Business School

Ph.D. In Business Competitiveness and Economic Development

A descriptive study about user innovation in emerging markets – The case of Colombia

Doctoral Thesis

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1. Chapter I – General Introduction

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1.1. Introduction

In today's knowledge economy, innovation plays a major role for competitiveness. Therefore, for companies to be competitive, these organizations must continuously innovate and push the frontier on new products and services. Many times, those innovation processes are not generated inside the company, they come from different sources, particularly users, who play an active role in innovation activities and new product development processes.

Empirical research found that users rather than manufacturers play a key role in innovative activities and are fundamental actors in new product development processes. Eric Von Hippel has been the first researcher who pointed out the role of users as a source of innovation back in 1976. Since then, the shift from a closed to an open innovation model has invited new actors to participate in the innovation process. Some of those actors are users, who play an active role and engage in innovation activities. Over the last forty years the role of users has progressively changed and has opened the door for new research.

Those finding has opened up a new area of research in a variety of fields such as management of technology, innovation management, organizational behavior and marketing research. Examples of these new fields include patterns of user innovation, measurements of user innovation activities, leading-edge user characteristics, lead users' involvement in the innovation process, co-creation, and users as innovators. Consequently, a considerably body of literature related to user innovation has been published from the late 1970s.

Despite the increasing number of studies that have been conducted in user innovation during the last four decades, little attempt has been made to translate those findings systematically into a comprehensive review of current knowledge. Indeed, it becomes more important to undertake systematic reviews. Hence, the purpose of this thesis is to contribute to an increased understanding of user innovation by providing a compile analysis of the different user innovation streams and the evolution of the community of scholar in this field. The systematic review reported in this study was guided by a desire to understand how the different streams of user innovation (UI) and its community of scholars have evolved from 1970 to 2013.

By describing the evolution of the different user innovation research streams, this study recognizes the main contributions to the field from the conceptual, analytical and empirical perspectives and provides a set of new avenues for future research on the field of user innovation. In this sense, conceptual, analytical and empirical contributions have been progressively extended by scholars to several research streams such as: lead users, product – service development, users´ role and types, online user communities, toolkits, user entrepreneurship, and user innovation.

This research also identifies the evolution of the community of scholar, by determining who has been working with whom in advancing the concept of the different user innovation streams. It shows a network of the most representative authors and countries that have contributed to the development of user innovation all around the world.

This study also intends to measure the percentage of user innovators at the consumer-level in an emerging market, particularly Colombia. Furthermore, this research intends to determine the characteristics of those user innovators found in the sample. Based on previous research and accepting the invitation of the community of scholars, the author found particularly interested the scale developed by Mujika-Alberdi, Gibaja-Martíns, and García-Arrizabalaga (2015) due to its simplicity and practicality to identify user innovators.

Following the work proposed by Mujika-Alberdi, et al (2015) and responding to their research invitation, the author make the cross-cultural adaptation of the instrument and applied it to an emerging country. After performing a rigorous validity process of the instrument to be adapted and applied to Colombian context, this study meets psychometric requirements of reliability and validity. This research has a cross-sectional quantitative design with a descriptive scope. This study has validated and tested the instrument to a sample of adult consumers in Bogotá, Colombia with the aim to identify user innovators.

The results of this study cannot be dismissed; they represent the first research in reference to user innovation studies applied to Colombia. The percentage of user innovators coincide with some of the findings published in similar international studies and open a new avenue for research to the community of scholars. The outcomes of this research constitute of a worthy starting point to collect and document data on the existence of user innovators and user innovation activities in Colombia. The following sections describe the problem statement, the importance of the topic, and user innovation in an emerging country suchs as Colombia.

1.2. Problem Statement

Early research showed that innovation is not only induced by manufacturers, but also by other actors such as users who engage in innovating, exploiting innovations, and play an active role in innovation activities (von Hippel, 1988; von Hippel, 2009b; Franke, von Hippel, & Schreier, 2006; Jeppesen & Frederiksen, 2006; Lettl, et al., 2006; Raasch, et al., 2008; Schweisfurth, 2013).

Empirical studies have demonstrated that users rather than manufacturers have contributed significantly to the development of new products and services (Urban & Hippel, 1988; Herstatt & von Hippel, 1992; Franke & Shah, 2003; Lüthje et al. 2005; Balwin et al., 2006; Schreier & Prügl, 2008; Raasch, Herstatt, & Lock, 2008; Hyysalo, 2009). However, studies on users engaged in innovating activities and user innovation in emerging countries particularly in Latin-American region are scarce (Sánchez, 2016; Van der Boor, Oliveira, & Veloso, 2014).

Von Hippel (1988) addressed that many products and services are actually developed by users, from whom manufacturers obtain innovative ideas that can be commercialized afterwards. As users (firms or individuals) have a better knowledge about their needs, the existence of user innovation in the market reduces the cost of commercial failure and can increase the likelihood of product's commercial appeal in the market place (Henkel & von Hippel, 2005; Franke et al., 2006). Consequently, involving users into new product/service development processes help managers to adopt a proactive approach and reduce risk of commercial failure by manufacturers (Henkel & von Hippel, 2005; Matthing, Sandén, & Edvardsson, 2004). In order to involve users into innovation processes, it is necessary a correct identification of those users. Evidently there is a gap and an opportunity to research and explore deeply on this topic.

Flowers and Henwood (2010) also observed a gap in the correct identification of innovative users (as cited in Mujika-Alberdi et al., 2015, p.108). Mujika-Alberdi et al., (2015) pointed out the need to apply cross-industry scales in order to identify user innovators in emerging markets. Mujika-Alberdi et al., (2015) also mentioned the need to conduct psychometric contrasts applying confirmatory analysis to different communities and regions with varied levels of development. In respond to that need, this research offers a validation of a measurement instrument to identify user innovators in an emerging country such as Colombia.

In Colombia, for instance, the Survey of Development and Technological Innovation in the Manufacturing Sector 2011-2012 revealed customer users were the main external source of ideas for innovation used by industrial firms (DANE, 2013). In Colombia, the government recognized innovation as a source of development and economic growth (Departamento de Planeación Nacional, 2009). For this reason, in 2009, the government created the national policy for science, technology and innovation in order to promote innovation activities, and plan a number of strategies for the development of innovation (Departamento de Planeación Nacional, 2009). In addition, Colombian government recognized innovation as a result of social networks that involve a wide range of actors such as suppliers of goods or services, users and clients (Departamento de Planeación Nacional, 2009).

As it was noted, Colombian government includes firm users (suppliers) and consumer users (clients) into the definition of innovation, but the official measurements and national statistics about innovation do not include or encourage innovation by users. For instance, if a consumer user modifies a good or service or creates a new one, he or she is considered a user innovator but this kind of consumer activity is not taken into account in official measurements. Consequently, there is an absence of consumer user innovation activities and individual user innovators in official statistics.

In this regard, Gault (2012) mentioned the need for collecting and documenting systematic data that measures user innovation activities at the consumer level in order to contribute to a better understanding of nature of the innovation. Additionally, Ogawa & Pongtanalert (2011) and Mujika-Alberdi et al., (2013) highlighted the necessity for large-scale surveys to be conducted in both developed and developing countries in order to understand better consumers' activities. Therefore, this research is relevant in Colombian context because to best of my knowledge, there is no formal research addressing neither user innovation activities nor user innovator characteristics in Colombia. To fill this gap, this research project pretends to contribute to a deeper understanding of user innovators at the consumer level in Colombia.

1.3. Importance of the Topic

Users often take an active role in the innovation process. The shift from a producer innovation model to a user centered innovation model has several attractive advantages. It has demonstrated that user innovation has several positive effects on social welfare (Henkel and von Hippel, 2005), it is a complement to and a feedstock for manufacturers (von Hippel, 2005) and it can significantly influence the rate and direction of innovation in some industries (Baldwin and von Hippel, 2006).

Extant research underlined that user-innovators and lead users are a source of innovation, valuable information and novel ideas that can be taking into account for the development of breakthrough solution. Eric von Hippel (1988) addressed that many products and services are actually developed by users, from whom manufacturers obtain innovative ideas that can be commercialized afterwards. As von Hippel (1988) pointed out the lead users' knowledge and familiarity about future trends put them in a position to provide precise data on needs related to those future conditions. As users (firms and individuals) have a better knowledge about their needs, the existence of user innovation in the market reduces the cost of commercial failure and can increase the likelihood of product's commercial appeal in the market place (Henkel and von Hippel, 2005; Franke et al, 2006).

Empirical studies have indicated that collaboration with user-innovators and innovations developed by users yield commercial success for companies (Franke et al., 2006; Ogawa and

Piller, 2006; Fuller et al., 2007). Therefore, many firms try to identify mechanisms to systematically involve users into their new product and service development process (Raash, et al, 2008).

Ever since customers became a source of innovation and competitive advantage, business organizations have focused their attention and effort to involve customers in the value chain. Nowadays, consumer users play a fundamental role in the marketplace and contribute to the success of new products, solutions and services that appeal to the market. User innovation literature has also expanded to entrepreneurship literature. Shah and Tripsas (2007) demonstrated some user-innovators create their own firms as their innovation became widely adopted and gained popularity in the market. An evidence of that is the proliferation of research on user innovation, user centered methodologies, user innovators, and lead users (von Hippel, 1986; Urban and von Hippel, 1988; von Hippel, 1988; Morrison, Roberts and von Hippel, 2000; von Hippel, 2001; Thomke and von Hippel, 2002; Lilien, Morrison, Searls, Sonnack, & Hippel, 2002; Morrison, Roberts and Midgley, 2004; Henkel and von Hippel, 2005; von Hippel, 2005; Baldwin, Hiernerth and von Hippel, 2006; Franke, von Hippel and Schreier, 2006; Schreier and Prügl, 2008; Ozer, 2009; Gault and von Hippel, 2009; von Hippel, Jong and Flowers, 2010; Hienerth & Lettl, 2011; Chandra & Leenders, 2012; Füller, Matzler, Hutter, & Hautz, 2012; Gault, 2012; Bin, 2013; Ogawa & Pongtanalert, 2013; Mujika-Alberdi, A., García Arrizabalaga, I., & Gibaja Martins, J. J., 2015).

The seminal work published by Von Hippel (1986) indicates that users create and modify products in order to better serve their own needs. Recent national surveys in United Kingdom, Japan, and the United States reveal the existence of user engage in innovation activities such as creation and modification of new products (Flowers, et al, 2010; Ogawa & Pongtanalert, 2011). Consequently, Ogawa & Pongtanalert (2011) and Mujika-Alberdi et al., (2013) pointed out the necessity to conduct large-scale surveys in both developed and developing countries in order to understand better consumers' activities.

Even though the importance of identifying user innovators and conduct large surveys, Bogers et al. (2010) mentioned the necessity to explore the demographics of user-innovators, as the only studies done about it are von Hippel et al. (2011), Wellner, and Herstatt, (2014), and Ogawa & Pongtanalert, (2015). Based on those results, business organizations may effectively identify the type of user innovators who are able to collaborate and participate into their organizations' innovation processes.

