



Collaborating with users to innovate: A systematic literature review

Khatereh Ghasemzadeh^{a,*}, Guido Bortoluzzi^b, Zornitsa Yordanova^c

^a Department of Management, University of Bologna, Via Capo di Lucca, 34, 40126, Bologna, Italy

^b DEAMS Department, University of Trieste, Piazzale Europa, 1, 34127, Trieste, Italy

^c Industrial Business Department, University of National and World Economy, 8mi Dekemvri 1, 1700, Sofia, Bulgaria

ARTICLE INFO

Keywords:

Firm-user collaboration
User innovation
Innovation strategy
Innovation management
Review

ABSTRACT

The purpose of this study is to systematize and consolidate a scattered literature on the theme of firm-user collaboration by focusing on the strategic, organizational, and managerial dynamics of firms. To achieve this aim, a systematic review of 152 articles was carried out. Papers were first organized into six clusters of firm-user collaboration: (1) Identifying and Selecting Users and Ideas, (2) Organizing Collaboration with Users, (3) Networking with Users, (4) Engaging Users in the Innovation Process, (5) Developing Resources and Capabilities to support Collaboration with Users, and (6) Strategizing for Users' Involvement. The main topics within each area were then organized sequentially, following a typical innovation-management process to facilitate the identification of further research opportunities and under-addressed topics that could be relevant to tackle. The paper contributes to the innovation literature by providing a firm-centered perspective on the strategic, organizational, and managerial preconditions and dynamics needed to enable and enhance collaboration with users.

1. Introduction

In the last two decades, there has been a rapid increase in the number of theories, concepts, and methods related to users' contribution to the innovation process of firms (Bogers et al., 2010; Felin et al., 2017). The reasons are numerous. Internet technology has made users' involvement in the innovation process significantly cheaper and easier than ever before, thus increasing the number of firms using online platforms, communities, and other methods to interact with users (von Hippel, 2017). More and more firms have also begun recognizing the distinctive advantages of collaborating with users while developing new offerings, and consequently have begun to organize themselves to maximize the efficiency and effectiveness of such collaboration (Chatterji and Fabrizio, 2014; Schweisfurth, 2017).

The literature has first looked at users as people innovating the firms' products independently and to answer their own needs. This perspective on users is well captured by the definition of user innovation (UI) and its related theory coined by Eric von Hippel (1976). It was later than users started to be considered as potential assets for firms and their innovation strategies. This change in the perspective is mainly due to Henry Chesbrough (2003) and to his open innovation (OI) theory, in which firms collaborate with external stakeholders (including different kinds of

users) to increase the efficiency and effectiveness of their innovation processes. So, essentially for their own return.

Over time the boundaries between the two theories have been blurring (Bogers et al., 2017) as long as firms have started to apply more and more 'distributed' (Bogers and West, 2012) or 'networked' (Hurmellina-Laukkanen et al., 2021) collaboration strategies mixing up elements typical of both the paradigms (Bartl et al., 2012; da Mota Pedrosa et al., 2013; Dahlander and Magnusson, 2008; de Araújo Burcharth et al., 2014; Hienerth et al., 2014a,b).

Take the case of IBM, a giant in the computer-software industry. In 1999, IBM started collaborating with Eurotech, an Italian mid-sized software company listed on the Milan stock exchange, on a new protocol for IoT connectivity for the industrial sector called Message Queuing Telemetry Transport. The protocol was based on an idea by Eurotech that applied a typical OI strategy. The two companies later realized that additional support was needed to help make the protocol a market standard. Hence, in 2011, they decided to release the protocol for free to the open-source community Eclipse Foundation, which started to develop it autonomously, following a typical UI strategy. The protocol finally became both an OASIS standard (Organization for the Advancement of Structured Information Standards) and an ISO standard (International Organization for Standardization) on the market,

* Corresponding author.

E-mail addresses: khatereh.ghasemzadeh@unibo.it (K. Ghasemzadeh), guido.bortoluzzi@deams.units.it (G. Bortoluzzi), zornitsayordanova@unwe.bg (Z. Yordanova).

<https://doi.org/10.1016/j.technovation.2022.102487>

Received 28 November 2019; Received in revised form 17 January 2022; Accepted 20 February 2022

Available online 25 February 2022

0166-4972/© 2022 Elsevier Ltd. All rights reserved.

allowing IBM and Eurotech to become the leaders in the sector.

This study looks at the scattered literature on firm-user collaboration to carry out a review that aims to highlight how firms can maximize their collaboration efforts with users. In particular, our paper aims to provide an answer to the following research questions:

1. What are the core research areas and topics related to the theme of firms organizing and managing collaboration with users?
2. What are the under-scrutinized areas and topics and the resulting research opportunities for scholars in the field?

To answer these two basic research questions, we first review selected literature and organize the extant studies into clusters by topic. We then introduce a sequential (process-based) framework that is typical of innovation management to spotlight under-addressed themes and further research opportunities to be addressed by scholars.

Our paper provides a potential answer to various calls raised by scholars for the need to come to a better understanding of the internal-to-firm dynamics of user involvement. Aligning with Bogers et al. (2017) and Hurmelinna-Laukkanen et al. (2021), we think that especially with the rise of hybrid forms of user involvement and the advent of new types of intermediaries (crowdsourcing platforms, digital innovation hubs, etc.), a deeper understanding of the strategic and organizational mechanisms through which firms can collaborate with users is needed.

2. Theoretical background

von Hippel (1976) first discussed the role of users as innovators in his pioneering article 'The Dominant Role of Users in the Scientific Instrument Innovation Process', published in *Research Policy*. This article gave rise to a broader discussion on the 'locus' of innovation activity, a discussion that was later broken down into different research streams.

Some years later, Chesbrough (2003) advanced a new (open) innovation theory, which is rooted in the assumption that the sources of knowledge are widely distributed in the economic environment and that firms need to open up their internal-innovation processes and actively build external coalitions with various stakeholders, including users (West and Bogers, 2014) to remain competitive. To do that, firms need to employ explicit, planned strategies to obtain novel ideas and technologies from both inside and outside a firm's borders and empower commercialization opportunities for technologies, products, and solutions developed in-house to maximize the overall return on innovation (Chesbrough et al., 2006).

Users' motivation to be involved in the innovation processes of firms span from fulfilling some specific and personal needs that cannot be met by firms even through mass customization, to personal learning, the pleasure from engaging in innovation, helping others and, last but not least, the potential financial rewards (De Jong et al., 2015; Stock et al., 2015).

On the side of firms, over time the many advantages of involving users in innovation processes have become clear to firms (von Hippel, 2006). Therefore, firms started putting in place new strategies, organizational solutions, routines, and managerial processes to optimize the contributions provided by users (Dahlander and Magnusson, 2008; Bartl et al., 2012; Hienerth et al., 2011, 2014a,b; Katila et al., 2017).

More in general, studies in the area of user innovation have shifted from being almost entirely focused on lead users and the contribution they can give to firms (Urban and von Hippel, 1988; von Hippel, 1986) to a collaborative approach of user participation called 'co-creation', in which the locus of innovation is shared among multiple actors, including users (Roberts et al., 2014; Gustafsson et al., 2012) and orchestrated by firms (Hurmelinna-Laukkanen et al., 2021). This has been facilitated by the exponential growth of internet-based platforms based on user-generated content, like-minded communities, and cost-effective technologies e.g., digital prototyping through which users can develop preferred products and services (von Hippel, 2017).

Gradually, firms have been asked to find a balance between the need to 'control' their (open) innovation strategies and the need to actively release part of their knowledge for free to external contributors to maximize acceptance and diffusion (Laursen and Salter, 2006; O'Mahony, 2007). This implies that user and community management shall become an integral part of a firm's (open) innovation strategy (Dahlander and Wallin, 2006; Jeppesen and Frederiksen, 2006). Aligning firms' aims and strategies with users' goals and needs is not easy but it is key to ensure success to the collaboration (Hienerth et al., 2014a,b; Pisano and Verganti, 2008; Van Oost et al., 2009). Changes in a firm's business model (Dahlander and Magnusson, 2008) and strategic leadership levels may also be needed (Bartl et al., 2012; da Mota Pedrosa et al., 2013) to prepare the ground for collaboration with users and to reduce potential defensiveness against external ideas among employees (de Araújo Burcharth et al., 2014). The same can be said for a firm's platform designs and reward structures, which can enhance users' involvement (Nambisan et al., 1999; Foss et al., 2013).

However, such a goal is not easy to achieve. A wide survey carried out by Bradonjic et al. (2019) has shown that still today top and middle managers of firms largely underestimate the real potential of users, hence potentially failing to optimize their involvement into the innovation processes of the firms they belong to.

The literature on firms-users collaboration is well developed, but it is also dispersed in many areas. Further, as noticed by Füller et al. (2014, p. 274), little is known about hybrid solutions (in between open and user innovation) 'such as innovation-contest communities [where] the initiative is centered on a certain brand or company'. Given the variety of the topics involved, a systemization of the literature will be useful to scholars interested in contributing to the research field on firms-users collaborative innovation.

3. Methodology

The review process consists of three phases, which are further detailed in the following subsections.

3.1. Defining protocols

Following Tranfield et al. (2003), we conducted a systematic review of the literature with the intent to answer the above-stated research questions and to identify core and under-scrutinized research areas related to the theme of firm-user collaboration. The research process was organized into separate consecutive phases, each having clear inputs and outputs:

- Phase 1: Defining the topic boundaries and selecting potentially relevant articles
- Phase 2: Applying inclusion and exclusion criteria to select relevant papers
- Phase 3: Categorizing and grouping the studies into clusters

In Phase 1, we first investigated Web of Science and Scopus to obtain a 'golden source' of studies that fit with our goal. To do so, we set the topic boundaries by applying specific keywords, or a combination of keywords, including the following: 'user innovation', 'user driven', 'user centric', 'innovat* & user', 'user led', and 'open innovation & user'. We started with a broad spectrum of concepts to limit the risk of excluding relevant articles dealing even in minor parts with internal-to-the-firm dynamics. Since the active role of users in the innovation process is of crucial importance for our review, we applied keywords that could result in as many articles concerning users' role in the innovation process, regardless of theoretical framework.

