A systematic literature review of the User Innovation field from 1970 to 2013

ABSTRACT

From the late 1970s onwards, a considerably body of literature related to user innovation has been published. Despite the increasing number of studies that have been conducted in user innovation during the last forty years, little attempt has been made to translate those findings systematically into a comprehensive review of current knowledge. The purpose of this study is to fill this gap, by providing a rigorous systematic literature review on the field of user innovation, thereby enhancing our understanding of the different user innovation streams and the evolution of the community of scholar. The research provides a systematic review of the conceptual, analytical and empirical user innovation literature from 1970 to 2013. It follows the process of a systematic review in management research. Conceptual, analytical and empirical contributions have been progressively extended by scholars to several research streams: 1. Lead users; 2. Product – Service development; 3. Users´ role and types; 4. Online user communities; 5. Toolkits; 6. User entrepreneurship; 7. User innovation. In the same manner, several avenues of future research have opened to junior and senior researchers.

Kew words: user innovation, innovation by users, systematic review, lead users, user entrepreneuship, users.

INTRODUCTION

Despite the increasing number of user innovation studies from the late 1970s onwards, little attempt has been made to translate those findings systematically into a comprehensive review of current knowledge. Flowers and Henwood (2010) mentioned research on user innovation is disparate across different industrial sectors and with the maturation of field; it becomes more important to undertake systematic reviews.

To the knowledge of the authors, no systematic review exists focusing on user innovation streams to date. Prior reviews have focused on user toolkit for innovation as a method (Goduscheit and Jørgensen, 2013); the role of user during innovation (Bogers et al, 2010) and the role of embedded lead users inside the firm (Schweisfurth, 2013). However, none of them use the methodology of the systematic review. The study aims to fill this gap, thereby enhancing our understanding of the different user innovation streams and the evolution of the community of scholar. The research provides a systematic review of the conceptual, analytical and empirical user innovation literature from 1970 to 2013. It pretends to answer the following research questions:1. What are the different research streams within the user innovation field? 2. What have been the main contributions to the field from the conceptual, analytical and empirical perspectives?.

LITERATURE REVIEW METHODOLOGY

This literature review followes the process of a systematic review in management research proposed by Transfield, et al (2003). It consists of three stages: Planning the review, conducting the review and reporting and dissemination.

Planning The Review

During the planning stage, the author set the objective of the review, analyzes the research questions, delimit the subject area and develop the review protocol (Tranfield et al, 2003). The objective of the review is to provide an integrated framework on the field of user innovation delineate how the different streams have evolved. The review protocol was developed around the main research question: What have been the main contributions to the field from the conceptual, analytical and empirical perspectives?

Under the conceptual work, the author considers articles that propose a new method, technique, or approach to user innovation. These methods or approaches are not justified with any additional work such as modeling, case study, or empirical research. The author also classifies articles that provide a literature review as conceptual research. Research methods such as simulation and mathematical modeling fall under the analytical research category. Analytical research primarily uses logical, mathematical, and or statistical methods (Sax, 1968; Wacker, 1998). Under empirical work, researchers collect data and observations and evaluate the collected information. The authors identified the following empirical research methods used for data gathering: Case studies, field studies, surveys, and interviews.

Conducting The Review

To conduct a systematic review, this research follows the steps illustrated in previous works (Delbufalo, 2012; Thorpe, et al, 2005; Trandfield, 2003). During this stage, the authors identify the key words, determines the search databases, decides the most appropriate search strings, establishes the period of time for the search, document types and language, develops an inclusion and selection criteria.

1. The keywords selected were: “user innovation”, “customer active paradigm”, “users as innovators”, “innovation by users”, “user centric innovation”, “user centered innovation”, “user driven innovation” and “lead users”.
2. The articles substantive relevance was ensured by requiring that selected articles contained at least one of the keywords mentioned above in their title, abstract or keywords.
3. In order to reduce the risk of missing publications, those keywords were entered into prominent academic databases such as ISI Web of Science, Ebscohost (Business Source Complete), Jstor, Scopus and Science Direct. The databases were searched for academic articles published from 1970 to 2013.
4. In order to ensure quality of the review, practitioner and academic journal articles were reviewed. In addition, only published peer-reviewed journal articles were considered.

