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Ciclo 32°

**“An Exploration of User Innovation from Inside the Firms:  
Uncovering Internal Dynamics and Embedded Lead Userness”**

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## Table of contents

<b>Acknowledgments.....</b>	<b>3</b>
<b>Executive summary .....</b>	<b>5</b>
<b>Introduction .....</b>	<b>9</b>
Research Aim.....	12
Introduction to the Three papers of the thesis.....	14
Overview of the papers in the thesis.....	17
<b>Paper 1 .....</b>	<b>23</b>
<b>Internal and external perspectives on User Innovation: what was left behind? A review of current literature .....</b>	<b>23</b>
<b>Paper 2.....</b>	<b>82</b>
<b>The Firm Side of Collaborating with Users: A Systematic Literature Review .....</b>	<b>82</b>
<b>Paper 3.....</b>	<b>126</b>
<b>Efficaciously smuggling ideas: untangling the relationship between Entrepreneurial Self-Efficacy, Creative Bootlegging and Embedded Lead Userness .....</b>	<b>126</b>
<b>Discussion and Conclusion .....</b>	<b>168</b>
1. Summary of the Findings and Theoretical Contributions.....	168
2. Managerial Recommendations .....	170
3. Limitations .....	171

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## **Executive summary**

Scholars have long argued the User Innovation (UI) phenomenon, during which users are the key contributors for the innovation processes and they are the ones that benefit entirely from the process by using the innovation and, sometimes commercializing their innovations (De Jong & von Hippel, 2009; Gault & von Hippel, 2009). Since the starting of such literature, various topics have been introduced. A great deal of literature focuses on lead users' characteristics and the motivations for collaboration (Battistella & Nonino, 2012; Füller, Faullant, & Matzler, 2010; Herstatt & von Hippel, 1992; Magnusson, 2009; Urban & von Hippel, 1988). Another significant research explores the role of communities of users and collaboration platforms in favoring the interactions between users (Franke, Keinz, & Schreier, 2008; Füller, Hutter, Hautz, & Matzler, 2014). Other studies have attended to the content of the process of collaborating with users and, in particular distinguishing between more or less radical innovations (Candi, van den Ende, & Gemser, 2016; Skiba & Herstatt, 2009) and environmental factors affecting collaboration with users (Gales & Mansour-Cole, 1995; van Doorn et al., 2010).

Whereas recent research emphasizes more than before on the importance of developing internal dynamics including strategical, organizational, and managerial dynamics and nurturing the human side of the UI within the organizations to leverage the input from external sources including users, little attention is devoted to provide a clear holistic understanding of internal firm conditions that make the collaboration between firms and users more effective and efficient (Bogers et al., 2017; Foss, Laursen, & Pedersen, 2005; Lichtenthaler, 2011).

This thesis contributes to the UI research by suggesting that firms need to put more emphasize on the internal dynamics by defining and boosting their strategic, organizational, and managerial potentials. At the same time, it suggests that the human side of the collaboration which deals with individual, choices, abilities, and motivations needs more attention in particular concerning lead useriness.

Based on the three papers, this PhD thesis aims to enhance our understanding of different perspectives of user innovation by providing a categorization of both external-to-the-firm and internal-to-the-firm themes and tackling the embedded userness.

The first paper aims to scrutinize the “locus” of UI meaning to distinguish between studies focusing on external-to-the-firm conditions of UI. By conducting a systematic literature review, this study explores the existing studies focusing on external-to-the-firm conditions of UI (user’s types, users’ roles, enabling platforms, etc.) and papers focusing on internal-to-the-firm conditions of UI, such as strategies, capabilities and organizational routines that trigger and support UI processes. While current studies tackle different angles of the UI mostly from an external-to-the-firm perspective, this study identifies two general streams of research from both perspectives from inside and outside of the firm and provides a complete categorization of different aspects and themes of each perspective.

The second paper investigates internal dynamics of firm–users collaboration by bridging the literature on user innovation and the literature on open innovation. Based on a systematic literature review, this study provides a more detailed categorization of internal-to-the firm conditions. The findings of this study highlight the precise sub-streams of each internal dynamic group including strategic, organizational, and managerial dynamics. Finally, based on the findings of the second study associated with dearth of research on micro-foundations or in other words human side of UI, the third study examines the individual-level antecedents of embedded lead userness.

More specifically, based on the data coming from collected from 554 employees belonging to 42 Italian and Croatian small and medium-sized companies, this study inspects the relationship between entrepreneurial self-efficacy and ELU when mediated by creative bootlegging. The findings show that employees who show self-motivation and conviction in entrepreneurial activities also tend to commit (enjoy

carving out some time to be committed) to unofficial innovation projects which in turn make them become more curious and expert about the products and to act as lead users.

Overall, the findings of the thesis are important to further advance the innovation management research and in particular UI research. Taken together, these findings shed more light on the various processes, roles, decisions as well as human and psychological arguments that underpin the use of UI in firms. The thesis concludes by summarizing the key theoretical and managerial contributions of the three papers and then the limitations and avenues for further research on UI is provided.





## Introduction

In the last decades, we have assisted to a shift in the way innovation is generated and managed by firms. For sure one of the main evolutions has been introducing User Innovation (UI) through which innovation is democratized meaning both individual and firm users are increasingly able to innovate for themselves (von Hippel, 2009, p. 40). In the process of UI, users are the key contributors for the innovation processes and they are the ones that benefit entirely from the process by using the innovation and, sometimes commercializing their innovations (De Jong & von Hippel, 2009; Gault & von Hippel, 2009). Since the seminal work of von Hippel (1976) the literature has been developing in different research themes. Whereas much literature focuses on external-to-the firm dynamics of UI, less attention is placed on the opportunities to scrutinize the dynamics and potentials residing inside the firm by developing strategical, organizational, and managerial dynamics and nurturing the human side of the UI within the organizations.

This thesis aims to shed more light on external and internal perspectives of UI with more focus on the latter one as the part of the literature that has been overlooked. By doing so it aims to contribute to the innovation management literature and, more specifically, to the research streams of user innovation and lead userhood. In this introduction, I further elaborate on these arguments to explain how the UI literature has been developed in different streams requiring further investigation to identify related gaps in the existing literature. More precisely, I discuss the current studies focusing on an internal perspective of UI and how internal-to-the-firm dynamics could affect the process of collaborating with the outside of the firm. Moreover, the concept of embedded lead userhood and its advancements in the literature is provided.

User innovation (UI) was introduced by von Hippel (1976) while the majority of the companies believed in the producer innovation. In contrary to traditional manufacturer-business model that products and

services are developed in a closed way using patents, copyrights, etc....against the free riders, in the process of UI, users fulfill their needs by generating novel ideas instead of relying on manufacturers producing for them (von Hippel, 2009). Studies have evolved concentrating on different angles of the process. Various studies have investigated the different characteristics of users engaged in the innovation process. Much of this part of the literature has been exploring lead users (Herstatt & von Hippel, 1992; Lüthje & Herstatt, 2004; von Hippel, 1986). Lead user is defined as a user “(1) who has needs in a specific area long before the rest of the market and (2) gain benefits from obtaining a solution” (von Hippel, 1976, 1986). The process of communicating with users outside of the firm was among the most-studied part of the literature. The most widespread ways of collaboration specifically with the explosion of digital technology are communities of users where users exchange ideas and generate innovative ideas around a specific theme or topic (Harhoff, Henkel, & von Hippel, 2003; Poetz & Schreier, 2012) and toolkits that let users design their preferred product and service (von Hippel & Katz, 2002).

Users engage in the innovation process with a diverse set of incentives. Generally, the literature shows that motivations for participating in the UI process are in two groups of extrinsic and intrinsic incentives (Füller, 2010; Füller et al., 2010). Considering the profile of the users, their motivation and the nature of the collaboration, co-creation results in radical, incremental or even sustainable products and services (Candi et al., 2016; Füller & Matzler, 2007; Lettl, 2007; Nielsen, Reisch, & Thøgersen, 2016; Perks, Gruber, & Edvardsson, 2012; Skiba & Herstatt, 2009).

While this body of literature highlights the right way of collaboration with the right users to produce innovation, it raises the challenges for the appropriate strategies (Keinz, Hienerth, & Lettl, 2012) and internal organizational factors (Agostini, Nosella, & Filippini, 2016). Previous studies claim that an appropriate organizational design is a necessary internal precondition to gain and bring in the knowledge from outside and to exploit relative opportunities (Foss, Lyngsie, & Zahra, 2013).

Furthermore, studies have shown that there is a strong need to define a precise business model and a strategic path to enable user collaboration (Bogers et al., 2017). Also, Managers of different levels play an important role to provide a positive culture inside the firm and reduce not-invented-here (NIH) and the not-shared-here (NSH) syndromes among employees (de Araújo Burcharth, Knudsen, & Søndergaard, 2014). Whereas recent research emphasizes more than before on the importance of internal dynamics to leverage the input from external sources including users, little attention is devoted to provide a clear holistic understanding of internal firm conditions that make the collaboration between firms and users more effective and efficient (Bogers et al., 2017; Foss et al., 2005; Lichtenthaler, 2011).

As mentioned before literature has discovered the vital role of lead users to come up with breakthrough ideas and their most prominent characteristics deeply. Nevertheless, despite external lead users' vital role in generating novel and breakthrough ideas for products and services (Colazo, 2014; Lettl, Herstatt, & Gemuenden, 2004; Schreier & Prügl, 2008) identifying external lead users and integrating their ideas into the firm is not always easy. Therefore, the concept of embedded lead userness has gained considerable attention specifically during the last few years in academia and practice. Embedded lead users (ELU) are the lead user employees of their firms that create ideas of higher originality and user value than ordinary employees and external lead users (Schweisfurth, 2017). ELUs are characterized by experience, expertise, technological knowledge and high expected benefit due to their position inside the firm and lead userness (Schweisfurth, 2017; Schweisfurth & Herstatt, 2016). In this sense, Schweisfurth and Herstatt (2016) noted that embedded users rely primarily on social resources including structural, relational, and cognitive capital during the innovation process. Internal lead users differ from external lead users regarding their cognitive structure in a way that internal lead users show more customer orientation, internal boundary spanning, and innovative work behavior comparing with regular employees because they are dually embedded in the firm and use context (Schweisfurth & Herstatt, 2015).

At the same time, it is claimed that the human side of the collaboration which deals with individual, choices, abilities, and motivations needs more attention. In the same line, research has indicated that innovation at work to a large extent is based on individual-level employee characteristics and behavior (Hirst, Van Knippenberg, & Zhou, 2009). Yet, literature did not show intensely how employees' cognitive style and intrinsic motivation influence on lead users by affecting the creative problem solving (Faullant, Schwarz, Kraiger, & Breitennecker, 2012).

This PhD thesis contributes to the current debate about the internal-to-the dimension of UI and tries to develop the concept of ELU.

## **Research Aim**

Building on the arguments presented in the previous section, the reasons for conducting this research can be summarized in three overall points to answer three specific gaps emerging from the literature. First, while previous studies have developed important insights on different aspects of UI namely communities and toolkits (Füller, Matzler, & Hoppe, 2008; von Hippel, 2001; von Hippel & Katz, 2002), user characteristics (Lüthje & Herstatt, 2004; von Hippel, 1986) yet there is not a complete categorization of different aspects and themes of collaborating with users. Having a complete and general insight of different angles of the UI could help scholars with grasping the phenomenon better in order to enlarge its borders, fulfill the unsearched areas, and provide practical insights for firms to apply it in a proper way. Hence, this calls for a deeper investigation of the locus of UI studies. More specifically, this entails further investigation of external-to-the-firm conditions of UI – such as the use of platforms, the characteristics of users, the impact of different industries and ecosystems –and internal-to-the-firm ones such as strategic, organizational and managerial conditions that support the deployment of UI-related activities.

Second, while we observe that current UI studies mainly focus on external-to-the- firm conditions, little understanding remains about various internal-firm conditions that enable the collaboration between firms and users (Bogers et al., 2017; Foss et al., 2005; Lichtenthaler, 2011). Although there are scattered ideas about how to manage and organize collaboration with users within the firms (Keinz et al., 2012; Piller & Ihl, 2009; Saebi & Foss, 2015), these studies are dispersed in both Open Innovation (OI) and UI literature. Hence, this calls for a better understanding of key aspects of various internal factors associated with various studies on effective collaboration with users by bridging OI and UI literature.

Third, research on the external-to-the firm has put much emphasis on the important role of lead users in coming up with new ideas for products and services and on the other hand studies on internal-to-the firm conditions emphasizes the importance of human side of UI (Foss, Laursen, & Pedersen, 2011). Arguably, such considerations become crucial when applying UI. Relatedly, the concept of Embedded lead useriness (ELU) has gained much attention during the last few years. However, key issues such as motivation and cognition aspects of such process which encourage employees to generate and share ideas need more investigation.

Finally, a better understanding of these aspects is crucial not only from a theoretical point of view but also from a managerial one. As managers increasingly implement UI within their organizations, they face various challenges in relation to how to effectively organize and manage the process of collaborating with users and also, how to provide a suitable atmosphere inside the firm in which employees try to work on their ideas and become the lead users of their organization.

The aim of this PhD thesis is therefore to:

“Enhance our understanding of different perspectives of user innovation by providing a categorization of both external-to-the-firm and internal-to-the-firm themes and tackling the embedded useriness”

## **Introduction to the Three papers of the thesis**

To operationalize and narrow the scope of the research, I formulated a subset of specific research aims, each of which guides the three papers of the thesis. These specific research aims are all related to the understanding of the UI phenomenon from a general perspective to a more specific one. In the three papers, I focus on a few selected aspects of interest which have been quite overlooked by current studies, but whose understanding results in outstanding outcomes for further developing UI research. A holistic view of UI phenomenon from both outside and inside of the firm, a precise categorization of specific internal dynamics in relation to strategic, organization, and management dynamics of firms, and also embedded lead userness and its required individual-level antecedents within firms are the aspects of the literature that have not been addressed profoundly in previous studies.

Addressing these aspects of the phenomenon is of crucial importance because the success of UI does not depend only on the correct ways of collaboration with outside and choosing the right users, but it is also influenced by the internal potentials of firms which could be a right strategy, proper organization, efficient managing system, and the human potential inside the firm for creating ideas. Table 1 below reports the title and research aims of each of the three papers.

**Table 1. Paper Titles and Research aims**

<b>Paper Titles</b>	<b>Research main aims</b>
Paper 1: “Internal and external perspectives on user innovation: what was left behind? A review of current literature”	Investigating the locus of UI studies to understand to what extent existing literature has been looking at external-to-the-firm and internal-to-the firm conditions of UI.
Paper 2: “The Firm Side of Collaborating with Users: A Systematic Literature Review”	Providing an overarching perspective on the internal conditions necessary to properly organize and manage user collaboration processes.
Paper 3: “Efficaciously smuggling ideas: untangling the relationship between Entrepreneurial Self-Efficacy, Creative Bootlegging and Embedded Lead Userness”	Increasing our knowledge of embedded lead userness by providing a better understanding of individual-level antecedents of ELU grounding on social cognitive theory.

The first paper is a systematic literature review (SLR) using Web of Science (WoS) as the main database to search for studies. This paper identifies the main focus of the studies in three different periods since the beginning of this literature until 2017 by applying VOSviewer software. Besides this study provides the different definitions of UI by considering different approaches toward this phenomenon in the literature. This paper distinguishes between scientific papers focusing on the external-to-the-firm conditions of UI and papers focusing on the firms’ internal conditions with more attention on the latter branch as an ignored part of the literature. In this regard, the first cluster of studies is classified into three sub-streams including (1) innovation-related theme, (2) user-relate theme, and (3) context-related-theme. Further, concerning the latter group studies, there are three sub-streams namely (1) strategy-related theme, (2) organization-related theme, and (3) management-relate theme which are only six percent of

the whole reviewed papers. This paper highlights the importance of combining an external with an internal perspective in an attempt to provide a full understanding of UI and opens an interesting path for future research in this specific field.

As the results of the first paper showed the internal dynamics affecting full, effective execution of collaboration with users have received limited scholarly attention. Thus, the second paper explores the internal conditions necessary to properly organize and manage such collaboration processes using the SLR method. To discover the detailed internal dynamics needed for implementation of UI, this study investigates the papers in both OI and UI literature with the focus on studies that collaborate with users as the main sources of innovation. More precisely, the strategy-related theme is divided into two sub-streams including (1) business modeling, and (2) search and involvement strategies. Organization topics are categorized into four areas: (1) organizational design; (2) organizational practices and routines; (3) culture and climate; and (4) micro-foundations. Finally, management-related theme characterized by three different sub-streams: (1) managerial competencies and processes; (2) networks and networking capabilities; and (3) absorptive capacity and knowledge management (KM).

Finally, the last paper zooms in on the specific topic of embedded lead userness (ELU) with an inclination to the internal side of the UI. The results of the second paper have revealed that micro-foundations or in other words the human side of the UI has been taken for granted (Gassmann, Enkel, & Chesbrough, 2010; Hosseini, Kees, Manderscheid, Röglinger, & Rosemann, 2017). This aspect concerns with individuals' choices, abilities, and motivations in general (Felin, Foss, & Ployhart, 2015). Based on the data collected from employees of 42 Italian and Croatian small and medium-sized companies this paper examines the relationship between entrepreneurial self-efficacy and ELU when mediated by creative bootlegging. More specifically, the results of this study add to the existing understanding of embedded



users' characteristics and the antecedents of the ELU process by focusing more on individual-level foundations and cognitive antecedents.

Hence, while the first two papers with the same method focus on providing a complete view of UI from outside and inside of the firm, the third empirical paper unfolds a narrow topic linking the human side of collaboration with lead userhood within the firm.

## **Overview of the papers in the thesis**

### **Paper 1: “Internal and external perspectives on user innovation: what was left behind? A review of current literature”**

Khatereh Ghasemzadeh (Accepted for presentation as an extended abstract at the 15<sup>th</sup> international Open and User Innovation Conference, Innsbruck, Austria, July 2017; Accepted for presentation at the Sinergie-SIMA conference, Venice, Italy, June 2018)

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### **Paper 2: “The Firm Side of Collaborating with Users: A Systematic Literature Review”**

Khatereh Ghasemzadeh, Guido Bortoluzzi (Accepted for presentation at the R&D management conference, Milan, Italy, July 2018)

Status: In preparation for submission to a major journal

### **Paper 3: “Efficaciously smuggling ideas: untangling the relationship between Entrepreneurial Self-Efficacy, Creative Bootlegging and Embedded Lead Userhood”**

Khatereh Ghasemzadeh, Guido Bortoluzzi, Matej Černe, Aldijana Bunjak (Accepted for presentation at the 17<sup>th</sup> Open and User Innovation Conference, Utrecht, Netherlands, July 2019; Accepted for presentation at 8<sup>th</sup> Economic and Business Review and Flu Doctoral Conference, Ljubljana, Slovenia, June 2019)

Status: In preparation for submission to a major journal



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## **Paper 1**

### **Internal and external perspectives on User Innovation: what was left behind? A review of current literature**

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#### **Abstract**

This paper carries out a systematic and up-to-date literature review in the domain of user innovation (UI). Differently from previous reviews, in this paper the “locus” of UI is scrutinized meaning we distinguish between studies focusing on external-to-the-firm conditions of UI (user’s types, users’ roles, enabling platforms, etc.) and papers focusing on internal-to-the-firm conditions of UI, such as strategies, capabilities and organizational routines that trigger and support UI processes. Our review shows that internal-to-the firm conditions represent a clearly neglected subject in the domain of UI studies. Thus, with this paper we encourage more research – both theoretical and empirical – to be carried out on the strategic, organizational and managerial sides of UI.

Keywords: user innovation, user-driven innovation, user involvement, customer-driven innovation, co-creation, co-development.

## 1. Introduction

The theme of user innovation has gained considerable attention in innovation studies and practices in the last decades Hyysalo, Repo, Timonen, Hakkarainen, and Heiskanen (2016, p. 18). Users have been renowned for a long time as vital sources to enhance innovation performance and increase competitiveness regardless of the type and size of the company (Keinz et al., 2012; von Hippel, 1986). Users' contribution to develop new products and services result in the enhancement of efficiency and effectiveness of the innovation process (Goduscheit & Jorgensen, 2013). Notably, collaborating with external stakeholders and more specifically users has been challenging the so-called "closed innovation" model through which the innovation is the result of large laboratories inside the firms (Pustovrh & Jaklič, 2018).

This research stream is nowadays characterized by certain maturity as well as an internal structuring in multiple sub-topics, such as the role of communities of users and crowdsourcing (Füller et al., 2008; Poetz & Schreier, 2012), ways and toolkits for involving users (von Hippel, 2001) and enabling them to experiment and innovate (Jeppesen & Frederiksen, 2006), not to mention a copious research stream on the different typologies of users to be involved, such as lead-users (Lüthje & Herstatt, 2004; von Hippel, 1986). While expansion in the number of papers published and an extension in the focus of UI studies is undeniable, the literature by far has provided abundant attention on the preconditions and on the consequences of the process of users' involvement (Bogers, Afuah, & Bastian, 2010; Greer & Lei, 2012). Nevertheless, the literature has overlooked studies of some aspects of the process itself which deal mainly with planning, organizing and managing UI processes inside the firms.

in this review, we take a different angle by investigating what happened to the locus of UI studies. Meaning, we aim to understand to what extent existing literature has been looking at external-to-the-firm



conditions of UI – such as the use of platforms, the characteristics of users, the impact of different industries and ecosystems –and internal-to-the-firm ones. With this latter, we refer to the strategic, organizational and managerial conditions that support the deployment of UI-related activities. Given that, based on the derived concept itself and its existing streams of research as well as the theoretical foundations, a future research agenda in the domain of UI specifically pertinent to internal-to-the-firm conditions is suggested. to derive a better understanding of the phenomenon to fulfill this aim, this paper is divided into 5 parts. First, we outline the concept of UI as offered by the literature followed by a snapshot of the historical evolution of such literature. Section 3 provides the methodological details of our research while section 4 presents the descriptive results and examine precisely papers in different streams. In section 5 discussion on theoretical contribution and contribution and managerial implications as well as future agenda is provided.

