognized as crucial for the successful implementation of OI: intellectual (relational) capital and absorptive capacity. Second, the context of investigation – B2B Small and Medium Enterprises (SMEs) – has not yet received great attention, even if the potential benefits of OI in such a context are particularly relevant “considering the increasing need to strengthen the relationship between the [small, B2B] firm and the customer within this context.”

As for managerial practices and tools, contributions concentrate on OI practices, including innovation contests, along with the monitoring tools used to set up OI implementation.

The paper by Ramirez-Portilla et al. (2017) investigates the effect of OI practices and models, both for inbound and outbound OI, on company performance (economic, environmental and social). A set of specialized SMEs operating in the supercar industry is adopted for the survey’s purpose. The value of the paper is that it attempts to verify whether certain specific practices in OI are actually able to improve the company’s innovativeness and, in turn, its performance, which is an open issue still being debated in literature. Innovatively, the environmental and social dimensions are included in the concept of performance.

Following the waves in OI practices, the paper by Rodríguez Ferradas et al. (2017) investigates innovation contests as a managerial tool for seeking external knowledge to foster a NPD process. They focus specifically on SMEs disregarded by the literature in favor of larger firms. The main aim is to identify the context and design factors necessary in order to implement an innovation contest for NPD in SMEs. The results show that SMEs threatened by market and technology turbulence seem to use innovation contests to nurture organizational ambidexterity: SMEs’ resources focus on today’s activities, while people participating in the innovation contest underpin tomorrow’s NPD process. In addition, the authors identify some key contextual factors and design elements, both internal (intellectual property management and corporate culture), and external (intermediaries and proximity), which are useful for getting the most out of the innovation contests.

Finally, the paper by Lamberti et al. (2017) aims at giving innovation managers a practical managerial tool with which to monitor the implementation of OI within their organizations. The paper is relevant as it provides a managerial tool easily exploitable by
innovation managers as a means of self-assessment for monitoring whether the firm is effectively and efficiently generating output from OI with the committed resources. As a first step, through an in-depth literature review, the authors elaborate a framework which categorizes a large number of OI metrics into five areas – the outer and inner environment, collaboration, importing and exporting mechanisms – representing inbound and outbound practices. As a second step, and based on this framework, a scorecard is developed by constructing six indicators balancing different criteria, such as objectivity, availability and systematic updating of data within companies’ information systems.

The remaining contributions adopt a blended approach, jointly considering two or more TMO dimensions, such as, for example, organizational choice at a micro (job and team design) or macro level (the role of organizational functions in OI implementation).

The paper by Burcharth et al. (2017) deals with the theme of implementing OI from an organizational and managerial perspective. The contribution supports both theoretically and empirically the role of job design in the implementation of OI, distinguishing also between the effects of inbound and outbound practices on innovation performance. Specifically, the authors examine the role of organizational activities within firms’ management systems in relation to the performance of openness. The rationale of the paper is that OI requires high levels of flexibility and experimentation and that employee autonomy has a central role in the innovation process, since it is associated with creativity, motivation and proactivity. The authors present a mediation analysis which supports the role of work autonomy and claims that economic benefits of both inbound and outbound OI are fully captured only if firms provide employees with time, freedom and independence.

The paper authored by Patrucco et al. (2017) offers an interesting supply chain management perspective on implementing OI, in that they analyze the contribution of suppliers and of purchasing departments in affecting a firm’s ability to innovate. The study integrates three different research fields (innovation, operations, and purchasing management), providing a synergistic vision on the topic by considering, as a unit of analysis, the purchasing category level rather than the NPD project level. Results draw on a survey of about 500 firms and confirm the relevant role of the purchasing interface in fostering innovation as well as the positive impact of supplier collaboration. They show that innovation is positively affected by supplier collaboration, which in turn is favored by purchasing absorptive capacity. Moreover, the purchasing status and innovation objectives enable the development of greater absorptive capacity.

The papers by Massa and Testa (2017) and Battistella et al. (2017) offer a completely integrated perspective of the TMO dimensions in pursuing the OI implementation process.

Specifically, the paper by Massa and Testa (2017) aims at understanding how an adequate mix of TMO levers might support the opening of the innovation processes in food sector contests in connection with the practice of involving customers in a variety of creative efforts. The authors conduct exploratory research by studying the innovation contests launched by top global food brands over the last decade. The results show that while the choice of the platform type for an OI contest is often neglected, it is a key choice encapsulating a large set of TMO levers and tools that strongly influence the collaborative behavior (if not the very participation) of partners throughout the innovation process.

Finally, Battistella et al. (2017) gives an extensive overview of the practices, tools (including technological) and actors involved in inbound, outbound and coupled OI. The authors draw a meaningful and robust set of practices, tools and actors in OI from the literature. They verify whether and how this theoretical picture actually corresponds to company practice in OI by an explorative survey of SMEs. Interestingly, the findings also highlight the combinations of practices, tools and actors most widely adopted by SMEs, which could be of high interest for managers looking to achieve some specific innovation goals.
Closing the issue comes the paper authored by Verbano and Venturini (2017), which studies how the OI paradigm is spreading among public organizations by analyzing the creation of spin-offs as one of the outbound OI practices used by public research centers. The authors elaborate a framework which identifies the types of resources (technological, human, financial and social) needed in the spin-off development, as well as a series of indicators to evaluate the spin-off performance. The framework is then tested throughout a single case study, a spin-off operating in the ICT sector generated by the Indian Institute of Science from the Bangalore area. The paper provides valuable insights into the actors involved in public spin-off generation (managers, researchers, public research universities and institutions, and government agencies) by enabling a better understanding of the mechanisms and conditions supporting a spin-off development. Such an understanding may stimulate more profitable policies and practices of technology transfer, leading to a strengthening of the national industrial system.

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**References**