We limited the search process to peer-reviewed journal articles written in English, hence excluding other types of publications. We did not apply any time limitations because of the relative youth of the body of literature. In addition to studies published in the business and

management field, we initially included papers published in more technical fields, such as computer science and telecommunications, limited to those that contribute to the organization and management of firm-user collaboration. ICT technologies impact user-firm dynamics in many ways which can also be addressed by scholars not working in the business and management field. The search process from both databases yielded a set of 970 potentially relevant articles.

In Phase 2, we applied more precise exclusion criteria to narrow down the relevant studies. First, all off-topic papers and off-topic journals, such as nursing and medical journals, were removed from the database unless they dealt specifically with firm-user innovation aspects and focused on non-medical issues. The excluded topics mainly dealt with external variables and dynamics not controllable by firms (e.g., communities' inner dynamics, the role of institutions, mere classifications of user types, etc.), or internal variables and dynamics in general, with no specific reference to users (e.g., innovation strategies in general, organization routines to foster innovation, leadership styles to nurture creativity, etc.). After a first round of exclusion, we reduced the number of articles to 565.

We then applied further inclusion and exclusion criteria to full articles to get closer to our topics, as follows:

- We included articles that identify users (or communities of users) as the main and active source of innovation;
- We excluded articles that consider users as just one of the (many) potential external sources of innovation (along with suppliers, universities, research centers, other firms, etc.).
- We excluded articles that focus on external-to-the-firm spheres, namely, users' characteristics and innovation specifications (radical/incremental) generated by them.
- We excluded articles on marginal topics, including those dealing with user entrepreneurship, the commercialization of innovations, and users' involvement in the innovation-diffusion process, as they do not focus on the 'generative' phase of innovation.

Perhaps the most challenging task in Phase 2 was to separate studies apparently dealing with user innovation from the perspective of firms but, in reality, not dealing with any active management action taken by firms. To ensure consistency in the review process, the three co-authors reviewed the abstracts of all the articles, and each article was reviewed in its entirety by at least two co-authors. Any disagreement between the two was resolved through a discussion involving all three co-authors. Altogether, 152 articles fulfilled all criteria.

Phase 3 included classifying the papers for methodologies, supporting theories, and main results, and categorizing them into various clusters using a tagging methodology (Randhawa et al., 2016). To reduce the possibility of bias, the three co-authors initially worked independently. Tags were then discussed in joint sessions and fine-tuned until full agreement was reached. The tagging procedure followed a bottom-up approach. We started by associating and combining various tags into second-order concepts (the sub-themes of each cluster) and then into six third-order constructs (the clusters) (Fig. 1¹). The process started from a wide variety of tags associated with each article in the first step, followed by the combinations of similar concepts, and the creation of more profound tags to identify the sub-themes in the second step. Going over the tags and scrutinizing the notions behind them, we categorized all the articles into six clusters.

3.2. Field mapping

The collecting of studies was concluded in April 2020. We observed a significant increase in the number of publications in the field starting

¹ The code list presented in the first iteration phase is neither complete nor exhaustive and should be considered just as an example.

from 2008. The trend reached its peak in 2019, suggesting an increasing interest by scholars and further developments to be expected in the next few years. Table 1 provides an overview of the most represented journals in our database and gives an idea of the variety of sources our review relies on.

In total, 114 studies (72%) were empirical in nature, followed by 29 (20%) conceptual studies and 13 (8%) reviews. Seventy-six (68%) of the empirical studies employed qualitative methods (mostly case studies) and 30 studies (27%) employed quantitative methods. A majority of the papers were based on UI theory (34%) and OI theory (16%). Additional theoretical frameworks include co-creation theory, creativity theory, and idea- or information-management theories.

4. Results

As anticipated, the grouping activity led to the identification of six third-order constructs—hereafter referred to as 'clusters'—that cover the whole spectrum of research dealing with the firm dynamics of user innovation. These clusters were named as follows: (1) Identifying and Selecting Users and Ideas, (2) Organizing Collaboration with Users, (3) Networking with Users, (4) Engaging Users in the Innovation Process, (5) Developing Resources and Capabilities to support Collaboration with Users, and (6) Strategizing for Users' Involvement.

4.1. Cluster 1: Identifying and Selecting Users and Ideas

The first cluster includes articles dealing with the processes and activities for (a) identifying and integrating the most promising ideas into firms' new product-development processes, (b) identifying and integrating the best and most creative users into firms' innovation activities, and (c) defining the most effective methodologies and tools that firms can use to select users and ideas.

Users' creative activity has increased considerably in recent years, especially that which is carried out in online communities and platforms (Battistella and Nonino, 2012; Füller et al., 2014; Hiennerth et al., 2014a, b). With the increase of ideas, users, and platforms, it has become more challenging for firms to identify and separate promising ideas (and collaborators) from mediocre ones, especially considering that collaborative innovation processes within communities of users are mostly self-organized, while collaboration relationships are loosely coupled (De Toni et al., 2012). Consequently, an increasing number of studies has started to describe firms' procedures and tools to separate the 'wheat' from the 'chaff' and to reach higher efficiency and effectiveness in the selection process (Ruiz and Beretta, 2021).

Another key theme included in this cluster concerns enhancing users' creativity, engagement, and creative potential. This can be achieved by using appropriate tools (communication tools, customization tools, testing tools, and sharing tools) to enhance the collaboration experience and/or request the help of expert intermediaries (Lalicic and Dickinger, 2019; Oksman and Kulju, 2017). Simply using platforms (such as open-innovation platforms like Innocentive.com) does not suffice to create effective collaboration with users. Users can easily lose their interest or find collaboration over structured and complicated or not in harmony with their inner motivations (Roberts et al., 2006). Experts and intermediaries can avoid this problem by creating platforms for firms that can generate more engagement among users (Windasari and Visita, 2019) and provide them with greater autonomy (Ye, 2018).

The literature discusses the compensative role that a firm's employees can play in bridging the gap between the firm and communities of users having limited skills and autonomy. This function can be realized through direct technical support (Huang et al., 2018) or with some backup in complex situations, such as when users must choose between alternative technological options that have pros and cons (Yan et al., 2018).

With the advancement of IT- and AI-based technologies, the literature has started to shed additional light on tools and techniques that can

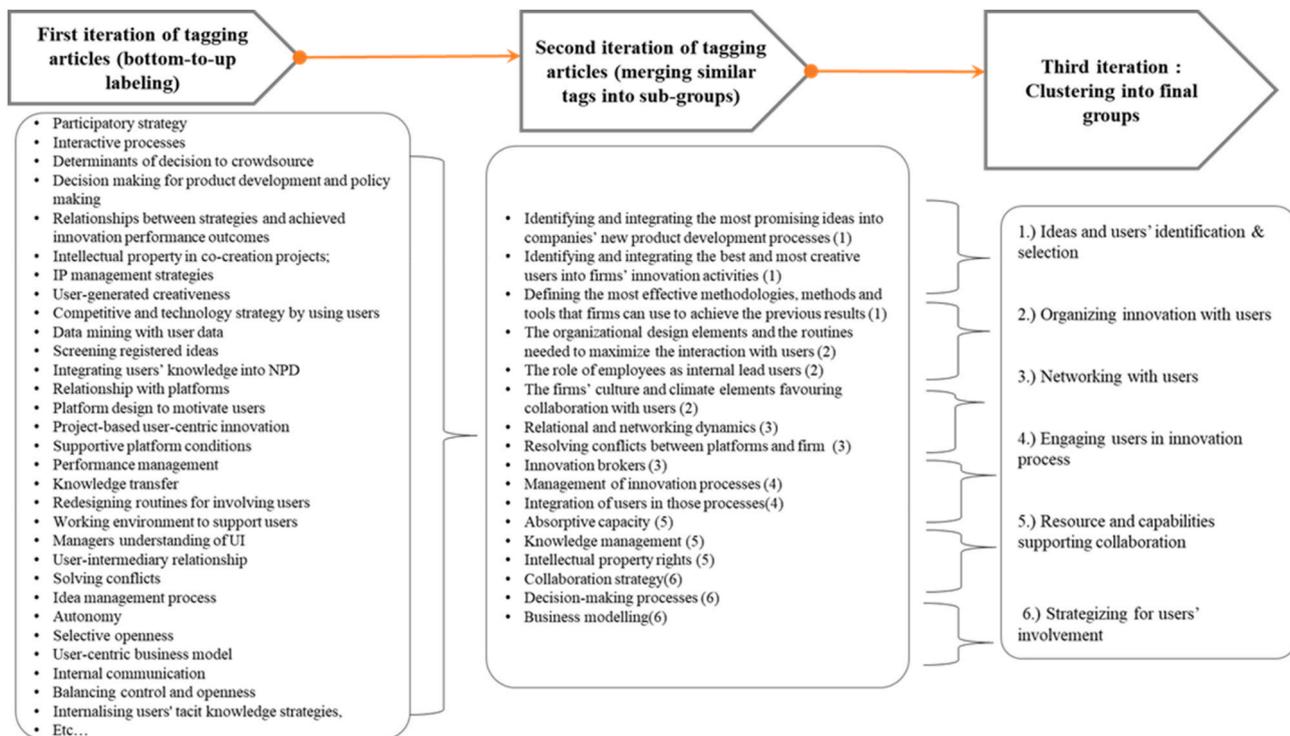


Fig. 1. Iteration process leading to the identification of the six clusters.

Table 1
Most represented source journals.