## **2. Background**

### ***2.1. A snapshot of the evolution of UI literature***

It's a common belief that studies on user innovation have their roots on the pioneering work done by von Hippel (1976). In this research, von Hippel examined the role of manufacturers and users in scientific instrument innovation and subsequently found out that such innovations derived from users' ideas. The results showed that users test and prototype the instruments and innovation merely does not belong to commercializing firm. Since then, such literature has been developing in long waves. Each wave characterized by a specific research theme becoming prevalent<sup>1</sup>. In particular, we identify:

- a “*user characteristics*” wave (from 1976 to 1995)

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<sup>1</sup> We used text analysis in VOSviewer software in order to provide a better vision of predominant topics of each wave.

- a “*tools for collaboration*” wave (from 1996 to 2005)
- a “*value co-creation*” wave (from 2006 to 2017)

The main – and somehow only – interest of scholars during this first period (1976-1995) was on the “lead-user” concept and on the active role that users started to play in many industries within the processes of new product development of firms. Studies on lead users, a category first introduced by von Hippel (1986) started brand new research from scratch in this period. He indicated that lead users are those users who own real-world experience to solve the problem in the market. Subsequently, the successfulness of the method was also put under empirical scrutiny. Urban and von Hippel (1988) characterized lead user method with three components: 1) users with higher experience of a need are more capable of giving information 2) users differ based on the benefit they gain through participating in idea generating and 3) sometimes users lead regarding the trend of the market.

Lead user method has been introduced as a much faster and less costly way of acquiring new ideas for products and consequently promising outcomes for the firms (Herstatt & von Hippel, 1992). Further studies within this wave focused also on developing products implementing UI in various firms. The promising examples of industries integrating users in the process of innovation are computer-related systems industry (Urban & von Hippel, 1988), low-tech sector (Herstatt & von Hippel, 1992), scientific instrument factories (von Hippel, 1976), industrial products (von Hippel, 1978), and electronic sector (von Hippel, 1977). In the period between 1996 and 2005, the pace of expansion of the literature has been moderated. Research on UI remained mainly confined to adjacent to the lead-user research field and the search for the best methods for fostering the collaboration between firms and users became more and more central.

The increase of the heterogeneity of users’ needs (Franke & von Hippel, 2003) triggered firms to create

new toolkits to fine-tune older ones in order to better and more accurately understand users (von Hippel, 2001) and to allow customers to more effectively create their own designs and products (Franke & von Hippel, 2003; Jeppesen, 2005). Furthermore, the enhancement of the internet and internet-based technologies have led to creating new areas of research on open-source software, virtual integration and deeper ways for involving users. Open-source software gained considerable attention among scholars as a way for revealing and sharing innovations freely inside a community of users (Lakhani & von Hippel, 2003; von Hippel & von Krogh, 2003). In addition, among the topics that started to be investigated by the scholars we found an increasing interest for the role of other-than-lead users, such as everyday users (Kristensson, Gustafsson, & Archer, 2004; Magnusson, 2003).

But it is only in the last decade (2006-2017) that we have been assisting to an exponential escalation in the number of studies on UI. Regarding the growing speed of social media and internet-based communication, more studies during the third wave focus on finding newer collaboration ways with users. Online platforms and contest communities are the most implemented ways through which users can contribute to different innovation processes (Füller et al., 2014; Hienerth, von Hippel, & Jensen, 2014). Simultaneously, more tools for integrating customers' efforts started to emerge such as living labs (Guzman, del Carpio, Colomo-Palacios, & de Diego, 2013) avatar based innovation (Kohler, Fueller, Stieger, & Matzler, 2011; Kohler, Matzler, & Füller, 2009) and brand communities (Brodie, Ilic, Juric, & Hollebeek, 2013; Füller et al., 2008). Furthermore, several new topics started also to emerge and to be addressed by scholars, such as the theme of co-creation and value-creation in the context of customer involvement which to large extent deal with the marketing issues. The research started to investigate the involvement process of users and customers in creating new products and most recently in the service sector (Alves, 2013; Gustafsson, Kristensson, & Witell, 2012). A high number of firms integrate users in the process of innovation in order to decrease market risks (Enkel, Perez-Freije, & Gassmann, 2005).

The results of a review on co-creation and co-production literature revealed that these processes are considered as value themselves used to attain more efficiency and more customer satisfaction (Voorberg, Bekkers, & Tummers, 2015). In the same year, Bharti, Agrawal, and Sharma (2015) developed a systematic literature review of value co-creation and stressed that the aforementioned process started to gain attention especially after Prahalad and Ramaswamy (2004) who introduced co-creation as a way to satisfy customers' needs. The review represents that co-creation gradually have been used as a way to maintain long-term relations, diminish ethical conflicts, creating customer loyalty, and building intellectual property rights. In the same line, Gronroos and Voima (2013) specified the roles of customers and firms in the process of value and co-creation indicating on a joint value sphere of direct interactions between customers. Similar concepts which overlap with co-creation studies are co-creation design (Frow, Nenonen, Payne, & Storbacka, 2015) and co-innovation (Lee, Olson, & Trimi, 2012; Romero & Molina, 2011). Figure 1 shows the graphical maps of three waves.

## ***2.2. Defining UI***

The paradigm of UI was brought to the literature during 1970s by Eric von Hippel who, in a pioneering study, introduced the concept of “customer-active” paradigm (CAP) through which “the would-be customer develops the idea for a new product; select a supplier capable of making the product; and take the initiative to send a request to the selected supplier” (von Hippel, 1978: 40). Later on, he provided a complement definition of the phenomenon by indicating that users do not manufacture an innovation but integrate it into the assembly of a finished product or process (von Hippel, 1998). Hence, in accordance with early definitions, users are the key inputs for the innovation processes and they are also the ones that benefit exclusively from the process by using the innovation and, sometimes also, trying to commercialize their innovations (De Jong & von Hippel, 2009; Gault & von Hippel, 2009).

More recently, Bogers and West (2012, p. 13) defined user innovation “conditions under which users innovate and how users can be supported to be more innovative” which brings utility for the user rather than any pecuniary benefit for the firm. Although the literature does not provide the accurate differences between existing overlapping concepts related to UI, we try to discern and group the already existing concepts in the literature. A body of studies address the phenomenon of User-driven Innovation (UDI), however, there’s not complete convergence in the literature on its definitions. Hjalager and Nordin (2011, p. 290) defined UDI as “the phenomenon by which new products, services, concepts, processes, distribution systems, marketing methods, etc. are inspired by or are the results of needs, ideas and opinions derived from external purchasers or users”.

Within the same period, Gault (2012) showed that users can act as sources of information for firms, for example by providing feedbacks to firms through the use of appropriate platforms and/or social media through User-driven Innovation (UDI) and User-Centered Innovation (UCI) processes. In this study, UDI is differed from UI indicating that in the process of UDI it is the firm that mainly benefits from the innovations produced by users. While in other studies such as a study carried out by Hyysalo et al. (2016), UDI is a broad concept consisting various modes including UI which varies from slight integration of users to a deep collaboration. De Moor et al. (2010, p. 53) who investigated the role of UDI in future technology provided the definition of UDI as “the process of collecting a particular type of information about the user: it deals with insights both at an observable and a more latent level that are quite difficult to grasp”.

Affected by the necessity to comprehend the new ways of collaboration process between users or customers and firms, most of the recent definitions focus on the concepts of co-creation and value-creation. Different from UI studies which highlight the main role of users and their characteristics and motives, these group of studies regard users as collaborators or inspiration of innovation process to

produce new or meaningfully improved products, services, and processes. Taking the similar point of view, Greer and Lei (2012, p. 64) defined the process of engaging customers as “process of engaging in the creation of new products or services in collaboration with customers or users”.

Considering the role of users and customers in product development, Hoyer, Chandy, Dorotic, Krafft, and Singh (2010, p. 283) defined co-creation process as “a collaborative new product development (NPD) activity in which consumers actively contribute and select various elements of a new product offering”. Bogers and West (2012) noted that co-creation is also a means to create value more generally beyond creating product innovation. Value co-creation refers to a joint problem-solving collaborative involving suppliers’ and customers’ resources (Aarikka-Stenroos & Jaakkola, 2012). Further studies expanded the concepts of customer-centered innovation or customer-driven innovation indicating that “customers may lead to innovations, not only be attracted or retained through innovations” (Öberg, 2010, p. 992).

Desouza et al. (2008) emphasized that in customer-driven innovation processes customers have the main role in innovation and the involvement of the organization is limited in contrast of older concepts such as customer-focused innovation that customers had fringe roles and innovation was done by the organization. Meanwhile, other similar concepts like “participatory innovation” and in particular “participatory design” gained incredible attention which are processes through which end-users are invited to contribute and participate in developing products and systems as co-designers (Buur & Matthews, 2008; Sleeswijk Visser, Van der Lugt, & Stappers, 2007).

### **3. Methodology**

We carried out a systematic review of the literature. To do so, we defined a search strategy, set explicit criteria for inclusion and exclusion of papers, and carried out a deep analysis of the results (Crossan & Apaydin, 2010). A systematic literature review provides transparency (Rousseau, Manning, & Denyer,

2008) and yields an accumulated knowledge of various research fields (Tranfield, Denyer, & Smart, 2003). To carry out this review, Web of Science database was chosen and searched using user innovation, user-innovation, and free innovation as the main keywords which provided 206 results. Further studies resulted from combinations of 14 different but related keywords. The first step was combining the first group of key words namely, user driven, user-driven, customer driven, customer-driven, user involvement, and customer involvement with the second group of keywords which were innovation and innovate.

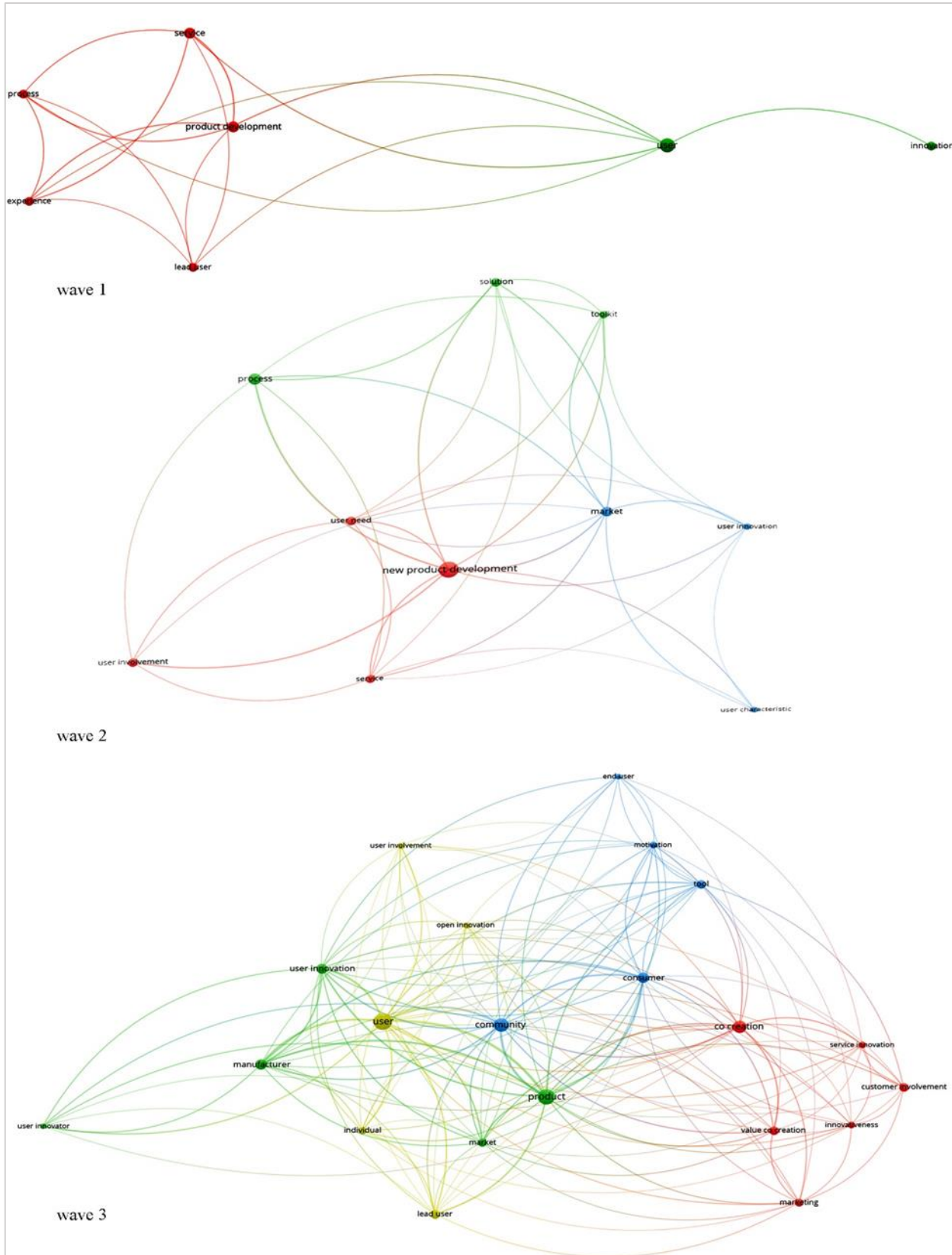
Subsequently, few more keywords added to a first group containing user collaboration, customer collaboration along with co-creation, co-development, new product development and new service development to the second group. Two Boolean search string was used including all 14 keywords with the distinct combination. For example, (user-driven \*AND innovation), (customer driven\*OR “customer-driven”) AND (co-creation\*OR “co-development”) in Web of Science. Only articles published in scientific journals were considered, while book chapters and conference papers were not included. The total number of entries using keywords was nearly 700. We reviewed titles, journals, and abstracts in order to exclude completely unrelated papers. In the first filtering process, 355 papers were excluded because they were purely in technical (like Information and Communication Technologies) and healthcare areas and were published in a journal providing no contribution to managerial and organizational literature.

We eliminated the papers not dealing with user innovation specifically, but with innovation in general. Through such a filtering process, we narrowed down our database to 345 articles. After retrieving the papers, bibliographic data (title, author, journal, year of publication, and abstract) were exported to an excel table. In the next step, the whole contents of remained articles were scrutinized in terms of their conceptual, theoretical, and empirical development and were graded from 1 to 5 in order to determine

how close each article was to the UI topic where 1 refers to least related papers to UI and 5 refers to the highest closeness. For such filtering, precise exclusion criteria were applied to isolate just the articles precisely focusing on UI. Such criteria have been chosen empirically based on an analysis of the papers remaining in the dataset. No prior criteria were applied in this phase.



Figure1. Evolution waves of UI literature



The most important reasons for excluding further papers were the following: 1) the paper focuses on innovation practices, not strictly related to UI; 2) the paper grounded on open innovation theoretical framework but does not deal specifically with UI; 3) the paper deals with user experience and not with the direct involvement of the user; 4) the paper is related to the role of users as innovators in the computer science and healthcare but brings low contribution to the managerial literature on UI overall; 5) the paper is about buyer-supplier collaboration in a B2B context and typically during a new product development phase. The articles have been graded separately and the articles not reaching the “3” threshold of 3 out of 5 were excluded from the review. As a result of the second filtering process, the number of articles nailed down to 275.

Then, all the papers were read in full and sorted out. In order to identify the main streams of research within UI literature, papers were coded based on 10 criteria. 1) Article type: Sorts the studies in three main kinds including empirical, conceptual and review papers. 2) Methodology: Empirical papers have been conducted in two qualitative and quantitative ways. 3) Method: Various methods have been used in sample empirical articles consisting case study, survey, interview, ethnography, netnography, experimental design, mixed method, etc....4) Innovation type: Since collaborating with users ends up to numerous innovation in products, services, and processes, the papers were divided into incremental and radical based on innovation type. 5) User type: Users who collaborate in innovation activities within these articles separated to lead users and ordinary or everyday users.

6) Collaboration type: User engagement is possible in two main types which are individual engagement and collaborating in the community of users. 7) Industry type: Generally, industries in which UI practices have been conducted include manufacturing and service industries. 8) Industry activity: More specifically, papers sorted based on activities of each industry type in order to discover in which sectors UI have been carried out. 9) Firms' age: Sample firms comprise startups and established firms regarding

their age. 10) incentive type: Due to the importance of incentives which motivate users to participate in innovation activities, we classified studies dealing with incentives to extrinsic and intrinsic motivations.

## **4. Results**

### ***4.1. Descriptive results***

Notwithstanding its long history, UI is a phenomenon that started collecting considerable attention in the literature only starting from 2008 (the research analyzes the papers to the end of 2017). Descriptive results show that empirical papers represented almost 4 out of 5 of the papers (75 percent) while theoretical papers were less defused (19 percent). The remaining are reviews of previous literature. Regarding the methodologies used in the (empirical) articles, qualitative research is the most popular (43.9 percent) while quantitative methods hold the second position. Among the methods of analysis used, case studies (39.1 percent) and then the survey (30.4 percent) are the most widespread methods. During the recent years, the use of mixed method has been growing significantly and currently account for more than 20% of researched studies. Other methods of collecting data employed in studies (such as ethnography, netnography, interview, experimental design, focus group, action research, and secondary data) have been used less frequently in the papers analyzed.

For the type of innovations involved in the study, the majority of papers (70 percent) deal with the cases of radical innovation, while a smaller percentage focuses on both radical and incremental innovation. Lead users are at the center of at least half of all the articles. Not surprisingly, just 22.3 per cent of studies focus on the everyday user as the only sources of innovation. It is notable to mention that collaborating with firms and users is done extensively within communities (61.4 percent) and individual collaboration is less common (25.7 percent). UI practices have been experimented and implemented in different types of industries since its emergence. A large number of studies especially during the last few years have

conducted UI studies in service firms (38.4 percent). To better understanding the implementation of UI we classified the specific activities of both service and manufacturing firms for all sample articles.

The results show that most of firms within these industries are incumbent firms (83 percent) and startups only have been searched in few papers (6.4 percent). When considering incentives of collaboration, in a wide variety of studies a combination of extrinsic and intrinsic incentives has been considered together to motivate users (61 percent), whereas extrinsic incentives alone (26.8 percent) and intrinsic motives alone (12.2 percent) have been used less frequently. Intrinsic incentives such as fun, altruism, sense of efficiency, etc.... On the other hand, extrinsic incentives refer to monetary rewards, career prospect, using free service and products, etc. Table 1 summarizes the descriptive characteristics of the papers considered in this review as well as the list of journals with the most published articles and the distribution of industries with the higher repetition among papers.

#### ***4.2. UI research streams***

On the basis of our literature review and coding procedure, we categorized the existing literature on UI in two general streams of research: (1) papers dealing with external-to-the firm conditions – that corresponded to the 94% (258) of the papers included in this review, (2) papers dealing with internal-to-the firm conditions, corresponding to the remaining 6% (17).

We further categorized the papers within each stream and identified three plus three categories. For the papers dealing with external conditions we distinguished between:

-Innovation-related papers. These papers deal mainly with the types of innovation (such as radical, incremental) or the type of products (goods, services, mixed) involved in the innovation process. We found 93 papers dealing with such a topic, corresponding to the 34% of the total;

-Users-related papers. Such papers deal mainly with the different characteristics of users (lead users and everyday users), the role of users in the process of UI both individually or on web-based platforms facilitating such processes, and incentive systems. Totally, we found 158 papers equal to 57% of literature.

-Context-related papers. These papers deal with the sectorial and the contextual conditions (location, ecosystem) that trigger, support or hamper the deployment of UI strategies. Only near 3% of the papers fall in such category.

*Table1. Descriptive results of sample articles*

Classification variable	Values	N.	%
<b>1.Paper type</b>	Empirical	207	75%
	Conceptual	51	19%
	Review	17	6%
<b>2.Methodology</b>	Qualitative	91	43.9%
	Quantitative	75	36.2%
	Mixed	41	19.8%
<b>3.Method(the most common)</b>	Case Study	81	39.1%
	Survey	63	30.4%
	Mixed	47	22.7%
	Interview	7	3.4%
<b>4.Innovation type</b>	Radical	28	70%
	Mixed	12	30%
<b>5.User type</b>	Lead user	60	49.6%
	Mixed	33	27.3%
	Everyday user	27	22.3%
<b>6.Collaboration type</b>	Community	86	61.4%
	Individual	36	25.7%
	Mixed	18	12.9%
<b>7.Good type</b>	Service	84	38.4%
	Mixed	63	28.8%
	Manufacture	55	25.1%
<b>8.Industry (most frequent)</b>	Sport goods	12	5.5%
	Telecommunication	10	4.6%
	Information Technology firms	10	4.6%
	Software	9	4.1%
	Computer game industry	8	3.7%

<b>9.Firm age</b>	Incumbent	78	83%
	Mixed	10	10.6%
	Start up	6	6.4%
<b>10.Incentive type</b>	Mixed	25	61%
	Extrinsic	11	26.8%
	Intrinsic	5	12.2%
<b>11.Journal (most publications)</b>	Journal of Product Innovation Management	29	10.5%
	Research Policy	14	5.1%
	Management Science	10	3.6%
	Creativity and Innovation Management	9	3.3%

As regards papers dealing with internal conditions, despite their limited number (17 papers), it seemed reasonable to us to divide them into the following categories:

-Strategy-related papers. These papers deal with the strategic aspects of UI, such as business modeling, customer interaction as a strategy or the relationship between UI and performance. We ascribed to such category 2 papers;

-Organization-related papers. We grouped under this category all the papers dealing with organizational aspects (such as routines, organizational structures, and processes) that represent preconditions to the effective deployment of a UI strategy. We attributed 8 papers to this category;

-Management-related papers. We included in this third group all the papers dealing with the management of the process itself of UI, the resources and the capabilities needed to manage in an effective way the process of UI. We found 7 papers belonging to this third category.

#### ***4.2.1. External-to-the-firm conditions***

##### *Research stream 1: Innovation-related theme*

Papers in the first research stream – innovation-related – are specifically focused on innovation itself. Thus, the role of users as innovators is mainly related to the type of innovation involved, would it be radical, incremental, disruptive or other.