5. To ensure that the search can be replicated we develop a series of search strings that are most appropriate for this study. We also developed a strict inclusion and exclusion criteria in order to provide the best quality evidence. Articles were reviewed according to their relevant subject.
6. To enhance substantive and empirical relevance of the review, all the abstracts are read looking for substantive context (i.e. discussion of the conceptual, analytical or empirical evolution of user innovation field, outcomes, findings and/or consequences of user innovation activities) and empirical content (i.e. mention of quantitative or qualitative analysis).
7. Substantive and empirical relevance is ensured by reading and analyzing all remaining articles in their entirety for substantive and empirical content.

The above criteria allow the author to conduct an effective and reproducible database.

Database Searching Process

The database searching process was performed in five electronic datableses. The keywords were entered into the following databases: ISI Web of Science, Ebscohost (Business Source Complete), Jstor, Scopus and Science Direct. The search strings were built using operators ANS/OR. An example of the search performed in the database Science Direct is as follows: TITLE-ABS-KEY ((("user innovation" OR "user driven innovation" OR "users as innovators" OR "customer active paradigm" OR "innovation by users" OR "user centered innovation" OR "user centric innovation" OR "lead users")) AND DOCTYPE (ar) AND SUBJAREA (mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 1969 AND PUBYEAR < 2014.

A total of 719 records were downloaded directly from the five databases and automatically introduced into the software vantage point to search for duplicates. In this process 322 were identified and removed from the new database. Then author removed manually a total of 109 records because they did not comply with the inclusion criteria (i.e. English language, type of publication).

The review was limited to double-blind reviewed journal articles published in top-tier journals. Adopting this approach provides an accurate and representative picture of relevant scholarly research. In this review, all articles published in the journals listed in the ABS Academic Journal Quality Guide, were selected to be analyzed. As a result, 108 were excluded because they did not comply with the top tier journal inclusion criteria. The selected articles were read and analyzed in their entirety for substantive and empirical content, classifying them into A, B, and C lists (Thorpe et al., 2005). “A” defined as definitely relevant; “B” defined as less relevant or unclear; “C” defined as not clear a priori. As a result, 146 articles were classified as “A” and “B” and 34 articles as “C”. Finally, data analysis has been performed over 146 files. One of the limitations during this stage is the relevance assessment may have a certain degree of subjectivity due to the classification A, B, C, is up to extent of the authors experience, knowledge and judgment about the topic.

Reporting and Disseminating

RESULTS

The research streams identified in the literature review are: 1. Lead users; 2. Product – Service development; 3. Users´ role and types; 4. Online user communities; 5. Toolkits; 6. User entrepreneurship; 7. User innovation.

Additionally, in order to identify the main contributions to the field, a closer analysis of all articles is performed. The authors classify the literature on user innovation based on the article citations number and the advancement of each article into the conceptual, analytical and empirical categories.

Conceptual Research (1970 – 1999)

Two types of conceptual research were conducted between 1970 and 1999: 1. User innovation and the customer-active paradigm; 2. Lead User approach. The first group mainly consists of Von Hippel (1978) and Foxal, (1978, 1988a, 1988b) who proposed and test a new "customer active paradigm" (CAP). The second group consists of Von Hippel (1986), Urban & von Hippel, (1988) and Herstatt (1992) who anticipated how lead users could be incorporated into marketing research, using the lead user method. These papers made revolutionary conceptual contributions as to change from the manufacturer active paradigm to a customer-active paradigm and incorporate concepts of lead users and the lead user method into managerial practices.

Conceptual Research (2000 – 2013): Conceptual contributions have been progressively extended by scholars to several research streams: 1. Lead users; 2. Product – Service development; 3. Users; 4. Online user communities; 5. Toolkits; 6. User entrepreneurship; 7. User innovation.

Lead users research stream

Inspiring by the seminal work of Von Hippel (1977 and 1986) and looking for a finer and more flexible concept of lead users, studies such as Morrison, Roberts & Von Hippel (2000) and Morrison, Roberts, & Midgley (2004) introduced the construct of leading edge status (LES), which refers to the degree to which organizations use and apply technology innovations in new and different ways to solve problems. Consequently, those firms that exhibit high levels of LES, are considered lead users (Morrison, Roberts, & Midgley, 2004). Additionally, studies on lead user theory has also extended the understanding of lead userness. For instance, Schreier & Prügl (2008) proposed the existence of a link between lead userness and new product adoption behavior and Faullant, Schwarz, Krajger, & Breitenecker (2012) pointed out lead userness and creativity are fundamentally interrelated.