Name of Journal	Number of Articles (n)
Journal of Product Innovation Management	9
R&D Management	8
Research Policy	7
International Journal of Innovation Management	7
Creativity and Innovation Management	7
Innovation: Organization & Management	5
Technological Forecasting and Social Change	5
Technovation	4
Journal of Engineering and Technology Management	4
International Journal of Entrepreneurship and Innovation Management	3
International Journal of Innovation and Technology Management	3
Technology Analysis & Strategic Management	3
European Journal of Innovation Management	2
European Management Journal	2
Industrial Marketing Management	2
Industry and innovation	2
International Journal of Technology Management	2
Journal of Management Information Systems	2
Long Range Planning	2
Management science	2
MIS quarterly	2
Research-Technology Management	2
Technology Innovation Management Review	2

simplify the selection of ideas and users (Franke and Piller, 2004; Nambisan, 2002). These include text-mining methods that may ease the identification of promising product and service concepts, starting from a broad spectrum of ideas and sources (Kim and Park, 2019; Olmedilla et al., 2019). The use of automatic idea-screening techniques and user-generated big data can allow firms to identify ideas with good potential at an early stage, thus saving time and energy (Trabucchi et al., 2018; Christensen et al., 2018).

Living labs have attracted significant scholarly attention in the UI

literature. Living labs provide real-life settings that facilitate co-creating innovations through the participation of skilled users (Dell'Era et al., 2019). Living labs are independent from firms, but they might represent potential sources of new business ideas, as both the products and technologies of a firm's interest can be accelerated while still in the early stages. Transparency and willingness to collaborate are essential to activate the necessary trust-building process between users and firms (Hakkarainen and Hyysalo, 2016) and to make the processes of knowledge transfer and absorption fluid (De Moor et al., 2010).

4.2. Cluster 2: Organizing Collaboration with users

In his famous book *Overcrowded*, Roberto Verganti advances the intriguing suggestion that getting new ideas is no longer an issue for firms. The real challenge, says Verganti, is to generate value from them and, in some cases, to escape the 'paradox of ideas', which states that the more ideas available, the poorer the quality of the innovation produced (Verganti, 2018). A similar argument was previously advanced by Ed Catmull, CEO of Pixar, in a discussion concerning Pixar's success. According to Catmull, this success is mainly rooted in excellent people acting as embedded lead users and in proper organizational routines in place in the company (Catmull, 2008).

In general, academic research has highlighted that firms often fall short in taking advantage of users' ideas not because the ideas are not good enough, but because of a lack of organizational readiness (Li et al., 2016). Studies in the second cluster focus specifically on the organizational dynamics needed to generate value from users' ideas. Three main topics emerge from our review: (a) the organizational-design elements and routines needed to maximize interaction with users, (b) the role of employees as internal lead users, and (c) the elements of firm culture that favor collaboration with users.

Open-innovation literature has extensively discussed how a failure to collaborate with users by a firm's employees (the well-known 'not-invented-here' syndrome) may constitute a severe impediment to collaboration. However, inadequate organizational structures and routines might represent even more severe impediments to collaboration

(Gales and Mansour-Cole, 1995; Schaarschmidt and Kilian, 2014). A failure to change established routines and an increased burden on employees have been identified as pressing obstacles to the full realization of collaboration with users (Olson and Bakke, 2001; Chesbrough and Appleyard, 2007).

According to Keinz et al. (2012), firms first need to define their users' involvement strategy, such as by distinguishing between a 'searching', 'harvesting', 'collaborating', and 'ecosystem' strategy, and then need to adjust their organizational structure and human resources–management side, such as by creating appropriate incentive systems, to fully benefit from collaboration with users. Taking the opposite perspective, according to which strategy follows organizational change, Foss et al. (2013) identify the decentralization of decision-making and fast horizontal coordination through internal-communication mechanisms as necessary components of an organizational-redesign process aimed at allowing firms to absorb knowledge from external sources and fully deploy a user-based innovation strategy.

Regarding the nature of users, while early literature focused almost exclusively on how to scout lead users from outside firms (Baldwin and von Hippel, 2011), some recent studies have started inquiring about the presence of lead users operating from the inside Schweisfurth (2017); (Hurmelinna-Laukkanen et al., 2021). We refer here to the so-called embedded lead users (ELUs), firm employees who exhibit lead-user characteristics (Schweisfurth and Herstatt, 2016). As with external users, ELUs can provide firms with novel ideas and creative solutions if put in the right circumstances (Schweisfurth and Raasch, 2015). However, different from external users, ELUs can take advantage of their social resources (i.e., structural, relational, and cognitive capital) to act as effective bridges between the firm and external users (Schweisfurth and Herstatt, 2016).

Specific organizational dynamics are needed to benefit from such sources. Ghasemzadeh et al. (2020) stress the role of a supportive environment to stimulate employees' self-efficacy, which, in turn, shapes the 'lead-user' attitude of employees.

Finally, innovation culture plays a vital role in determining the willingness and ability of an organization to successfully benefit from external sources of innovation (West and Bogers, 2014). A supportive innovation culture is one in which organization members feel comfortable coming forward with ideas and are encouraged to do so, corporate-entrepreneurship initiatives are provided with support, and innovation is given importance for the long-term survival of the firm. Innovation culture is certainly a co-determinant of the effectiveness of UI strategies at the organizational level, but it is not a silver bullet. In this regard, Agostini et al. (2016) find that innovation culture acts along with other factors (i.e., performance management, autonomy, and internal networking) as a moderating factor in the relationship between user involvement and the radical-innovation performance of a firm. Even concerning the public sector, Liang et al. (2018) reach a similar conclusion, as they highlight the importance of an organizational climate that encourages users to innovate in public-service organizations.

4.3. Cluster 3: networking with users

Studies in the third cluster deal with relational and network dynamics. Relational dynamics refer to both the management of formal relationships/networks with innovation brokers, such as crowdsourcing platforms or living labs, and communication issues between a firm's employees and users (and the communities they might belong to). Such dynamics often face difficulties due to the conflicting desires of firms and users: for the former, a desire to control innovation processes and appropriate their benefits, and for the latter, a desire for transparency, accessibility, and unfettered participation (Henkel et al., 2013; West and O'Mahony, 2008).

There are several ways to deal with this mismatch (Andersen and Mørch, 2016; Fichter, 2009; Parjanen et al., 2012). One is to rely on

external intermediaries that can mediate between the parties. Living labs might represent a possible solution (Hakkarainen and Hyysalo, 2016) because they act not only as knowledge intermediaries but also as facilitators of innovation-oriented business relationships, for example, by defining the rights, roles, and rules of the participants. Another strategy is to have 'your man in Havana' and integrate the firm's agents within communities of users to smooth collaboration with its members (Fichter, 2009). Such agents (differently called 'promoters' or 'champions') can also be external to the firm, hired by the firm among the community members, and can provide firms with access to supplementary resources and know-how, thus enhancing user support and user-to-user collaboration (Andersen and Mørch, 2016; Parjanen et al., 2012).

Another way to solve the mismatch is to change the firm from the inside. The multiple-case study conducted by Parmentier and Mangematin (2014) in the context of digital creative industries provides useful suggestions in this regard by revealing product and service features that stimulate users' creativity, integrate users' contributions into development efforts, and build common identity between users and the communities they belong to. The question of how to balance the need to share information and knowledge with users, and the protection of the core sources of a firm's competitive advantage is still debated (Lauritzen and Karafyllia, 2019; Miozzo et al., 2016). Paradoxically, in a later study Parmentier (2015) argues that to avoid conflicts, firms need to reduce control over communities and users and open up their assets in order to achieve greater control over the innovations produced. Indeed, the greater the opening up of assets, the greater the chances that users will provide solutions that meet the specific needs of the firm.

Several sociological factors play a key role in facilitating the relationship between firms and users, such as trust, transparency, mutual agreement on aims, and a sense of belonging. Symbols, rites, and shared representations might also help to line up the values and interest of users and firms (Heiskanen et al., 2010). Indeed, social and cognitive inconsistencies can damage the processes of joint idea generation and innovation, as Pässilä et al. (2013) have pointed out. In particular, the authors suggest using the "forum theatre" technique to maintain balanced and open dialogue between users and firms.

4.4. Cluster 4: Engaging Users in the innovation process

Firms may face various managerial challenges in incorporating users' ideas and products into their New Product Development (NPD) processes and organizational routines (Bengtsson and Ryzhkova, 2013). Take, for example, a firm using a stage-gate-like process for new product development that is willing to open up its innovation process to users. Such a firm will need to precisely identify the phases/stages in which to include users, the tools to integrate their contributions, and the impact the users are expected to have on the whole process. This 'practical side' of firm-user collaboration is under-represented in the literature.

The fourth cluster includes papers dealing with (a) the management of innovation processes and (b) the integration of users in those processes. We can recognize two main sub-topics within the cluster. The first is related to the managerial methods, tools, and competencies needed to involve and support users in different innovation practices, while the second deals more specifically with user integration within the innovation process. However, it is not easy to set clear boundaries between the two.

The methods firms can use to facilitate the involvement of users include scheduling co-development activities and creating joint teams with shared roles and responsibilities (Kuusisto et al., 2013). However, the literature is still far from identifying any single mechanism able to guarantee the greatest involvement possible. The study by Nambisan et al. (1999) tests many mechanisms, including customer-support units, user groups, user labs, and relationship management, but the results do not offer a 'one best way' and suggest that firms create a sound mix of involvement mechanisms to enhance users' propensity to innovate and

collaborate in NPD activities.

Something similar could be said about the capabilities that firms need to integrate users. Although the advent of online platforms has facilitated increased user involvement and participation, the full integration of users into firms' innovation processes also remains a matter of ability to integrate. In this vein, Bengtsson and Ryzhkova (2013) refer to a set of competencies that include motivating users, compensating them adequately, and following-up on their ideas to reach an effective integration. To this list, Abrell et al. (2018) add the ability to understand users' problems and the value of their knowledge, to select the most relevant users, to match them with the various phases of the NPD process, to translate users' ideas into specifications, and to enable timely feedback.

In terms of the innovation process, a recurring theme of discussion in the literature concerns how and where to integrate users within a firm's NPD process. The earliest and most creative phases—the idea-generation, business-case, and prototyping phases—are generally the top candidates. However, some studies support the idea that users could also be usefully integrated beyond such early phases (Hienerth, 2006; Magnusson, 2009). Digital technologies may allow firms to extend users' involvement to later phases when a product is already on the market and needs continuous optimization (Bosch-Sijtsema and Bosch, 2015).