A common theme within this stream is related to innovation type: radical and incremental. There are not many studies in the literature which explore the degree of innovativeness of user-generated innovations. Radicalness of innovations and finding new solutions have always been a critical topic for UI scholars. Various scholars proposed definitions for radical innovation (RI) which in general refers to creating new products that offer long-term sale potential rather than just improving the product (Skiba & Herstatt, 2009). On the other hand, radical innovations are also connected with service innovation in a way that separates previous practices and results in fundamental changes in organizational activities (Perks et al., 2012). Incremental innovations alone are not sufficient for firms in developing and fast-changing technology and one important factor is choosing the right user at the right time and in the best form (Lettl, 2007).

The characteristic of users is a determinant element which contributes to the development of radical innovation (Lettl, Herstatt, & Gemuenden, 2005). Accordingly, due to differences between the profiles of users who contribute to RI and others who involve in conventional marketing research, firms seeking RI need to apply different marketing inquiry approach. In search of exploring the techniques of providing radical changes, lead user method (von Hippel, 1986) and user toolkits (Herstatt & von Hippel, 1992; Oliveira & von Hippel, 2011) have been proposed as the most widespread techniques. Candi et al. (2016) made a distinction between the utilitarian radicalness which refers to innovation in technology and functionality and hedonic radicalness which delivers new meanings and values to products and services. Since the radical and incremental innovation is complement concepts, in a high percentage of studies two types of innovations are studied and compared with each other.

The results of a study in a motor insurance company as a financial sector revealed that the sequence of micro-level activities related to incremental innovation in the co-creation process results in radical innovation which indeed requires more managerial attention (Perks et al., 2012). Online and offline

collaboration are two modes of involving users through which online collaboration increases the probability of introducing incremental innovations while offline collaboration increases the probability of introducing radical innovations in an ICT sector (Ryzhkova, 2012). Incremental innovation considered as a more frequent and customary innovation through which both business and individual users develop upon the work of producers and other groups of users (Bogers & West, 2012).

Füller and Matzler (2007) found out that listening to customers closely will end up creating some incremental innovations but virtual customer integration provides an opportunity to come up with really new products in order to satisfy customer needs. Notably, the type of innovation is a key factor in selecting the co-creation and communication process. Gustafsson et al. (2012) came to the conclusion that frequency, direction, and content of co-creation have the same and positive effect on the product and market success in incremental innovation. Whereas, in radical innovation projects frequency has a positive effect and content has a negative significant effect on product success. In a study of the kayak industry, innovation moved from radical to more incremental and customer-oriented innovation by adapting the equipment to general customers and amateurs. As a result, the manufacturer could sell new products and designs to more customers every year and improved the commercialization process (Hienerth, 2006).

It is noteworthy to mention that studies of this stream demonstrate that design, products, and product concepts that are created together with users fit user needs' better (Pals, Steen, Langley, & Kort, 2008) as well as outline the positive effect of UI on service sectors such as the positive direct effect on technical quality and innovation speed (Carbonell, Rodriguez-Escudero, & Pujari, 2009). Most recently the scholars have found out the important role of users in sustainable product and service innovation in addition to radical and incremental attributes (Nielsen et al., 2016; Parmentier & Gandia, 2013).

#### *Research stream 2: User-related theme*



Papers belonging to the second research stream - users-related papers – are the most consistent in number. Along with this stream, three sub-themes of research have been identified. First sub-theme deals with different types of users: lead users and ordinary or everyday users. Studies dealing with lead-users and their characteristics prevail in absolute. Lead user has been defined as a user “(1) who has needs in a particular area before the rest of the market and (2) gain benefits from obtaining a solution and try to innovate” (von Hippel, 1986, p. 796). The primary studies focused on the role of lead users in marketing activities and new product development such as testing the impact of lead user participation in the development of industrial products (Urban & von Hippel, 1988). Similarly, Herstatt and von Hippel (1992) showed that the lead user method could bring positive results in a low-tech industry despite having users without technical training.

A large body of literature has been investigating lead user concept within consumer products. As an example, lead users considerably contribute to the innovation process of sport equipment for example in the case of kitesurfing equipment, it has been proven that two main characteristics of lead users: being ahead of the trend in the market and high expected benefits result in appealing commercial innovations (Franke, von Hippel, & Schreier, 2006). The search on antecedents and consequences of consumers’ lead users took a step forward and explained that antecedents of the process are consumer knowledge, using experience, the locus of control and innovativeness as requirements to identify users. Moreover, investigation of the consequences of lead user method revealed that lead users do not only participate in idea generation process but also adopt new products more heavy and faster (Schreier & Prugl, 2008). User expertise and motivation, the extreme user need as well as opinion leadership and commitment have been proposed as other characteristics of lead users in addition to being ahead of the market and high expected benefits (Brem & Bilgram, 2015).

Moreover, the authors indicate that lead users exhibit some new behaviors like participating in online communities according to the cultural changes triggered by social media. Consequently, lead users have been assigned to problem-solving stages of developing new products including three phases of problem detection, analysis, and removal. Inventive users hold some common characteristics with lead users but have a definition beyond the traditional lead user. Lettl et al. (2005) characterize inventive users as those who: 1) have high motivation for the development of new solutions 2) face the need with extremely high precision. Surprisingly, the outcomes of a study on the role of lead users on the different stages of problem-solving of new product development demonstrated that the interfere of lead users in each stage of innovation problem-solving process decreased productivity in spite of providing desirable products (Colazo, 2014).

On the other hand, some empirical and conceptual articles studied general and everyday users' characteristics and their input in generating new ideas. Ordinary students who were in charge of designing watches using toolkits could bring heterogeneous design to market and increased significantly user willingness to pay high prices for them (Franke & Piller, 2004). According to Magnusson, Matthing, and Kristensson (2003), ordinary users created more original ideas than professional users during service innovation developing due to a higher level of creativity. Respectively, Kristensson et al. (2004) claimed that professional developers and advanced users generated more realizable ideas, and ordinary users provided the most valuable ideas. Given the increasing role of users in service development, Magnusson (2003) conducted a study experimenting ordinary users and professionals in the service innovation process and showed ordinary users provided more creative and novel suggestions than professionals but professionals made easier ideas to produce. Despite the originality and value of ordinary users' ideas, it has been turned out that users could not be expected to come up with ideas that immediately go to production phase but basically, they are sources of inspirations and information of users' needs (Magnusson, 2009).

The second sub-theme sheds lights on the type of collaboration between firms and users and holds a significant position within studies containing individual and community-based collaboration. According to Baldwin and von Hippel (2011, p. 9) “A single user innovator is a single firm or individual that creates innovation in order to use it”. Individual users have been identified as drivers of many developments in sports products (Hienerth, 2006) and also consumer products (Flowers, von Hippel, De Jong, & Sinozic, 2010). In a single case study, Hennala and Melkas (2016) emphasized the importance of formulating a collective voice of individual users and a deeper understanding of users’ experiences to foster service innovation. Involving few numbers of users mostly has been common in lead- user method through which extremely advanced users eager to create novel and radical innovations which are quite practical for projects with limited time domain (Keinz et al., 2012).

Despite the critical role of individual users, it has proven that the group of users can be much more efficient than specialized producer innovators (Hienerth, von Hippel, et al., 2014). Communities are no longer a place just for lead user activities but also the presence of potentials and expertise of multiple users are necessary for innovation process (van Oost, Verhaegh, & Oudshoorn, 2009). The internet allows a less costly collaboration with a large number of customers through virtual customer integration (VCI) and make use of customers’ know-how, creativity, and judgment (Bartl, Füller, Muhlbacher, & Ernst, 2012). Thereby, user communities and platforms (are normally online) have been identified as a promising approach that provide the opportunity to exchange ideas among users and generate innovative ideas around a specific theme or topic (Harhoff et al., 2003; von Hippel, 2007).

Platforms defined as “the nexus for the aggregation and integration of different members (individuals and companies) in an innovation community, permitting access to a large pool of experts and contributors, benefiting from proximity to customers and user innovations and avoiding a local search bias in innovation” (Battistella & Nonino, 2012, p. 2). Exploring “Propellerheads” community as a case

study, Jeppesen and Frederiksen (2006) investigated the motivation and characteristics of users who participate in such communities and found out that such motives lie in three groups: 1) being hobbyist 2) response to firm recognition 3) try to be a lead user. Promising examples of such communities include mystarbucksidea.com (Lee & Suh, 2016; Sigala, 2012), dell idea storm community (Bayus, 2013), and salesforce.com (Li, Kankanhalli, & Kim, 2016) aim at improving the effectiveness of new service and product development. Interaction among participants, information exchange, mutual support, community building, and cooperation among users in online contest communities lead to better and more innovations (Füller et al., 2014).

Another type of such communities is virtual brand communities in which consumers manifest loyalty, satisfaction, empowerment, connection, emotional bonding, trust and commitment (Brodie et al., 2013). Furthermore, user toolkits became widespread which have been defined as tools that “allow manufacturers to actually abandon their attempts to understand user needs in detail in favor of transferring need-related aspects of product and service development to users along with an appropriate toolkit” (von Hippel, 2001, p. 247). Such user-friendly tools let users design their own preferred product and service (von Hippel & Katz, 2002). User toolkits have been applied not only by end users (Jeppesen, 2005; von Hippel, 2001; von Hippel & Katz, 2002) but also, such toolkits are also aimed at various general users (Franke et al., 2008; Franke, Keinz, & Steger, 2009; Goduscheit & Jorgensen, 2013). Toolkits for user innovations are considered also as a powerful marketing tool (Franke & Piller, 2004) to achieve mass customization and in contrast of lead user method and user communities do not focuses only on radical new ideas (Keinz, Hienerth, & Lettl, 2012).

One further sub-theme papers of this stream focus on the process of stimulating the users with the help of different types of incentives. Generally, the literature shows that motivations for participating in the UI process are in two groups of extrinsic and intrinsic incentives. Füller (2010) proposed users' decision

to engage in innovation activities is based on a combination of intrinsic (fun and altruism), internalized extrinsic motives (learning, reputation) and entirely extrinsic motives (payment, career prospects). In a study aim at exploring the motivations to take part in platforms, drivers are categorized to intrinsic-individual motivation, intrinsic-social driven motivation, extrinsic economic motivation, extrinsic professional motivation and extrinsic social motivation (Battistella & Nonino, 2012).

Nambisan and Baron (2009) further tried to detail and enrich users' incentives and motives by proposing four groups of them: Cognitive or learning benefits (product-related learning), social integrative benefits (sense of belongingness and social identity), personal integrative benefits (reputation or status and the sense of self-efficacy), hedonic benefits (pleasure, enjoyment). In contradiction, Lüthje (2004) underlined the importance of non-financial rewards. The author specified that financial motives cannot distinguish between innovating and non-innovating users and there are the fulfilled needs in the market that stimulate users to innovate. Based on the results of his research in the case of the outdoor industry, having more fun or being faster and safer during sports activities are the main motives. Later on, similar results showed that the engagement of customers in virtual product development is not motivated by monetary compensation or reputation. On the other hand, users participate for possibilities of product development (Füller et al., 2010).

### *Research stream 3: Context-related theme*

Studies focusing on the contextual elements of UI are still rare. Research within this stream has focused on the environmental and contextual dimensions covering the conditions of various sectors and industries, technological and scientific changes, marketplace fluctuations, policy making, competitors, etc... Although these elements are not usually the only effective factors on UI but provide a complementary role. Context factors impact the roles of users and innovation activities in different direct

and indirect ways which mostly are out of control of the firms. Addressing the uncertainty in an environment involving the unavailability of resources, instability, and unpredictability of markets, changing government regulations is of significant importance in user involvement (Gales & Mansour-Cole, 1995).

Carbonell et al. (2009) investigated the impact of technological uncertainty on customer engagement and found out that technological novelty, as well as technological turbulence, affect the process of involving the customer in a positive way. Different sectors provide diverse conditions and prerequisites for UI practices. Particularly, Alves (2013) identified that co-creation of value in public sector fosters the radical and discontinuous innovation through integrating the citizen potential and knowledge, however this specific sector suffers from some weaknesses such as resource limitation and citizen contest that effects the process in a negative way. Correspondingly, some other sectors such as electricity sector have been characterized by slow-moving and challenging attributes for UI activities, however, users have been inspirations of innovation even within this sector (Heiskanen & Matschoss, 2016). Heiskanen and Repo (2007) indicated in general micro-sociological processes, market power, and the competitive environment effect user innovations both positively and negatively.

A Study has been done by van Doorn et al. (2010) searching the antecedents and consequences of CEB process revealed some interesting results on context level factors. The most affecting context level factors include political and legal environment which encourage or prevent the information flow, natural events, media attention, and competitive marketing atmosphere. UI has been affected by technological improvements in a positive way by for instance providing an opportunity for even elder people to design new products and services (Ostlund, Olander, Jonsson, & Frennert, 2015). Furthermore, modern technologies like wiki and wikis and mobile environment let users collaborate with firms easily

(Wagner & Majchrzak, 2006; Wong, Peko, Sundaram, & Piramuthu, 2016). Technologies shift the business process to consumers and they can communicate, collaborate and make a decision with the help of new technologies such as Web 2.0 (Nambisan & Nambisan, 2009). The most conducted papers (57 percent) belong to user stream and papers within innovation stream hold the second position (34 percent). As mentioned before papers dealing with context level consider contextual factors as complementary conditions to apply UI practices. The papers solely contributing to this stream consist of only 3 percentage of whole papers but in around 15 percent of papers context level factors have been studied along with other streams. The contributions of the most relevant paper of external-to-the-firm studies are provided in Table 2.

#### ***4.2.2. Internal-to-the-firm conditions***

Studies focusing on internal-to-the firm conditions are much less diffused than studies focusing on external dimensions and started to gain attention very recently. We divided this stream of studies into three sub-streams.

##### *Research stream 4: Strategy-related theme*

Among the studies dealing with internal issues of organizations, less diffused appear to be papers dealing with strategy-related issues (fourth stream). In particular, we just found 2 papers dealing with strategic aspects of UI. The first contribution by Kristensson, Matthing, and Johansson (2008) proposed a conceptual framework and defined key strategies to pursue a successful involvement of users in the process of new product development. They suggest that firms ought to provide an opportunity for users to understand their latent needs and play various roles, consider different users' situations, use analytical tools and benefits, escape from brainstorming, and also provide heterogeneity. A second contribution by Baldassarre, Calabretta, Bocken, and Jaskiewicz (2017) consists of a theoretical contribution coupled to a qualitative study and deals with business models and UI.

Table 2. Articles reviewing external-to-the-firm conditions

<b>Categories</b>	<b>Author</b>	<b>Contribution</b>
Innovation-related papers	Lettl (2007)	<ul style="list-style-type: none"> <li>-Provide insights with regard to the interaction dimension of user involvement competence for radical innovations.</li> <li>-Contribute to the development of a more taxonomic approach of the firm and integrate qualified users in the radical innovation process</li> </ul>
	Skiba and Herstatt (2009)	<ul style="list-style-type: none"> <li>-Highlight the impact of radical innovation on the service industry</li> <li>-Propose that service providers should focus their efforts on integration of the right users early in their innovation process</li> </ul>
	Gustafsson et al. (2012)	<ul style="list-style-type: none"> <li>-Emphasize that positive results from co-creation with customers caused by frequency, direction, and content</li> <li>-Argue that it is useful while working with incremental innovation to spend time with customers and become absorbed in the customer's context as much as possible</li> </ul>
	Perks et al. (2012)	<ul style="list-style-type: none"> <li>-Mention that co-creation develops an interactional process of inducing and visualizing innovative behavior of the actors</li> <li>-Propose that in order to achieve radical innovation, a sequence of incremental innovations in required and advance knowledge of the way co-creation occurs in radical service innovation</li> </ul>
	Candi et al. (2016)	<ul style="list-style-type: none"> <li>-Introduce two different kinds of radicalness: 1) hedonic which refers to the degree to which an innovation is novel in terms of technology and functionality 2) utilitarian that concerns about sensorial, emotional, or symbolic aspects</li> <li>-Emphasize that collaborating with users is moderated positively by utilitarian radicalness, but hedonic radicalness moderated the co-creation process negatively</li> </ul>
User-related papers	Magnusson (2003)	<ul style="list-style-type: none"> <li>-Stress that users engaging in a service innovation process offer more original and valuable proposals than professional developers</li> <li>-Outline that technical abilities of professional developers limit them to come up with creative ideas</li> </ul>
	Lüthje (2004)	<ul style="list-style-type: none"> <li>-Summarize the characteristics that distinguish innovating from non-innovating users</li> <li>-Argue that benefit the users expect from using their innovations and their level of expertise discriminate between users</li> <li>-Identified that new needs, dissatisfaction with existing products, financial reward, fun, experience,</li> </ul>



		and product-related knowledge determine the participation of users
	Schreier and Prugl (2008)	<ul style="list-style-type: none"> <li>-Underline the antecedents and consequences of consumers' lead user-ness and behavior of lead users in each stage</li> <li>-Show that consumer expertise, use experience locus of control, and innovativeness as antecedents have positive relationships with lead user-ness. consumers' lead user-ness is related to new product adoption behavior as a consequence. Lead users tend to embrace new products in the faster and more heavily than ordinary users.</li> </ul>
	Füller et al. (2010)	<ul style="list-style-type: none"> <li>-Elaborate on the role of customers during virtual customer integration and propose that monetary reward and reputation are not sufficient to attract customers</li> <li>-Highlight that the possibility for product development as well as benefiting from the improved products and technologies become users' willingness to participate</li> </ul>
	Hiennerth, von Hippel, et al. (2014)	<ul style="list-style-type: none"> <li>-Find that an open, uncoordinated group of users can be more efficient than producer innovators</li> <li>-Emphasize that more efficiency of a group of users within new product development is driven by "efficiencies of scope" in problem-solving</li> </ul>
Context-level papers	Gales and Mansour-Cole (1995)	<ul style="list-style-type: none"> <li>-Show that unknown uncertainty (operationalized as project radicalism and the stability of the scientific and technological foundation) is a motivation for managers to engage potential users more frequently</li> <li>-Indicate that known uncertainty (operationalized as the extent to which project managers believe they can meet the constraints and requirements of users) affects the number of users that a firm try to contact</li> </ul>
	Freel and Harrison (2006)	-Find that public policy should strengthen two aspects: internal learning capabilities and absorptive capacity of firms and increase the availability of external resources
	Alves (2013)	-Indicates that co-creation could be a source of radical innovation in sectors such as the public sector despite having too many insufficiencies
	Heiskanen and Matschoss (2016)	<ul style="list-style-type: none"> <li>-Underscore that in challenging context such as the energy industry, lead users' ideas are helpful for marketing and the development of new relationships with consumers</li> <li>-Put emphasize on the role of users as innovators who can also be involved to cause industry-wide innovation in industries like the electricity industry, which is of significant public interest.</li> </ul>

In particular, the authors suggested that the creation of sustainable value propositions through products and services takes place in a repetitive and long process of talking, thinking, and testing. In between strategy- and organization-related papers, the study by Ojanen and Hallikas (2009) discussed the link between UI strategies and inter-organizational routines needed to achieve such strategies and, in particular, to balance exploitation and exploration activities in customer-centered innovation. The results of the study demonstrated that innovation collaboration requires explorative inter-organizational routines and also firms need to apply routines enabling inter-organizational relationships, inter-organizational learning, and also feedback mechanisms in order to enhance effective collaboration transformation process within the organization.

A similar positioning is shared by the study carried out by Keinz et al. (2012) who discussed the role of organizational design in the implementation of different user innovation strategies. In particular, the authors defined four different strategies (searching, harvesting, cooperation, and ecosystem strategies) and indicate the necessity of changes in the organization design including human and structural components to implement such strategies. More specifically, searching (i.e. lead user) and harvesting (i.e. user contests) strategies need changes associated with human components. While for cooperation strategy (i.e. lead user and expert cycles) firms adjust their structure to achieve radical innovation and assign some employees to manage the relationship with lead users and external parties. Moreover, ecosystem strategy (i.e. toolkits and communities) require major changes related to structural components.

#### *Research stream 5: Organization-related theme*

Papers belonging to the fifth research stream – organizational-related papers – are the most diffused and mainly deal with intra and inter-organizational factors (functions, positions, roles, routines) and behaviors facilitating UI activities in firms (Agostini et al., 2016). One of the earliest studies within this

stream has been carried out by Nambisan, Agarwal, and Tanniru (1999) exploring the organizational design actions in the form of mechanisms in order enhance users' propensity to innovate in information technology. Furthermore, they identified technology cognizance, ability to explore, and intention to explore as main organizational antecedents to UI. In another contribution, Foss et al. (2011) recognized some organizational routines - namely delegate responsibility, internal communication, and knowledge incentive - to better organize and manage the transfer of knowledge from users.

The authors focused on practices that improve internal information flows and give more motivation which resulting in better exploitation of knowledge from the external environment. Agostini et al. (2016) analyzed the moderating effects of key factors of internal organizational context - including performance management, autonomy, internal networking, and organization and culture - on the relationship between users' involvement and radical innovation performance. The results revealed that user involvement enhances radical innovation performance with the presence of organizational context, however, internal networking, organization, and culture seem to have a more crucial influence on radical innovation performance.

#### *Research stream 6: Management-related theme*

Finally, papers belonging to the sixth research stream – management-related papers – deal with the management of the process (methods, tools) and the resources and capabilities needed to do that. Examples of articles belonging to such stream are the paper by Bengtsson and Ryzhkova (2013) who discussed the need to collect enough internal management competencies in order to benefit from user involvement tools. In particular, in the article, the authors argued disclosure competence (finding and motivating users, support functions), appropriation competence (compensation issues), and integration competence (transfer and further development issues) as appropriate and managerial practices for UI.

The study by Ashok, Narula, and Martinez-Noya (2016) outlined the role of knowledge management (KM) capabilities of the firm to benefit from user collaboration.

The authors analyzed the effect of firm-level factors in particular collaboration with different kinds of users and KM on innovation activities of a service sector and found out that collaborating with existing users has an effect on incremental innovation, whereas for achieving radical innovation collaboration with prospective customers is needed which subsequently requires higher investment in KM practices.

Between managerial and organizational study, the paper conducted by Roberts and Darler (2017) outlined the necessity to redefine co-creation process by considering the importance of having a culture supporting innovation and co-creation, choice of the consumer with the help of top-level management, and training in business creativity and relationship-building skills. Likewise, Tseng and Chiang (2016) found out that organizational culture and communication quality moderate the relationship between co-creation and development/completion of new products. Furthermore, Bartl, Füller, Muhlbacher, et al. (2012) discussed the role of managers' perspective in applying UI (in the form of Virtual Customer Integration). The author simultaneously highlighted the effect of managers' cognition, attitude, subjective norms and perceived behavioral control on the process of UI. Table 3 provides a summary of the most relevant contributions related to internal-to-the firm conditions of UI.