Consequently, this research is relevant to Colombian context because it serves as the basis to a better understanding of user innovation activities in this country. The general purpose of this thesis is to contribute to an increased understanding of user innovation (UI) by determining the percentage of user innovators and the characteristics of user innovators at the consumer level in emerging markets, particularly Colombia.

User innovation can also be done by consumers, (Gault 2011), as a result, the scope of this study is focused on individual user innovators. To address the general objective, a systematic and comprehensive review of user innovation literature has been performed and a scale to identify user innovators has been applied. The secondary objectives are:

1. Validate an instrument to identify user innovators in Colombia.
2. Measure the percentage of user innovators at the consumer-level in an emerging market.
3. Identify the characteristics of user innovators in Colombia.

User Innovation in Colombia

Colombia is a Latin American country that have called the attention of international investors by its consistent economic policies and free-trade agreements (Bolaños, Burneo, Galindo, & Berggrun, 2015). This country has been characterized by a great dynamism of its economic activities and a rapid growth over the last decade. In Colombia, the government effort has been significant to assess the innovation progress.

For instance, the Survey of Development and Technological Innovation is a national survey applied to the Manufacturing sector with the purpose of analyzing innovation activities and technological development of the industrial sector in that country. One of the results from this survey confirmed customer users were the main external source of ideas for innovation used by industrial firms (DANE, 2013). This is an example of consumer users as a source of innovation.

In Colombia, innovation is a critical factor for competitiveness and an engine to drive economic development and prosperity. Currently, many Colombian people are concerned with our present level of innovation. According to the Global Innovation Index (GII 2016), Colombia is ranked 63 among 128 countries. Among the 16 countries in the region, Colombia is in the fifth position, above countries such as Brazil, Peru, Ecuador and Venezuela, being the latter that obtains the lowest GII, standing at the120 position.

Despite Pineda (2013) affirmed Colombia is below the average for Latin America; innovation is considered one of the pillars of economic, technological and social development for this country (Departamento Nacional de Planeación 2010, p. 50).

Pineda (2013) also mentioned the need for Colombia to develop and carry out strategies for research, development and innovation directly involved with economic development, from a broader perspective. In this sense, this research is relevant to Colombian context because it serves as the basis to a better understanding of user innovators and user innovation activities in this country.

In this regard, Zita, and Lopes (2011) affirmed user innovation research is important in all economies, but more so in developing economies where there is limited capacity to invest in new capital goods or software systems. Gault (2011) stated there is an increasing need for statistical indicators that helps to measure user innovation. Ogawa & Pongtanalert (2011) and Mujika-Alberdi et al., (2013) highlighted the need to carry out large-scale surveys in both developed and developing countries in order to understand better consumers' activities. To fill this gap, this study pretends to contribute to a deeper understanding of user innovators at the consumer level in Colombia.

Knowing the percentage of user innovators and their characteristics in an emerging country, having a systematic and rigorous research on user innovation, gathering statistics and documenting cases in regards to user innovation will provide the basis for a better understand of the field and will allow an informed policymaking in Colombia. To the best of my knowledge, there is no formal research addressing neither user innovation activities nor user innovator characteristics in Colombia. Therefore, this thesis provides fundamental knowledge on user innovation field and user innovators in an emerging country such as Colombia.

2. Chapter II - User Innovation a new paradigm

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2.1. Introduction

The second chapter offers an overview of the user innovation paradigm. In this section, a description of a closed innovation model, open innovation model and user innovation model are displayed. In the closed innovation model, products and services are developed by manufacturers in a closed way; in this approach, the users' role is limited to have needs which producers then identify by designing and creating new products (von Hippel, 2009). On the contrary, in the open innovation model there are multiple actors such as individuals, groups, organizations, communities, institutions who are distributed throughout the innovation environment and contribute with ideas, knowledge, and expertise to the development of new products and services.

Furthermore, this chapter also provides a description of the user innovation field, its evolution and the user model proposed originally by Eric Von Hippel. According to Von Hippel (1976), the user-model of innovation consists of three stages: 1. Invention and prototyping; 2. Information diffusion; and 2. Pre-commercial replication and use. In this section each phase is expounded utilizing a clear example.

The following section mentioned in this chapter corresponds to the specification of the research questions applied in this study. Some research questions are related to the literature review and others are related to the field work. Finally, this chapter ends with an explanation of the conceptual model for this thesis.

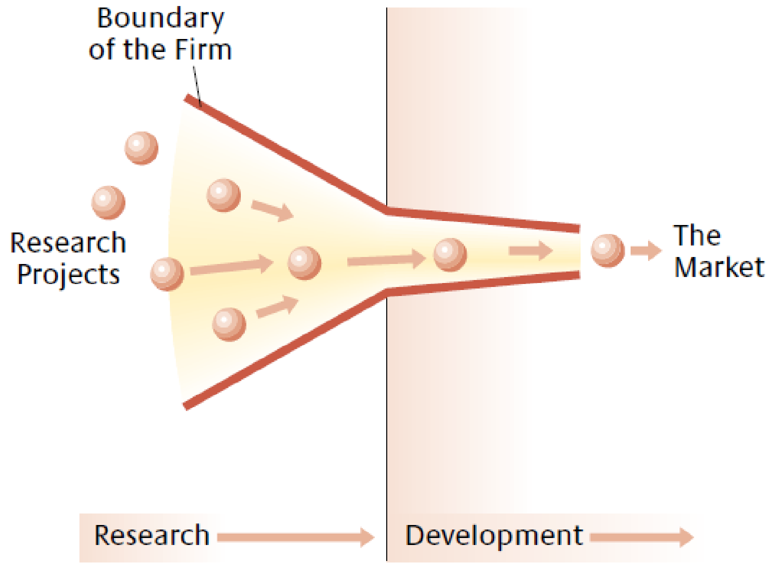
2.2. From Closed to Open Innovation

Today it is widely spread out that user-centered innovation plays a significant and influential phenomenon in academy and managerial practices (Baldwin, Hienerth, & von Hippel, 2006; von Hippel, 2009b). It has supposed a shift from a traditional manufacturer-centric approach to a user-centric approach. In the traditional approach, products and services are developed by manufacturers in a closed way, where the users' role has been to have needs which producers then identify by designing and creating new products (von Hippel, 2009). In contrast, an open innovation model involves new and multiple actors such as individuals, groups, organizations, communities, institutions who are distributed throughout the innovation environment. In this sense, the new open innovation model overlaps the close innovation model and offers several advantages (von Hippel, 2009).

In the traditional approach products and services are developed by manufacturers in a closed way, where the users' role has been to have needs which producers then identify by designing and creating new products (von Hippel, 2009). This traditional approach has been adopted by manufacturers during most of the 20th century.

In a closed innovation model, research is initially performed by the firm. Science and technology base of the firm launches a variety of research investigations; some of them are stopped during the process, while others are selected, go through different stages of their development process and finally reach the market (Chesbrough, 2008). Figure 1 illustrates the closed innovation model.

Figure 1 The Closed Innovation Model



Source: Chesbrough (2008)

In the closed innovation model, companies fund internal research facilities dedicated to create new products which later on turn in profits that might be fed back the cycle again. In the model of Closed Innovation, companies follow the philosophy of "*Successful innovation requires control*", meaning that the company itself should develop its own innovation ideas and then manufacture, market, distribute and service them, completing and controlling the whole cycle (Chesbrough, 2011).

According to Barge-gil, (2010), closed innovators are firms whose innovations were developed mainly through their own efforts and which have neither cooperated nor bought external R&D

(p. 12). Closed Innovation led companies to invest great amount of money in Research and Development (R&D) departments and to hire the smartest people in the industry in order "to discover the best and greatest number of ideas, which allowed them to get to the market first" (Chesbrough, 2011). The ideas were protected and controlled by intellectual property (IP) and the received profits were reinvested in conducting more R&D, creating a cycle of innovation.

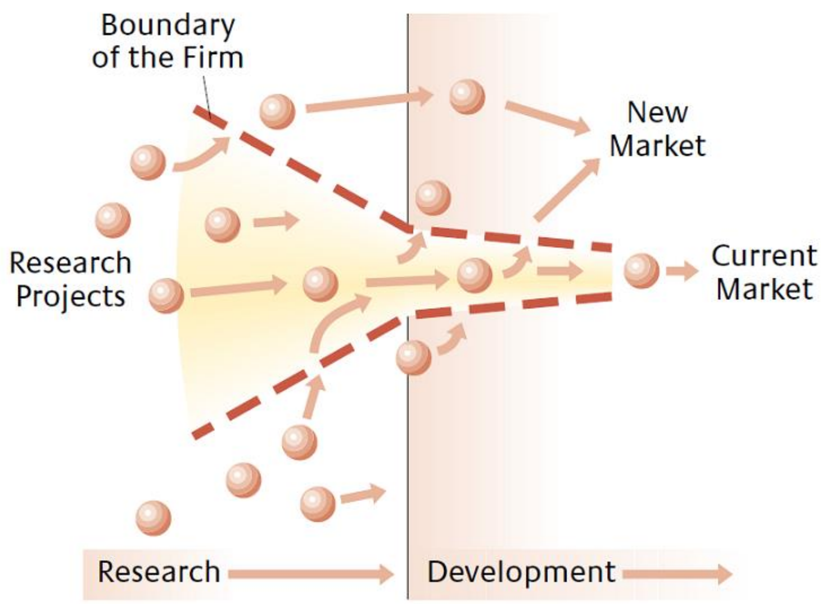
Although Closed Innovation was successful for some time during the 20th century, some factors caused this success to decay. The first cause was the mobility of knowledge workers that made difficult to companies to control their proprietary ideas and expertise. A second factor was the accessibility to venture capitals that allowed new companies to develop the innovation ideas outside the traditional R&D labs. Additionally, if companies that funded a discovery did not develop it in a timely manner, people involved can seek it in their own with the support of venture capitals (Chesbrough, 2011). Soon, the company that invested in a new idea did not profit from the investment, and the proceeds are not reinvested in new discoveries. Then the radiant cycle that sustained the closed innovation is broken.

One typical example of closed innovation businesses is the nuclear reactor industry, which only depends on internal ideas, its labor mobility is very low, little venture capital, and almost no research is conducted at universities (Chesbrough, 2011).

Although, traditional approach fit some fields and conditions (von Hippel, 2009), the new open innovation model overlaps the closed innovation model and offers several advantages. Open innovation model involves new and multiple actors such as individuals, groups, organizations, communities, institutions who are distributed throughout the innovation environment.