To some extent, firms need to strike a balance between their internal ideas- and innovations-management process and users' processes, with the latter being very different from the former. In this regard, Tietz et al. (2005) analyze the 'stage-gate' mentally used by users while innovating, and find it composed of just two stages: idea generation and idea realization. They warn firms against involving users in complicated NPD processes and invite them to simplify such processes in order to maximize and streamline user involvement.

However, simplifying the process does not mean reducing touch points with users. On the contrary, firms must be aware that the collaboration process with users proceeds along two levels. The first is the formal level, which can be thought of as a stage-like process with clear boundaries and a division of labor. Firms seek to manipulate and optimize this process at each specific phase to gain the most value out of users (von Hippel and Katz, 2002). The second is the informal level, which is characterized by a continuum of problem-solving and knowledge-sharing activities nurturing a process of mutual cross-fertilization of knowledge between the users and the firm (Bogers and Horst, 2014; Fuchs, 2011).

4.5. Cluster 5: Developing Resources and Capabilities to support collaboration with users

Studies in this cluster deal with various topics connected to the role played by specific firms' resources and capabilities—such as absorptive capacity, knowledge management, and intellectual property (IP) rights—in enabling the management and valorization of external ideas and creators. The theme of absorptive capacity plays a prominent role in the literature. Absorptive capacity refers to a firm's abilities to identify the value of new external knowledge and apply it for commercial ends (Spithoven et al., 2010). As we have seen when it comes to user innovation, employees' attitudes toward open innovation are key to enabling a dialogue with users. But for a firm applying a user-innovation strategy, a simple willingness (or positive attitude) exhibited by some employees might not be enough. Abrell et al. (2018) claim that firms need to develop and raise their absorptive capacity regarding the innovation potential of users to execute their open strategies. They argue this can be done by exposing employees to users' knowledge and encouraging direct contact between users and employees. The same operation can be done internally in case a firm aims at valorizing its embedded lead users, as Laviolette et al. (2016) have stated.

Putting employees in direct contact with external users is also an effective way of transferring tacit knowledge that can be difficult to articulate, absorb, and integrate (Schaarschmidt and Kilian, 2014; von

Hippel, 1994). The study by Bretschneider and Zogaj (2016) identifies two strategies that firms can use to access users' tacit knowledge. The first is storytelling, which can be used as a mechanism to enhance the transfer of knowledge that cannot be codified, and through which users can foster a shared understanding with internal employees and encourage innovative problem solving. The second is the direct observation of users, which provides an opportunity for firms to see and experience users' tacit knowledge directly. In general, research has shown that additional managerial effort is needed to allow firms to translate potential users' ideas into innovative solutions, particularly when these solutions are radically new. Therefore, proper knowledge management is crucial to capturing and converting external learning into firm-specific capabilities (Ashok et al., 2016).

With the expansion of online communities and the emergence of techniques like big-data management, researchers have started to explore the capabilities that can help firms acquire co-created knowledge (de Zubielqui et al., 2019; Martínez-Torres and Olmedilla, 2016; Wang et al., 2020; Yuan, 2019). In this regard, Randhawa et al. (2017) state that to maximize knowledge transfer from online communities (through OI intermediaries), firms need to enable specific knowledge-boundary-management mechanisms at the syntactic, semantic, and pragmatic levels, and develop a set of capabilities at each level to enable knowledge transfer and encourage knowledge absorption.

Another central theme in this cluster is IP management, which is important given the tension between the opportunity for firms to open up their innovation processes to users and the desire for them keep a certain level of control over the knowledge generated. The studies we analyzed identify and discuss specific appropriation mechanisms (Gama, 2019; Stefan and Bengtsson, 2016), such as IP modularity and selective revealing (Henkel et al., 2013, 2014), used to overcome this tension. Other studies examine compensation strategies in the form of both monetary and non-monetary rewards as a way for firms to obtain acquisition rights to co-created products (Boudreau and Lakhani, 2013; de Beer et al., 2017).

Adopting a contextual perspective on IP management in co-creation, Tekic and Willoughby (2020) claim that limited IP management is needed when there is a firm-to-one (single user) relationship. The most popular knowledge transfer modes include patent acquisition and exclusive licensing. Things change considerably in firm-to-many contexts, where IP management cannot be easily controlled. In such contexts, firms tend to apply more unrestricted IP-management mechanisms, such as open-source or creative-common licensing, or completely evade any licensing arrangements.

4.6. Cluster 6: Strategizing for Users' involvement

Involving users in the innovation processes may heavily impact the organizational structures, processes, routines, and, as a result, the cost structure of a firm. For this reason, defining a strategic route for cooperation is necessary to achieve the intended results of the collaboration process (Cheng and Huizingh, 2014) and to overcome managers' skepticism (Bradonjic et al., 2019). This cluster includes studies dealing with strategic aspects of UI, such as collaboration strategies, decision-making processes, and business modeling. Different from the previous clusters, the studies we present in this section are more scattered and hardly connectable to well-defined research streams.

One of the first and most important questions that firms must ask is, is it worth collaborating with users or not? As Raasch (2011) argues, the costs of collaboration may outweigh the benefits. In some cases, it could be more beneficial for firms to discourage users from collaborating instead of incentivizing them. This argument leads to a wider discussion about collaboration as an opportunistic decision taken by firms. What are the boundaries of such opportunism? What is the right balance between give and take? The topic is open and involves discussions of ethical relevance to corporations. Dahlander and Magnusson (2008)

adopt a pragmatic approach to how firms can strategically manage relationships with community members to maximize their returns. By ‘pleasing’ users and increasing their reputation within the communities they belong to, firms can obtain greater control over the whole interaction process and maximize the level of knowledge produced.

A related theme of strategic relevance is that of selective revealing: how much information should firms disclose and share with users? Much depends on the role that users are expected to play in the innovation process (just idea providers in the early phases, or something more?) and the type of information a firm aims to obtain from them (is it of strategic relevance or not?). The greater the user involvement in the process and the strategic relevance of the information possessed by users, the greater the need for firms to reveal and share more information with them (Wandahl et al., 2011).

At the highest level of strategy-making, we found that competitive imitation and isomorphism play a role in user-innovation strategies. Indeed, when firms open up their processes, competitors tend to follow (Llanes, 2019). The theme of alignment between a firm’s general strategies and user-innovation strategy (or strategies) is also key. For example, in the context of mobile applications, Eshet et al. (2017) distinguish between collaboration strategies that best fit a ‘cost leadership’ base strategy and UI strategies that suit a ‘differentiation’ strategy.

Finally, the need for firms to innovate their business models, or develop brand new ones, to increase the benefits from collaboration with users is a theme that was first discussed by Chesbrough and Appleyard (2007). In user-centered business models, value is co-created between the user and firm through continuous interaction (Hienrath et al., 2011). For firms, shifting to such a business logic can be problematic for a number of reasons (Hienrath et al., 2011; Kohler and

Nickel, 2017; Saebi and Foss, 2015). Kohler and Nickel (2017) make a list of best practices that firms can implement to align their business models with users, which includes enhancing users’ commitment through positioning the firm and the users around a common goal, involving users in value-capture processes, preserving value-creation logic over time, allowing users to have fun, and cultivating a sense of belonging.

5. Discussion and research opportunities

Keeping in mind our research questions, we further re-organized the clusters and main themes within each cluster following a logical and process-based sequence that combines elements of the ‘innovation process’ described by Dodgson et al. (2014: Fig. 1.1) with the ‘model of the innovation process’ crafted by Tidd and Bessant (2020: Fig. 1.5). In particular, Fig. 2 makes a parallel between the typical innovation process followed by a firm and the sequence of activities that firms organize and manage with users, both internally and with intermediaries, per the literature we collected. As shown by Fig. 2, the extant literature concentrates mainly on the central phases of the process: selection of ideas and users and users’ subsequent involvement in the innovation process. Less studies address the preceding phases of developing a user-interaction strategy and organizing a firm for user innovation. We also found a limited number of studies on the subsequent phases, like the after-launch and long-term integration of users within a firm’s innovation processes—a topic of clear strategic importance that, in our opinion, deserves more attention from scholars in the future (Keinz et al., 2012).

Starting with the innovation-strategy phase, we cannot avoid remarking that despite the several calls for a deeper investigation of the