NPD / NSD and Co-Creation Research Stream

Studies in the field of user innovation have extended to research on product–service development. Recently, Hoyer, Chandy, Dorotic, Krafft, & Singh (2010) defined co-creation in New Product Development (NPD) as the collaboration between companies and customers in the product development, allowing consumers to take an active and central role in this process (ideation, product development, commercialization, and postlaunch).

Involving consumers in the early stages of NPD can save both time and expense and reduce the risk of failure of the new product (Hoyer, et al. 2010). Hoyer, et al. 2010 identified four barriers that might restrain co-creation in NPD from its full advancement: concerns about secrecy, ownership of intellectual property, information overload due to large volume of consumers´ inputs, and unworkable novel ideas in the production stage. These obstacles might affect the co-creation potential in some companies.

On the other hand, Kuusisto, Kuusisto, & Yli-Viitala (2013) demonstrated that working together with customers and users in innovation increases the likelihood of producing services that are actually valued and desired in the market. Regarding the motivators of consumer participation in co-creation, although there is dearth literature, some studies have reported not only monetary interest as motivators, but also social and freely share effort in the post ideation stages of co-creation (Hoyer, et al. 2010; von Hippel and von Krogh 2006).

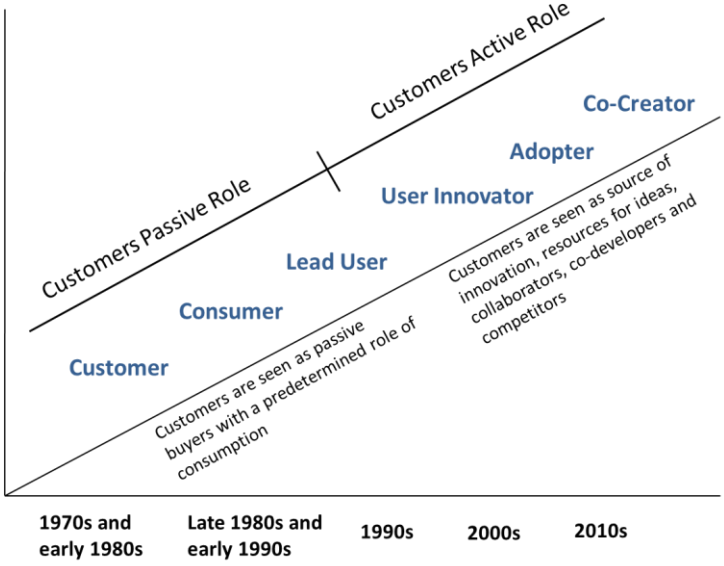
Users research stream

Users´ role are considered another research stream. Von Hippel's work, beginning in the 1970s, has been the first in studying the role of users as innovators Von Hippel (1976). Additionally, Bogers, Afuah, & Bastian, (2010) is one of the most cited papers in regards to the role users play during innovation. Bogers et al. (2010) affirmed the rapid pace of technological change, globalization, and increasing user sophistication implies a progressive tendency of users to innovate or contribute to producer innovations. In this sense, the role of users is becoming more active over time.

Several studies have demonstrated the evolution of the customers' roles shifting from a passive role to an active one over the last three decades (von Hippel, 1986; Prahalad and Ramaswamy, 2000; Lüthje, 2004; Bogers, et., 2010; Mujika-alberdi, et al., 2013). Figure 1 is a graphic representation of how the role of users has evolved from 1970´s until now. During the 1970's and early 1980's customers were considered an average statistic and their contributions did not have any kind of value or feedback to the producers (Prahalad and Ramaswamy, 2000).

During late 1980´s and early 1990´s, a shift from the company´s interaction with the customers occurred. Prahalad and Ramaswamy (2000) pointed out a shift from selling to helping customers utilizing help-desks, call centers or customer service programs. In 1986 Von Hippel published another seminal work titled "Lead Users a source of novel product concept" and spark a new line of research where users are capable to engage in innovative activities.