The open innovation model suggests that research projects can be launched from either internal or external science and technology sources and new technology can be incorporated into the new product development process at different stages. Additionally, projects can reach the market in various ways, not only through the marketing and sales channels but also through licensing or spin-off venture companies (Chesbrough, 2008). In the new model of Open Innovation, companies can generate ideas either outside or inside their R&D labs, and commercialize them either outside or inside their current business. A new discovery can be developed in the R&D labs and then made marketable in an external channel like a startup company. In the other way, a new breakthrough can be found outside the firm´s own labs, and then brought inside for commercialization. The boundaries between the company and its surrounding environment are no longer constrained, enabling innovation to easily move between the two (Chesbrough, 2011).

Figure 2 The Open Innovation Model



Source: Chesbrough (2008)

As figure 2 shows, in the open innovation model, the boundaries between the company and its surroundings are pervious. The company takes its own ideas to the outside markets or acquires breakthroughs from the exterior and commercializes them by itself. It is a flexible model totally in contrast to the rigidness of the closed innovation model.

2.3. From Open Innovation to User Innovation

User innovation has changed innovation focus, from closed to open innovation, user innovation represents as a new paradigm (von Hippel, 2009b). It has demonstrated that users not only consume products manufactured and marketed by companies, they are also a source of ideas and creators of new products (Mujika-Alberdi et al., 2013). Subsequently, the open innovation model has invited new actors to participate throughout the innovation process. Some of those actors are users, who demonstrated to play an active role in innovation activities.

In this sense, Gassmann, Enkel & Chesbrough, (2010) stated user perspective as one of the nine streams of open innovation. Later, Lichtenthaler (2011) declared user innovation as a research streams or one of the lines of open innovation research. Furthermore, three years later, Faludi (2014) in the effort of examining open innovation, stated the user-oriented approach and collaboration of firms or users are two categories of open innovation. In this thesis, the author studies the user innovation phenomenon, its evolution and dissemination as a new field of research.

Studies on “user innovation” as a source of innovation has grown rapidly and is subject to increasing debate in both academia and industry. Over the last three decades, researchers have begun a systematic and rigorous study of innovation by end users and user firms as it provides a significant complement to manufacturer innovation (von Hippel, 2009).

Eric von Hippel has been identified as the first researcher to systematically collect and document information about users as a major source of innovation in the late 1970s (von Hippel, 1976, 1977, 1978a, 1978b). Von Hippel (2009), Raash et al, (2008) and Flowers, Sinozic, Patel, (2009) among others have examined the phenomenon of user innovation over time and have contributed to an increased understanding about the concept. Flowers et al. (2009) has stated that von Hippel "…views user innovation as an activity whose primary motivation is to produce something that will be used by its originator to fulfill a specific need" (p. 6).

Evidently, the classical definition of user innovation involves user firms and user consumers. As von Hippel (2005) defined users as "firms or individual consumers that expect to benefit from using a product or a service" (p. 3). Arguably, user innovation can be defined as an innovation carried out by users for the purpose of their own benefit. These users can be user manufacturer innovators or user innovators. User innovators can be defined as firms or individual consumers that benefit from *using* a good or a service they develop (Gault & von Hippel, 2009). In other words, user innovators are those users who engage in innovative activities such as create or modify a product for their benefit (Gault, 2012). On the other hand, manufacturer innovations originate from firms for profit purposes, as manufacturers expect to benefit from selling a product or a service (von Hippel, 1976, 1986, 2009).

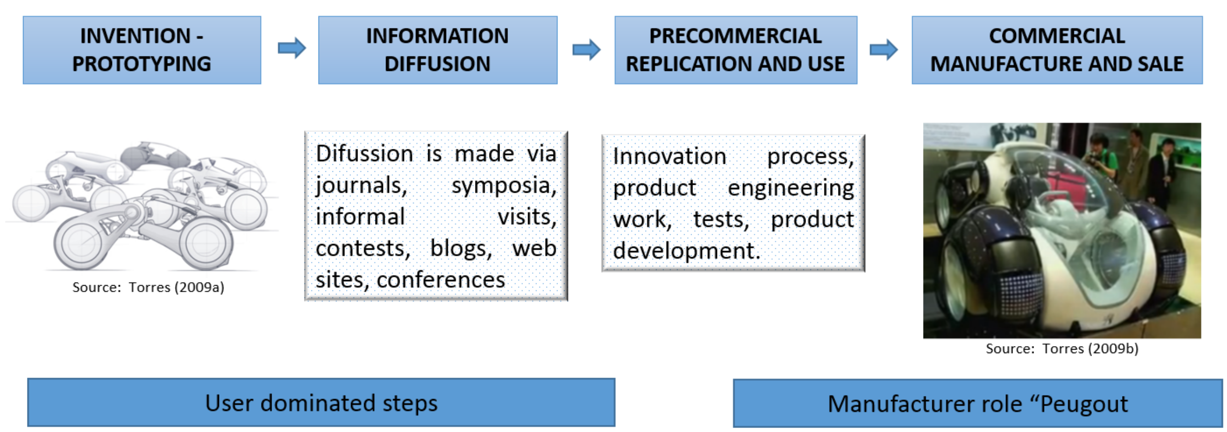
Von Hippel (2005) explained an example of users represents the company Boeing. This manufacture makes airplanes and it is also a user of machine tools. Boeing would be considered a manufacturer-innovator in the case of developing innovations for the airplanes that Boing sells. In contrast, Boeing would be considered a user innovator when it develops metal-forming machinery for in-house use in building airplanes (von Hippel, 2005). As a result, Boeing as many other user innovators develop or modify a product trying to satisfy its own needs; they innovate for its own purpose, in order to solve a need, it experienced with a certain product. Consequently, users can yield valuable ideas in the sense; they may use products differently from what companies expect, or approach products from a perspective that companies have not previously been aware of (Ogawa & Pongtanalert, 2013).

Similarly, a firm user, who develops a new transport device for manually disabled people with the purpose of selling it, would be a producer-innovator (De Jong, 2014). But if an individual would develop the device primarily for personal use or benefit, he or she would be considered a user-innovator.

To understand better the concept, figure 4 shows the user dominated steps in developing an individual user innovation. Based on the seminal work of von Hippel (1976), the user-model of innovation, follow a typical pattern. Let´s explain the model using an example: Carlos Torres, a Colombian industrial designer, invented and prototyped called a “future car”. A car design with three wheels, to be driven by one person, based on the idea that in the future most people will walk alone and will need a connection to internet.

Following the steps of the user model of innovation proposed by von Hippel (1976), in the first stage, Carlos Torres created the design and the prototype of its new car invention. In the second step, he diffused detailed information on the value of his invention and how his prototype device could be replicated. For instance, he applied to the “Peugeot design contest in 2008” and won the sponsorship to manufacture the new invention. The third stage “pre-commercial replication and use”, in this example, the company, it meanse, the French multinational manufacturer of automobiles, Peugeot, started the innovation process. As it is stated by Von Hippel (1976), the user dominated the first two steps in the user innovation model; afterwards, the manufacturer’s contribution is to perform product engineering work on the user’s device to improve its reliability, convenience of operation, etc. (p. 220). Finally, the company manufactures, markets and sells the innovative product; in this example, the new car was launched, exhibited, and sold in the Shanghai Motor Show 2009 sponsored by the firm Peugeot. Figure 3 illustrates the user innovation model applied to an individual user innovator example.

Figure 3 User Innovation Model



Source: Adapted from Von Hippel (1976)

Von Hippel (1976) found that approximately 80% of the innovations created by users were in fact invented, prototyped and first field-tested by users of the instrument rather than by an instrument manufacturer. Empirical studies have demonstrated that users rather than manufacturers have contributed significantly to the development of new products and services, and they are a major source of innovative activity in the economy (Urban and Hippel, 1988; Herstatt and von Hippel, 1992; Franke and Shah, 2003).

Addicitionally, the presence of user innovation in the market place provides significant value to innovative companies. Research into de sources of innovation have found that users are the developers of breakthrough ideas that later become the basis for important new commercial products (Lilien et al, 2002; Franke et al, 2006). Involving users into new development products and services assists managers to adopt a proactive approach and reduce risk of commercial failure by manufacturers (Henkel and von Hippel, 2005; Mathing et al, 2004). Consequentely, user innovation has a great impact on managerial activities. As a result, the scope of this study is focused on user innovators at the consumer lever in an emerging market.

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3. Chapter III - Systematic Literature Review on User Innovation

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3.1. Introduction

From the late 1970s onwards, a considerably body of literature related to user innovation has been published. 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.

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.

To the knowledge of the authors, no systematic review exists focusing on user innovation streams to date. Prior reviews have focused on how firms engage in collaborative innovation with individual and business customers (Greer, and Lei, 2012); 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 systematic review reported in this study was guided by a desire to understand how the different streams of user innovation (UI) and its community of scholars have evolved?

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. How the community of scholars and the number of publications in the field have evolved?

3. Who has been working with whom in advancing the concept of the different user innovation streams?

4. What are the main journals publishing articles related to the field of user innovation?

5. Which are the most representative countries that have contributed to the development of user innovation?

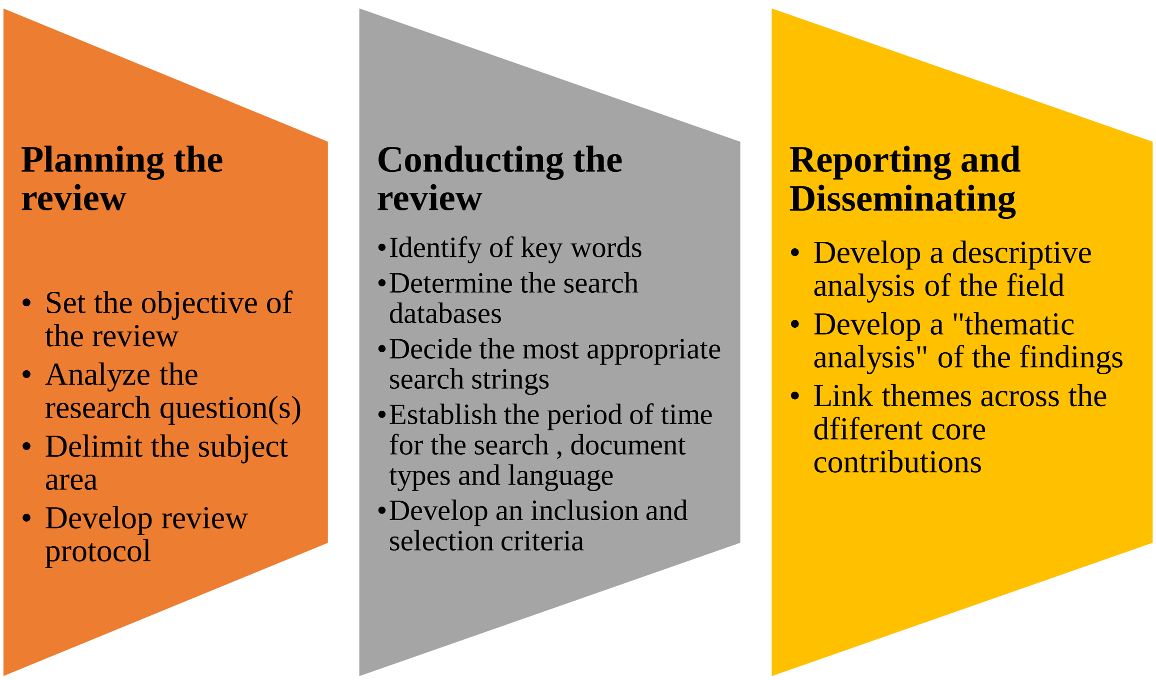
6. What have been the main contributions to the field from the conceptual, analytical and empirical perspectives?