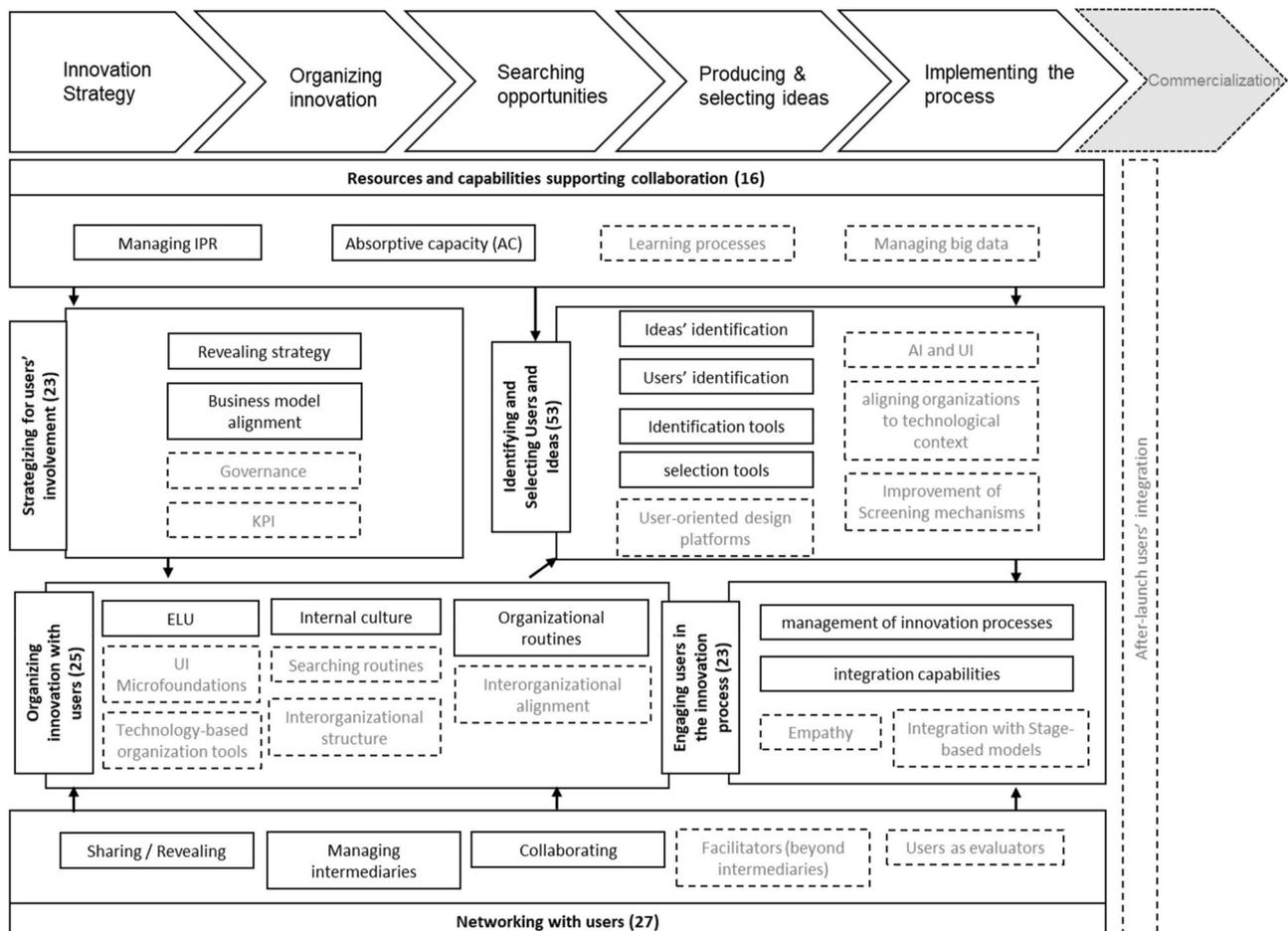


Fig. 2. A process view of firm-user collaboration activities, with identification of further research opportunities.

strategic aspects of firm-user collaboration (Bogers et al., 2017; Chesbrough and Appleyard, 2007; Hosseini et al., 2017), the literature still suffers from a lack of theoretical and empirical research. Among the most popular strategic themes we identified business modeling, with a particular focus on value-creation mechanisms (value propositions). Value-capture mechanisms (revenue models) deserve more research: should firms revise and involve users in their revenue model beyond compensating them for their ideas? How? We think that emerging business models based on the active engagement of users in revenue generation, like ‘The Consumer Brand’², could inspire new research questions to scholars.

A research area we found to be quite covered in the literature is firms’ revealing strategies (Hienerth et al., 2011; Saebi and Foss, 2015), while a connected but in our opinion still under-researched area is firms’ appropriation strategies (Randhawa et al., 2016). Thus, attention needs to be broadened to questions such as: How can firms maximize the appropriation of the results of collaborative innovation processes without breaking the code of ethics linking them to users? And what mechanisms could favor appropriation?

Future research may focus on the relationship between users and governance (Keinz et al., 2012). Should users play a more active role within firms’ governance bodies? And which kind of users? For example, we think that some interesting research questions arise in the case of the ‘lead user’ and popular influencer Chiara Ferragni recently joining the board of directors of the Italian fashion company Tod’s. Extending inquiry beyond the role of users as just idea generators begs questions regarding using users as problem creators (posing to firms new challenges to be solved), not just problem solvers (Majchrzak et al., 2018; Alexy et al., 2020).

Furthermore, the measurement of the returns from user-collaboration strategies deserves more consideration. We refer, in particular, to the development of key performance indicators and other control and accountability tools and mechanisms for firms-users collaboration strategies.

Another central theme is IP management and associated knowledge-control mechanisms (Henkel et al., 2013; Stefan and Bengtsson, 2016). This theme brings us back to the openness-control dichotomy and how to wisely manage such embedded friction in user-firm collaboration. The theme of IP management deserves further examination in the digital context. Digital collaboration requires the development of agile tools for managing IP rights without putting an excessive burden on firms and users.

Moving to the area of organizing innovation in Fig. 2, the most debated themes relate to the organizational structures (Agostini et al., 2016; Hosseini et al., 2017; Ghasemzadeh et al., 2020), the routines (Keinz et al., 2012; Nambisan et al., 1999) needed to manage collaboration with users, and the role of absorptive capacity. The organizational mechanisms needed to reinforce collaboration have received less attention than the three above (Foss et al., 2013; Yordanova, 2018). Additional research could address the mechanisms rooted in digital technologies (i.e., augmented reality, virtual reality, remote collaboration, etc.) that could further enhance collaboration.

At a similar level of analysis, further research should also consider deepening the motivational and emotional mechanisms that encourage the integration of users in the innovation processes, with a particular focus on the role of empathy. Open-innovation research in the health care sector has already recognized the importance of empathic listening for patients (and caregivers) in the development of health care solutions that not only meet patients’ clinical needs, but also ease their hospitalization process and increase the effectiveness of medical treatments (see, for example, McDonagh and Thomas, 2010). Other sectors could benefit from the application of similar methods as well, especially in cases in which users’ well-being is highly dependent on innovation, such as

products and services for elderly or handicapped users.

The literature we reviewed put considerable attention on the theme of absorptive capacity as an organizational prerequisite for collaboration with users (Ashok et al., 2016; Abrell et al., 2018; Yuan, 2019). Hence, it is not easy to suggest original research avenues with regard to this theme. However, we think there is still room to examine, both theoretically and empirically, how absorptive capacity can be generated collectively, and in particular, through the interaction among firms, users, and knowledge intermediaries (Spithoven et al., 2010).

Finally, we found a limited number of studies concerning the micro-foundations perspective that lies between management and psychology. Hence, our knowledge about the attitudes, mindsets, and values that encourage employees inside a firm to effectively collaborate with users on the outside is still limited.

Moving at the phase ‘searching opportunities’ in Fig. 2, here we find a variety of studies dealing with the identification of potential collaborators, whether they be internal or external to the firm. Concerning internal collaborators, an emerging and promising theme in the literature is that of embedded lead users (ELUs) (Schweisfurth and Herstatt, 2016; Schweisfurth and Raasch, 2015a,b). Identifying and selecting skilled external users is anything but simple for firms. In this sense, leveraging and nurturing internal lead users could allow firms to save time and energy in the process of talent scouting and management (Hurmelinna-Laukkanen et al., 2021). However, the overall quality of ideas provided by ELUs, compared to external lead users, is still unknown (Schweisfurth, 2017) and would benefit from additional study.

The theme of innovation intermediaries (i.e., brokers, promoters, communities, digital-innovation hubs, etc.) is becoming more and more central in the innovation literature, as firms become aware of the difficulties related to managing users’ expectations. For this reason, studies tend to focus on the mechanisms that intermediaries employ to overcome communication barriers and conflicts between firms and users (Hyysalo et al., 2016; Lauritzen, 2017; Dell’Era et al., 2019). However, additional research across all phases of the innovation process is needed to understand the strategies, organizational mechanisms, processes, and routines through which firms may optimize their collaboration efforts and maximize user expectations. It is also worth noting that users change over time; they accumulate experience in collaborating with firms and modify their expectations and behaviors towards them. Thus, additional research could address the theme of users’ life cycle and look at the most appropriate strategies and tools for managing groups of users with different skills and experiences.

In the ‘producing and selecting ideas’ stage of Fig. 2, we enter the managerial phase of the collaboration process. This phase starts with the mechanisms and tools for identifying users and ideas. Many of the studies we reviewed drew attention to the fact that more and more firms are shifting toward adopting new technologies to collect the enormous amounts of data coming from the user side and ease the identification of users and ideas. We refer to employing technologies, such as AI, machine learning, and big data analytics, for identifying the most valuable ideas and most promising users (Kim and Park, 2019). Given the increasing pervasiveness of such technologies in every area of business management, additional research is needed to investigate the processes, mechanisms, and skills needed to effectively integrate them into firms’ user-driven innovation processes (Christensen et al., 2018; Trabucchi et al., 2018).

Finally, the two main themes in the ‘implementing the process’ phase of Fig. 2 are the capabilities needed by firms and their employees to effectively integrate users, and the integration of users within firms’ NPD processes. The latter is particularly under-developed and in need of additional theoretical contributions. The integration of users throughout the whole NPD process (as well as the whole product life cycle, as previously discussed) represents an opportunity that firms have already started to exploit, especially in relation to the evaluation activities normally included in the ‘gates’ of a stage-gate-like NPD process. The case of LEGO and its LEGO Ideas platform, as well as the new LEGO Lead

² <https://www.theconsumerbrand.co.uk>.

User Lab, has received lots of media coverage and attention from business scholars, but more and more companies are looking for concrete solutions for how to integrate users in their idiosyncratic NPD processes to obtain specific results, and more importantly, how to keep them involved throughout the whole process. Keeping users involved throughout the whole innovation process has been shown to mitigate the risk of failure (Füller et al., 2006; Moore, 1987).

Concerning the theme of capabilities, the question of how to combine firms' and users' skills to generate radically new products and services is still partly unanswered. A related question is, what are the skills firms need to manage users' knowledge coming 'in block' (i.e., from web platforms, open contexts, communities of users, etc.)? Here the main challenge deserving further consideration is how to maximize the value of users' knowledge without creating bottlenecks in firms' innovation processes while meeting users' expectations in terms of (timely) feedback, rewards, and further involvement.

6. Conclusions

Collaboration with users has forever changed how firms manage innovation. But things change fast, and firms need to keep up with new trends, especially considering the increasing pervasiveness of digital technologies and social media, which make interaction among users and firms easier and cheaper—as well as deeply different. Trabucchi et al.'s (2018) study on the use of user-generated big data to inform firms' innovation processes is illuminating in this regard. Big data generated by users coupled with advanced AI-enabled interaction technologies (such as third-generation chatbots) are expected to overturn the current interaction paradigm, opening up new avenues for firm-user collaboration.