Figure 11 Users´role from Passive to Active



Source: Adapted from Prahalad and Ramaswamy (2000)

During 1990´s, Prahalad and Ramaswamy (2000) indicate manufactures are able to establish lifetime bonds with customers, cultivate longer relationships and see the individual customer as a person. During that time, firms are able to identify solutions from lead users, reconfigure products and services based on a deep understanding of customers. From 2000´s customers started to play a more active role, innovating by themselves, participating in the innovation processes, providing information, ideas and early feedback from the products and services offered in the market.

Online user communities research stream

Conceptually, Von Hippel (2007) reported user networks constitutes user nodes interconnected by information transfer links which may involve face-to-face, electronic or any other form of communication. (Hienerth & Lettl, 2011) reported user communities differs from user networks as they emerge and center on a certain topic or field of shared interest. Franke & Shah, 2003, indicated one example of a user-community is open source communities in which information, assistance, and innovations are freely shared. The term "open source" is now generally used by scholars to refer to free or open source software (Hippel & Krogh, 2003). Hippel & Krogh (2003) is one of the most cited papers in this research stream. In their work, Hippel & Krogh (2003) mentioned open source software development projects are internet-based communities of software developers who voluntarily collaborate to develop software; people who participate on it can obtain private benefits such as learning and enjoyment.

Toolkits research stream

Toolkits are the other stream on the literature of user innovation. A toolkit is a development setting which enables customers to assign their needs repeatedly to a concrete solution, without contact with the company. The manufacturer provides users with an interactive platform, where they can create a solution according to their needs using the toolkit's available solution setting (Piller, Ihl, & Vossen, 2010).

Conceptually, one of the greatest contributions in this line of research is (von Hippel & Katz, 2002) which defined toolkits as an interphase were users can develop products by themselves through trial and error. This paper explored toolkits for user innovation and explained why and how they work. It reported, utilizing user friendly design tools, users can create a preliminary design, simulate or prototype it, evaluate its functioning in their own use environment, and then iteratively improve it until satisfied (von Hippel & Katz, 2002).

User entrepreneurship research stream

The first researcher who reported the existence of entrepreneurial awareness of new product opportunities was Gordon Foxall back in 1986. Foxall, (1986) indicated users may initiate the process of product innovation, not only by producing ideas and designs but by the collection of marketing intelligence to reduce the uncertainties of the commercial exploitation of innovations. Foxall, (1986) also mentioned both process innovation and product innovation require entrepreneurial alertness.

Shah & Tripsas, (2007) is one of the most cited papers in this research stream. In their work, the mentioned user entrepreneurs are distinct from other types of entrepreneurs in that they have personal experience with a product or service and derive benefit through use in addition to financial benefit from commercialization. One of their greatest contributions is the development of a process model of how end users, create, evaluate, share, and commercialize their ideas (Shah & Tripsas, 2007).

User innovation research stream

Lichtenthaler (2011) recognized user innovation as a stream of research and mentioned it refers to how firms may collaborate with users to explore new knowledge and ideas. Studies such as Baldwin & von Hippel (2011), Lichtenthaler (2011), Buu & Mattews (2008) are the most cited articles. The concept and research of user innovation has progressed for some time (von Hippel, 2005; Hysalo, 2009), being Eric von Hippel the pioneer of this line of research. During the period of time, the shift from a producer customer active paradigm to a customer active paradigm has become a mature concept that has also been driven by the new technologies. Contributions in this category offer theoretical work and conceptual frameworks to demonstrate how innovation by individual users is another mode of innovation (Baldwin & von Hippel, 2011; Luhje & Herstatt, 2004). Studies has also focused on identifying those users that are likely to innovate, characteristics

and motivations driven by users to innovate and the composition of user-innovation communities (Hysalo, 2009; Lauritzen, Salomo & La Cour, 2013; Lüthje, 2004; Marchi, Giachetti, & De Gennaro, 2011; Stewart & Hyysalo, 2008; von Hippel, 2007).