In order to answer those questions, this research employed a systematic approach review using clearly defined processes and criteria in reference to previous studies focused on how to conduct systematic literature reviews in management research (Denyer and Neely, 2004; Pittaway et al., 2004; Tranfield et al., 2003). This chapter offers a detailed explanation of the literature review methodology carried out in this study; then respond to the research questions formulated above and finally it provides information about the main contributions to the field from the conceptual, analytical and empirical perspectives.

3.2. Literature Review Methodology

The literature review about user innovation presented in this paper follow 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. Figure 4 summarizes key activities to be performed in each stage.

Figure 4 Systematic Review Process



Source: Adapted from Transfield, et. al., 2003

3.2.1. 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 is presented, which delineates how the different streams and the community of scholars 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.

3.2.2. 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 author identifies of 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. See Table 1 and Table 2 for inclusion and exclusion 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. In consequence, books, chapters in books, thesis, forums, essays, conference proceedings, working papers and other unpublished works were excluded.

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.

Table 1 Inclusion criteria

Inclusion Criteria	Reasons for inclusion
All countries	To examine how different countries have contributed to the development of user innovation
All sectors	To have a wide picture of how user innovation has flourished across different sectors
Conceptual, analytical and empirical and studies	To capture all conceptual, analytical and empirical evidence
“user innovation”, “customer active paradigm”, “users as innovators”, “innovation by users”, “user centric innovation”, “user centered innovation”, “user driven innovation” and “lead users”	To ensure coverage the related topics
Language	Academic articles written in English language

Source: Author’s elaboration

Table 2 Exclusion criteria

Exclusion Criteria	Reasons for exclusion
Information systems; human computer interfaces	To exclude articles on innovation that focus on how IT systems are linked together
User centered design	To exclude articles that focus on approaches different from user innovation
Language	To exclude articles written in other languages rather than English
Essay, Book reviews, conference proceedings, forums	To exclude non-academic articles

Source: Author’s elaboration

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.

3.2.3. Database searching process

The database searching process is developed in three stages:

In the first stage, the keywords were entered the five electronic databases: ISI Web of Science, Ebscohost (Business Source Complete), Jstor, Scopus and Science Direct. The search strings were built using operators ANS/OR and following the aforementioned criteria points 3, 4, 5. 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.

The outcome of this process yields 719 records. Table 3 describes the initial database outcomes.

Table 3 Initial Database Outcomes

BASE DE DATOS	ECUACION DE BUSQUEDA	NO. REGISTROS	FECHA DE BUSQUEDA
Jstor1	"user innovation" OR "users as innovators"	11	10/17/14
Jstor	"innovation by users"	0	10/17/14
Jstor	"user centered innovation"	0	10/17/14
Jstor	"customer active paradigm"	0	10/17/14
Jstor	"user centric innovation"	0	10/17/14
Jstor2	"lead users" or "user driven innovation"	9	10/17/14
isi	TS=("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")	180	10/17/14
Science	("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")	95	10/17/14
scopus	("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")	278	10/17/14
Ebscohost	("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")	146	10/17/14
	Total Records	**719**	

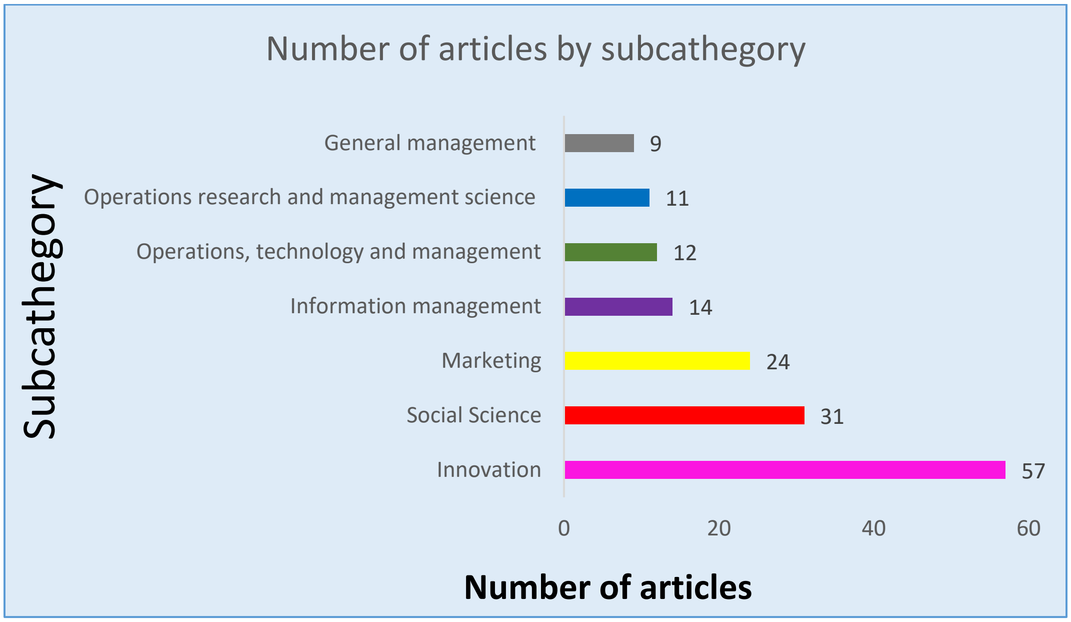
Source: Author’s elaboration

In the second stage, each title and abstract retrieved from the initial database search is read and analyzed. In addition, the following articles were eliminated: duplicate studies (321), none related topic (84), other types of publications (16) (i.e. book reviews, essay, conference proceedings), articles published in other languages rather than English (8). As a result, 288 articles remained as relevant.

Then, the review was limited to double-blind reviewed journal articles published in top-tier journals. Established influential journals tend to shape the theoretical and empirical work in a field by setting new horizons for inquiry within their frame of reference (Furrer et al. 2008, p. 2). Therefore, adopting this this approach provides an accurate and representative picture of relevant scholarly research.

The ABS Academic Journal Quality Guide provides a comprehensive guide to the range, subject matter and relative quality of journals in which business and management academics publish the results of their research (Morris, Harvey, & Kelly, 2009). 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. The180 remaining articles were published in a wide range of sub-fields within business and management discipline. Figure 5 represents the most representative subfields, such as Innovation, Social Science, Marketing, Information Management, Operations, Technology and Management, Operations Research and Management Science.

Figure 5 Subfields within business management discipline



Source: Author's elaboration

The Guide classifies journals into four categories (grades 1 to 4*). The category of 4* recognizes the quality of those journals ranked as a 'top' class journal in at least seven of ten international listings consulted (Morris, Harvey, & Kelly, 2009).

In the third stage, the selected articles read and analyze in their entirety for substantive and empirical content, classifying them into four-point scale: 1, 2, 3, 4 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". 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 author's experience, knowledge and judgment about the topic.

3.2.4. Reporting and disseminating

The systematic review was carried out following the methodology presented. A total of 719 records were downloaded directly from the five databases ISI Web of Science, Ebscohost (Business Source Complete), Jstor, Scopus and Science Direct and then they were 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). Out of 188 articles, 108 did not comply with the top tier journal inclusion criteria. Then, 34 were classified as not relevant articles and 146 were classified as relevant. Finally, data analysis has been performed over 146 files. A list of the 146 article is shown in appendix 2.

In this stage of the systematic literature review, a descriptive analysis of the field will include the following: The most prominent authors analyzed by the date of their publication, the analysis by journal which show the academic journals most utilized to published literature on user innovation related topics, and the analysis by country which demonstrate those countries with the greatest number of publications related to this research field. The previous information will be explaining trough the development of the answers to the research questions formulated in the introduction chapter.

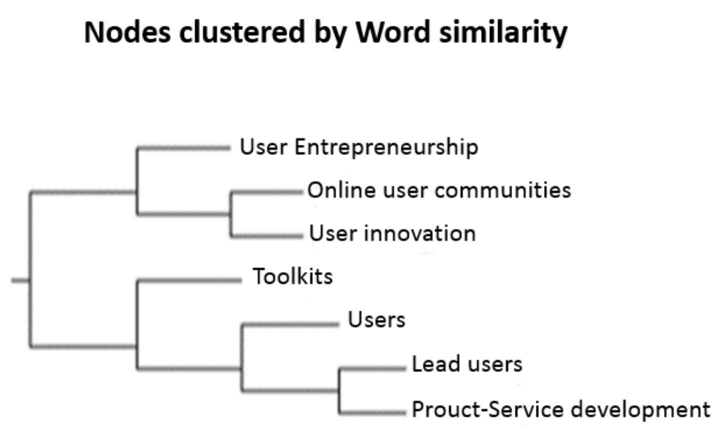
3.2.5. Answers to the research questions related to the literature review

3.2.5.1. What are the different research streams within the user innovation field?

To illustrate how the community within the different research streams has evolved a series of cross-correlation maps has been created for each research stream. A cross-correlation maps show a two-dimensional visual depiction of the authors and their networks based on set of their publication items. The authors are displayed in the form of nodes. The links represent the similarities among authors; the highest similarity is represented by the links with similarity > 0.75.

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. Figure 6 illustrates the nodes or research streams clustered by word similarity.