Internal-to-the-firm conditions, such as strategies, managerial processes, and organizational dynamics, are and will remain essential for firms to successfully maximize collaboration with users. The same is true of resources and capabilities. We aimed to look at the firm side of user collaboration to provide a narrative account of the existing literature and to identify the most important strategies, processes, dynamics, and routines that make such interaction successful.

Our study not only identifies the most covered topics in the field of firms-users collaboration, but also suggests many research opportunities that deserve scholars' attention. Inevitably, this study is subject to limitations, and mainly the following two. First, despite the care given to article selection, some studies may have been overlooked, and therefore our representation of the literature could be biased. Because firms-users collaboration is very fluid topic, it is not easy to capture all of its aspects. Second, to ensure the relevance of our review to the topic at issue, we limited our study to articles published in scholarly journals. Such selectivity entails the risk of ignoring studies published in other forms of media, primarily books.

References

- Abrell, T., Benker, A., Pihlajamaa, M., 2018. User knowledge utilization in innovation of complex products and systems: an absorptive capacity perspective. *Creativ. Innovat. Manag.* 27 (2), 169–182. <https://doi.org/10.1111/caim.12244>.
- Agostini, L., Nosella, A., Filippini, R., 2016. Users and radical innovation performance: the moderating role of the organisational context. *Technol. Anal. Strat. Manag.* 28 (7), 798–810. <https://doi.org/10.1080/09537325.2016.1156667>.
- Alexy, O., Frederiksen, L., Hutter, K., 2020. Quo Vadis, open and user innovation theory? *Innovation* 22 (2), 97–104. <https://doi.org/10.1080/14479338.2020.1741789>.
- Andersen, R., Mørch, A.L., 2016. Mutual development in mass collaboration: identifying interaction patterns in customer-initiated software product development. *Comput. Hum. Behav.* 65, 77–91. <https://doi.org/10.1016/j.chb.2016.08.005>.
- Ashok, M., Narula, R., Martinez-Noya, A., 2016. How do collaboration and investments in knowledge management affect process innovation in services? *J. Knowl. Manag.* <https://doi.org/10.1108/JKM-11-2015-0429>.
- Baldwin, C., von Hippel, E., 2011. Modeling a paradigm shift: from producer innovation to user and open collaborative innovation. *Organ. Sci.* 22 (6), 1399–1417. <https://doi.org/10.1287/orsc.1100.0618>.

- Bartl, M., Füller, J., Mühlbacher, H., Ernst, H., 2012. A manager's perspective on virtual customer integration for new product development. *J. Prod. Innovat. Manag.* 29 (6), 1031–1046. <https://doi.org/10.1111/j.1540-5885.2012.00946.x>.
- Battistella, C., Nonino, F., 2012. What drives collective innovation? Exploring the system of drivers for motivations in open innovation, Web-based platforms. *Prod. Plann. Control* 24 (2–3), 226–245. <https://bia.unibz.it/esploro/outputs/991005773429101241>.
- Bengtsson, L., Ryzhkova, N., 2013. Managing a strategic source of innovation: online users. *Int. J. Inf. Manag.* 33 (4), 655–662. <https://doi.org/10.1016/j.ijinfomgt.2013.04.003>.
- Bogers, M., Afuah, A., Bastian, B., 2010. Users as innovators: a review, critique, and future research directions. *J. Manag.* 36 (4), 857–875. <https://doi.org/10.1177/0149206309353944>.
- Bogers, M., Horst, W., 2014. Collaborative prototyping: cross-fertilization of knowledge in prototype-driven problem solving. *J. Prod. Innovat. Manag.* 31 (4), 744–764. <https://doi.org/10.1111/jpim.12121>.
- Bogers, M., West, J., 2012. Managing distributed innovation: strategic utilization of open and user innovation. *Creativ. Innovat. Manag.* 21 (1), 61–75. <https://doi.org/10.1111/j.1467-8691.2011.00622.x>.
- Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., 2017. The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Ind. Innovat.* 24 (1), 8–40. <https://doi.org/10.1080/13662716.2016.1240068>.
- Bosch-Sijtsema, P., Bosch, J., 2015. User involvement throughout the innovation process in high-tech industries. *J. Prod. Innovat. Manag.* 32 (5), 793–807. <https://doi.org/10.1111/jpim.12233>.
- Boudreau, K.J., Lakhani, K.R., 2013. Using the crowd as an innovation partner. *Harv. Bus. Rev.* 91 (4), 60–69, 140.
- Bradonjic, P., Franke, N., Lüthje, C., 2019. Decision-makers' underestimation of user innovation. *Res. Pol.* 48 (6), 1354–1361. <https://doi.org/10.1016/j.respol.2019.01.020>.
- Bretschneider, U., Zogaj, S., 2016. Exploring strategies for capturing customer's tacit knowledge in customer integration methods. *Int. J. Knowl. Manag.* 12 (2), 1–18. <https://doi.org/10.4018/IJKM.2016040101>.
- Catmull, E., 2008. *How Pixar Fosters Collective Creativity*. Harvard Business School Publishing Boston, MA.
- Chatterji, A.K., Fabrizio, K.R., 2014. Using users: when does external knowledge enhance corporate product innovation? *Strat. Manag. J.* 35 (10), 1427–1445. <https://doi.org/10.1002/smj.2168>.
- Cheng, C.C., Huizingh, E.K., 2014. When is open innovation beneficial? The role of strategic orientation. *J. Prod. Innovat. Manag.* 31 (6), 1235–1253. <https://doi.org/10.1111/jpim.12148>.
- Chesbrough, H., Vanhaverbeke, W., West, J., 2006. *Open Innovation: Researching a New Paradigm*. Oxford University Press on Demand.
- Chesbrough, H.W., 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business Press.
- Chesbrough, H.W., Appleyard, M.M., 2007. *Open innovation and strategy*. *Calif. Manag. Rev.* 50 (1), 57–76.
- Christensen, K., Scholderer, J., Hersleth, S.A., Næs, T., Kvaal, K., Møllestad, T., Veflen, N., Risvik, E., 2018. How good are ideas identified by an automatic idea detection system? *Creativ. Innovat. Manag.* 27 (1), 23–31. <https://doi.org/10.1111/caim.12260>.
- da Mota Pedrosa, A., Välling, M., Boyd, B., 2013. Knowledge related activities in open innovation: managers' characteristics and practices. *Int. J. Technol. Manag.* 12 (3/4), 254–273, 61.
- Dahlander, L., Magnusson, M., 2008. How do firms make use of open source communities? *Long. Range Plan.* 41 (6), 629–649. <https://doi.org/10.1016/j.lrp.2008.09.003>.
- Dahlander, L., Wallin, M.W., 2006. A man on the inside: unlocking communities as complementary assets. *Res. Pol.* 35 (8), 1243–1259. <https://doi.org/10.1016/j.respol.2006.09.011>.
- de Araujo Burcharth, A.L., Knudsen, M.P., Søndergaard, H.A., 2014. Neither invented nor shared here: the impact and management of attitudes for the adoption of open innovation practices. *Technovation* 34 (3), 149–161. <https://doi.org/10.1016/j.technovation.2013.11.007>.
- de Beer, J., McCarthy, I.P., Soliman, A., Treen, E., 2017. Click here to agree: managing intellectual property when crowdsourcing solutions. *Bus. Horiz.* 60 (2), 207–217. <https://doi.org/10.1016/j.bushor.2016.11.002>.
- De Jong, J.P., Von Hippel, E., Gault, F., Kuusisto, J., Raasch, C., 2015. Market failure in the diffusion of consumer-developed innovations: patterns in Finland. *Res. Pol.* 44 (10), 1856–1865. <https://doi.org/10.1016/j.respol.2015.06.015>.
- De Moor, K., Berte, K., De Marez, L., Joseph, W., Deryckere, T., Martens, L., 2010. User-driven innovation? Challenges of user involvement in future technology analysis. *Sci. Publ. Pol.* 37 (1), 51–61. <https://doi.org/10.3152/030234210X484775>.
- De Toni, A.F., Biotto, G., Battistella, C., 2012. Organizational design drivers to enable emergent creativity in web-based communities. *Learn. Organ.* 19 (4), 335–349. <https://doi.org/10.1108/09696471211226699>.
- de Zubielqui, G.C., Fryges, H., Jones, J., 2019. Social media, open innovation & HRM: implications for performance. *Technol. Forecast. Soc. Change* 144, 334–347. <https://doi.org/10.1016/j.techfore.2017.07.014>.
- Dell'Era, C., Landoni, P., Gonzalez, S.J., 2019. Investigating the innovation impacts of user-centered and participatory strategies adopted by European living labs. *Int. J. Innovat. Manag.* 23, 1950048. <https://doi.org/10.1142/S1363919619500488>, 05.
- Dodgson, M., Gann, D.M., Phillips, N., 2014. *Perspectives on Innovation Management*. Oxford University Press, Oxford, UK.