## **5. Discussion**

### ***5.1. Theoretical contribution***

Regarding the lack of well-defined theoretical foundation of UI concept (Bogers et al., 2010) we attempt to provide an overview of theoretical streams and their explanatory support for research on UI. Attempting to drive synthesized theoretical perspectives of UI, we identified four theoretical frameworks: user innovation, service-dominant logic (S-D Logic), process management and open

innovation perspectives. User innovation (52.1 percent) is the most applied perspective, followed by the S-D logic perspective (22.3 percent). We assume that classifying the papers in terms of theoretical perspective could provide a better and clearer picture of the phenomenon.

More than half of the studies are grounded purely on strategies to exploit the users' novel ideas in order to derive innovation in various firms. Based on the user innovation theoretical framework, innovating by individual users and user firms have replaced with producer innovation. A user innovator aims to benefit from the innovation by using it while, a producer innovator is a single, non-collaborating firm which benefits from selling the innovation (Baldwin & von Hippel, 2011). Studies grounding on UI theoretical basis focus strongly on the characteristics of users in the process of developing new products and services such as tracking down end users in sport field activities and products (Lüthje, 2004; Luthje, Herstatt, & von Hippel, 2005; Tietz, Morrison, Luthje, & Herstatt, 2005). Lead users started to gain considerable attention because of their specific characteristics including "high expected benefits" and "being ahead of the market trend" (von Hippel, 1986).

The former characteristic could be caused by heterogeneity and changing nature of customers and the latter one indicates that the costs of innovation are lower for users than manufacturers due to "stickiness" of preference information (von Hippel, 1994). Finding out that users seek other users to fulfill the innovation process, communities became popular in a decade corresponding the second wave and has turned into a strong strategy to able every single user to contribute in innovation activities of firms (Hiennerth, von Hippel, et al., 2014; van Oost et al., 2009). Why users often freely reveal their innovations has been searched by many scholars in various industries (Morrison, Roberts, & Midgley, 2004; von Hippel & Finkelstein, 1979). It has been responded that users benefit in a different way than they would by selling it.

The users acquire reputation (Lerner & Tirole, 2002), have the chance that the producer would be able to produce the innovation and sell it at a lower price than users' production costs (Harhoff et al., 2003), achieve fun and learning (Lakhani & Wolf, 2003), can increase the chance of getting revealed by some communities (Franke & Shah, 2003), provide benefit for other users (von Hippel & von Krogh, 2003), and when the opportunity costs are quite low, change the role and become producer to benefit from selling the innovation (Baldwin, Hiennerth, & von Hippel, 2006).

*Table 3. Articles reviewing internal-to-the-firm conditions*

<b>Categories</b>	<b>Author</b>	<b>Contribution</b>
Strategy-related papers	Kristensson et al. (2008)	-introduce the most important strategies for user involvement during NPD process -Provide guidelines for managers in order to implement a successful UDI with market orientation
	(Keinz et al., 2012)	-Stress that for harvesting user innovation strategy, processes, incentives and competencies should developed allow the focal producer firm to leverage the creative potential from a large number of users and to adjust the creative contributions with the corporate strategy -Provide a link between UDI strategy and organizational routines in order to develop such strategies - Argue that involving user needs to integrate changes in the human components with changes in the structural components of organizational design
Organization-related papers	Ojanen and Hallikas (2009)	-Emphasize that collaboration in innovation practices requires more extensive usage of explorative inter-organizational routines than traditional arms-length type -Highlight that organizational routines enable inter-organizational relationships to contribute to the driving forces prevent the restricting forces -Argue that the collaboration process needs inter-organizational learning and feedback mechanism to better performance of exploitation and exploration-related routines
	Agostini et al. (2016)	-Emphasis on integrating the external dimensions of connecting with users and the internal facet of the organizational context

Management-related papers		- Argue that combining internal and external processes effects radical innovation performance
	Foss et al. (2011)	-Introduce a model through which organizational practices mediate the interaction between firms and customers. -Give special attention to internal knowledge flow and motivation
	Ashok et al. (2016)	-Emphasize that translating user's ideas to radical innovations depends on the firm's internal potentials -Propose that the higher managerial effort such as investing in knowledge management (KM) practices develops the absorptive capacity
	Bengtsson and Ryzhkova (2013)	-Outline the management competences needed in different stages of innovation process within online innovation tools -Provide a holistic and integrative perspective on management issues related to implementation of online innovation tools -Show a detailed and managerially relevant view of the complementarities between external sourcing of knowledge and necessary internal competences like absorptive capacity
	Bartl, Füller, Muhlbacher, et al. (2012)	-Emphasize on role of managers' perspectives on the process of VCI -Show that managers identify future customer needs, form a broader decision basis, increase efficiency in gathering and use of customer information, and increased customer retention

S-D logic perspective has become more popular among studies due to the notable increasing number of service-oriented firms. In alignment, a high number of studies in the domain of UI overlaps with the holistic view of service science defined by Ostrom et al. (2010, p. 2) as “emerging interdisciplinary field of inquiry to drive service innovation, competition, and wellbeing through co-creation of value”. S-D logic brings a new perspective to service and co-creation and implies that value is co-created with the user and customer and is experienced and evaluated when the service is understood within the user's own context (Vargo, Maglio, & Akaka, 2008). Within customer-centric service organizations, the value is co-created with customers and it is not predefined and fixed in outputs, therefore, examining new

approaches that help to learn from and with customers in new service development is of crucial importance (Matthing, Sanden, & Edvardsson, 2004).

S-D logic perspective is a powerful theoretical lens that enhances the concept of customer engagement (Brodie et al., 2013) which directs to customers' perceived empowerment (Füller, Muhlbacher, Matzler, & Jawecki, 2009) and could be considered as a means to share the experience (Prahalad & Ramaswamy, 2004). Putting a step forward, Kristensson et al. (2008, p. 475) specified that firms need special strategies for involving the users in the co-creation process where we can see that the S-D logic and UI perspective overlap the most. The concept of service has changed from the variety of market offerings to creating value for customers. Hence, more scholars started to scrutinize the antecedents and consequences of collaborating with users and customers in developing new services. It is argued that customer involvement influence on new service performance by impacting on technical quality and speed of the development process (Carbonell et al., 2009).

Furthermore, some studies investigated areas pertaining to the methods and stages of user integration in service development process. The results of a study on user involvement in financial services organizations revealed that users can participate in ten stages of service development but among them user input is more significant in idea generation, service design, and service testing with the highest intensity in idea generation and screening and less intensity for the stages of test marketing and commercialization (Alam, 2002). In the similar vein, Edvardsson, Kristensson, Magnusson, and Sundstrom (2012) identified the dominant use modes which provide valuable information about different use situations (activities and collaborations at a specific situation) and different characteristics of users aiding service firms to integrate users.

Process management perspective concentrates on organizing and fine-tuning the new product development (NPD) process considering users as the sources of innovation. Etgar (2008, p. 98) defined



co-production a process that “consumers participate in the performance of the various activities performed in one or more stages of the production process”. More specifically Nambisan (2002, p. 392) indicated that “Customers can be involved not only in generating ideas for new products but also in co-creating them with firms, in testing finished products, and in providing end-user product support”. Moreover, Tietz et al. (2005) divided the process of UI into two separate phases namely idea generation phase which needs knowledge and experience as prerequisites and realization phase which requires tools, materials, time, and some kinds of incentives. Accordingly, the developed product is tested, changed and tested again in a single or several circle process.

It still remains somehow unclear how user input will be commercialized. Responding to this question, (Baldwin et al., 2006) proposed a model to transfer user innovations to commercial products which allow manufacturers look systematically at new product opportunities provided by users and user communities and set their business strategies. The model proposes that users first try to seek “design space” and then join the communities and freely reveal their ideas and get motivated by increased efficiency. However, user –purchasers appear in some points of the process and try to buy the copies of user-innovators which drive user-innovators to become user-manufacturers by using high-variable-cost and low-capital methods. In consequence, co-creating with customers brings positive results in different phases of NPD process including ideation, product development, commercialization, and post-launch phases for both the firm and the customer (Hoyer et al., 2010).

Very recently, Lynch, O'Toole, and Biemans (2016) introduced some metrics to better comprehend involvement of customers in NPD process and name them as rationale, structure, and process of customer network involvement which mostly put emphasis on the interaction of main parties rather than the locus of innovation. In addition, process management perspective seeks out the process of customers' and suppliers' integration. Lagrosen (2005) mentioned that cross-functional teams are necessary for a close

relationship between customers and suppliers enabling product development process and indicated on formal methods of customer involvement. Identifying different types of customers is of critical importance during the integration process and for this purpose, some studies put emphasis on the importance of detecting customers' perspectives, abilities, and also social identities during new product development (Brockhoff, 2003; Dahl, Fuchs, & Schreier, 2015).

As regards the final theoretical background, there are two opposing and competing definitions of open innovation that characterize the innovation literature. one provided by Chesbrough (2003), according to whom open innovation refers to a specific and planned strategy aimed at gaining novel ideas from outside and commercialize innovations. Based on this paradigm, companies try to exploit on purpose the innovation potential of customers, employees, partners and other interested innovators in order to accelerate their innovation process. On the other hand, another definition which is in line with this study is provided by Eric von Hippel who conceive open innovation as free innovation a situation in which all information related to the innovation is a public good non-rivalrous and non-excludable in contrast of definition provided by Chesbrough that refers to "organizational permeability".

Accordingly, open collaborative innovation is defined "the work of generating a design and also reveal the outputs from their individual and collective design efforts openly for anyone to use" (Baldwin & von Hippel, 2011). Corresponding the latter definition, communities act as contributors through which ideas are generated and the results expose to everyone to use it through a process called "freely reveal" such as open source software projects (Baldwin & von Hippel, 2011; David & Rullani, 2008; De Jong & von Hippel, 2009; Lakhani & von Hippel, 2003; von Hippel & von Krogh, 2003) and innovation-contest communities (Füller et al., 2014). Open collaborative innovation provides the opportunity for user contributors take responsibility for some works and others fulfill the rest (Baldwin & von Hippel, 2011)

Since the focus of this study is reviewing papers dealing specifically with users, the number of papers in the sample that grounded on open innovation is quite low. Open innovation literature classifies external stakeholders to individual contributors, extra-organizational groups, and wider network and ecosystem (Bogers et al., 2017). We only stress on the papers related to open innovation and similar strategies that consider user innovation as one specific channel for opening their innovation processes. In an open collaboration process, everyone such as suppliers, customers, designers, research institutions, inventors, students, hobbyists, and even competitors can participate (Pisano & Verganti, 2008). Battistella and Nonino (2012, p. 18) define the so-called open community “places where companies can find the collective intelligence of stakeholders' communities, capture outstanding ideas, and do crowdsourcing by fostering bottom-up innovation within or beyond organizational boundaries”.

They also found good strategies to motivate users to take part in such platforms. Building a case study at Get Satisfaction (a social media platform which enables various participants from all around the world share ideas about new products) Andersen and Mørch (2016), examined the process of mass collaboration through a platform in order to find out the pattern of interaction between end users and professional developers. They suggested 4 patterns of mass collaboration in mutual development containing 1) gatekeeping 2) bridge building 3) general development and 4) user-user collaboration. Crowdsourcing of ideas within a consumer product firm competing with professionals and users revealed that crowdsourcing is a good way to absorb user ideas which are highly important in terms of originality and customer benefit (Poetz & Schreier, 2012). Crowdsourcing and netnography which are open calls for ideas could be potential sources for identifying lead users (Brem & Bilgram, 2015).

## ***5.2. Limitations with Future research agenda***

UI is positioned within the broader management topic of open innovation that has been discussed comprehensively throughout the literature and was therefore not examined in detail in this paper.

Although this study covers a broad range of studies and themes it is possible that we have neglected some studies while searching in the database. Regarding the potential gaps founded in this study by reviewing a large volume of academic literature, we provide some directions for future studies to address gaps in relation to the discussed UI topics. Suggestions, at the strategic level research opportunities, can be found at the crossroad between strategy, business modeling and, UI. As recently discussed by (Baldassarre et al., 2017) more knowledge is urged on the interplay between business modeling, strategy and, dynamic capabilities. This is true also for UI studies. More theoretical contributions and further empirical validation are needed to understand how such different but complementary dimensions interact with each other in determining the success of UI strategies.

Further, we agree with (Kristensson et al., 2008) who claim that future studies need to explore deeper the surrounding factors (financial, being remote from R&D laboratories, relationship with R&D strategies) that enable specific UI strategies to succeed. At the organizational level, we see a huge research potential on the relationship between organizational design and UI, with particular reference to the theme of organizational structures and routines enhancing/hampering the deployment of UI strategies in firms. More research at the interplay between formal and informal organizations is also needed as suggested by (Foss et al., 2011) in order to better understand which organizational setting can better capture and take advantage of the knowledge and the results obtained from informal networks (such as communities of consumers). At the managerial level, we agree with (Ashok et al., 2016) on the need to come to a better understanding on how knowledge coming from users can be transformed into firm-specific capabilities and, specifically, what's the role of knowledge management in this process. In general, a deeper investigation is urged for what concerns approaches, practices, and processes used by organizations to manage UI processes.

As regards research opportunities in the domain of external-to-the firm conditions, we fully back (Ojanen & Hallikas, 2009) suggestion to carry out more empirical research on the role of industries and contexts - and their characteristics – in determining the success of UI strategies carried out by firms. Despite the research on users and their characteristics is nothing but scarce, we also see some potential in examining individual attitudes and behaviors more explicitly (Foss et al., 2011). In particular, a closer evaluation of the role of mindsets, the values, and the culture of individuals could enrich our knowledge on which micro-foundations better support the development of innovation capabilities in users. And, in turns, in firms.

### ***5.3. Conclusions and research implications***

Overall, this systematic literature review on UI and findings have shown that in a period of the tremendous growth of studies related to UI, the phenomenon investigated mainly from an “external” perspective so far. Because of this, a complete understanding of the internal preconditions favoring and supporting UI is still far to be achieved. This study has useful implications both for the academic community and the practice. Referring to academic implications, firstly, in our study we distinguished between scientific papers focusing on the external-to-the-firm conditions of UI and papers focusing on the firms’ internal conditions with more attention on the latter branch as an ignored part of the literature. we advanced knowledge about the importance of combining an external with an internal perspective in an attempt to provide a holistic view of UI and opens an interesting path for future research in this specific field.

Besides, theoretical contributions of studies in the literature was provided in response to the scarcity of a systematic argument associated with theoretical basis of UI. This review makes a unique contribution by enlarging the borders of the UI looking at different aspects of the phenomenon from user and innovation perspectives to environmental effects and firm-related angles. The paper holds some

managerial implications for firms that wish to engage users for innovation activities. Dealing with practical implications, reviewing the potentials and threats of UI processes in different sectors and industries will help managers to benefit from previous experiences of companies. Regarding the benefits of involving users in the process of innovations, managers should devote more effort to apply it along with a supportive internal environment. More specifically, our discussion has indicated that applying UI requires a firm to focus on formal and informal relationships, processes and procedures both within and across organizational borders.

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## **Paper 2**

# **The Firm Side of Collaborating with Users: A Systematic Literature Review**

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### **Abstract**

This paper reviews the literature on the internal dynamics of firm–users collaboration by bridging the literature on user innovation and the literature on open innovation. Despite abundant research in both streams in recent decades, the internal dynamics affecting full, effective implementation of collaboration with users have received limited scholarly attention. This study reviews the findings from 87 scientific articles focusing on the topic. Our findings allow identifying three main areas (strategic area, organizational area and managerial area) and the main research topics covered by the literature. Gaps and potential research opportunities in each area are identified and discussed. The paper contributes to the literature by providing a transversal perspective on the internal firm dynamics needed to enable and enhance the user collaboration strategies of firms.

**Keywords:** User innovation, strategy, management, organization, review.

## 1. Introduction

Firms increasingly rely on external sources of innovation to boost their product and service development and to remain competitive over time (Chesbrough, 2003). Users have been identified as one of the most valuable external sources of innovation during collaboration to develop new products and services (von Hippel, 1976, 1986). So far, academic research on user collaboration has mostly been developing in separate streams. On one hand, the open innovation (OI) literature studies firms' explicit, planned strategies to obtain novel ideas and technologies from the outside (inbound OI) and to empower the commercialization opportunities of internal ideas and technologies (outbound OI) to maximize the returns on innovation (Chesbrough, 2003). On the other hand, the user innovation literature (UI) takes a specific user-centric perspective and considers the processes by which users create new products and modify existing products, mostly for their own benefit (De Jong & von Hippel, 2009). The link between these two literature streams lies in users' role as providers of knowledge and ideas. Indeed, according to the UI literature, users can understand the strengths and weaknesses of products better than others, which can make them valuable collaborators for firms (Agostini et al., 2016). From an OI perspective, users are among the main sources of external ideas and technologies, which makes UI, according to Gassmann et al. (2010, p. 214) 'one of OI's best-researched part field'.

The growing interest in OI and UI has led to a rapid increase in the amount of literature dedicated to both topics. However, there is still a vague, fragmented understanding of the internal firm conditions that make possible—or simply more effective—the management of collaboration between firms and users (Bogers et al., 2017; Foss et al., 2005; Lichtenthaler, 2011). The aim of this paper is to provide an overarching perspective on the internal conditions necessary to properly organize and manage such collaboration processes. The intended contributions of the paper are twofold: to provide a comprehensive typology of the various internal factors associated with various studies on effective collaboration with users and to highlight gaps and further research opportunities in the literature.

The rest of this paper is organized as follows. In the next section, we provide an overview of research on the internal firm sources and processes of UI and OI. Then the research design is described: a search for and review of the literature from the past 19 years, followed by systematic categorization of 87 papers. The paper concludes with a discussion of the research gaps and opportunities.

## **2. Overview of the Literature**

Starting with the pioneering study by von Hippel (1976), the literature on UI has evolved in multiple directions (Ghasemzadeh, forthcoming 2019). Some of the literature has started to focus on lead users' characteristics and the motivations driving their proactive behaviour in innovating (Battistella & Nonino, 2012; Füller, Faullant, & Matzler, 2010; Herstatt & von Hippel, 1992; Magnusson, 2009; Urban & von Hippel, 1988). Another significant research stream has focused on the role played by communities of users and collaboration platforms in favoring the interactions between users (Franke et al., 2008; Füller, Hutter, Hautz, & Matzler, 2014). Other studies have attended to the content of the process of collaborating with users and, in particular, the different types of innovation produced by users, usually distinguishing between more or less radical innovations (Candi et al., 2016; Skiba & Herstatt, 2009). Finally, environmental factors affecting collaboration with users have also been scrutinized (Gales & Mansour-Cole, 1995; van Doorn et al., 2010).

The literature on OI started to gain attention later, but particularly since Chesbrough (2003) seminal work, it has expanded into many sub-fields. Some studies have investigated how firms collaborate with various stakeholders (e.g. suppliers, customers and partners) to leverage external knowledge, technology and resources for new product development (NPD; (Bahemia & Squire, 2010; Clausen, 2013). Others have examined the role of platforms and communities in this process (Dahlander & Gann, 2010; Füller et al., 2008). Other studies have dealt with the role of OI (Vanhaverbeke, Van de Vrande, & Chesbrough, 2008) in enhancing relationships between firms and policy-makers, the public sector and national and

regional systems of innovation (Freitas, Geuna, & Rossi, 2013). Taking a more firm-based perspective, some scholars have sought to understand how knowledge can flow inside and outside firms (Dahlander & Piezunka, 2014; Gassmann & Enkel, 2004; Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009) and what specific competencies trigger and support firms' OI strategies (Cassiman & Veugelers, 2006; Spithoven, Clarysse, & Knockaert, 2010).

In general, the literature on user collaboration has increased exponentially following the path of the diffusion of digital technologies, which have enabled and made more efficient and effective interactions with final users. The literature on internal dynamics needed for implementation of user collaboration has lagged behind. The discussion on the preconditions for interacting with external entities dates to the seminal work of Dyer and Singh (1998) discussing the roles played by relationship-specific assets, knowledge-sharing routines, complementary resources and effective governance in enhancing inter-firm collaborations. The debate later shifted to interactions with users. In particular, Nambisan, Agarwal, and Tanniru (1999) explored the various organizational mechanisms needed to enhance users' involvement in the information technology (IT) sector, including the ability and intention to explore a technology. The results (*ibidem*) showed that close interactions between staff and users influence technology recognition, and mechanisms such as IT steering committees, strategic IT planning teams and IT task groups boost users' intention to explore a technology.

After users started to spontaneously organize into online communities, academic studies began to address community members' ways of interacting and obtaining mutual recognition and cooperation (Hienerth, von Hippel, et al., 2014; Pisano & Verganti, 2008; Van Oost, Verhaegh, & Oudshoorn, 2009). In this vein, Dahlander and Magnusson (2008) stressed that firms need to embed explicit OI dynamics into their business models and to implement specific tactics to benefit from such cooperation. Additionally, the debate on technological enablers has highlighted the need to finetune knowledge-sharing mechanisms,

the cultural dimension, organizational norms and firms' heuristics to exploit the full potential of communities, social networking sites, wikis and blogs (Denyer, Parry, & Flowers, 2011).

Buganza, Chiaroni, Colombo, and Frattini (2011) showed that firms apply different level of interventions in their organizational structures to optimize collaboration with users either by devoting units to supervise and coordinate collaboration or conducting unstructured, informal processes and screening. In general, a proper organizational design is assumed to be necessary to absorb knowledge from outside and to exploit relative opportunities such as creating potential sources of revenue (Foss et al., 2013). The role of managers, of course, is central, as discussed in the literature (Bartl, Füller, Mühlbacher, & Ernst, 2012; da Mota Pedrosa, Välling, & Boyd, 2013). For example, managers reduce the not-invented-here (NIH) and the not-shared-here (NSH) syndromes among employees (de Araújo Burcharth et al., 2014).