Figure 6 Research Streams

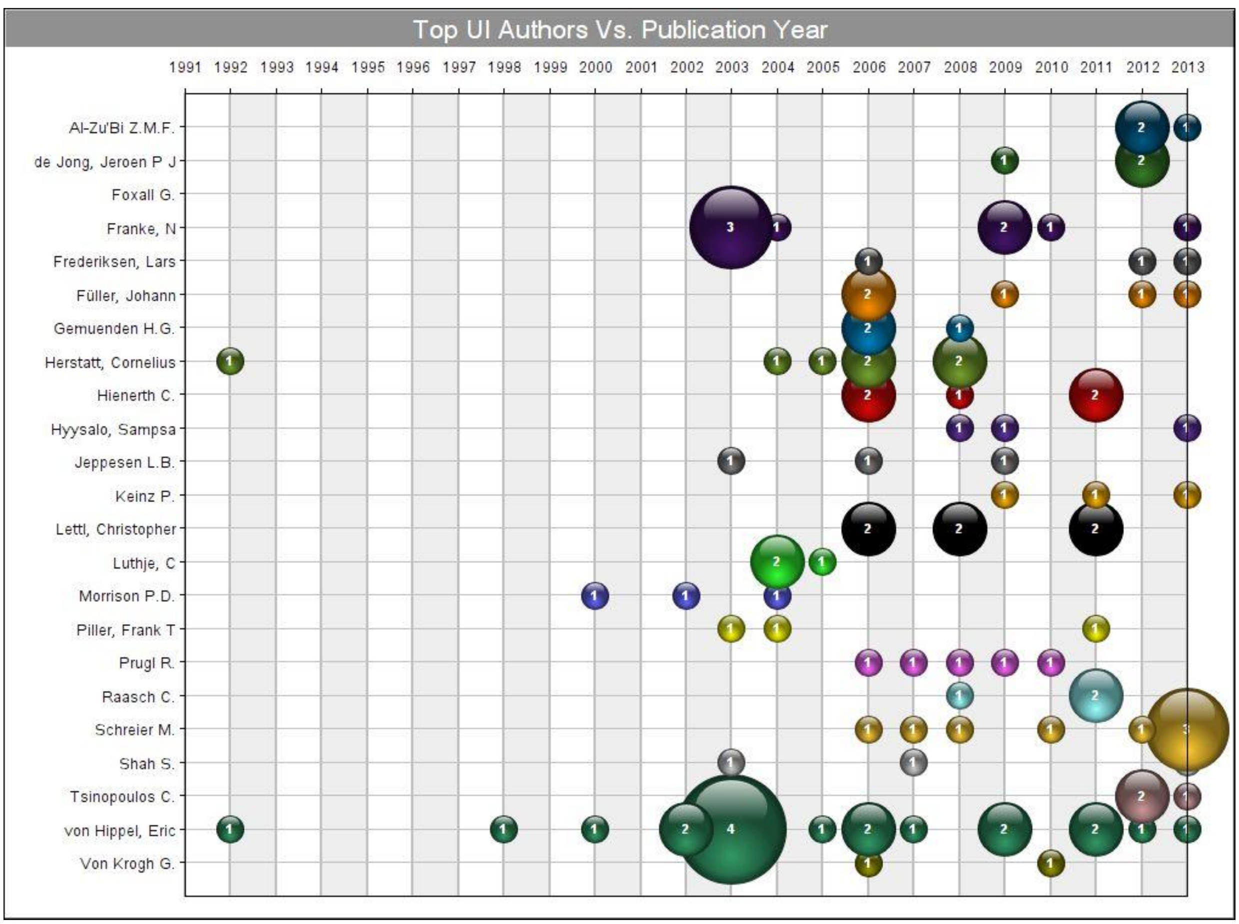


Source: Author´s elaboration

3.2.5.2. How the community of scholars and the number of publications have evolved?

A total of 232 authors have written at least one article related to user innovation. Figure 7 shows the author's names and the frequency of their publications. After a cleaning process, we selected a group of 23 top authors who have published more than 3 articles and associate them with their work's publication year. Figure 7 shows the field of user innovation has gained increasing attention and a considerably body of literature related to user innovation has been published from 2013 onwards.

Figure 7 Author and Publication Year



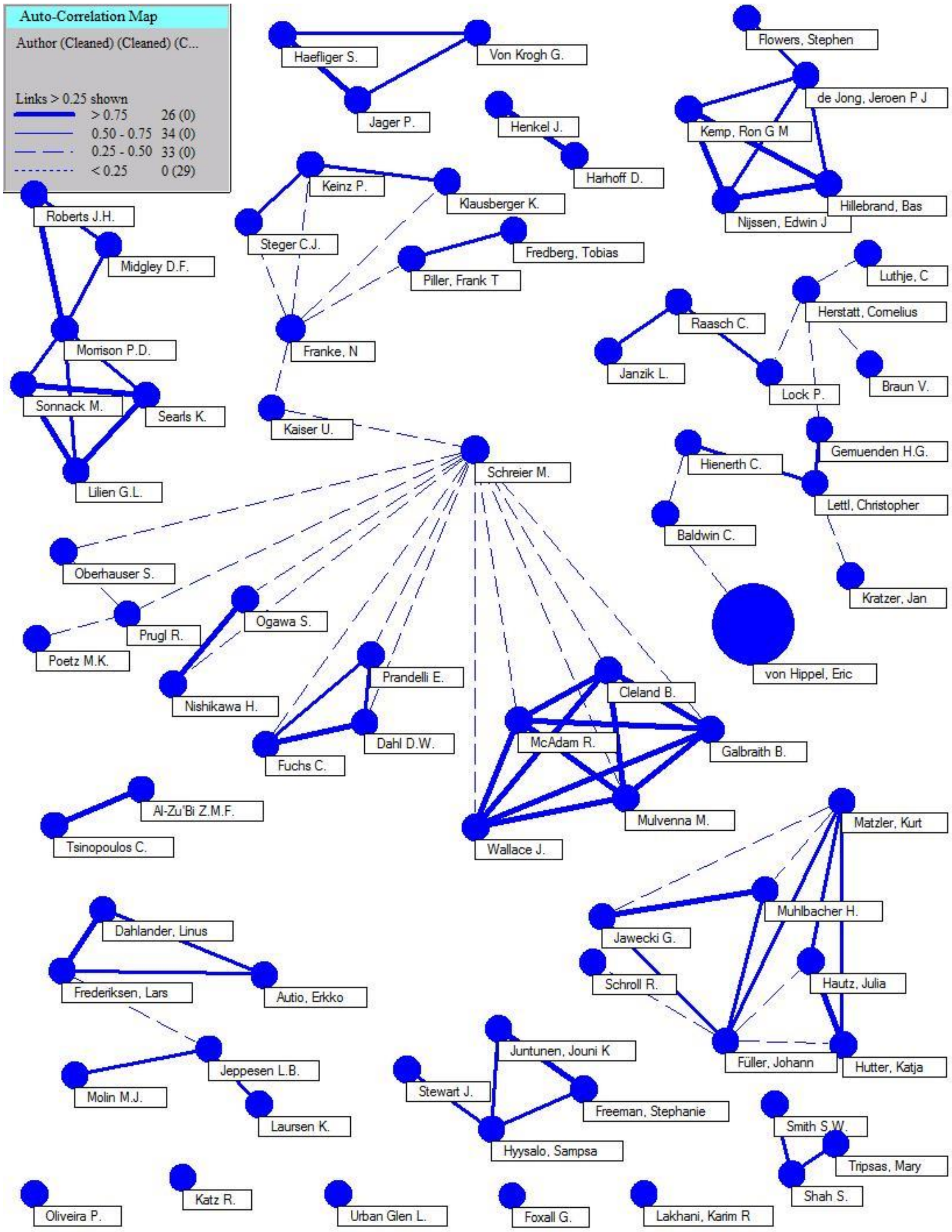
Source: Computed based on the data set

3.2.5.3. Who has been working with whom in advancing the research streams?

The community of scholars working on user innovation related research topics has grown. Figure 13 illustrates an auto-correlation map that displays connections between the top 23 authors. It shows the relations shared by the top 23 authors, mapping the top authors to see who is working with whom. An auto-correlation map is utilized when exist the possibility of shared records between the authors. The software utilized to obtain the networking maps is called Vantage Point. The nodes represent the authors and the links represent records or published articles shared by the authors. As the basis for interpretation, it uses links rather than distance; the reason is the use of the map scaling algorithm attempts to put similar nodes near each other, but cannot always succeed. The nodes can vary of sizes depending on the number of publications from the author. For example, in Figure 13, the biggest node corresponds to Eric Von Hippel, who is the authors that hold the greatest number of publications in this field.

The links can vary depending on the strengths. Authors linked by a solid line will be co-authors on a number of records. The map shows all links and networks from the 23 top authors. In Figure 13, the author’s map not only represents several research teams but also those authors who work or published articles by themselves. Within a single university, heavily linked individuals are probably research directors. Across multiple universities, the individual is probably an academic who work with other peers and extend academic mobility. Figure 8 represents authors´ network.

Figure 8 Top 23 Authors Network Map



Source: Computed based on the data set

3.2.5.3.1. User innovation research stream author´ network

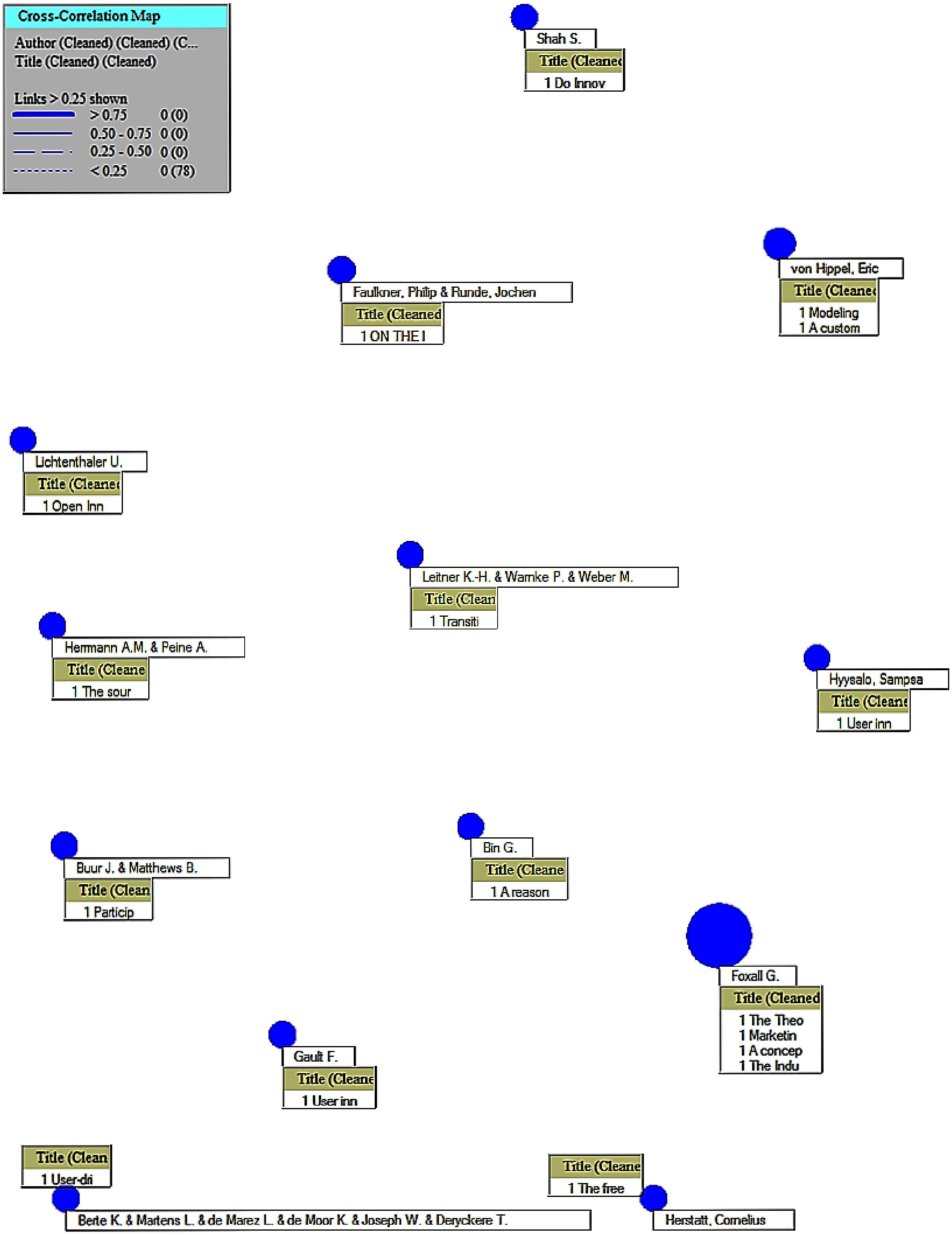
Thirteen groups of authors have published articles classified in this research stream. Foxal represents the biggest node, as he published four articles classified in this category. Six authors work alone: Foxal, Von Hippel, Bing, Lichtenhaler, Gault, and Shah. The remaining 21 authors work in groups. Table 4 and Figure 9 represent UI authors´network grouped by publication.