- Eshet, E., de Reuver, M., Bouwman, H., 2017. The role of organizational strategy in the user-centered design of mobile applications. *Commun. Assoc. Inf. Syst.* 40 (1), 14. <https://doi.org/10.17705/1CAIS.04014>.
- Felin, T., Lakhani, K.R., Tushman, M.L., 2017. Firms, crowds, and innovation. *Strat. Organ.* 15 (2), 119–140. <https://doi.org/10.1177/1476127017706610>.
- Fichter, K., 2009. Innovation communities: the role of networks of promoters in Open Innovation. *R D Manag.* 39 (4), 357–371. <https://doi.org/10.1111/j.1467-9310.2009.00562.x>.
- Foss, N.J., Lyngsie, J., Zahra, S.A., 2013. The role of external knowledge sources and organizational design in the process of opportunity exploitation. *Strat. Manag. J.* 34 (12), 1453–1471. <https://doi.org/10.1002/smj.2135>.
- Franke, N., Piller, F., 2004. Value creation by toolkits for user innovation and design: the case of the watch market. *J. Prod. Innovat. Manag.* 21 (6), 401–415. <https://doi.org/10.1111/j.0737-6782.2004.00094.x>.
- Fuchs, B., 2011. Transforming lead user innovations into new corporate ventures: a matter of information asymmetry? *Int. J. Enterpren. Innovat. Manag.* 14 (1), 80–95. <https://doi.org/10.1504/IJEM.2011.040823>.
- Füller, J., Bartl, M., Ernst, H., Mühlbacher, H., 2006. Community based innovation: how to integrate members of virtual communities into new product development. *Electron. Commer. Res.* 6 (1), 57–73. <https://doi.org/10.1007/s10660-006-5988-7>.
- Füller, J., Hutter, K., Hautz, J., Matzler, K., 2014. User roles and contributions in innovation-kontext communities. *J. Manag. Inf. Syst.* 31 (1), 273–308. <https://doi.org/10.2753/MIS0742-1222310111>.
- Gales, L., Mansour-Cole, D., 1995. User involvement in innovation projects: toward an information processing model. *J. Eng. Technol. Manag.* 12 (1–2), 77–109. [https://doi.org/10.1016/0923-4748\(95\)00005-7](https://doi.org/10.1016/0923-4748(95)00005-7).
- Gama, F., 2019. Managing collaborative ideation: the role of formal and informal appropriability mechanisms. *Int. Enterpren. Manag. J.* 15 (1), 97–118. <https://doi.org/10.1007/s11365-018-0544-1>.
- Ghasemzadeh, K., Bunjak, A., Bortoluzzi, G., Černe, M., 2020. Efficaciously smuggling ideas: untangling the relationship between entrepreneurial self-efficacy, creative bootlegging and embedded lead users. *Int. J. Innovat. Manag.* 2150032. <https://doi.org/10.1142/S1363919621500328>.
- Gustafsson, A., Kristensson, P., Witell, L., 2012. Customer co-creation in service innovation: a matter of communication? *J. Service Manag.* 23 (3), 311–327. <https://doi.org/10.1108/09564231211248426>.
- Hakkara, L., Hyysalo, S., 2016. The evolution of intermediary activities: broadening the concept of facilitation in living labs. *Technol. Innovat. Manag. Rev.* 6 (1).
- Heiskanen, E., Hyysalo, S., Kotro, T., Repo, P., 2010. Constructing innovative users and user-inclusive innovation communities. *Technol. Anal. Strat. Manag.* 22 (4), 495–511. <https://doi.org/10.1080/09537321003714568>.
- Henkel, J., Baldwin, C.Y., Shih, W., 2013. IP modularity: profiting from innovation by aligning product architecture with intellectual property. *Calif. Manag. Rev.* 55 (4), 65–82. <https://doi.org/10.1525/cmr.2013.55.4.65>.
- Henkel, J., Schöberl, S., Alexy, O., 2014. The emergence of openness: how and why firms adopt selective revealing in open innovation. *Res. Pol.* 43 (5), 879–890. <https://doi.org/10.1016/j.respol.2013.08.014>.
- Hienert, C., 2006. The commercialization of user innovations: the development of the rodeo kayak industry. *R D Manag.* 36 (3), 273–294. <https://doi.org/10.1111/j.1467-9310.2006.00430.x>.
- Hienert, C., Keinz, P., Lettl, C., 2011. Exploring the nature and implementation process of user-centric business models. *Long. Range Plan.* 44 (5–6), 344–374. <https://doi.org/10.1016/j.lrp.2011.09.009>.
- Hienert, C., Lettl, C., Keinz, P., 2014a. Synergies among producer firms, lead users, and user communities: the case of the LEGO producer–user ecosystem. *J. Prod. Innovat. Manag.* 31 (4), 848–866.
- Hienert, C., von Hippel, E., Jensen, M.B., 2014b. User community vs. producer innovation development efficiency: a first empirical study. *Res. Pol.* 43 (1), 190–201. <https://doi.org/10.1016/j.respol.2013.07.010>.
- Hosseini, S., Kees, A., Manderscheid, J., Röglinger, M., Rosemann, M., 2017. What does it take to implement open innovation? Towards an integrated capability framework. *Bus. Process Manag. J.*
- Huang, P., Tafti, A., Mithas, S., 2018. Platform sponsor investments and user contributions in Knowledge communities: the role of Knowledge Seeding. *MIS Q.* 42 (1), 213–240. <https://doi.org/10.25300/misq/2018/13490>.
- Hurmelinna-Laukkanen, P., Nätti, S., Pikkariainen, M., 2021. Orchestrating for lead user involvement in innovation networks. *Technovation* 108, 102326. <https://doi.org/10.1016/j.technovation.2021.102326>.
- Hyysalo, S., Repo, P., Timonen, P., Hakkara, L., Heiskanen, E., 2016. Diversity and change of user driven innovation modes in companies. *Int. J. Innovat. Manag.* 20, 1650023. <https://doi.org/10.1142/s1363919616500237>.
- Jeppesen, L.B., Frederiksen, L., 2006. Why do users contribute to firm-hosted user communities? The case of computer-controlled music instruments. *Organ. Sci.* 17 (1), 45–63. <https://doi.org/10.1287/orsc.1050.0156>.
- Katila, R., Thatchenkery, S., Christensen, M.Q., Zenios, S., 2017. Is there a doctor in the house? Expert product users, organizational roles, and innovation. *Acad. Manag. J.* 60 (6), 2415–2437. <https://doi.org/10.5465/amj.2014.1112>.
- Keinz, P., Hienert, C., Lettl, C., 2012. Designing the organization for user innovation. *J. Organ. Dysfunct.* 1 (3), 20–36.
- Kim, J., Park, Y., 2019. Leveraging ideas from user innovation communities: using text-mining and case-based reasoning. *R D Manag.* 49 (2), 155–167. <https://doi.org/10.1111/radm.12292>.
- Kohler, T., Nickel, M., 2017. Crowdsourcing business models that last. *J. Bus. Strat.* <https://doi.org/10.1108/JBS-10-2016-0120>.
- Kuusisto, J., Kuusisto, A., Yli-Viitala, P., 2013. Service development tools in action. *Serv. Ind. J.* 33 (3–4), 352–365. <https://doi.org/10.1080/02642069.2013.747520>.
- Lalicio, L., Dickinger, A., 2019. An assessment of user-driven innovativeness in a mobile computing travel platform. *Technol. Forecast. Soc. Change* 144, 233–241. <https://doi.org/10.1016/j.techfore.2017.02.024>.
- Lauritzen, G.D., 2017. The role of innovation intermediaries in firm-innovation community collaboration: navigating the membership paradox. *J. Prod. Innovat. Manag.* 34 (3), 289–314. <https://doi.org/10.1111/jpim.12363>.
- Lauritzen, G.D., Karafyllia, M., 2019. Perspective: leveraging open innovation through paradox. *J. Prod. Innovat. Manag.* 36 (1), 107–121. <https://doi.org/10.1111/jpim.12474>.
- Laursen, K., Salter, A., 2006. Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strat. Manag. J.* 27 (2), 131–150. <https://doi.org/10.1002/smj.507>.
- Laviolette, E.M., Redien-Collot, R., Teglborg, A.-C., 2016. Open innovation from the inside: employee-driven innovation in support of absorptive capacity for inbound open innovation. *Int. J. Enterpren. Innovat.* 17 (4), 228–239. <https://doi.org/10.1177/1465750316670490>.
- Li, M., Kankanhalli, A., Kim, S.H., 2016. Which ideas are more likely to be implemented in online user innovation communities? An empirical analysis. *Decis. Support Syst.* 84, 28–40. <https://doi.org/10.1016/j.dss.2016.01.004>.
- Liang, L., Kuusisto, A., Kuusisto, J., 2018. Building strategic agility through user-driven innovation: the case of the Finnish public service sector. *Theor. Issues Ergon. Sci.* 19 (1), 74–100. <https://doi.org/10.1080/1463922X.2016.1274456>.
- Llanes, G., 2019. Competitive strategy for open and user innovation. *J. Econ. Manag. Strat.* 28 (2), 280–297. <https://doi.org/10.1111/jems.12282>.
- Magnusson, P.R., 2009. Exploring the contributions of involving ordinary users in ideation of technology-based services. *J. Prod. Innovat. Manag.* 26 (5), 578–593. <https://doi.org/10.1111/j.1540-5885.2009.00684.x>.
- Majchrzak, A., Griffith, T.L., Reetz, D.K., Alexy, O., 2018. Catalyst organizations as a new organization design for innovation: the case of Hyperloop Transportation Technologies. *Acad. Manag. Discov.* 4 (4), 472–496. <https://doi.org/10.5465/amd.2017.0041>.
- Martinez-Torres, R., Olmedilla, M., 2016. Identification of innovation solvers in open innovation communities using swarm intelligence. *Technol. Forecast. Soc. Change* 109, 15–24. <https://doi.org/10.1016/j.techfore.2016.05.007>.
- McDonagh, D., Thomas, J., 2010. Rethinking design thinking: empathy supporting innovation. *Australas. Med. J.* 3 (8), 458–464.
- Miozzo, M., Desyllas, P., Lee, H.-f., Miles, I., 2016. Innovation collaboration and appropriability by knowledge-intensive business services firms. *Res. Pol.* 45 (7), 1337–1351. <https://doi.org/10.1016/j.respol.2016.03.018>.
- Moore, W.L., 1987. New product development practices of industrial marketers. *J. Prod. Innovat. Manag.* 4 (1), 6–20.
- Nambisan, S., 2002. Designing virtual customer environments for new product development: toward a theory. *Acad. Manag. Rev.* 27 (3), 392–413. <https://doi.org/10.5465/amr.2002.7389914>.
- Nambisan, S., Agarwal, R., Tanniru, M., 1999. Organizational mechanisms for enhancing user innovation in information technology. *MIS Q.* 23 (3), 365–395. <https://doi.org/10.2307/249468>.
- O'Mahony, S., 2007. The governance of open source initiatives: what does it mean to be community managed? *J. Manag. Govern.* 11 (2), 139–150. <https://doi.org/10.1007/s10997-007-9024-7>.
- Oksman, V., Kulju, M., 2017. Developing online illustrative and participatory tools for urban planning: towards open innovation and co-production through citizen engagement. *Int. J. Serv. Technol. Manag.* 23 (5–6), 445–464. <https://doi.org/10.1504/IJSTM.2017.088943>.
- Olmedilla, M., Send, H., Toral, S., 2019. Identification of the unique attributes and topics within smart things open innovation communities. *Technol. Forecast. Soc. Change* 146, 133–147. <https://doi.org/10.1016/j.techfore.2019.05.004>.
- Olson, E.L., Bakke, G., 2001. Implementing the lead user method in a high technology firm: a longitudinal study of intentions versus actions. *J. Prod. Innovat. Manag.: Int. Publ. Prod. Develop. Manag. Assoc.* 18 (6), 388–395. <https://doi.org/10.1111/1540-5885.1860388>.
- Parjanen, S., Hennala, L., Konsti-Laakso, S., 2012. Brokerage functions in a virtual idea generation platform: possibilities for collective creativity? *Innovat. Org. Manag.* 14 (3), 363–374. <https://doi.org/10.5172/impp.2012.14.3.363>.
- Parmentier, G., 2015. How to innovate with a brand community. *J. Eng. Technol. Manag.* 37, 78–89. <https://doi.org/10.1016/j.jengtecman.2015.08.001>.
- Parmentier, G., Mangematin, V., 2014. Orchestrating innovation with user communities in the creative industries. *Technol. Forecast. Soc. Change* 83, 40–53. <https://doi.org/10.1016/j.techfore.2013.03.007>.
- Pässilä, A., Oikarinen, T., Parjanen, S., Harmaakorpi, V., 2013. Interpretative dimension of user-driven service innovation. *Baltic J. Manag.*
- Pisano, G.P., Verganti, R., 2008. Which kind of collaboration is right for you. *Harv. Bus. Rev.* 86 (12), 78–86.
- Raasch, C., 2011. The sticks and carrots of integrating users into product development. *Int. J. Technol. Manag.* 56 (1), 21–39. <https://doi.org/10.1504/IJTM.2011.042460>.
- Randhawa, K., Josserand, E., Schweitzer, J., Logue, D., 2017. Knowledge collaboration between organizations and online communities: the role of open innovation intermediaries. *J. Knowl. Manag.*
- Randhawa, K., Wilden, R., Hohberger, J., 2016. A bibliometric review of open innovation: setting a research agenda. *J. Prod. Innovat. Manag.* 33 (6), 750–772. <https://doi.org/10.1111/jpim.12312>.
- Roberts, D., Hughes, M., Kertho, K., 2014. Exploring consumers' motivations to engage in innovation through co-creation activities. *Eur. J. Market.* 48 (1/2), 147–169. <https://doi.org/10.1108/ejm-12-2010-0637>.
- Roberts, J.A., Hann, I.-H., Slaughter, S.A., 2006. Understanding the motivations, participation, and performance of open source software developers: a longitudinal