Analytical Contributions

Angur and Nataraajan (1998) made an attempt to provide an analytical research in one of the research streams subject to this study: Lead users. In their study, the authors applied the LISREL model to identify the proclivity of a firm to be innovative

Harhoff, Henkel and von Hippel (2003) proposed a game model to assess the profitability lead users may receive because of freely revealing information about their proprietary innovations. They conclude a range of conditions under which user may benefit from freely revealing their innovations to others via manufacturers. However, the authors also indicate that revealing has two disadvantages: (i) the revealed information becomes available to all other users, and (ii) the manufacturer may offer lower cost versions of the innovation to all users on an equal basis.

Baldwin, Hienerth and von Hippel (2006) analyzed the pathways traversed as user innovations are transformed into commercial products. The found that search redundancy is reduced within communities and all community members can benefit from the findings of those users who search the longest.

On the other hand, in the stream of Toolkits, the contribution of Franke and Piller (2004) defined the so called "toolkit for user innovation and design" as a design interface that enables users to interact in a trial-and-error experimentation in order to create their own products. Through a trial-and-error learning and immediate feedback functions, the watch toolkit allows reaching at least 650 million different possible product designs. The authors found the products designed by the users were very heterogeneous and the toolkits are a promising way to exploit mature markets, and non-designer users liked user-designed products.

Finally, in the Lead Users stream we can highlight Kratzer and Lettl (2008), who analyzed the new product development in children´s consumer market by using the lead user analysis. The results of the study showed the children who are the more creative also tend to score higher on lead user characteristics and vice versa, lead users are bridges between clusters of people, creativity is stimulated by a high informational diversity, by structural holes and by minimizing communication barriers, being creative and lead user correlate positively with each other, and lead users can be identified independently of the age or gender of the children that participated in the study.

Empirical Contributions

For the Empirical Research, in the period of time 1970 – 1999, the streams that contributed the most were: Product Service Development, Users, and User Innovation. In the Product Service Development stream, the article cited the most is von Hippel (1998), where the author deeply described the stickiness of information. Sticky information effects are manifested in CTI (Computer Telephony Integration Systems) when users say they prefer to design and make changes to their CTI systems themselves because they are unable to describe what they want to suppliers accurately and completely.

In the Users stream, the highlighted articles are Nambisan, Agarwal, and Tanniru (1999), and Slaughter (1993). Nambisan, Agarwal and Tanniru (1993) focused on technology users as a source of IT innovation and how the organizations encourage and nurture IT innovation among users. Additionally, Slaughter (1993) demonstrated that users with significant experience can create innovations by using their acquired learning, through a field study in the construction industry. Moreover, the most cited article is Foxall (1988a). The author is interested in understanding of "user-initiated innovation" when an enterprise achieves profitability from an invented device.

In the period of time 2000 to present, the streams that contributed the most for the Empirical Research were: Online User Community, and Users. On the Online User Community stream, the most representative articles are Lakhani and Von Hippel (2003), and Jeppesen and Frederiksen (2006). Lakhani and Von Hippel (2003) analyzed the rationale behind the help open source software developers provide each other for free, when answering technical questions in the development of projects.

On the other hand, Jeppesen and Frederiksen (2006) focused their attention on the personal attributes of the innovative user in the field of Computer-Controlled Music Instruments and found out the innovative user is a hobbyist in her field of innovation, meaning that the field in which she innovates is not the field of her core occupation and the innovative user prefers the firm recognition over the peer recognition.

On the Users stream, the article by Franke and Shah (2003) can be highlighted. The findings of the study indicated innovators appear to be different from non-innovators at both the individual and community level, and possess "lead-user" characteristics that differentiate them from non-innovators. Finally, the study suggested that monitoring some innovative user-communities may be an efficient method for identifying innovations made by users.

CONCLUDING REMARKS AND FUTURE LINES OF RESEARCH

This study provides a rigorous systematic literature review on the field of user innovation. An initial finding of 719 articles related to this field were found. After a laborious cleaning process, the final sample was 146 academic papers published in high quality journals. The research found a total of 232 authors have written at least one article related to user innovation. Moreover, conceptual, analytical and empirical contributions have been progressively extended by scholars to several research streams: 1. Lead users; 2. Product – Service development; 3. Users´ role and types; 4. Online user communities; 5. Toolkits; 6. User entrepreneurship; 7. User innovation. The first

four research streams namely above have demonstrated an increasing number of publications and scholars interested in the evolution and advancement of this research field.