Table 4 UI Research stream author´s network

Items	# Records	UI research stream Authors´ network
1	4	Foxall G.
2	2	von Hippel, Eric
3	1	Berte K. & Martens L. & de Marez L. & de Moor K. & Joseph W. & Deryckere T.
4	1	Bin G.
5	1	Buur J. & Matthews B.
6	1	Faulkner, Philip & Runde, Jochen
7	1	Gault F.
8	1	Herrmann A.M. & Peine A.
9	1	Herstatt, Cornelius
10	1	Hyysalo, Sampsa
11	1	Leitner K.-H. & Warnke P. & Weber M.
12	1	Lichtenthaler U.
13	1	Shah S.

Source: Computed based on the data set

Figure 9 User Innovation research stream author´s network and publications



Source: Computed based on the data set

3.2.5.3.2. Lead user research stream

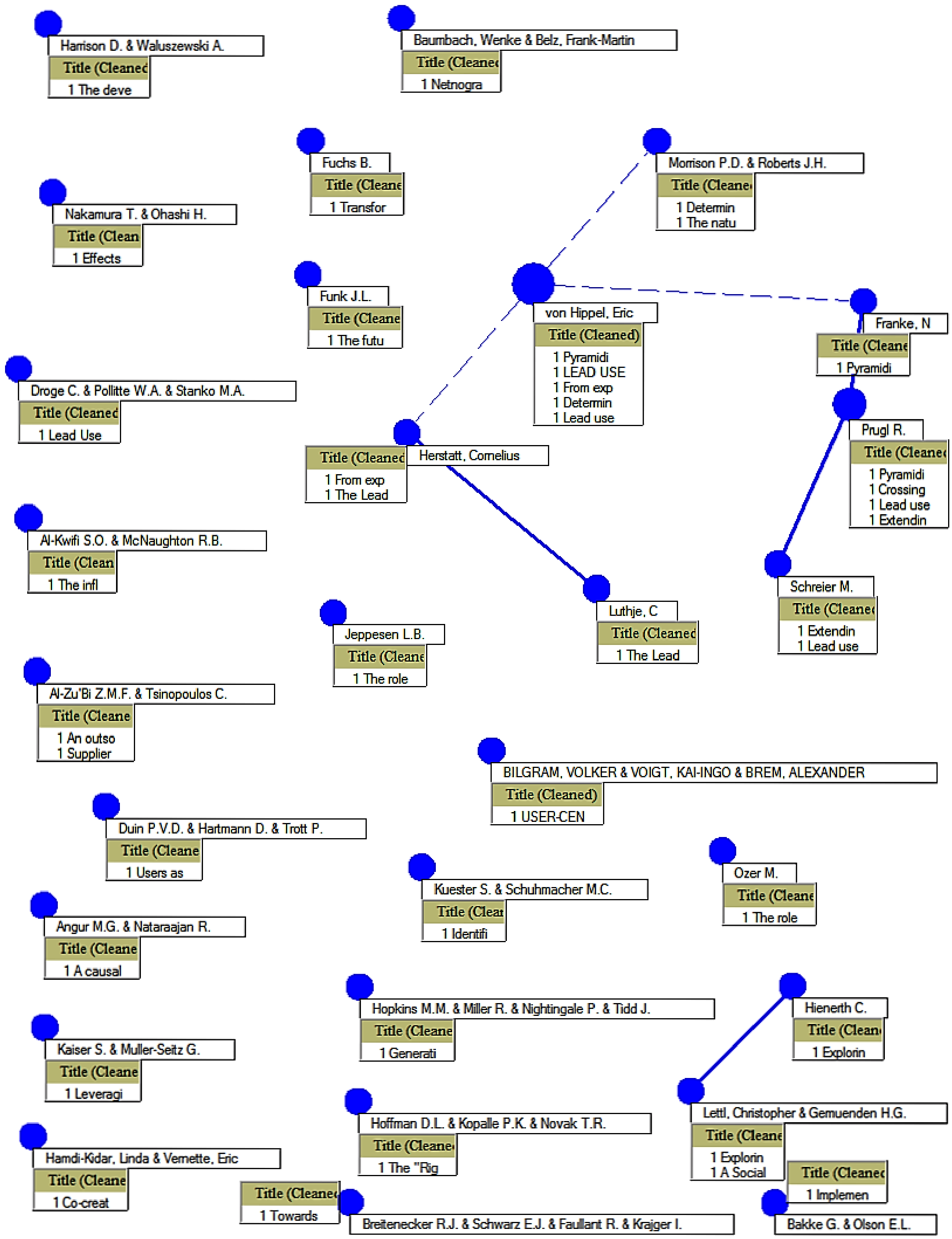
There are 29 authors working in this research stream. Von Hippel and Prugl represent the biggest node, as they published five and four articles respectively in this category. Table 5 and Figure 10 represent LU authors´network grouped by publication.

Table 5 LU research stream authors' network and publications

Nodes	# Records	Lead users research stream Author´s network
1	5	von Hippel, Eric
2	4	Prugl R.
3	2	Al-Zu'Bi Z.M.F. & Tsinopoulos C.
4	2	Herstatt, Cornelius
5	2	Lettl, Christopher & Gemuenden H.G.
6	2	Morrison P.D. & Roberts J.H.
7	2	Schreier M.
8	1	Al-Kwifi S.O. & McNaughton R.B.
9	1	Angur M.G. & Nataraajan R.
10	1	Bakke G. & Olson E.L.
11	1	Baumbach, Wenke & Belz, Frank-Martin
12	1	BILGRAM, VOLKER & VOIGT, KAI-INGO & BREM, ALEXANDER
13	1	Breitenecker R.J. & Schwarz E.J. & Faullant R. & Krajger I.
14	1	Droge C. & Pollitte W.A. & Stanko M.A.
15	1	Duin P.V.D. & Hartmann D. & Trott P.
16	1	Franke, N
17	1	Fuchs B.
18	1	Funk J.L.
19	1	Hamdi-Kidar, Linda & Vernette, Eric
20	1	Harrison D. & Waluszewski A.
21	1	Hienerth C.
22	1	Hoffman D.L. & Kopalle P.K. & Novak T.R.
23	1	Hopkins M.M. & Miller R. & Nightingale P. & Tidd J.
24	1	Jeppesen L.B.
25	1	Kaiser S. & Muller-Seitz G.
26	1	Kuester S. & Schuhmacher M.C.
27	1	Luthje, C
28	1	Nakamura T. & Ohashi H.
29	1	Ozer M.

Source: Computed based on the data set

Figure 10 Lead User research stream authors' network and publications



Source: Computed based on the data set

3.2.5.3.3. NPD/NSD research stream

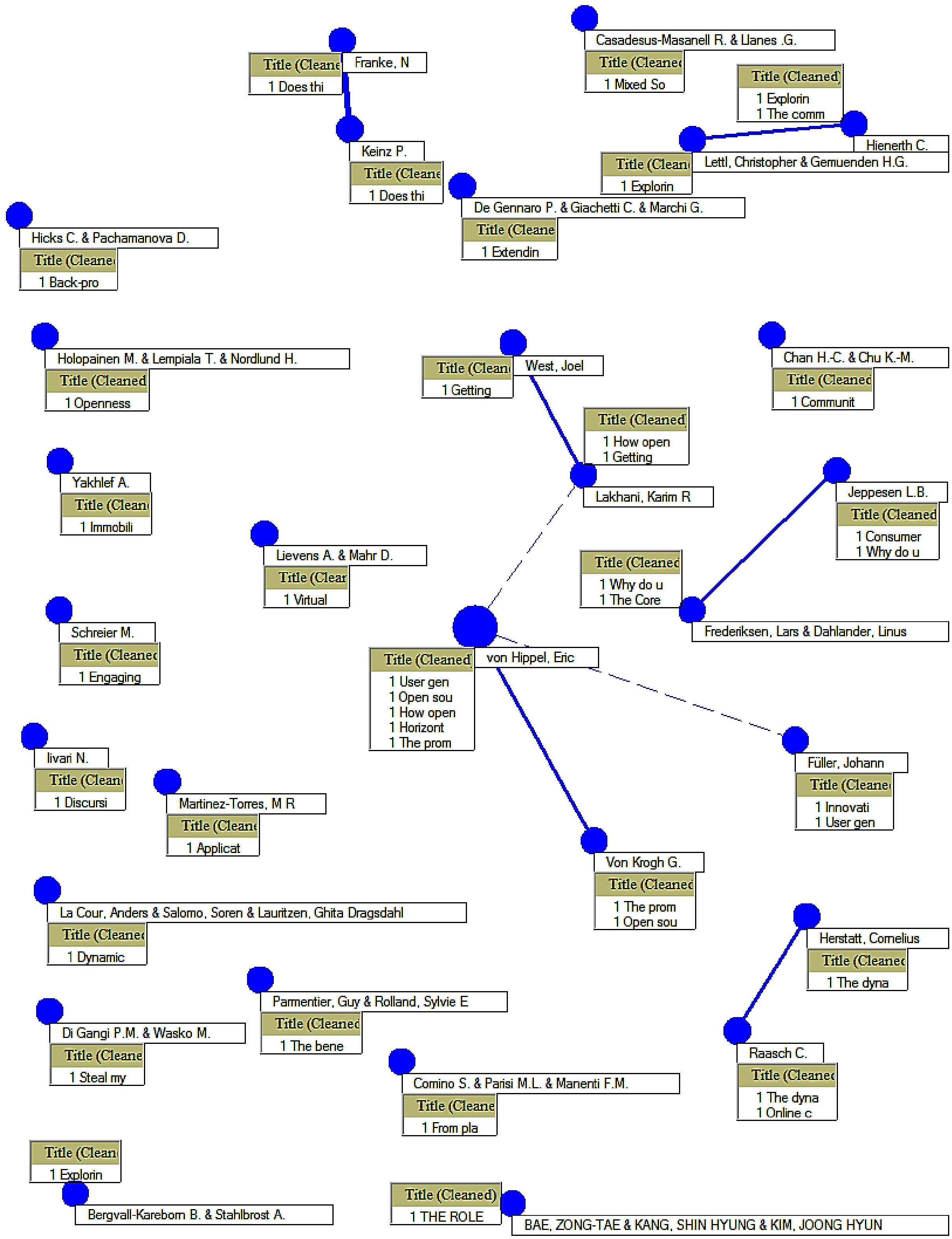
There are 29 authors or group of authors working in this research stream. Von Hippel represents the biggest node, as they published five classified in this category. Table 6 and Figure 11 show NPD/NSD research stream authors´ network grouped by publication.