Despite the increasing number of contributions, it is our opinion that the literature on the internal dynamics of user collaboration has not developed linearly or through a process of progressive knowledge accumulation. To the contrary, we see scattered contributions referring to different theories and research streams that hardly contribute to a common topic. This situation presents a need for a systematic literature review.

### **3. Research Design**

Following Tranfield et al. (2003), we conducted a systematic literature review to bring together various research streams, theoretical advancements and empirical evidence. We found articles by using the Web of Science (WOS). Given the focus on firm-level factors, we searched for combinations of keywords representing user collaboration, UI, OI and internal firm dynamics. The first group of search keywords included user innovation, user-driven innovation, open innovation, free innovation, co-creation and user collaboration. The second group of keywords referred to internal dynamics (synonyms of dynamics, capabilities and abilities), organizational routines, process management and strategy related issues.

Regarding the significance and influence of management journal articles in the field of management (Podsakoff, Mackenzie, Bachrach, & Podsakoff, 2005), we limited our review to peer-reviewed journal articles and excluded books, book chapters, conference papers and other types of publications. Our research yielded a total of 150 possibly relevant articles. We then went through all the contents of every article to exclude non-relevant ones using the following inclusion and exclusion criteria:

- We excluded studies on OI that did not specifically consider users and customers as main external sources of collaboration.

- Studies that focused on the topic but did not provide any significant contributions to the management field were also excluded (e.g. studies focusing on users' role in IT and health sectors but making no references to strategies, organizational dynamics and managerial processes).

- We excluded studies that dealt with external factors such as ecological, environmental and external technological dynamics that affected users and OI but did not contribute to internal dynamics.

- We excluded studies focusing on the effects of internal dynamics on innovation in general, namely, service-encounter-based innovation, without any contributions from users or customers.

This process left 87 articles published between 1999 and 2018. The peak was the year 2017, with 15 published articles, closely followed by 2018, with 13 articles. These figures testify to the current popularity of the topic and debate. The articles we reviewed were published in 46 different journals. Table 1 presents a list of the articles and their descriptive characteristics.

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Table 1 here

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## **4. Classification of the Articles**

After reading all the papers, we organized them into three main research streams: first, strategic issues in firms; second, organizational dynamics; and third, managerial aspects. Each stream was also organized into sub-streams to get a more precise view of the internal dynamics facilitating and impeding the implementation of OI and UI and to recognize potential gaps pointing to needs for further investigation.

### ***4.1. Strategy-Related Papers***

Strategy is the backbone of an organization determining its future. Having a strategic route is necessary during external cooperation to achieve high business performance and sustain a competitive advantage (Cheng & Huizingh, 2014). We classified strategy papers into two sub-streams: (1) business model strategies; (2) search and involvement strategies.

#### ***4.1.1. Business Modelling***

The concept of developing a business model for user collaboration activities was introduced to the literature by the seminal work of Chesbrough and Appleyard (2007). Since Van der Meer (2007) identified the absence of an appropriate business model as a challenge to OI, few scholars have started to address this issue. When applying OI, the most pertinent issues for firms are the design of an open business model, attainment of competitive advantage and value capture, and presence of OI in a portfolio with dynamic capabilities (Ghezzi, Balocco, & Rangone, 2016). Consequently, different practical strategy archetypes for innovation management can serve as means to successfully balance OI with firms' general business strategy. When applying the opportunity-seeking prospectors' archetype, firms consider a broad range of OI activities. The dual-oriented analyzers archetype is useful when firms intensively collaborate with external partners and can moderate and, therefore, adapt their degree of firm openness.



Finally, the market-segment-securing defenders archetype emphasizes the use of a few OI activities by closed innovation firms to increase efficiency (Bader & Enkel, 2014).

In an attempt to comprehensively characterize the business models of various OI strategies, Saebi and Foss (2015) have identified a framework for the breadth and depth of the inbound OI in the content, structure and governance dimensions of a business model. In this regard in the market-based innovation strategy, market gains provide knowledge input for the innovation. The crowd-based innovation strategy is appropriate for collaboration with a large number of actors including contests and user communities. As such, the collaborative innovation strategy involves a few knowledge-intensive partners such as lead users.

Finally, the network-based innovation strategy engages and sustains a network of relationships with various external parties. In this investigation of various inbound OI frameworks, Saebi and Foss (2015) found that, OI strategies dealing with highly diverse external sources need more governance, while deep collaboration with few parties needs a more mutual exchange of knowledge. Additionally, communities are giving extensive attention to collaborating with a huge number of users, and researchers have sought to identify strategic decisions regarding making use of knowledge within such communities. Taking free and open software as an example, Dahlander and Magnusson (2008) identified tactics for the three dimensions of a business model: accessing, aligning and assimilating, which, respectively, refer to spreading the firm's resource base, creating a connection between the firm's strategy and the community and in the end integrating and assimilating the work of the communities.

A set of studies has attempted to focus more on the features and dimensions of user-centric business models. Keinz et al. (2012) proposed a group of strategies to overcome internal resistance when implementing user-centric business models in established firms. The first strategy includes implementing primarily experiments without obligatory standard processes to control the NIH syndrome and

organizational barriers such as inertia. The second strategy is to spread successful stories of user integration among employees. In the final strategy, firms apply softer measures to evaluate the success of UI initiatives. Very recently, there has been an interest in sustainable business models for user-driven innovation. Baldassarre et al. (2017) explained that the creation of sustainable value propositions through products and services takes place in a lengthy, repetitive process of talking, thinking and testing. This observation emphasized the importance of understanding user needs and inspiring users by involving them in the development of value proposition.

Similarly, Tolkamp, Huijben, Mourik, Verbong, and Bouwknecht (2018) elaborated the concept of user-centered sustainable business models and evaluated the impacts of user-driven approaches on the business models of some energy-efficiency firms. The findings of their work indicated that any element of a business model could be altered after user involvement. The most incremental changes were based on value propositions of mostly non-financial values such as safety, social cohesion and comfort. Deeper participation such as face-to-face interactions caused more radical changes to the business model. However, the authors claimed that it is still not clear whether user-centered approaches to business model design will result in more marketing success for understudied firms.

#### *4.1.2. Search and Involvement Strategies*

Searching for and adopting innovative knowledge from the external environment has become an essential component of firms' innovation strategies (Balka, Raasch, & Herstatt, 2014). The first step to gain innovation from external sources such as users is to search for and identify potential collaborators. Laursen and Salter (2006) sought to extend the understanding of the role of search strategies, particularly search breadth and depth, in shaping open innovative performance. Indeed according to the results of this study, firms need to control the costs of search strategies and change search strategies in the face of challenges to achieve better performance. In addition, West and Bogers (2014) described the balance

between the costs and benefits of acquiring knowledge from external sources in relation to the breadth and depth of search strategies. Moreover, Sofka and Grimpe (2010) examined the search strategies of firms within an OI context, focusing on the underlying structures of specialization in firms' search strategies; in particular, they argued that the effectiveness of market-oriented search strategies is moderated by research and development (R&D) investments, while potential knowledge spillovers from outside the firm moderate the effectiveness of search strategies at realizing innovative performance.

In this vein and inspired by Garriga, Von Krogh, and Spaeth (2013), search strategies are affected by firms' context, particularly their resources and available external knowledge. Thus, firms willing to apply deep and broad search strategies need to consider their resource limitations as fewer constraints enable deeper search strategies, and when such restraints are increased, broader searches are needed. Search strategies also depend on the type of innovation (incremental or radical) tracked by firms. Firms apply various innovative technologies to search for innovative users, including online communities (Dahlander & Frederiksen, 2012; Hiennerth, Lettl, & Keinz, 2014), Internet platforms (Rayna, Striukova, & Darlington, 2015) and toolkits (Franke et al., 2008; Füller et al., 2010; von Hippel & Katz, 2002).

Firms implement fixed strategies to involve and co-create with external parties, particularly users. Co-creation is defined as the 'involvement of the customer as an active collaborator right from the beginning of the innovation process' (Kristensson, Matthing, & Johansson, 2008). Firms, therefore, should help users understand their latent needs, consider their situations, provide opportunities for them to play various roles, use analytical tools and experience the apparent benefits resulting from the collaboration and ensure enough heterogeneity among users. Specifically, tactical decisions need to be fixed for the co-creation process to aid firms in developing co-creation strategies. Decisions to be made include consumers' choices and selection of facilitating mechanisms and the NPD strategy for co-creation (Roberts & Darler, 2017). Eshet, de Reuver, and Bouwman (2017) studied the role of organizational

strategy in user-centered design (UCD) and identified two strategic decisions involved in UCD: cost-leadership and innovation-focused strategies, with the former (cost-leadership) focusing on the economic scope of users' engagement, and the latter (innovation-focused) on activities that facilitate deeper engagement, such as conducting contextual interviews and focus groups, observing users and analysing data on users to develop more organizational work practices committed to UCD.

## ***4.2. Organization-Related Papers***

Another significant research stream addresses firms' internal organization while collaborating with external parties. Precise organizational requirements should be regarded as derived from open and closed innovation, which have different organizational implications (Herzog & Leker, 2010). Organization topics are categorised into four areas: (1) organizational design; (2) organizational practices and routines; (3) culture and climate; and (4) micro-foundations.

### ***4.2.1. Organizational Design***

A pioneering study by Sapolsky (1967) considered the design and redesign of the organization as a challenging issue. Researchers have offered various organizational design structures for collaborating outside the firm. Keinz et al. (2012) addressed the appropriate organizational design for various UI strategies and introduced UI strategies for firms: the searching strategy (lead-user method), harvesting strategy (innovation contests), cooperation strategy (lead-user method and expert circles) and ecosystem strategy (toolkits and co-creation with communities). These authors simultaneously highlighted that to implement such strategies, changes need to be made to both the human and the structural components of the organization design. More specifically, searching and harvesting strategies require changes in human components, the former in processes, incentives and competencies to leverage the innovative potential from many users, and the latter in collaboration in an exclusive circle. For cooperation strategies, firms

adjust their structures to achieve radical innovation and assign some employees to manage relationships with lead users and external parties. Ecosystem strategies require major changes in structural components, such as creating organizational units to manage communities and shaping coordination and control mechanisms. For instance, the LEGO Company provided collaborative infrastructures and facilitated a collective process by developing a shared vision and protocols to leverage user ecosystem strategies.

Scholars have identified seven characteristics that should be considered when designing a structure to create a favourable environment for customers: 1) specialization: more varied tasks should be assigned to members of organizations to enhance information seeking and learning with customers; 2) configuration: an emphasis on flat structures creates opportunities and facilitates advantage-seeking behaviors in relation to external knowledge; 3) incentives system: in-house incentives and initiatives motivate employees; 4) formalization: clear responsibilities and job descriptions facilitate collaboration with customers; 5) decentralization: subordinates take part in high-level decision making, thereby increasing valuable internal information and the number of external recipients; 6) coordination: the interactions of committees, boards and teams are institutionalized to facilitate the vertical and lateral exchange of knowledge; and 7) culture: openness is positioned as a social and cognitive state within the organization (Piller & Ihl, 2009). Regarding these key factors, Foss et al. (2013) identified decentralization and coordination as necessary components of organizational design for firms to absorb knowledge from external sources. Decentralization refers to spreading decision making throughout the organization, while coordination refers to the internal employee communication mechanisms.

Relational qualities and ongoing collaboration by actors are among the challenging aspects of collaborative innovation. The fundamental design principles of collaborative and OI, therefore, hold the potential to offer creative solutions through creating diversity among participants and providing multiple

identities to guide people in certain ways. As well, an appropriate design increases the awareness of others' needs, unites people and positions participants as the creators of collaboration, letting them discuss its prospects and presumptions (Ollila & Yström, 2016).

Additionally, identification and appointment of key persons are necessary, significant factors in organizational designs. Accordingly, Chiaroni, Chiesa, and Frattini (2011) discussed the major dimensions, particularly organizational roles, that need to be changed when implementing OI and emphasized the formation of organizational roles such as champions who steer the process of adoption of OI and gatekeepers responsible for managing the firm's interactions with external parties (Lazzarotti, Manzini, & Pellegrini, 2011). For instance, in Wikhamn and Styhre (2017) study on a pharmaceutical corporation, a senior manager implemented OI as a champion to provide support for change. Gatekeepers can also enlarge the company's external network and move it from unfreezing of status quo towards OI by allowing clients to access their experience and make use of their networks (Zynga et al., 2018). Accordingly, Lazzarotti, Manzini, and Pellegrini (2015) emphasized the importance of internal communication and cooperation to enhance the effectiveness of OI practices by stressing the roles of change agents and cross-functional teams as facilitators of collaboration.

#### *4.2.2. Organizational Practices and Routines*

The process of collaborating with external partners requires internal adoption of planned behaviors, specific practices and organizational rules. Organizational routines are defined as 'repetitive, recognizable patterns of interdependent actions involving multiple actors' (Feldman & Pentland, 2003, p. 96). A pioneering study in this stream investigated the (internal) level of coordination needed to cope with (external) partners and found that internal cooperation is a coordination mechanism for external cooperation as internal and external cooperation behaviors interact (Hillebrand and Biemans (2004).

Hillebrand and Biemans (2004) also suggested that internal cooperation assists in distributing, interpreting, exploiting and assessing new knowledge from external parties.

Routines are essential to ease inter-organizational knowledge sharing and learning, which positively influence customer-oriented innovation collaboration. The most common underlying routines are training clarification and grounding the need for innovation in the organization, enhancement of information and knowledge transfer, improvement of leadership at all levels, regular forums on OI, knowledge and experience sharing, securing of trust at the individual level and boosting of collaboration partners' technological knowledge through creating new idea banks and partner feedback (Ojanen & Hallikas, 2009). Organizational procedures are used for coordination and integration of ideas from both inside and outside the firm. As such, organizations characterized by low uncertainty need informal screening and evaluating systems supervised by the head of the R&D unit, while firms with high uncertainty should follow more formalised and structured processes (Buganza et al., 2011).

Specifically, new organizational practices to leverage users' and customers' knowledge represent new communication channels, reward systems and approaches to the delegation of responsibilities as discussed in the study by (Foss et al., 2011). Based on the results of their study, the more an organization interacts with customers, the more it delegates decision-making to employees and consequently uses more knowledge incentives and internal communication between departments and between management and employees. Organizational norms and practices play a role in OI and firm performance (Rass, Dumbach, Danzinger, Bullinger, & Moeslein, 2013). In particular, they found that extensive use of organizational norms and practices allows employees to freely decide how to interact with external stakeholders in firms adopting OI strategies that result in higher innovation performance. Khanagha, Volberda, and Oshri (2017) discussed how initiatives in systems, processes and practices affect co-creation with customers. Such activities can take the forms of new intra- and inter-departmental

communication structures, tasks and responsibilities, experimental rules and procedures, and regular updates to elements of organizational structure.

Furthermore, setting clear objectives and providing sufficient autonomy to external partners increases firms' organizational learning capability, ultimately moderating the effectiveness of OI (Shi & Zhang, 2018). More precisely, according to Agostini et al. (2016), autonomy and internal networking are two vital elements in the organizational context to leverage users' contributions to radical innovation. Autonomy draws on individuals' fundamental belief systems and values to increase their sense of belonging to an organization and improve their creativity and commitment. Hence, organizations try to develop subordinates, push decision making to the lowest level and provide employees with the information necessary for decision making. Likewise, practices useful to provide autonomy include bridge building to gather together people with different backgrounds and knowledge levels, encouraging radical innovation teams to tap into the knowledge in the organization at any level and establishing network ambassadors to connect radical innovation teams with other internal members. Similarly, Burcharth, Præst Knudsen, and Søndergaard (2017) stressed that internal organizational activities that promote employees' autonomy are mediators of OI performance. To derive economic results from OI activities, therefore, firms should ensure employees' autonomy by allowing them to work independently and choose the problems to work on and giving them time for creativity and intrapreneurial activities.

#### *4.2.3. Culture and Climate*

Organizational culture is a significant determinant of successfully benefiting from external sources of innovation (West & Bogers, 2014). Culture is defined as the 'values, norms, attitudes, and behavior patterns, etc., that form the core identity of an organization or of its sub-units' (Herzog & Leker, 2010, p. 324). A review on the capability framework of OI by Hosseini et al. (2017) showed that culture consists of OI attitudes and behaviors, OI risk attitudes, leadership attention and Internet Protocol (IP)



management norms, although these have been less discussed in the literature. According to Roberts and Darler (2017); Tseng and Chiang (2016) and based on a case study on Procter & Gamble's connect-and-develop (C&D) strategy revealed that cultural changes are necessary to move towards OI. One staff described the C&D as like a way of life with an associated mindset (Dodgson, Gann, & Salter, 2006). A vigorous organizational culture reinforces inter-organizational cooperation, facilitates organizational goals, encourages employees and is regarded as an essential element that enhances the relationship between co-creation and NPD.

Herzog and Leker (2010) empirically examined cultural factors including organizational risk and management support of open and closed units. The results of their study contribute to the literature by implying that open units have more positive attitudes towards attracting external knowledge. They also showed that open units are more willing to take risks and have stronger management support even if it still seems neutral. Regarding inertia within firms, network inertia refers to the degree of dependence on past dyadic relationships and negatively moderates the relationship between OI and radical innovation performance. Cognitive inertia, or the accumulation of success knowledge, positively moderates the relationship between OI and radical innovation performance by accumulating new ideas, information and methods. Firms, therefore, need to align their inertia with different inbound OI activities to successfully implement radical innovation and should mostly focus on exploiting technologies and information outside their local industry (Shi & Zhang, 2018).

A supportive culture also involves organizational attitudes towards UI and OI. More specifically, Agostini et al. (2016) measured cultural factors such as the extent to which organization members are encouraged to come forward with ideas, support for firm entrepreneurship, support from top management and the importance of radical innovation for long-term survival and concluded that strong organizational

attitudes positively and significantly moderate the relationship between UI and radical innovation performance.

In the literature, a climate for innovation has been defined as ‘an environment that promotes the development and implementation of ideas on a productive setting’ (Bogers, 2018). A creative climate is necessary to implement OI and can arise from offering employees time and resources, rewarding employees, forming separately skilled teams with free, open communication, and creating an atmosphere for employees to discover non-routine, challenging work. Formal and informal cross-functional meetings and cross-fertilisations also inspire creativity and innovation, resulting in a creative climate in the OI context (Yström, Aspenberg, & Kumlin, 2015).

#### *4.2.4. Micro-foundations*

OI and UI exist at the firm level only when enacted at the individual level. A body of studies has examined the individual-level foundation of the OI and UI processes otherwise taken for granted in the literature (Gassmann et al., 2010; Hosseini et al., 2017). Firms can shed light on various organizational levels by considering and understanding the micro-level foundations of individual natures, choices, abilities, heterogeneity and motivations (Felin & Foss, 2005). Few studies in the literature have investigated such factors despite the call from Foss et al. (2011) for deeper inquiry into individual behaviours to leverage customer collaboration. Scholars have recently paid more attention to the human side of OI. Ahn, Minshall, and Mortara (2017) investigated chief executive officers’ (CEO) characteristics, particularly positive OI attitudes, entrepreneurial orientation, patience, education and experience in different OI modes. Among these characteristics, patience and education are positively connected with inbound OI, which can also be highly crucial to UI processes within firms. Similarly, a study on the impacts of managers’ characteristics on virtual customer integration (VCI) in NPD demonstrated that managers normally show positive reaction to VCI, however having positive attitude

towards VCI is not sufficient to take action. Among other elements affecting VCI, cognitive judgment, perceived social norms and perceived behavioural control have significant bearing on managers' intentions to collaborate with outside of the firm (Bartl, Füller, Mühlbacher, et al., 2012). Open-mindedness and self-motivation are two other managerial characteristics required for external collaboration (da Mota Pedrosa et al., 2013).

Moreover, employees' attitudes shape firm-level decisions and are regarded as vital micro-foundations of firms' innovation capabilities (Teece, 2007). Other studies have examined the crucial role of employees and their personalities in external collaboration. In an empirical study, Rangus and Černe (2019) showed that employees' openness to others increases respect among employees and stimulates collaboration and knowledge and idea exchanges, thereby improving innovation behaviour. Most recently, the results of a survey on the role of employee diversity in firm-level openness highlighted that diversity in educational backgrounds improves firms' ability to use external knowledge resources; however, work history lacks importance (Bogers, Foss, & Lyngsie, 2018). The NIH and NSH syndromes are the most widespread negative attitudes on sourcing external knowledge. NIH refers to judgmental and protective attitudes during the evaluation of outside knowledge, and NSH refers to employees' negative feelings regarding the exploitation of knowledge within the firm (de Araújo Burcharth et al., 2014).

#### ***4.3. Management-Related Papers***

Firms face managerial challenges to integrate novel ideas and new products suggested by users into their development and operational units (Bengtsson & Ryzhkova, 2013). Detailed innovation management activities augment firms' capacity to identify, adapt and exploit external knowledge contributions (Salge, Bohné, Farchi, & Piening, 2012). We classified this cluster of studies into three areas: (1) managerial

competencies and processes; (2) networks and networking capabilities; and (3) absorptive capacity and knowledge management (KM).

#### *4.3.1. Managerial Competencies and Processes*

Managerial competencies are ‘activities, knowledge, skills or attitudes and perhaps also personal characteristics necessary to improve management performance’ (Martina, Hana, & Jiri, 2012, p. 132) that can be applied through a variety of managerial mechanisms. In a seminal work, Nambisan et al. (1999) created a framework of different classes of managerial mechanisms for users’ innovation in the IT sector, including customer support units, user groups, user labs and relationship management. They further indicated that a mix of these mechanisms enhance all three dimensions of users’ propensity to innovate: technology cognisance, ability to explore and intention to explore a technology.

More generally, Piller and Ihl (2009) identified the competencies required for OI activities: 1) disclosure competence to reveal the required information about NPD with selected customers and the general public; 2) appropriation competence to capture the co-produced knowledge from customers and protect it against free-riders; and 3) integration competence to incorporate new knowledge co-produced with customers into the NPD process. Bengtsson and Ryzhkova (2013) expanded these competencies through a case study of online communities and suggested beneficial practices for each set of competencies. Disclosure competence can be exercised through feedback systems, contests, events and recruitment and motivation of expert users. To overcome appropriation challenges, firms need to offer transparent compensation and rewards. Concerning integration competence, firms can professionally rank users’ ideas and hold regular meetings with business unit managers to integrate users’ contributions into the organization and product portfolio. Such managerial practices enable firms to benefit from external knowledge at different stages of the innovation process (*ibidem*).