Studies on Lead users as a research stream have significantly propagated in the last years. However, there are still numerous research questions that need to be answered. For instance, Tsinopoulos & Al Zu'bi (2011) suggest the concept of Lead User outsourcing could be developed further; some of the open questions in this regard are whether the association between lead users and firms drive cost savings or the reasons to explain why lead users' behaviour changes when entering a long-term agreement with a firm.

Al-Zu'bi, Z. B. M., & Tsinopoulos (2012) emphasize the importance of collaboration with suppliers and lead users to change the configuration of products and increase variety, an additional research avenue is the extent to which companies implement the changes requested or suggested by lead users.

The role of lead users in the different stages of the co-creation and new product/service development process is still underdeveloped. For instance, Urban & von Hippel (1988) suggest lead users might be tracked after product launch as a means of identifying important user modifications and improvements to the initial product. Addionally, Luhje & Herstatt (2004) mentioned little is known about critical success factors of the lead user method in the context of the fuzzy front-end phase of innovation projects. In this line, Bogers, M., Afuah, A., & Bastian, B. (2010) mentioned the research stream on users as innovators will also greatly benefit from empirically testing on a larger scale, empirical findings are scarce.

In regards to co-creation, lead users are a meaningful source of research. Indeed, Vernette & Hamdi-Kidar (2013) and Hoyer, et al, (2010) reported the need to better understand the motives, wants, needs and preferences driving lead users to engage in co-creation with a company. Understanding those motives might increase the participation rate of those consumers in co-creation processes. Hoyer, et al. (2010) questioned whether the firms should focus their co-creation efforts on a few narrow segments of consumers such as lead users.

Kratzer & Lettl (2008) and Tsinopoulos & Al-Zu'bi (2012) coincide on the need to understand who lead users are. Kratzer & Lettl (2008) suggest further research on social network structures and the involvement of lead users, how do the social network structures of lead users work. Tsinopoulos & Al-Zu'bi (2012) point out the identification of lead users is becoming critical to develop systematic ways of integrating them into the new product development process. Trott, P., Duin, P. V. D., & Hartmann, D. (2013) recommended to make research on determining the predictive power of lead users. For instance, once a lead user always a lead user? Or is it possible that a lead user in a certain type of new product or service can also function as such for other new products and services?

On the identification of lead users, Belz & Baumbach (2010) suggest conducting further lead user netnography studies and von Hippel, Franke, & Prügl (2009) recommended the importance of pyramiding that invites referrals to people outside a predefined population on the identification process. Luhje & Herstatt (2004) recommend further research on how can internal information sources, such as reports of sales representatives, be used to identify lead users and which screening methods can be applied to test the value of experts as information source?

User entrepreneurship is another promising areas of future research. For instance, a better understanding of professional- user entrepreneurs would be a welcome research to develop further this concept. Additionally, Shah & Tripsas (2007) suggest a need to investigate the role of user entrepreneurs in the formation of non-profit ventures and the need to better understand the process by which user firms might commercialize innovations originally developed by end-user entrepreneur for their own use. Further research is needed in regards to how resources, competencies, culture and organizational structure influence new corporate venturing originating either from lead users (Fuchs, 2011).

Autio, Esmt, & Frederiksen (2013), Kratzer & Lettl (2008) Olson and Bakka, (2001) von Hippel (1986) coincide on the need to apply longitudinal research design on user entrepreneurship research. Kratzer & Lettl (2008) report social networks are dynamic, so in order to trace and follow individual changes in network configurations over a lifetime, longitudinal research designs are required.

Von Hippel (2007) proposes to examine the conditions, nature, functioning, costs, and benefits that each kind of innovation network can provide, understanding innovation network as "a network of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity". Furthermore, West and Lakhani (2008) urge the future research of the role of communities in innovation, showing some opportunities to explore.

In the Toolkits research stream, future research can be focused on measure the willingness to pay (WTP) for both self-designed and standard products at the individual user´s level, as Franke and Piller (2004) suggest in their article. Additionally, their study in a population of students may be extended to the overall population of watch buyers, examining the effects of collaborative design by users in regard to the final product, process satisfaction, heterogeneity, and WTP. Moreover, future research is also required in the toolkits for consumer goods.

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