Table 6 NPD / NSD and co-creation research stream authors' network

Nodes	# Records	NPD/ NSD and Co-creation research stream Author´s network
1	5	von Hippel, Eric
2	2	Frederiksen, Lars & Dahlander, Linus
3	2	Füller, Johann
4	2	Hienerth C.
5	2	Jeppesen L.B.
6	2	Lakhani, Karim R
7	2	Raasch C.
8	2	Von Krogh G.
9	1	Bae, Zong-tae & Kang, Shin hyung & Kim, joong hyun
10	1	Bergvall-Kareborn B. & Stahlbrost A.
11	1	Casadesus-Masanell R. & Llanes .G.
12	1	Chan H.-C. & Chu K.-M.
13	1	Comino S. & Parisi M.L. & Manenti F.M.
14	1	De Gennaro P. & Giachetti C. & Marchi G.
15	1	Di Gangi P.M. & Wasko M.
16	1	Franke, N
17	1	Herstatt, Cornelius
18	1	Hicks C. & Pachamanova D.
19	1	Holopainen M. & Lempiala T. & Nordlund H.
20	1	Iivari N.
21	1	Keinz P.
22	1	La Cour, Anders & Salomo, Soren & Lauritzen, Ghita Dragsdahl
23	1	Lettl, Christopher & Gemuenden H.G.
24	1	Lievens A. & Mahr D.
25	1	Martinez-Torres, M R
26	1	Parmentier, Guy & Rolland, Sylvie E
27	1	Schreier M.
28	1	West, Joel
29	1	Yakhlef A.

Source: Computed based on the data set

Figure 11 NPD/NSD and Co-creation authors' network and publications



Source: Computed based on the data set

3.2.5.3.4. Toolkits research stream

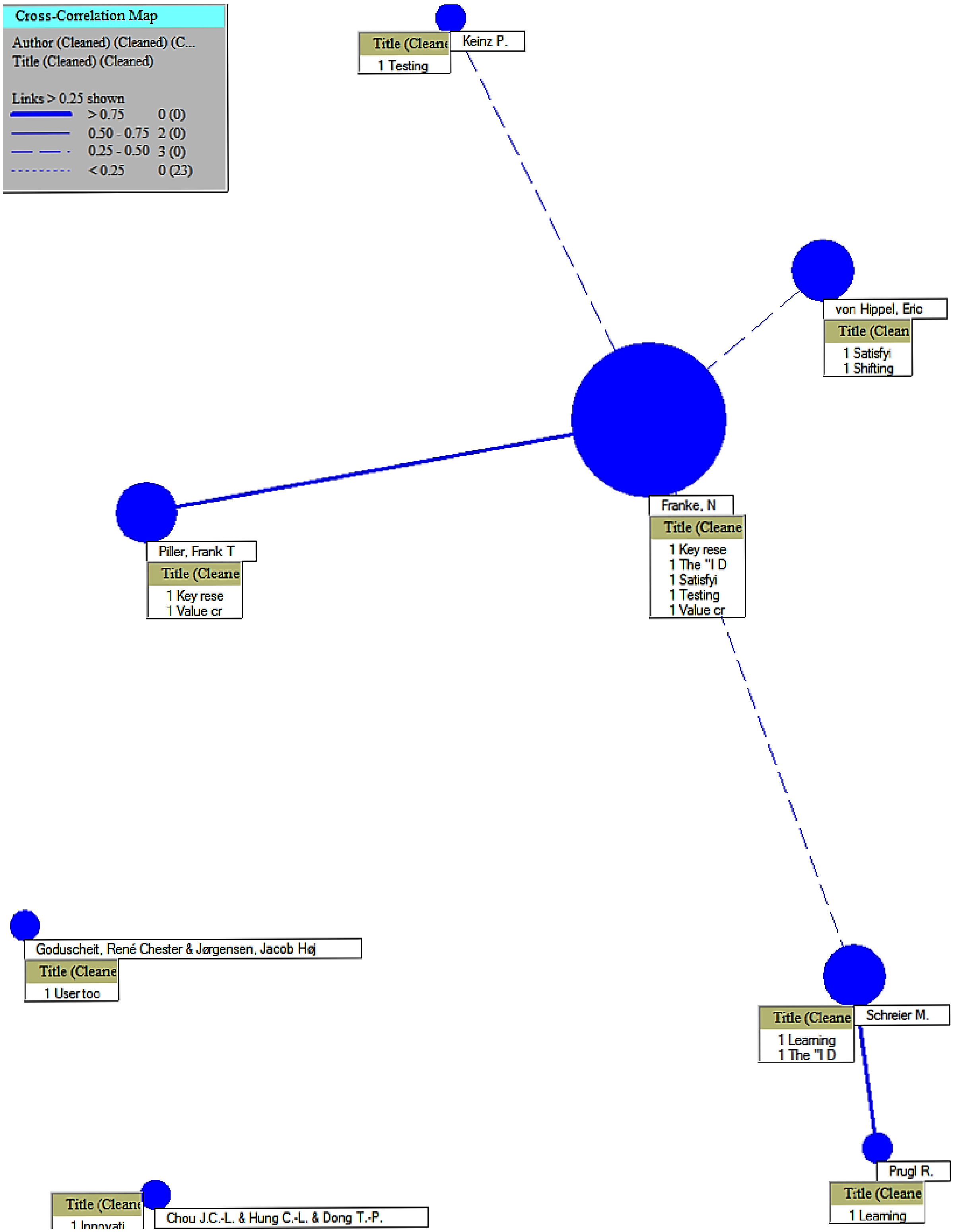
There are 8 authors or group of authors working in this research stream. Nicolous Frank represents the biggest node, as they published five classified in this category. Table 7 and Figure 12 show Toolkits research stream authors' network grouped by publication.

Table 7 Toolkits research stream authors' network

Nodes	# Records	Toolkits research stream Author´s network
1	5	Franke, N
2	2	Piller, Frank T
3	2	Schreier M.
4	2	von Hippel, Eric
5	1	Chou J.C.-L. & Hung C.-L. & Dong T.-P.
6	1	Goduscheit, René Chester & Jørgensen, Jacob Høj
7	1	Keinz P.
8	1	Prugl R.

Source: Computed based on the data set

Figure 12 Toolkits authors' network and publications



Source: Computed based on the data set

3.2.5.3.5. Online User Communities Research stream

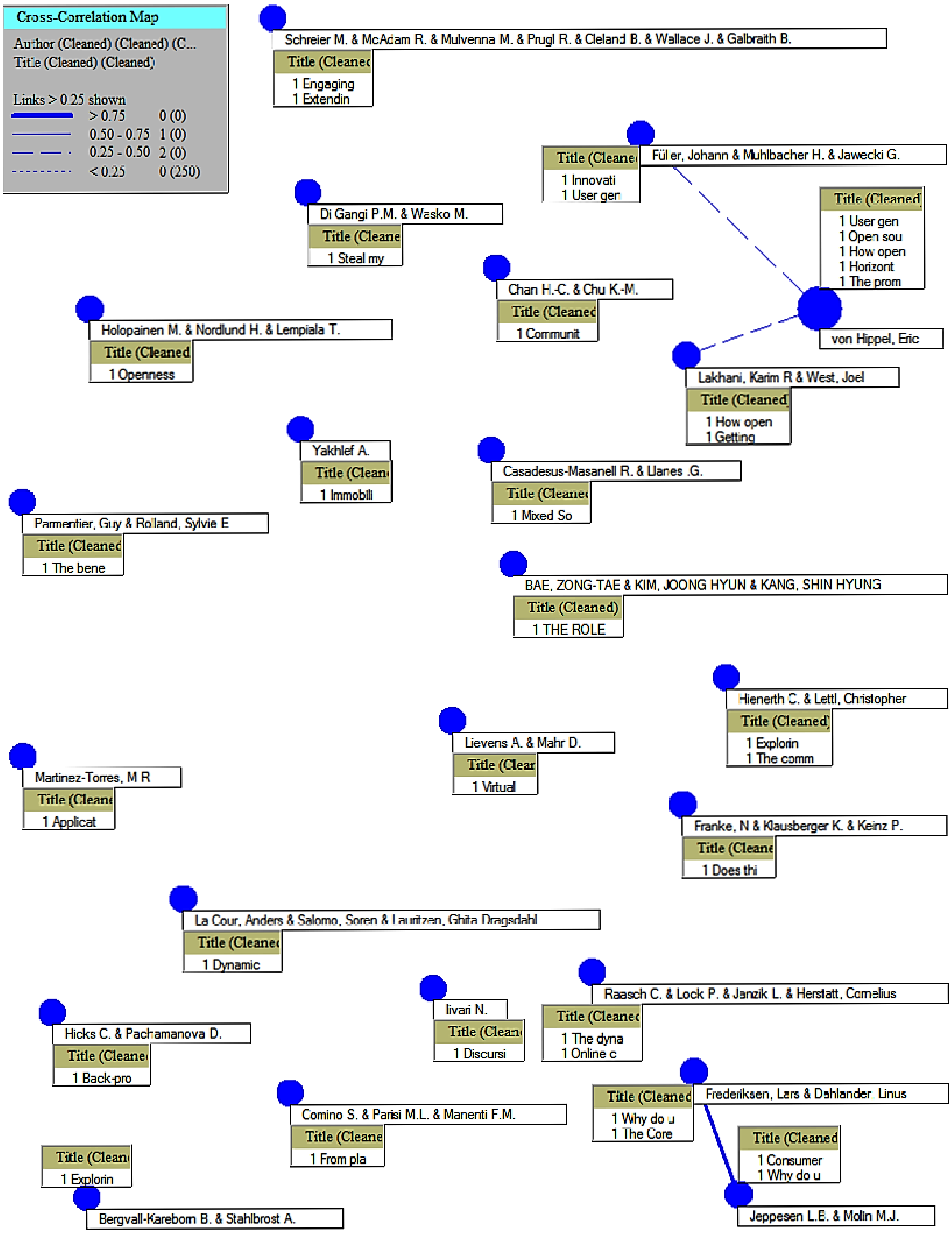
There are 23 authors or group of authors working in this research stream. Von Hippel represents the biggest node, as they published five classified in this category. Table 8 and Figure 13 show Online user communities' authors' network grouped by publication.