Top management is responsible for creating a favourable environment to support co-creation (Lazzarotti et al., 2015; Roberts & Darler, 2017), managerial attention, therefore, is required in terms of senior managers' perceptions and involvement with the aim to secure the provision of sufficient resources and increase organization members' willingness to participate in customer co-creation (Khanagha et al., 2017). Dividing the OI process into three stages (exploration, transformation and exploitation), da Mota Pedrosa et al. (2013) stressed the important role of managerial practices in the transformation process as managers engage in formal and informal meetings and attempt to understand their organizations' capabilities and language to overcome members' resistance to unfamiliar knowledge and to exploit transformed knowledge.

#### *4.3.2. Networks and Networking Capabilities*

Organizations need networking abilities to ease communication with outsiders such as communities of users and customers and to absorb their knowledge. Network competency has been defined as 'tasks that need to be performed to manage a company's technological network and the qualifications, skills, and knowledge that are needed to perform these tasks' (Ritter & Gemünden, 2003). Tseng and Chiang (2016) underlined the importance of communication skills as a moderator between the co-creation and NPD. They mentioned that firms should spend more time communicating with customers as equal partners and focus on specific kinds of content (Tseng & Chiang, 2016). Regarding the nature and extent of external communication, Stanko and Bonner (2013) specified that to have effective relationships and communication with customers and to shape their future needs, two important inter-organizational elements are relational embeddedness and knowledge redundancy.

As such, knowledge redundancy refers to the degree of similarity in parties' knowledge, and relational embeddedness consists of the degree of closeness and reciprocity between firms and customers involved in NPD. The research results show that relational mechanisms enhance trust and willingness to share,

leading to higher innovation performance. However, knowledge redundancy, although helps to know customers' needs, leads to repetitive routines and can be a source of inertia in the firm. Inbound OI has the dimensions of breadth, depth and ambidexterity. Breadth refers to opening up to many types of external parties, depth refers to the level of integration, and ambidexterity consists of both new and longstanding relationships (Bahemia & Squire, 2010). As well, in this context and grounded in organizational learning and social networks, Chiang and Hung (2010) noted that firms seeking incremental innovation performance need to engage in strong, deep, frequent contacts with a particular group of external partners, but to achieve radical innovation, firms need communicative routines with many external parties.

In recent years, communities and platforms have become undeniable tools for engaging with numerous users and customers. Nevertheless, the relationships between firms and such communities and how firms' capabilities can manage and orchestrate these communities have been little studied. A study on the interrelationships between firms and their user communities by Parmentier and Mangematin (2014) suggested three features to manage innovation with user communities: 1) opening up firms' boundaries to involve users; 2) opening up product and service boundaries to increase and improve users' creative abilities while also reducing and redesigning intellectual property rights; and 3) opening up identity boundaries to create common identities and present firms as community-friendly organizations. Tensions commonly arise between firms and communities. Lauritzen (2017) identified three types of tensions: (1) power tensions in the innovation process between control (inside) and openness (outside), which can be managed through communicating mixed messages to participants and giving them special rights; (2) competence tensions between professionalism (inside) and personality (outside), which can be controlled by assigning an expert role, as well as professional duties, to participants in communities, creating personal relationships and applying the firms' discipline and guidelines; and (3) identity tensions

between group (inside) and individuals (outside), which can be reduced by setting common goals, individual interests and shared norms that oppose NIH problems.

By applying optimal openness, firms leverage community members' contributions to the innovation process. Accordingly, firms make sure that community members feel a sense of affiliation and identification by building a transparent design. At the same time, accessible design enhances members' feelings of competence and autonomy by giving them options, choices and replicability, enabling them to independently produce copies of the design (Balka et al., 2014).

#### *4.3.3. Absorptive Capacity and Knowledge Management*

A large body of studies has described the role of absorptive capacity and KM in OI and UI strategies. According to Cohen and Levinthal (1990), firms with high levels of internal absorptive capacity are more likely to successfully use innovation from external sources. Absorptive capacity refers to firms' ability to identify the value of new external knowledge and adjust and apply it to commercial goals and use (Spithoven et al., 2010). Absorptive capacity increases the effects of external knowledge on innovation performance and commercialization of that knowledge (Fabrizio, 2009; Rothaermel & Alexandre, 2009). Cohen and Levinthal (1990) further argued that absorptive capacity integrates customers' solutions into firms' NPD process and sees internal R&D as a proxy for integrating new ideas and solutions. However, (West & Bogers, 2014) discussed conflicting ideas regarding the role of internal R&D in the relationship between absorptive capacity and effective external sourcing. Most studies have seen internal R&D capacity and external sources as complementary (Ceccagnoli, Graham, Higgins, & Lee, 2010; Laursen & Salter, 2006), whereas a small group of studies has viewed internal innovation resources as impediments to external sourcing of innovation (Chesbrough & Crowther, 2006; Witzeman et al., 2006).

To enhance firms' absorptive capacity, Piller and Ihl (2009) proposed three competencies to boost the success of OI and stated that firms need disclosure competence to share information with users and customers, appropriation capability to seize the co-produced knowledge from customers and protect it against free-riders, and integration competence to integrate various inputs into a single solution and ultimately firms' NPD process. Spithoven et al. (2010) investigated how traditional firms deal with their lack of appropriate absorptive capacity. Based on the study results, research centers function as technology intermediaries that help build absorptive capacity by performing knowledge exploration, knowledge agency, knowledge intelligence (e.g. gatekeeping, technology watching and road mapping) and knowledge repository activities (e.g. technical libraries and study days).

KM capacity, or 'firms' ability to manage its knowledge base over time', is needed to coordinate knowledge processes and to renew firms' knowledge base to maximize their absorptive capacity (Lichtenthaler & Lichtenthaler, 2009, p. 1315). Research has shown that more managerial efforts through investment in KM are needed to translate potential users' ideas into radical solutions; consequently, KM is crucial to capture and convert external learning into firm-specific capabilities (Ashok et al., 2016). Accordingly, the KM system is considered to be a managerial tool necessary to adopt OI to foster the distribution, sharing and transfer of knowledge within the firm and between the firm and external environment. In more detail, the KM system includes the use of a technological platform and ICT tools and the implementation of IP management systems (Chiaroni et al., 2011). Additionally, in a case study in the public transport sector, Sindakis, Depeige, and Anoyrkati (2015) explored the role of KM practices in supporting customers' needs known as customer-centered KM and highly recommended that firms in this sector focus their KM methods and tools on the knowledge needs of their customers and prospective users.. Customer KM results in radical innovation by boosting organizational learning ability, particularly exploratory learning, because customers prefer to provide specific solutions instead of communicating their exact needs (Wang & Xu, 2018).



Regarding the importance of efficient management and execution of OI in firms, Casprini, De Massis, Di Minin, Frattini, and Piccaluga (2017), in a case study of a family firm, identified two capabilities to overcome obstacles to knowledge acquisition and transfer. The family firm suffered from a lack of intra-firm formalization in transferring knowledge, particularly difficulties observing employees' communication skills (Casprini et al., 2017). Family firms, therefore, need to share their values and approach to knowledge and establish stable, long-term relationships with employees and outside partners by building trust in social interactions (Casprini et al., 2017). Managers can facilitate exploring and exploiting knowledge by establishing a conducive culture and structure and encouraging technology usage to accelerate decision-making through successful KM to achieve OI goals (Naqshbandi & Jasimuddin, 2018).

## 5. Discussion

This paper was aimed at exploring the internal firm dynamics and capabilities needed to collaborate with users. Table 2 provides a summary of the main studies organized by the streams identified. Following this same structure, we discuss the main contributions of these studies, identify research gaps and highlight possible future research opportunities.

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Table 2 here

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Strategy-related papers are the least diffused type of studies in the literature. Despite several calls for deeper investigations of strategic aspects of user collaboration (Bogers et al., 2017; Chesbrough & Appleyard, 2007; Hosseini et al., 2017), the literature still suffers from a lack of theoretical and empirical evidence. Among the strategic themes, business modelling is quite popular. Research has focused primarily on the themes of opening up business models (Ghezzi et al., 2016) and the effects of various

collaboration strategies on the structure and governance of business models (Saebi & Foss, 2015). The theme of creating user-centric business models from scratch is still underdeveloped (see (Hienerth, Keinz, & Lettl, 2011)).

A strong emerging research stream combines sustainability, circular business models and user-driven innovation. This literature is focused on the energy and environmental protection sectors (Abdelkafi & Hansen, 2018; Baldassarre et al., 2017; Tolkamp et al., 2018) but is likely to expand quickly to other sectors for several reasons. In general, there is a need to further deepen the linkage between user collaboration and business modelling, especially user-centric business models (Bogers et al., 2017). The literature has mostly focused on value-creation mechanisms (e.g. value propositions). More research is needed on the value-capture phase and the ways in which firms align open business models with the outcomes of value creation and capture (Randhawa, Wilden, & Hohberger, 2016), particularly revenue models and key resources and activities. Furthermore, we should note that the long-term effects of user-centric business models and their associated success factors associated have not yet been investigated (Keinz et al., 2012). Thus, there still is a need for detailed quantitative and qualitative exploration of the competitive dynamics of user-centric business models in user platforms, communities, contests and numerous user collaboration strategies.

As regards organization-related papers, our review identified four sub-streams related to the organizational factors needed to implement collaboration practices. The most well-developed theme is the role of organizational structures and design in facilitating collaboration with external users. Organizational changes in both the human and the structural dimensions are needed to implement various collaboration strategies (Keinz et al., 2012). Most authors have pointed out that that specialization, particularly creating specialised organizational units and configurations, can help simplify information and advantage seeking from outside the firm (Buganza et al., 2011; Piller & Ihl, 2009). It is also essential

to make decentralization and coordination available within the firm to spread decision making and ease internal exchange knowledge (Foss et al., 2013; Ollila & Yström, 2016). Nevertheless, further research is still needed to address the alignment between the degree of formalization of internal (firm) communication and relationships and external collaboration. Accordingly, research could address the fit between the firm's structure and the external collaborative environment in a typical contingency perspective (Lawrence & Lorsch, 1967).

Moreover, the literature has discussed the roles of key individuals—including champions, gatekeepers and change agents—in easing cooperation with external parties (Chiaroni et al., 2011; Lazzarotti et al., 2011, 2015). Further research could investigate the roles of other key individuals, particularly knowledge gatekeepers with responsibility for knowledge interpretation boundaries, which are an emerging obstacle to external collaboration (Wilhelm & Dolfsma, 2018), and organizational sponsors with responsibility for project management to overcome obstacles and lead organizations' members (Tidd & Bessant, 2018).

Studies have also considered various inter-organizational practices and routines, such as leadership improvement programs, training programs in general, experimental rules and processes, employee autonomy, use of evaluating systems, delegation of responsibilities, and the impacts of such practices on collaboration with users (Agostini et al., 2016; Foss et al., 2011; Khanagha et al., 2017; Ojanen & Hallikas, 2009). The topic of internal organizational practices and routines requires more attention as it is perceived as one of the most important elements required to organize collaboration with users. Future research could investigate the processes to resolve external and internal conflicts and ambiguity, especially among users. Another potential research topic is how to improve structured approaches to increase the clarity of different functional elements in the process of collaborating with users, including cross-functional teams. In addition, few studies have addressed specific organizational practices to embed digital technologies at different levels of firms, which are making significant use of digitalization

to collaborate with different stakeholders, especially platform users. Regarding the increasing emphasis on the sustainability of OI and UI strategies, more investigations of the organizational capabilities and procedures required for sustained employment of user collaboration strategies are needed.

Additionally, organizational culture is widely seen as a determinant internal factor in the literature. Research on organizational culture has strongly concentrated on OI attitudes, behaviours and risk attitudes (Hosseini et al., 2017); the atmosphere resulting from the NIH and NIS syndromes (Herzog & Leker, 2010); organizational inertia (Shi & Zhang, 2018); and climates that allow employees to discover challenging ideas and socially interact with each other (Popa, Soto-Acosta, & Martinez-Conesa, 2017). According to Hosseini et al. (2017), there are not enough studies on the role of organizational culture in OI. Similarly, we recommend deeper investigation of the conditions that create a proper climate, communication policies and procedures, training policies, accounting and measurement systems and reward and recognition systems to inspire participation. Future research should concentrate on methods that organizational cultures can use to embrace user-centric business models and create a balance between current and new business models.

The last sub-theme in this group of studies is the individual level and human dimension of user collaboration, which has been overlooked in the literature. These studies acknowledge the micro-foundations of both OI and UI in employees' beliefs, mindset, choices and abilities (Gassmann et al., 2010). The theme of the effects of firm employees' characteristics on user collaboration is gaining attention in the literature (Bogers et al., 2017; Hosseini et al., 2017). More recently, studies have also looked at CEOs' characteristics (Ahn et al., 2017; da Mota Pedrosa et al., 2013), the degree of diversity among employees (Bogers et al., 2018; Rangus & Černe, 2019) and negative and judgmental attitudes of organization members (de Araújo Burcharth et al., 2014). Future research could explore employee motivation, passion and confidence related to entrepreneurial passion and entrepreneurial self-efficacy,

which make them willing to be involved in the UI process. As noted by Bogers et al. (2017), more inquiries into the impacts of these individual features on inter-organizational knowledge flows are needed.

Similarly, the so-called NIH syndrome is a widespread challenge to external collaboration, so future research could explore the practices and strategies to address this challenging syndrome and the conditions that encourage cooperation inside and outside of the firm. The literature has identified a proactive work environment (Burcharth et al., 2017) and employee autonomy and freedom within firms (Agostini et al., 2016) as significant factors in benefitting from external knowledge and ideas. A key research direction, therefore, is to investigate the impacts of employees' internal proactive behaviour on the UI process and the role of organizations in providing sufficient freedom and flexibility for employees to ease internal collaboration and take on the role of embedded users or employee lead users in the firm.

Finally, in relation to management-related papers, the literature we reviewed has made clear that managing external collaboration, especially with users, requires fundamentally appropriate managerial competencies and processes. Firms expose information on NPD outside the firm by conducting events and contests and implementing feedback systems. Firms also seize co-produced knowledge through rewards systems and integrate incoming ideas by holding meetings to rank ideas (Bengtsson & Ryzhkova, 2013; Piller & Ihl, 2009). Moreover, when engaging with users, managers' skills and attention to providing an appropriate atmosphere and sufficient resources are of utmost importance. Managers engage in formal and informal meetings and enable practices to increase employees' willingness to participate in the process of external collaboration (da Mota Pedrosa et al., 2013; Khanagha et al., 2017; Lazzarotti et al., 2015; Roberts & Darler, 2017).

Future research could move the literature towards a more refined understanding of managerial competencies and mechanisms by considering financial, decentralization and participative mechanisms.

Likewise, regarding the role of top and middle management, other competencies such as leadership, interpersonal and staff development skills, as well as customer focus and integrity, could be further examined. Similarly, it has been argued that networking capabilities (Stanko & Bonner, 2013), the depth and breadth of collaboration (Bahemia & Squire, 2010; Chiang & Hung, 2010) and relationship management with communities and platforms (Balka et al., 2014; Lauritzen, 2017; Parmentier & Mangematin, 2014) are of extreme importance to the success of user collaboration. Additional research could investigate whether and how it is possible to improve firms' ability to obtain additional benefits by limiting poor communication and conflicts over resources and objectives and, in general, by creating a network culture in the organization. Accordingly, it is also essential to inspect the social ties between network units and the governance mechanisms needed to drive value creation and capture in these networks. Other potential research topics are the roles of key individuals and key organizational roles in enhancing firms' external networking abilities.

Absorptive capacity and KM have been of special interest to many scholars. Future research should pay more attention to knowledge from communities of users and to the knowledge transfer process in which knowledge is shared not on a one-to-one basis but from one to many. Moreover, deeper empirical investigations are needed on the organizational antecedents supporting the development of the absorptive capacity and KM capabilities needed to use external knowledge.

## **6. Conclusions**

With the increasing pervasiveness of digital technologies and social media, users will become increasingly central to the innovation processes of firms. Consequently, new theoretical and empirical research will be needed in this field. Our study reveals a literature characterized by many well-developed vertical silos on user collaboration but also several underexplored areas demanding attention that we highlighted and discussed in the previous section.

This review has shown an increasing body of research on investigating the internal dynamics of firms towards user collaboration. The review has demonstrated that the internal dynamics of firms are classified into three main categories namely strategy, organizational, and managerial dynamics. Among the studies focusing on strategy, most studies have focused on the business model. However, the different aspects of the user-centric business model remain unclear. Even though a great deal of studies has examined organizational dynamics facilitating user collaboration, future research should strive more towards investigating decentralization and coordination inside the firm and the role of specific key individuals. Moreover, studies have inspected various inter-organizational policies and routines needed for user collaboration yet future research could also delve deeper into practices to simplify the provision of digitalization, sustainable user-firm collaboration and appropriate culture for deeper collaboration. The human side of user collaboration could go further by scrutinising employees' behavioural and cognitive states. Regarding the managerial capabilities, future research could explore the networking competencies and KM capabilities concerning communities of users.

As with every paper, ours has several shortcomings. First, despite the care given to the article selection, some studies could have been overlooked, so our representation of the literature could be biased. Furthermore, user collaboration is a very fluid, transversal topic, so it is not always easy to capture all the possibly relevant papers through the careful use and combination of keywords. Second, to increase the relevance to the topic, we limited our study to papers published in scientific journals and searched for them only on the WOS. Of course, such selectivity runs the risk of ignoring contributions on our topic published in other media (primarily books) and minor journals.

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Table 1. Descriptive Results

<i><b>Journals</b></i>	<i><b>No. of Articles</b></i>
Journal of Product Innovation Management	7
R&D Management	5
Technovation	5
Creativity and innovation management	4
International Journal of Technology Management	4
Journal of Knowledge Management	4
Long range planning	4
Research Policy	3
International Journal of Innovation Management	3
Journal of Business Research	3
Organization Science	3
Strategic management journal	3
Technological Forecasting and Social Change	3
Business Process Management Journal	2
European Journal of Innovation Management	2
Journal of Cleaner Production	2
Baltic Journal of Management	1
California Management Review	1
Communications of the Association for Information Systems	1
Decision Support Systems	1
Electronic Commerce Research and Applications	1
European Management Journal	1
Foundations, Competences and International Trends	1
Industrial Management & Data Systems	1
Industrial Marketing Management	1
Industry and Innovation	1
International Business Review	1
International Journal of Market Research	1
International Journal of Service Industry Management	1
International Journal of Entrepreneurial Venturing	1
International Journal of Information Management	1
Journal of Business & Industrial Marketing	1
Journal of General Management	1
Journal of management studies	1
Journal of Organization Design	1
Journal of organizational change management	1
Journal of Small Business Management	1
Journal of Strategy and Management	1
Management research review	1
Management decision	1
MIS quarterly	1



Research-Technology Management	1
Technology Analysis & Strategic Management	1
The Academy of Management Perspectives	1
The international journal of human resource management	1
	1
<b><i>Type of Paper</i></b>	
Empirical	76
Conceptual	4
Review	7
<b><i>Methodology (empirical studies only: 76)</i></b>	
Quantitative	36
Qualitative	32
Mixed	8
<b><i>Method (empirical studies only: 76)</i></b>	
Case study	31
Survey	29
Mixed	14
Design practice	2

Table 2. Contributions of the main studies

<b>Strategy streams</b>		
<b>Sub-streams</b>	<b>Authors</b>	<b>Major findings and contributions</b>
<b><i>Business model</i></b>	(Saebi & Foss, 2015)	Focus on improving business models for various OI strategies including market-, crowd-, collaborative- and network-based innovation strategies regarding the depth and breadth of knowledge research
	(Hienerth et al., 2011)	Identify useful factors to attract and engage users in core business processes, and address effective strategies to solve internal resistance by introducing novel tools, procedures and instruments
	(Cheng & Huizingh, 2014)	Highlight the role of firms' strategic orientation (e.g. entrepreneurial, market and resource orientation) as a mediator between OI activities and innovation performance to achieve continuous business performance
	(Baldassarre et al., 2017)	Initiate a new research stream by combining sustainable business models and user-driven innovation to develop more successful, user-based value propositions
<b><i>Co-creation and involvement strategies</i></b>	(Garriga et al., 2013)	Contribute to firms' search strategies in the OI field related to the type of innovation, and evaluate resource limitations and available external knowledge
	(Kristensson et al., 2008)	Introduce key strategies during co-creation with users to achieve the desired effects
	(Roberts & Darler, 2017)	Emphasize assignment of clear goals and objectives for co-creation decisions and top management support
<b>Organization stream</b>		
<b><i>Organizational design</i></b>	(Keinz et al., 2012)	Address the predominant organizational issues, particularly design elements in organizations' four UI strategies (searching, harvesting, cooperation and ecosystem strategies)
	(Foss et al., 2013)	Concentrate on appropriate design for engaging external parties by considering decentralization and coordination as two necessary factors
	(Ollila & Yström, 2016)	Stress design principles as conceptual tools needed for collaborative innovation, which constitutes a conceptual tool
<b><i>Organizational practices and routines</i></b>	(Foss et al., 2011)	Identify the required organizational practices for customer interactions, and characterize delegation of decision rights, internal communication and incentive systems as the most important practices
	(Ojanen & Hallikas, 2009)	Contribute to better understanding interorganizational routines: explorative interorganizational routines, routines for inter-organizational relationships and inter-organizational learning and feedback systems
	(Agostini et al., 2016)	Posit the role that organizational context plays in the relationship between user collaboration and radical innovation, and characterize moderating organizational practices as employee autonomy and internal networking procedures
<b><i>Culture and climate</i></b>	(Herzog & Leker, 2010)	Define the OI culture and empirically examine OI cultures in relation to NIH syndrome, risk-taking behaviour and management support