- study of the Apache projects. *Manag. Sci.* 52 (7), 984–999. <https://doi.org/10.1287/mnsc.1060.0554>.
- Ruiz, E., Beretta, M., 2021. Managing internal and external crowdsourcing: an investigation of emerging challenges in the context of a less experienced firm. *Technovation* 106, 102290.
- Saebi, T., Foss, N.J., 2015. Business models for open innovation: matching heterogeneous open innovation strategies with business model dimensions. *Eur. Manag. J.* 33 (3), 201–213. <https://doi.org/10.1016/j.emj.2014.11.002>.
- Schaarschmidt, M., Kilian, T., 2014. Impediments to customer integration into the innovation process: a case study in the telecommunications industry. *Eur. Manag. J.* 32 (2), 350–361.
- Schweisfurth, T.G., 2017. Comparing internal and external lead users as sources of innovation. *Res. Pol.* 46 (1), 238–248. <https://doi.org/10.1016/j.respol.2016.11.002>.
- Schweisfurth, T.G., Herstatt, C., 2016. How internal users contribute to corporate product innovation: the case of embedded users. *R D Manag.* 46 (S1), 107–126.
- Schweisfurth, T.G., Raasch, C., 2015a. Embedded lead users—The benefits of employing users for corporate innovation. *Res. Pol.* 44 (1), 168–180. <https://doi.org/10.1016/j.respol.2014.09.007>.
- Schweisfurth, T.G., Raasch, C., 2015b. Embedded lead users—the benefits of employing users for corporate innovation. *Res. Pol.* 44 (1), 168–180. <https://doi.org/10.1016/j.respol.2014.09.007>.
- Spithoven, A., Clarysse, B., Knockaert, M., 2010. Building absorptive capacity to organise inbound open innovation in traditional industries. *Technovation* 30 (2), 130–141. <https://doi.org/10.1016/j.technovation.2009.08.004>.
- Stefan, I., Bengtsson, L., 2016. Appropriability: a key to opening innovation internationally? *Int. J. Technol. Manag.* 71 (3–4), 232–252. <https://doi.org/10.1504/IJTM.2016.078570>.
- Stock, R.M., Oliveira, P., von Hippel, E., 2015. Impacts of hedonic and utilitarian user motives on the innovativeness of user-developed solutions. *J. Prod. Innovat. Manag.* 32 (3), 389–403. <https://doi.org/10.1111/jpim.12201>.
- Tekic, A., Willoughby, K.W., 2020, Apr. Configuring intellectual property management strategies in co-creation: a contextual perspective. *Innovat. Org. Manag.* 22 (2), 128–159. <https://doi.org/10.1080/14479338.2019.1585189>.
- Tidd, J., Bessant, J.R., 2020. *Managing Innovation: Integrating Technological, Market and Organizational Change*, seventh ed. John Wiley & Sons, Chichester (UK).
- Tietz, R., Morrison, P.D., Luthje, C., Herstatt, C., 2005. The process of user-innovation: a case study in a consumer goods setting. *Int. J. Prod. Dev.* 2 (4), 321–338. <https://doi.org/10.1504/IJPD.2005.008005>.
- Trabucchi, D., Buganza, T., Dell’Era, C., Pellizzoni, E., 2018. Exploring the inbound and outbound strategies enabled by user generated big data: evidence from leading smartphone applications. *Creativ. Innovat. Manag.* 27 (1), 42–55. <https://doi.org/10.1111/caim.12241>.
- Tranfield, D., Denyer, D., Smart, P., 2003. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br. J. Manag.* 14 (3), 207–222. <https://doi.org/10.1111/1467-8551.00375>.
- Urban, G.L., von Hippel, E., 1988. Lead user analyses for the development of new industrial products. *Manag. Sci.* 34 (5), 569–582. <https://doi.org/10.1287/mnsc.34.5.569>.
- Van Oost, E., Verhaegh, S., Oudshoorn, N., 2009. From innovation community to community innovation: user-initiated innovation in wireless Leiden. *Sci. Technol. Hum. Val.* 34 (2), 182–205. <https://doi.org/10.1177/0162243907311556>.
- Verganti, R., 2018. *Overcrowded: Designing Meaningful Products in a World Awash with Ideas*. The MIT Press, Boston.
- von Hippel, E., 1976. The dominant role of users in the scientific instrument innovation process. *Res. Pol.* 5 (3), 212–239. [https://doi.org/10.1016/0048-7333\(76\)90028-7](https://doi.org/10.1016/0048-7333(76)90028-7).
- von Hippel, E., 1986. Lead users: a source of novel product concepts. *Manag. Sci.* 32 (7), 791–805. <https://doi.org/10.1287/mnsc.32.7.791>.
- von Hippel, E., 1994. “Sticky information” and the locus of problem solving: implications for innovation. *Manag. Sci.* 40 (4), 429–439. <https://doi.org/10.1287/mnsc.40.4.429>.
- von Hippel, E., 2006. *Democratizing Innovation*. the MIT Press, Boston, MA.
- von Hippel, E., 2017. Free Innovation by Consumers—how Producers Can Benefit: consumers’ free innovations represent a potentially valuable resource for industrial innovators. *Res. Technol. Manag.* 60 (1), 39–42. <https://doi.org/10.1080/08956308.2017.1255055>.
- von Hippel, E., Katz, R., 2002. Shifting innovation to users via toolkits. *Manag. Sci.* 48 (7), 821–833. <https://doi.org/10.1287/mnsc.48.7.821.2817>.
- Wandahl, S., Jacobsen, A., Lassen, A.H., Poulsen, S.B., Sørensen, H., 2011. User-driven innovation in a construction material supply network. *Construct. Innovat.* <https://doi.org/10.1108/14714171111175882>.
- Wang, Y., Wu, J., Zhang, R., Shafiee, S., Li, C., 2020. A “user-knowledge-product” Co-creation cyberspace model for product innovation. *Complexity*. <https://doi.org/10.1155/2020/7190169>, 2020.
- West, J., Bogers, M., 2014. Leveraging external sources of innovation: a review of research on open innovation. *J. Prod. Innovat. Manag.* 31 (4), 814–831. <https://doi.org/10.1111/jpim.12125>.
- West, J., O’Mahony, S., 2008. The role of participation architecture in growing sponsored open source communities. *Ind. Innovat.* 15 (2), 145–168. <https://doi.org/10.1080/13662710801970142>.
- Windsari, N.A., Visita, L., 2019. User engagement mechanisms of online co-design service: does user innovativeness matter? *Asian Acad. Manag. J.* 24 (1).
- Yan, J., Leidner, D.E., Benbya, H., 2018. Differential innovativeness outcomes of user and employee participation in an online user innovation community. *J. Manag. Inf. Syst.* 35 (3), 900–933. <https://doi.org/10.1080/07421222.2018.1481669>.
- Ye, H., 2018. Encouraging innovations of quality from user innovators: an empirical study of mobile data services. *Serv. Sci.* 10 (4), 423–441. <https://doi.org/10.1287/serv.2018.0223>.
- Yordanova, Z., 2018. User innovation as a basis of innovation network between universities and business. *Int. J. Innovat.* 6 (2), 85–96. <https://doi.org/10.5585/iji.v6i2.308>.
- Yuan, D., 2019. Intelligent innovative knowledge management integration method based on user generated content. *Cluster Comput.* 22 (2), 4793–4803.