	(Mortara & Minshall, 2011)	Consider organizational culture as one of the organization-level requirements for implementing OI, and show how the internal cultural legacy facilitates OI adoption
	(Shi & Zhang, 2018)	Explore the role of organizational inertia (cognitive and network inertia) in the relationship between inbound OI and radical innovation
	(Popa et al., 2017)	Evaluate the role of climate in OI activities by measuring the time and resources available to employees, various free and open workshops and the existence of a motivating atmosphere
<b>Micro-foundations</b>	(de Araújo Burcharth et al., 2014)	Emphasize the importance of managing attitudes that can either establish or become barriers to the important micro-foundations of organizational dynamics
	(Salter, Criscuolo, & Ter Wal, 2014)	Address the various challenges individuals face in different stages of involvement with external partners and how they develop strategies to cope with these challenges
	(Ahn et al., 2017)	Examine the relationship between CEOs' characteristics (positive attitude, entrepreneurial orientation, patience, education and experience) and different OI modes
	(Bogers et al., 2018)	Study the human side of OI by scrutinising the diversity among employees, particularly work history and education
<b>Management stream</b>		
<b>Managerial competencies and processes</b>	(Cheng & Shiu, 2015)	Analyze the mediating role of knowledge learning (technical and administrative) and organizational capabilities (explorative and exploitative) in the relationship between OI activities and innovation performance
	(Bengtsson & Ryzhkova, 2013)	Develop a framework of the necessary management competencies to manage online users, particularly disclosure, appropriation and integration competence
	(Lazarotti et al., 2011)	Introduce managerial actions that support OI activities: evaluating goals and risks, choosing and analysing potential partners and personal relationships of the R&D manager with different actors
	(da Mota Pedrosa et al., 2013)	Identify managerial practices in the OI process: engaging in formal and informal meetings, discussions and expertise in organization capabilities and language
<b>Networks and networking capability</b>	(Parmentier & Mangematin, 2014)	Explore how to orchestrate networking between firms and communities in three ways: opening firm boundaries, opening up products and services and reshaping organizational and product identities
	(Chiang & Hung, 2010)	Differentiate between open-search breadth and depth: the latter leads to more incremental innovation, but accessing knowledge from many external sources results in more radical innovation
	(Lauritzen, 2017)	Demonstrate that tensions and membership uncertainty while networking between firms and communities can be diminished by communicating through mixed messages, giving special rights and assigning an expert role and a power user role to control power-related issues
<b>Knowledge management and absorptive capacity</b>	(Lichtenthaler & Lichtenthaler, 2009)	Stress the role of KM capacity for OI consisting of reconfiguration and realignment in managing firms' knowledge base over time

	(Ashok et al., 2016)	Posit that KM plays a crucial role in acquiring value from external user-specific knowledge and the need for firms to devote more resources to KM to achieve radical innovation
	(Piller & Ihl, 2009)	Indicate that absorptive capacity is needed to integrate customer solutions into the NPD process through the assimilation, transformation and exploitation phases
	(Spithoven et al., 2010)	Highlight the importance of absorptive capacity for implementing inbound OI activities, which can be handled by search centers in traditional firms lacking such capacity



## Paper 3

# Efficaciously smuggling ideas: untangling the relationship between Entrepreneurial Self-Efficacy, Creative Bootlegging and Embedded Lead Userness

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## Abstract

The phenomenon of Embedded Lead Userness (ELU) has gained considerable attention during the last years. An increasing amount of both theoretical and empirical studies have been discussing the effect of ELU on creativity and innovation-related activities in firms. However, research on the antecedents of ELU is still limited. The present study examines the relationship between entrepreneurial self-efficacy and ELU when mediated by creative bootlegging. After analyzing the data collected from 554 employees

belonging to 42 Italian and Croatian small and medium-sized companies, our study reveals that entrepreneurial self-efficacy exerts a positive impact on ELU and that creative bootlegging mediates this relationship. Consistent with social cognitive theory, these results suggest that employees who show self-motivation and conviction in entrepreneurial activities also tend to commit (enjoy carving out some time to be committed) to unofficial innovation projects which in turn make them become more curious and expert about the products and to act as lead users. The study's contributions and practical implications are discussed.

**Keywords:** Embedded lead userness, user employees, entrepreneurial self-efficacy, creative bootlegging, social cognitive theory.

## 1. Introduction

Embedded lead users are defined as "employees who are lead users of their employing firm's products or services" (Schweisfurth & Herstatt, 2015, p. 2). Research indicated that embedded users contribute to corporate innovation (Schweisfurth & Herstatt, 2016) and they are more effective than regular employees in attaining need information, undertaking internal boundary spanning, and exploiting market information for corporate innovation (Schweisfurth & Raasch, 2015). Given the importance of embedded users for innovation, scholars have begun to investigate the antecedents of ELU with regard to embedded users' advantages being positioned inside the firm namely having experience, and holding expertise and technological knowledge (Schweisfurth, 2017) and also their lead userness that is associated with higher expected benefits from innovations (Schweisfurth & Herstatt, 2016). Further, the literature has shown that internal lead users have different cognitive structure comparing with external lead users (Schweisfurth & Herstatt, 2015) and generally rely on structural, relational, and cognitive capital for innovation (Schweisfurth & Herstatt, 2016).

Research has indicted that innovation at work to a large extent is based on individual-level employee characteristics and behavior (Hirst et al., 2009). Schweisfurth and Raasch (2015) highlighted that lead users' cognition, attitudes, and behaviors will be affected after becoming employed in the firm performing as employee lead users. In other words, having hybrid role as an employee inside the firm and a lead user outside it may cause role conflicts and affect their motivation and incentives towards innovative behavior. However, an understanding of the micro-level foundation scrutinizing the lead user employees' unique personal characteristics and motivations is underdeveloped. In particular, there is a dearth of knowledge of individuals' attitudes, beliefs and cognitive constructs. Similarly, despite the fact that growing research is highlighting the importance of human side of the innovation (Brenton & Levin,



2012; Salter, Ter Wal, Criscuolo, & Alexy, 2015), the role of individuals' belief in their capabilities in ELU has yet to be investigated in detail.

In the present study, we seek to increase our knowledge of embedded lead users by providing a better understanding of individual-level antecedents of ELU grounding on social cognitive theory. Social cognitive theory explains how individuals' thoughts, motivation, and performance are affected by individuals' self-control and self-motivation (Bandura, 1991). Particularly, our study focuses on the role of employees' entrepreneurial self-efficacy when forming their ELU. Entrepreneurial self-efficacy driven from social cognitive theory has been defined as "strength of a person's beliefs that she or he is capable of successfully performing the various roles and tasks of entrepreneurship" (Ahlin, Drnovšek, & Hisrich, 2014, p. 4). It has been shown that employees require entrepreneurial self-efficacy to transform their creative potential to innovation (Ahlin et al., 2014). This is important because having high levels of entrepreneurial self-efficacy results in higher opportunity recognition and individuals' innovative behavior in general (Barakat, Boddington, & Vyakarnam, 2014). Furthermore, the results of the studies provided evidence for the positive effect of self-efficacy on innovative behavior including idea generating and personal initiative (Axtell et al., 2000; Speier & Frese, 1997).

Furthermore, we include creative bootlegging (as mediating variable) to influence the relationship between entrepreneurial self-efficacy and ELU. Bootlegging is defined as "deviate behavior hidden from senior managers whereby organizational time and resources are used for pursuing innovative ideas that are mainly in line with organizational goals and benefits" (Sakhdari & Bidakhavidi, 2016, p. 6). Further, self-efficacy has been found to be associated with involving in bootlegging activities among employees (Ahlin et al., 2014). Employees with higher level of self-belief in abilities for entrepreneurial tasks begin bootleg activities (Globocnik & Salomo, 2015). Taking part in creative bootlegging activities, employees provide more time and freedom to generate more innovative outcomes through unconventional paths

(Agostini et al., 2016). For instance Patagonia; an American clothing company that sells outdoor clothing; gives employees slack time to motivate them to test and use the products (Schweisfurth & Raasch, 2015). Therefore, this study's first aimed contribution is to the ELU literature (Schweisfurth & Herstatt, 2015; Schweisfurth & Raasch, 2015) and specifically add to the existing understanding of embedded users' characteristics and the antecedents of embedded lead user process by focusing more on individual-level foundations and cognitive antecedents. Drawing on social cognitive theory and lead user theory, we attempt to show that entrepreneurial self-efficacy has a significant positive effect on ELU when involving creative bootlegging as underlying mechanism in the relationship.

Second intended contribution relates to the mediating role of creative bootlegging as a proactive behavior in the relationship between entrepreneurial self-efficacy and ELU. Further, as the third contribution we intend to bridge creative bootlegging and ELU literature by proposing and examining how bootleg activities end up with more innovative behavior.

The remainder of the paper is structured as follows: Section 2 discusses the theoretical background of this study and formulates our research hypotheses. Section 3 describes the methodology and method. Section 4 presents the empirical findings and Section 5 discusses these findings and section 6 provides the implications for research and practice along with future directions.

## **2. Theoretical background and hypotheses development**

### ***2.1. Entrepreneurial self-efficacy and ELU***

lead users face needs of a market months or years before getting general, and benefit from gaining a solution to those needs (von Hippel, 1986). lead users generate valuable and novel ideas in different stages of product and service development (Colazo, 2014; Lettl et al., 2005; Schreier & Prugl, 2008) and concepts of superior commercial potential than the ones developed traditionally (Lilien, Morrison, Searls,

Sonnack, & von Hippel, 2002) which result in more radical corporate innovation (Chatterji & Fabrizio, 2014). Despite being so efficient, integrating external users' ideas into the firm is not always easy. Von Hippel, Franke, and Prügl (2009) highlighted that identifying lead users is a relatively difficult task for firms. The reason behind could be the lack of knowledge regarding customers and users' needs and insufficient empathic ability among employees which decrease the cognitive empathy toward users (Homburg, Wieseke, & Bornemann, 2009). In a similar vein, users might not be able to define the practical use of their ideas (Poetz & Schreier, 2012) which makes it sometimes hard for firms to seize and adapt the value coming from the outside of the firms (Schweisfurth, 2017).

Therefore, the concept of embedded lead userness has gained considerable attention specifically during the last few years in academia and practice. ELUs are the lead user employees of their firms that create ideas of higher originality and user value than ordinary employees and external lead users (Schweisfurth, 2017).

Additionally, compared to ordinary employees, ELUs have different knowledge sets and mental systems as well as informational advantages to deal with product-related issues (Schweisfurth & Raasch, 2015). While a wide body of research can help us understand who ELUs are and their role in contributing to product innovation (Schmidt-Keilich & Schrader, 2019; Schweisfurth & Dharmawan, 2019; Schweisfurth & Raasch, 2015) little has been done in terms of explanation the antecedents of being an embedded user and in particular their attitudes, beliefs, and behaviors.

For such a long time, lead users have been characterized by two definitional characteristics 1) being ahead of the market 2) high expected benefits (von Hippel, 1986). Later on, Schreier and Prügl (2008) identified that higher level of consumer knowledge, use experience, innate innovativeness and locus of control lead to higher level of lead userness. Further, lead users are opinion leaders both at the early stages and late stages of innovation process (Kratzer & Lettl, 2009). Nevertheless, literature did not show

profoundly that individuals' cognitive style and intrinsic motivation influence on lead usersness by affecting the creative problem solving (Faullant et al., 2012).

In this sense, Schweisfurth and Herstatt (2016) noted that embedded users rely primarily on social resources including structural, relational, and cognitive capital during the innovation process. Schweisfurth and Herstatt (2015) drawing on the user innovation and consumer behavior literature noted that employees' use experience and lead usersness behaviors partially effect on opinion leadership and domain-specific innovativeness, which is mediated by their cognitive empathy towards the external user. Furthermore, internal lead users differ from external lead users regarding their cognitive structure in a way that internal lead users show more customer orientation, internal boundary spanning, and innovative work behavior comparing with regular employees because they are dually embedded in the firm and in use context (Schweisfurth & Herstatt, 2015). Concerning the debate on the cognitive differences between internal and external lead users, we rely on social cognitive theory in this study to inspect the individual employees' mindset toward thinking creatively and creating new ideas. Concerning the cognitive differences between internal and external lead users and building on social cognitive theory, we aim to link entrepreneurial self-efficacy as an antecedent to ELU.

Social cognitive theory concerns with personal cognition, physiological characteristics, and behavior, and implies that understanding one's own behavior effects the individual himself and the environment which in turn affects future behavior (Bandura, 1977, 1986). Social cognitive theory relies on self-regulatory mechanisms through which individuals' thoughts, motivation, and performance are affected by exercise of self-control and self-motivation in a proactive way (Bandura, 1991). Stajkovic and Luthans (1998) argued that although individual employees are influenced by organizational environment to large extent, still they behave and act upon their personal characteristics. Moreover, the concept of self-efficacy was drawn from social cognitive theory which deals with one's confidence about his/her ability

to perform a task (Bandura, 1989; Bandura & Cervone, 1986). In the sense that individuals assess themselves upon their capabilities to trigger the cognition resources and motivation which concerns challenges to accept, efforts to expand the endeavor (Mauer, Neergaard, & Linstad, 2017).

Further, individuals with a high level of self-efficacy are more persistent in performing tasks and problem-solving efforts and motivate themselves in a proactive way which is a crucial condition for creative productivity (Bandura, 1991; Bandura & Walters, 1977). thereby, employees with higher level of self-efficacy put more effort toward a specific task that will result in more successful results related to work performance (Stajkovic & Luthans, 1998). Similarly, entrepreneurial self-efficacy is a particular type of self-efficacy that refers to individuals' beliefs connected to different tasks and requirements of entrepreneurship (Stajkovic & Luthans, 1998) and is associated with certain behaviors like opportunity recognition and innovative behavior (Barakat et al., 2014).

Lead users devote their time to create promising and even marketable problem solutions (Füller, Jawecki, & Muhlbacher, 2007; Lilien et al., 2002). In this vein, the results of study by Schweisfurth and Herstatt (2016) also showed that embedded users display innovative behavior and contribute to firm's product innovation due to lead userness and product experience more than regular employees. Embedded users test products and give technical feedbacks to R&D department and also take the internal boundary spanner role to gain and spread market information within the firm owing to their high customer orientation characteristic (Schweisfurth & Raasch, 2015).

The literature has further showed that personality and cognition as well as domain-specific factors namely motivation and knowledge determine the employees' role in contributing to innovation in firms (Woodman, Sawyer, & Griffin, 1993). Individuals employ different cognitive processes toward problem-solving which differentiate them in the innovation process (Barron & Harrington, 1981). Similarly, research showed that individual creativity is a determinant of lead userness and in terms of thinking style,

lead users are characterized by divergent thinking style (Faullant et al., 2012). Further, Ahlin et al. (2014) revealed that individuals require entrepreneurial self-efficacy to transform their creative potential to innovation. Entrepreneurial self-efficacy is a general attitude of one's self-confidence toward thinking creatively, creating new ideas and products and even looking for commercializing the opportunities which can be translated to a positive attitude toward discovery of unsatisfied needs and drawbacks of current products and technology in the market and in general the status quo which correspond to the profile of lead userhood.

Given above argumentations and considering the embedded users' position inside the firm and at the same time being embedded at use context and their high level of innovative behavior, it is expected that having high level of positive judgment and confidence about capabilities toward entrepreneurial tasks among them are likely to be an antecedent to the lead userhood.

H1: Entrepreneurial self-efficacy is positively related to Embedded Lead Userhood.

## ***2.2. The Mediating Role of Creative bootlegging***

Creative bootlegging is part of the broad stream of proactive creativity (Criscuolo, Salter, & Ter Wal, 2013). Proactive individuals are willing to look for better ways of doing jobs, seek new practices, and learn new things to enhance the quality of their performance (Kim, Hon, & Crant, 2009). Proactive individuals go beyond the required obligation and normal expectations at work and show extra-role behavior (Seibert, Kraimer, & Crant, 2001). Many studies provided evidence for the positive relationship between proactive personality and innovative behavior at work (Bateman & Crant, 1993; Frohman, 1997; Seibert et al., 2001). Bootlegging counts as a kind of secret, bottom-up, and non-programmed proactive activity (Criscuolo et al., 2013). Employees undertake bootlegging activities in order to establish legitimacy and obtain needed resources for elaborating ideas (Kannan-Narasimhan, 2014), to reduce the

uncertainty associated with their ideas (Masoudnia & Szwejczewski, 2012), and to become identified using a diagnostic personality test (Augsdorfer, 2012).

The literature has shown that autonomy and freedom are mainly provided for employees specifically R&D employees through formal and organizational mechanisms which is likely to increase the creativity and innovation performance (Cooper & Edgett, 2009; Kanter, 1988; Mowery, 2009). Scholars have provided further support for the importance of a proactive and discretion work environment without tight control and monitoring provided by the organization (Burcharth et al., 2017). In this regard, Agostini et al. (2016) developed the concept further and discussed autonomy is a determinant organizational factor to leverage user innovation by letting employees be responsible for their work, encouraging to perform creatively that will make them to take more proactive approach toward innovation. In this context, bootlegging behavior let employees gain more autonomy by themselves in their efforts to develop innovations through unconventional paths and postpone the official judgment process of the organization. In the sense that employees deviate from formal job requirements and show proactive creativity to generate innovative outcomes (Criscuolo et al., 2013). To do so, employees often escape from formal rules (Kanter, 1988) and involve in pre-development activities in absence of official control (Augsdorfer, 1994). Furthermore, Masoudnia and Szwejczewski (2012) have linked bootlegging to creative and innovative outputs showing that employees undertake bootleg activities to decrease the uncertainty associated with ideas and be accepted by managers.

On the other hand, creativity is dependent on individuals' inclination to involve with creative challenges in a proactive manner therefore requires persistence to meet these challenges while facing with difficulties (Richter, Hirst, Van Knippenberg, & Baer, 2012). Globocnik and Salomo (2015) already provided evidence that self-efficacy acts as an individual-level determinant factor of creative bootlegging along with organizational antecedents. According to Sakhdari and Bidakhavidi (2016), extroverted

individuals reveal their hidden ideas sooner and in contrary employees with low self-confidence are not willing to make their ideas public or at least reveal them later. Self-efficacious individuals demonstrate more motivation toward performing tasks and are more committed, risk-taking and optimistic in facing with difficulties (Krueger Jr & Dickson, 1994; Mitchell & Shepherd, 2010; Wood & Bandura, 1989). Hence, employees begin bootleg activities if they believe themselves to have the necessary abilities for entrepreneurial tasks and motivation for bootlegging (Globocnik & Salomo, 2015). The authors further argued that employees with high intrapreneurial self-efficacy which corresponds to early-stages of innovation process are more likely to involve in bootlegging than the ones with a low level of self-efficacy. The reasoning behind this is that the first group of employees believe in their ability to successfully intricate their ideas even without the organization's formal backing.

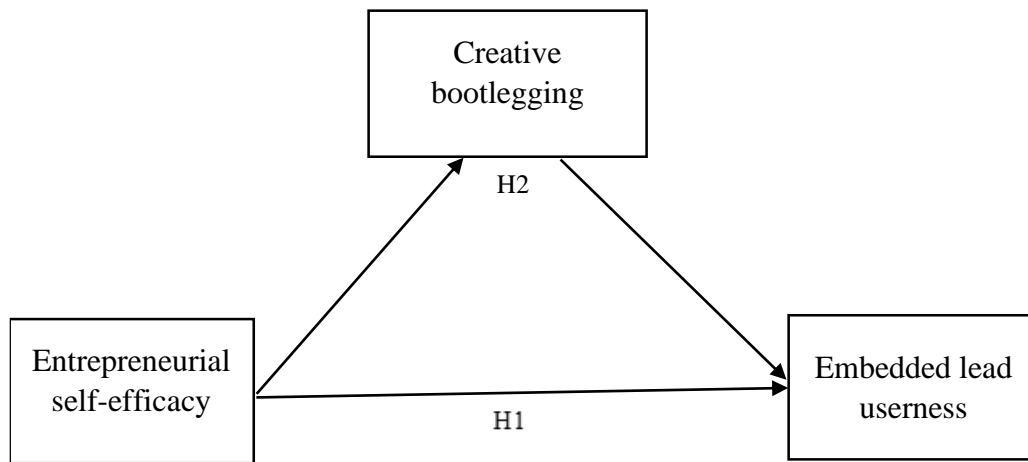
Starting from such evidences, in this paper we posit that employees having a higher level of confidence for entrepreneurial tasks will demonstrate more proactive behavior towards innovation and devote more time on informal and pet projects to generate innovative ideas (Schweisfurth, 2017; Schweisfurth & Raasch, 2015). In turn, autonomy and freedom will nurture their expertise, both on the technological and the market sides, making such individuals experts and passionate on their domain and thus reinforcing their lead user status. Hence, our second hypothesis follows:

H2. Creative bootlegging mediates the relationship between entrepreneurial self-efficacy and ELU.

Figure 1 demonstrates the research framework comprising the hypotheses of this study.



Figure 1: Research model with hypotheses



### 3. Methodology

#### 3.1. Sample and data collection

This study is part of a big and Cross-border Italy-Croatia project Blue enhancement action for technology transfer” (acronym “BEAT”). The survey data were collected in the period May 2018-October 2018 from the employees (white collars and managers) of 42 organizations in Italy and Croatia. As regards, in total 18 firms were from Croatia and 24 were from Italy.

A mix of data collection methods was used for this survey. The Italian team created individual online surveys through an online platform (surveymonkey.com) for each company involved. In this case, every company involved was asked to send emails to its own employees asking for their participation in the study. A mix of the online and paper-based data-collection method was used in Croatia where questionnaires were distributed in companies directly from the research team. The questionnaire was originally developed in English language and then translated into Italian and Croatian respectively. Back-translation procedures were used in both cases (Brislin, 1970). There were less than 5% of incomplete questionnaires that were discarded from the analysis. In total, 554 employees responded to

questionnaires. Of the received responses 427 (77%) were from Italy and 127 (23%) from Croatia. Descriptive statistics showed that in total 77% of respondents were males. The average tenure was 11.5 years of work and the most respondents belonged to the 35-44 age group (31%). In terms of education, 47.6% of respondents declared to possess a bachelor or master degree while 46.3% have a middle or high school diploma. Few respondents possessed an MBA/EMBA degree (4.8%) and doctorate degree (1.3%).

### **3.2. Measures**

Creative bootlegging and ELU consist 5-point Likert-type scale items anchored at 1 (“strongly disagree”) to 5 (“strongly agree”) and entrepreneurial self-efficacy at 1 (“not at all confident”) and 5 (“very much confident”). We reverse-coded some items in the questionnaire, which diminishes the risk of biases.

*Dependent variable.* We measured ELU using an instrument based on a 5-item scale developed by Franke et al. (2006). Lead userness in general is characterized by two components namely “being ahead of the market” and “high expected benefit” but in line with the purpose of the study, we used items proposed by Schweisfurth and Herstatt (2015) study ( $\alpha=0.79$ ) to stay focused on the second component.

*Independent variable.* We assessed entrepreneurial self-efficacy by using a 4-item measurement tool developed by Zhao, Seibert, and Hills (2005) ( $\alpha=0.79$ ) in order to let employees assess themselves regarding the level of confidence in entrepreneurial tasks.

*Mediator variable.* We based the valuation of creative bootlegging on a scale developed by Criscuolo et al. (2013) ( $\alpha=0.72$ ), which has been created for identifying bootlegging among R&D scientists who generate different levels of bootlegging. Since the internal lead users take the responsibility of innovation and are busy doing official and unofficial obligations, we thought the scale is in line with the purpose of our study.

*Control variable.* We controlled for basic demographic information (gender and age). We also included cognitive empathy as a control variable adapted from Schweisfurth and Herstatt (2015) ( $\alpha=0.81$ ); a

measured with a 3-item scale. This construct describes the adoption of perspective of other users, which previous studies have shown this to contribute to embedded lead userhood in order to add-up to need information, to collecting need knowledge, and to acting in customer orientated ways (Schweisfurth & Raasch, 2015).

### **3.3. Analysis**

We tested the hypotheses using SPSS® by IBM (version 25) statistical software. Moreover, we applied hierarchical regression to test our hypotheses, with ELU and creative bootlegging as outcome variables, one for each regression. Then we applied PROCESS macro (Preacher & Hayes, 2004)(model 4) using a bootstrap approach to identify the mediation effect of creative bootlegging. Tables 2 and Table 3 present the step by step results.

## **4. Results**

### **4.1. Descriptive statistics, reliability and validity**

Descriptive statistics, mean values, standard deviations, correlations related to the variables in the study are presented in Table 1.

We run different screening tests namely Mahalanobis, Cook's, and Leverage to check the outliers. Regarding the normality, the results showed that data are normal as none of the items has skewness and kurtosis values greater than (-1 to +1). The level of correlations among our key variables is quite low confirming that there is not a problem regarding multicollinearity in our data. Reliability analysis looks at the extent to which a set of items all measure the same underlying construct was measured by the Cronbach's alpha coefficient. All the Cronbach's alpha coefficients of all the tested variables are above 0.60 as suggested by (Bagozzi & Yi, 1988).

Next, we observed the factor structure of the focal variables using confirmatory factor analysis (CFA) in order to test the construct validity and factor structures in our data applying AMOS software version 24. The expected three-factor solution (entrepreneurial self-efficacy, creative bootlegging, employee lead

userness) displayed a good fit with the data [chi-square (74) = 299.9, CFI = .903, SRMR = .0607, RMSEA = .074]. The standardized factor loadings ranged from .56 to .81 for entrepreneurial self-efficacy items, from .39 to .71 for creative bootlegging items, and from .39 to .79 for employee lead userness items.

#### ***4.2. Results of hypotheses testing***

Hypothesis 1 predicted that entrepreneurial self-efficacy would be positively associated with ELU. Model 1 in Table 2 shows the regression of ELU onto the control variables and entrepreneurial self-efficacy. As hypothesized, there was a significant positive relationship between entrepreneurial self-efficacy and ELU ( $\beta=.096$ ,  $p<.05$ ).

The results of for mediating model verify that entrepreneurial self-efficacy is positively related to creative bootlegging ( $\beta=.29$ ,  $p<.01$ ) and creative bootlegging is positively related to ELU ( $\beta=.11$ ,  $P<.01$ ). We employed Baron and Kenny (1986) mediating effect testing method. The beta coefficient of model 1 and model 2 were significant and positive in sign in support of the first and second mediation conditions. Finally, the last hierarchical regression analysis was applied by entering ELU as the outcome variable. Then, we inserted control variables in the first step, and entrepreneurial self-efficacy and creative bootlegging as independent variables in the second step to test the mediating effect of creative bootlegging in the relationship between entrepreneurial self-efficacy and ELU. Model 4 in Table 2 shows the regression equations for ELU on both the mediator (creative bootlegging) and independent variable (entrepreneurial self-efficacy).

The coefficient of entrepreneurial self-efficacy in relation to ELU decreased and became not significant ( $\beta= .068$ ,  $p>.01$ ) and the coefficient of creative bootlegging is positive and significant ( $\beta=.097$ ,  $p<.05$ ) which according to Baron and Kenny (1986) is a strong sign of the full mediation effect of creative bootlegging in the relationship between the entrepreneurial self-efficacy and ELU. To test H2 the

PROCESS macro model 4 (Preacher & Hayes, 2004) was conducted to statistically examine the significance of the mediating effect of creative bootlegging. The results confirmed the outcomes from the regression analysis. The process macro identified a significant relationship between entrepreneurial self-efficacy and ELU ( $b=.0904$ ,  $t=2.05$ ,  $p<.05$ ) supporting H1. Additionally, we used 5000 samples constructed 95% bias-corrected confidence intervals for the hypothesized indirect mediating effects. PROCESS macro confirmed the whole mediation model using model 4 in the provided templates (Preacher & Hayes, 2004). We observed a significant mediation effect because the confidence interval from the bootstrap analysis excluded zero [ $CI=.001$ ,  $.054$ ] which provides support for H2. Results of the MACRO process is provided in table 3.

Table 1 Descriptive statistics

		Mean	SD	Cronbach $\alpha$	(1)	(2)	(3)	(4)	(5)
(1)	Embedded lead userness	2.96	.66	.79	-	-	-	-	-
(2)	Entrepreneurial self-efficacy	3.44	.70	.79	.128**	-	-	-	-
(3)	Creative bootlegging	2.92	.79	.72	.128**	.344**	-	-	-
(4)	Cognitive empathy	3.55	.68	.81	.094*	.371**	.198**	-	-
(5)	Gender	1.32	.46		-.030	-.216**	-.191**	-.053	-
(6)	Age	3.08	1.06		-.045	.067	-.032	.108*	-.173**

N = 554. Age was classified into 5 classes: 1= less than 24, 2= 25-34, 3= 35-44, 4= 45-54, 5= over 54. For gender, 1 = male, 2 = female.  
\* $p < .05$ ; \*\* $p < .01$

Table 2. Hierarchical Regression Results for the Mediating Effect of Creative Bootlegging in the Relationship between entrepreneurial self-efficacy and ELU

model 1 ELU					model 2 creative bootlegging				model 3 ELU				model 4 ELU			
Variables	B	SE B	$\beta$	t	B	SE B	$\beta$	t	B	SE B	$\beta$	t	B	SE B	$\beta$	t
Constant	2.67	.22		12.06**	1.89	.25		7.56**	2.64	.21		12.24**	2.52	.23		10.85**
Gender	-.02	.06	-.02	-.46	-.23	.07	-.13	-3.32**	-.02	.06	-.01	-.39	-.01	.06	-.00	-.16
Age	-.03	.02	-.06	-1.43	-.06	.03	-.08	-2.05*	-.03	.02	-.05	-1.2	-.03	.02	-.05	-1.24

<b>CE</b>	.03	.04	.04	.87	.10	.05	.08	2.06*	.0	.042	.05	1.20	.03	.04	.03	.68
<b>ΔR<sup>2</sup></b>																
<b>R<sup>2</sup></b>	.01				.07				.01				.01			
<b>F</b>	1.75				15.33**				1.75				1.75			
<b>CB</b>									.09	.03	.11	2.58**	.08	.03	.09	2.09*
<b>ΔR<sup>2</sup></b>									.01				.00			
<b>R<sup>2</sup></b>									.02				.02			
<b>F</b>									3.00*				2.78**			
<b>ESE</b>	.09	.04	.09	2.04*	.33	.05	.29	6.74**					.06	.04	.06	1.38
<b>ΔR<sup>2</sup></b>	.00				.07								.00			
<b>R<sup>2</sup></b>	.01				.15								.01			
<b>F</b>	2.37*				23.81**								2.37*			

N = 554. In tables, CE= Cognitive empathy, ESE= Entrepreneurial self-efficacy, CB=Cognitive empathy. \*p < .05; \*\*p < .01

Table 3: Results of the mediation analyzes with the PROCESS macro (Model 4)

Dependent variable	Creative bootlegging	Embedded lead usersness
Constant	1.89**	2.52**
Entrepreneurial self-efficacy	.33 (.05) **	.06 (.04)
Creative bootlegging (mediator)	-	.07 (.03) *
Gender	-.23 (.07) *	-.01 (.06)
Age	-.06 (.03) *	-.03 (.02)
Cognitive empathy	.10 (.05) *	.03 (.04)
F	23.81	2.78
df	(4,538)	(5,537)
R <sup>2</sup>	.15	.02
<b>Indirect effect of entrepreneurial self-efficacy on ELU via creative bootlegging</b>	-	.02 (.01) * (LLCI: .0014, ULCI: .0542)

N = 554. \*p < .05; \*\*p < .01; unstandardized coefficients are reported (standard errors in parentheses). LLCI, lower level confidence interval. ULCI, upper level confidence interval. The indirect effect was tested using bias-corrected percentile method with bootstrapping 5000 samples. 95% confidence intervals are represented.

## 5. Discussion

This paper set out to advance our understanding of embedded lead userness and in particular, we sought to explore how entrepreneurial self-efficacy and ELU are related both directly and indirectly (via creative bootlegging). Applying hierarchical regression and PROCESS macro of survey data, we found consistent support for the first hypothesis showing that entrepreneurial self-efficacy has a significant and positive relationship with ELU. Second, the results revealed the significant mediating effect of creative bootlegging on this relationship confirming second hypothesis.

### *5.1. Theoretical contributions*

This study makes three main contributions to the literature. First, it enhances our understanding of embedded lead userness by shedding more light on the antecedents of ELU. While past literature has focused on lead users' expertise, use experience, and leaderness (Schweisfurth, 2017; Schweisfurth & Herstatt, 2016) as necessary antecedents of embedded userness, our study focuses on a complementary aspect related to personal characteristics and people's beliefs in their capabilities called as self-efficacy. Therefore, this research illuminates a new point that employees with self-beliefs of efficacy in particular toward entrepreneurship activities are more likely to become lead users within the firm they operate. Thus, our study contributes to the social cognitive theory and lead user theory which connects employees' cognition in particular self-influence behavior and their lead userness.

Our study focused on cognitive characteristics of individuals and provided evidence that individuals choose to become lead users of their firms because they are high in entrepreneurial self-efficacy meaning they believe that they can become successful lead users. Social cognitive theory describes self-efficacy as a self-regulation factor stimulating people's motivation and action (Bandura, 1991). In this regard individuals' belief in bringing up required behavioral, cognitive and motivational resources results in

accomplishing tasks in relation to generating novel and great use ideas for products/services or evolving marketing plans.

We complement existing research on internal users that has so far primarily focused on their need knowledge due to their lead user status and benefits they gain by positioning inside the firm (Schweisfurth, 2017). In other words, the advantages that employees gain from their position inside the firm and experiencing needs and problems are not the sole reasons for being an embedded user, though individuals' convictions about their abilities in relation to thinking creatively and overcoming current and future challenges should be regarded as well.

Our second theoretical contribution is bridging the entrepreneurial self-efficacy and ELU through bootlegging as an underlying mechanism. Creative bootlegging provides a more nuanced understanding of the relationship by showing that the proactive behavior of individuals in terms of bootlegging activities boost their entrepreneurial attitude which result in showing more characteristics associated with leading-edge users. In this regard, employees with self-efficacy characteristics tend to find more autonomy for themselves to develop innovations through unconventional and unofficial paths (Globocnik & Salomo, 2015). The group of employees showing self-motivation and conviction in entrepreneurial activities enjoy working around their personal ideas and take more time and risk to work on the pet or unofficial projects through which become more curious about the products and their characteristics in current markets as lead users. In this regard, we suggest that self-efficacious employees take part in bootleg activities that in turn make them more willing to think of the dissatisfactions and problems associated with current products and services and to pursue and then persist to provide ideas and solutions.

Third, this study is making a contribution in the relation between creative bootlegging and ELU by proposing and testing creative bootlegging as underlying mechanism between entrepreneurial self-efficacy and ELU. We build up on the literature that has shown creative bootlegging is related to



individuals' creativity and innovation (Criscuolo et al., 2013; Faullant et al., 2012). Differently from previous studies, our study has shown that the effect of bootlegging as a self-regulating element on innovation is not “short-run” as shown by previous literature (I give you more freedom and time, you produce more innovation) but also “long-run”, meaning employees find freedom and time both secretly and with permission and invest it to become more expert on technological domain and market and this knowledge will become a useful resource on which building upon for several generations of new products. As proposed, higher level of entrepreneurial self-efficacy make the employees of firms to behave more proactively and undertake bootleg activities inside the firm which in turn result in higher level of ELU. Putting entrepreneurial self-efficacy aside, showing more creative bootlegging behavior fosters the lead usersness among employees which provides important implications for the study of ELU. Accordingly, our Study provided evidence of the importance of unofficial freedom that individuals provide themselves in relation to their willingness to become embedded lead users. This emphasizes the positive effect of proactive behavior of employees like “stealing” official working time for working at unofficial innovation projects in which they strongly believe, on generating ideas and problem solutions inside the firm taking leading-edge status.

## ***5.2. Managerial implications***

Our study holds managerial implications especially for people having leadership positions in firms. In particular, we showed how entrepreneurial self-efficacy and creative bootlegging could act in tandem in order to foster the lead user behavior of employees.

Due to the increasing importance of users' contribution for firms, managers that aim to benefit from internal lead users, should generate a climate in which employees feel confident - and gain more confidence - in behaving entrepreneurially and, at the same time, are not afraid of “stealing” some official

working time to follow their own intuitions. Further, HR managers interested in obtaining such results, should (a) select and hire new resources also for the possession of an entrepreneurial attitude/mindset and (b) trigger the enhancement of entrepreneurial self-efficacy in employees, for example through specific training programs.

Besides, managers and leaders should provide a flexible work environment for employees in order to let the work freely on their ideas and personal projects. A very famous example is the “15% policy” originally implemented by 3M company through which employees have time and flexibility to work on their favorite and self-interest projects up to 15% of their time (Tidd, Bessant, & Pavitt, 2005). To do so, we suggest firms lessen tight control on employees especially those who show lead usersness to let them work on non-official projects in parallel to official obligations to gain benefit for the achievement of innovation.

### ***5.3. Limitations and suggestions for future research***

As for any research, our study is not immune to limitations. The most important one relates to the use of cross-sectional single-source data collection. We have applied all possible remedies to alleviate concerns of potential common method variance (Podsakoff, MacKenzie, & Podsakoff, 2012) including the post-hoc marker variable test, which did not reveal any issues with common method bias. However, another consequence of such an approach to data collection is that we cannot establish causality with absolute certainty. Although we have derived from theory in our conceptual build-up of the hypotheses explaining the mediation model, additional experimental or longitudinal studies should be conducted to address issues related to potential reverse causality.

Future research should also examine the boundary conditions of the proposed mediating model, in terms of a certain personality characteristics or/and context-specific factors such as management support and organizational climate (Globocnik, 2019; Sakhdari & Bidakhavidi, 2016). While this is beyond the scope of this study, future research could investigate the relationship between entrepreneurial self-efficacy and user entrepreneurs.

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## Appendix

Table A1 constructs and measures

Construct	Question	Scale type	
<b>Employee lead-userness</b>  (Schweisfurth & Herstatt, 2015)	I am often confronted with problems that cannot be solved by products available on the market (are them ours or our competitors')	1 (strongly disagree)	5 (strongly agree)
	I am dissatisfied with some pieces of commercially available products.		
	In my opinion, there are still unresolved problems with products offered in the market.		
	If I was a client, I think I could have needs that are not covered by the products currently offered on the market.		
	I often get irritated about the lack of sophistication in certain products on the market.		
<b>Entrepreneurial self-efficacy</b>  (Zhao et al., 2005)	Identifying new business opportunities?	1 (not at all confident)	5 (very much confident)
	Creating new products?		
	Thinking creatively?		
	Commercializing an idea or new development?		
<b>Creative bootlegging</b>  (Criscuolo et al., 2013)	I have the flexibility to work my way around my official work plan, digging into new potentially valuable business opportunities	1 (strongly disagree)	5 (strongly agree)
	My work plan does not allow me the time to work on anything other than the projects I have been assigned to		
	I enjoy tinkering around with ideas that are outside the main projects I work on.		
	I am running several pet projects that allow me to learn about new areas		
	I proactively take time to work on unofficial projects to seed future official projects		
<b>Cognitive empathy</b>  (Schweisfurth & Herstatt, 2015)	I always sense exactly what users in our sector may want.	1 (strongly disagree)	5 (strongly agree)
	I realize what other users mean even when they have difficulty in saying it.		
	It is easy for me to take the user's perspective.		

## **Discussion and Conclusion**

In this thesis, I have explored different perspectives toward user innovation with more emphasis on the internal-to-the-firm perspective to generate new insights into this important phenomenon. Below, I discuss the implications for the theory and practice of the findings of this thesis. I conclude the thesis by briefly discussing its limitations and opportunities for future research.

### **1. Summary of the Findings and Theoretical Contributions**

The aim of the first paper is “Investigating the locus of UI studies to understand to what extent existing literature has been looking at external-to-the-firm and internal-to-the firm conditions of UI”. A key contribution of this study is combining an external with an internal perspective in an attempt to provide a holistic view of UI and opening an interesting pathway for future research in this specific field. Current studies have investigated the UI phenomenon mainly from an “external” perspective so far. However, this study makes a unique contribution by enlarging the borders of the UI looking at different aspects of the phenomenon from user and innovation perspectives to environmental effects and firm-related angles. Furthermore, the findings of this paper show that a great deal of the literature associated with external-to-the firm perspective is categorized in three sub-streams namely (1) innovation-related theme, (2) user-related theme, and (3) context-related theme. On the other hand, studies focusing on internal-to-the firm conditions are very limited and are divided into three sub-streams including (1) strategy-related theme, (2) organization-related theme, (3) management-related theme.

The second paper aims to “Provide an overarching perspective on the internal conditions necessary to properly organize and manage user collaboration processes”. This paper contributes to the user and open innovation literature by shedding more light on the internal dynamics of firms towards user collaboration. The findings of this study show that each cluster of internal dynamics consists of various sub-streams



which are necessary to properly organize and manage the UI process. Moreover, the findings of this paper provide a comprehensive typology of the various internal factors associated with various studies on effective collaboration with users. This study categorizes strategy-related papers into two sub-streams: (1) business model strategies (2) search and involvement strategies. Moreover, firms' internal organizational dynamics are categorized into four areas: (1) organizational design; (2) organizational practices and routines; (3) culture and climate; and (4) micro-foundations. Finally, studies associated with managerial dynamics are classified into three areas: (1) managerial competencies and processes (2) networks and networking capabilities and (3) absorptive capacity and knowledge management.

The third paper of this thesis aims to “increase our knowledge of embedded lead userness by providing a better understanding of individual-level antecedents of ELU grounding on the social cognitive theory”. The findings of this paper contribute to UI research by increasing our understanding of embedded lead userness and its antecedents. Unlike the past literature that showed expertise, use experience, and leaderness are the most prominent antecedents of ELU, the findings of this study show that individuals' cognitive characteristics in particular entrepreneurial self-efficacy have a positive relationship with embedded lead userness.

Thus, our study contributes to the social cognitive theory and lead user theory which connects employees' cognition in particular self-influence behavior and their lead userness. Another theoretical contribution is linking the entrepreneurial self-efficacy and ELU through bootlegging as an underlying mechanism which is a proactive behavior in terms of carrying out unconventional and unofficial activities. The results of this study provide evidence that self-efficacious employees participate in bootleg activities that in turn make them more willing to think of the dissatisfactions and problems associated with current products and services and to follow and persevere to provide ideas and solutions.

## **2. Managerial Recommendations**

Overall, the findings of this thesis have important practical implications and thus can be used by practitioners to understand different aspects of the UI process along with its potentials and threats to better prepare organizations for applying it. More specifically, regarding the outcomes of the first paper managers should dedicate more effort to apply UI together with a supportive internal environment which requires more focus on formal and informal relationships, processes and procedures both within and across organizational borders.

More specifically, the second paper sheds more light on various internal dynamics needed inside the firm to apply UI which managers need to take into account. These findings may be used as guidelines to have a list of dynamics to better organize, manage, and set strategies for the implementation of UI. As strategic dynamics are less defused topics among papers thus, I posit that managers should pay more attention to setting appropriate strategies and defining a business model to better collaborate with users. Besides, among the internal organizational dynamics, managers should concentrate more on micro-foundations which is associated with employees' beliefs, mindset, choices, and abilities. As such, managers could assist employees and provide them an atmosphere in which they are willing to collaborate with outside of the firm.

Based on the finding of the third paper, managers that aim to benefit from internal lead users should generate a climate in which employees feel confident in behaving entrepreneurially and, at the same let them devote their work time to follow their intuitions to nurture their self-efficacious characteristics. In this respect, I suggest that that managers need to provide a flexible work environment for employees to allow them to work freely on their ideas and personal projects.

### **3. Limitations**

First, I discuss the shortcoming of the first and second papers as they have been conducted with the same method. Regarding the availability of several studies on this topic in particular for the first paper, some studies could have been overlooked. I tried to use all possible keywords related to the topic and the combination of them yet there could be ignored possibly relevant papers. I limited these two reviews to papers published in scientific journals and searched for them only on the Web of Science database. It is important to posit that these two reviews could be biased regarding that there are various sources such as books, book chapters, and minor journals on this topic.

Second, the third paper is an empirical quantitative study based on cross-sectional single-source data collection thus, this study cannot establish causality with absolute certainty. The collected data are from 42 small and medium-sized firms in Italy and Croatia. More research is needed in other organizational contexts to understand whether these findings may apply in different settings. Moreover, the firms included in this thesis are mainly from the shipbuilding and maritime sectors. As such, this opens up the question of whether there may be differences between these sectors and other sectors.