Table 8 Online user communities' research stream authors' network

Nodes	# Records	Use online Communities research stream Author´s network
1	5	von Hippel, Eric
2	2	Frederiksen, Lars & Dahlander, Linus
3	2	Füller, Johann & Muhlbacher H. & Jawecki G.
4	2	Hienerth C. & Lettl, Christopher
5	2	Jeppesen L.B. & Molin M.J.
6	2	Lakhani, Karim R & West, Joel
7	2	Raasch C. & Lock P. & Janzik L. & Herstatt, Cornelius
8	2	Schreier M. & McAdam R. & Mulvenna M. & Prugl R. & Cleland B. & Wallace J. & Galbraith B.
9	1	Bae, Zong-tae & Kim, Joong hyun & Kang, shin hyung
10	1	Bergvall-Kareborn B. & Stahlbrost A.
11	1	Casadesus-Masanell R. & Llanes .G.
12	1	Chan H.-C. & Chu K.-M.
13	1	Comino S. & Parisi M.L. & Manenti F.M.
14	1	Di Gangi P.M. & Wasko M.
15	1	Franke, N & Klausberger K. & Keinz P.
16	1	Hicks C. & Pachamanova D.
17	1	Holopainen M. & Nordlund H. & Lempiala T.
18	1	Iivari N.
19	1	La Cour, Anders & Salomo, Soren & Lauritzen, Ghita Dragsdahl
20	1	Lievens A. & Mahr D.
21	1	Martinez-Torres, M R
22	1	Parmentier, Guy & Rolland, Sylvie E
23	1	Yakhlef A.

Source: Computed based on the data set

Figure 13 Online user communities authors' network and publications



Source: Computed based on the data set

3.2.5.3.6. User entrepreneurship research stream

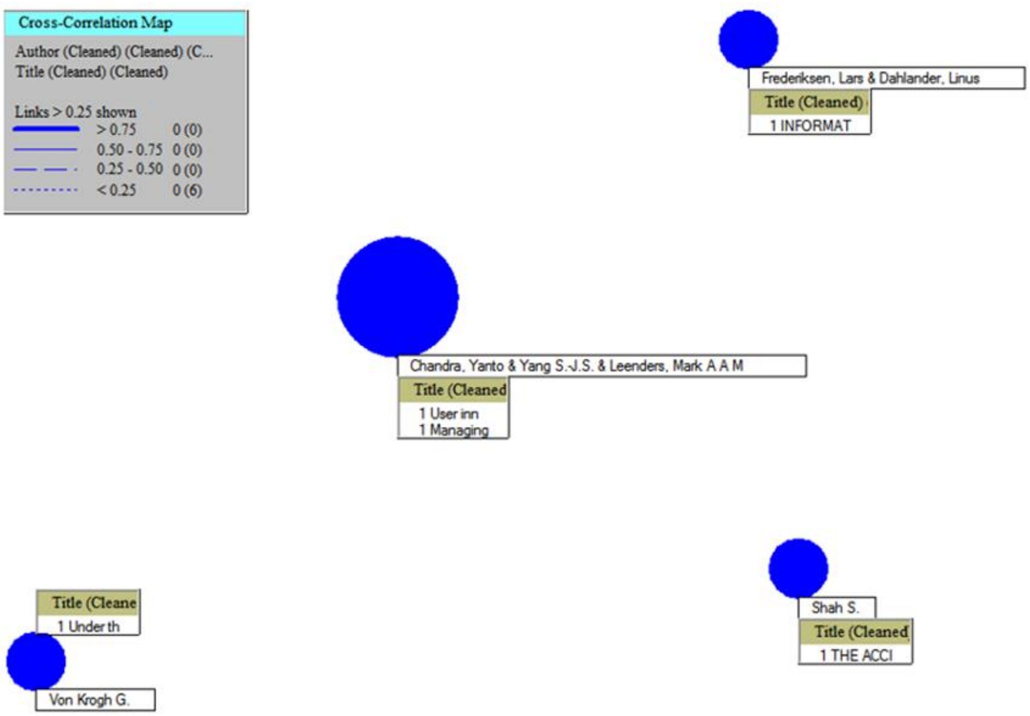
There are 4 authors or group of authors working in this research stream. Chandra, Yanto represents the biggest node, publishing two articles classified in this category. Table 9 and Figure 14 show User Entrepreneurship authors' network grouped by publication.

Table 9 User Entrepreneurship research stream authors´networs

Nodes	# Records	User entrepreneurship research stream Author´s network
1	2	Chandra, Yanto & Yang S.-J.S. & Leenders, Mark A A M
2	1	Frederiksen, Lars & Dahlander, Linus
3	1	Shah S.
4	1	Von Krogh G.

Source: Computed based on the data set

Figure 14 User Entrepreneurship authors' network and publications



Source: Computed based on the data set

3.2.5.3.7. Users research stream

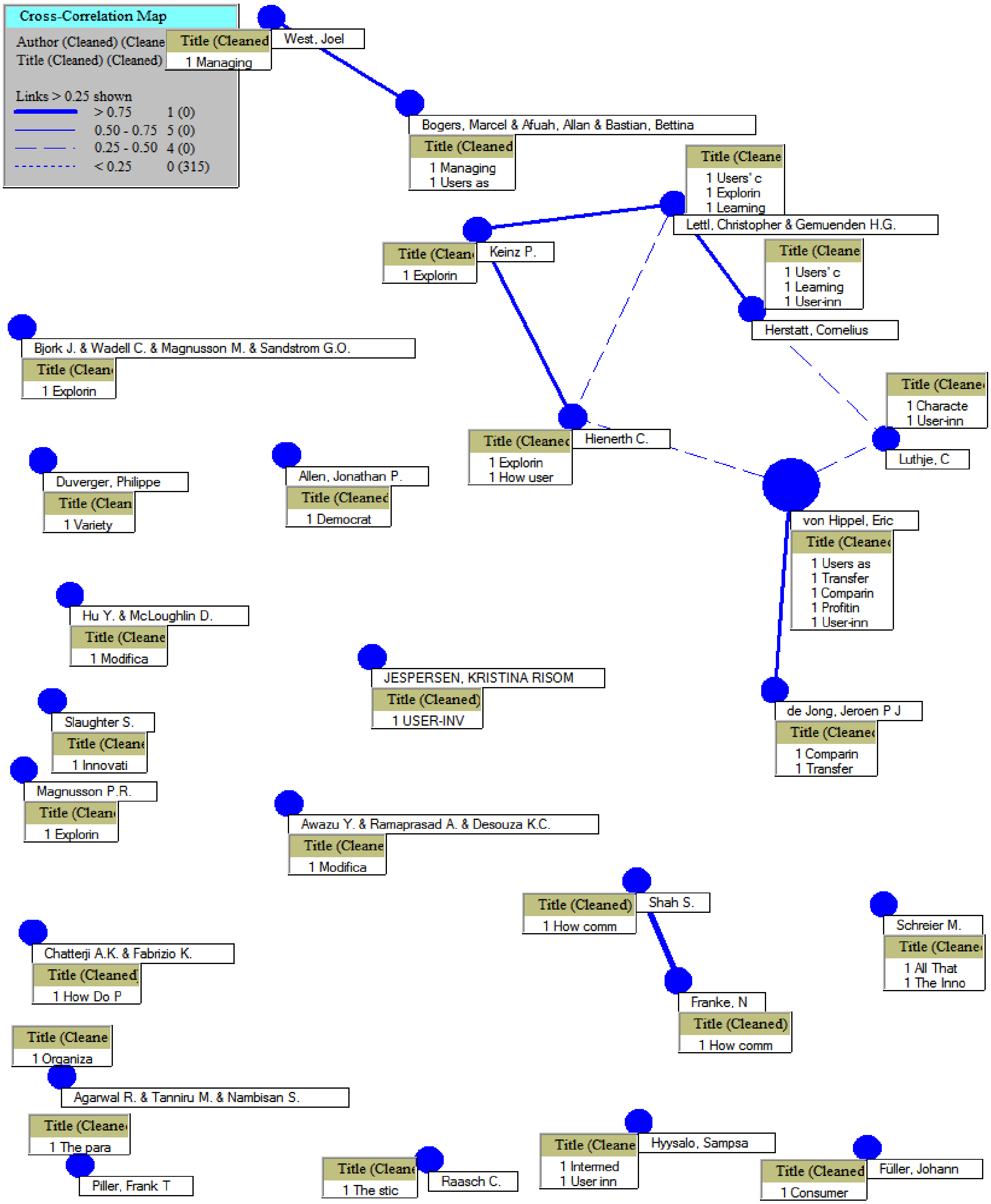
There are 29 authors or group of authors working in this research stream. Von Hippel, Eric, Herstatt, Cornelius and Lettl, Christopher & Gemuenden H.G represent the biggest nodes. Table 10 and Figure 15 show User research stream authors' network grouped by publication.

Table 10 User Entrepreneurship research stream authors' network

Nodes	# Records	Users research stream Author´s network
1	6	von Hippel, Eric
2	3	Herstatt, Cornelius
3	3	Lettl, Christopher & Gemuenden H.G.
4	2	Bogers, Marcel & Afuah, Allan & Bastian, Bettina
5	2	de Jong, Jeroen P J
6	2	Hienerth C.
7	2	Hyysalo, Sampsa
8	2	Luthje, C
9	2	Schreier M.
10	1	Agarwal R. & Tanniru M. & Nambisan S.
11	1	Allen, Jonathan P.
12	1	Awazu Y. & Ramaprasad A. & Desouza K.C.
13	1	Bjork J. & Wadell C. & Magnusson M. & Sandstrom G.O.
14	1	Chatterji A.K. & Fabrizio K.
15	1	Duverger, Philippe
16	1	Franke, N
17	1	Füller, Johann
18	1	Hu Y. & McLoughlin D.
19	1	JESPERSEN, KRISTINA RISOM
20	1	Keinz P.
21	1	Magnusson P.R.
22	1	Piller, Frank T
23	1	Raasch C.
24	1	Shah S.
25	1	Slaughter S.
26	1	West, Joel

Source: Computed based on the data set

Figure 15 Users authors' network and publications



Source: Computed based on the data set

3.2.5.4. What are the main journals publishing articles related to user innovation field?

A total of 106 journals contained the selected publications. Table 11 shows those journals with more than 4 publications. The majority of selected articles are published in journals with a high rating (4*, 4, 3) in accordance with the The Academic Journal Quality Guide (2010) by the Association of Business Schools (ABS) provides journal ratings. The complete list of journals is in Appendix 2.

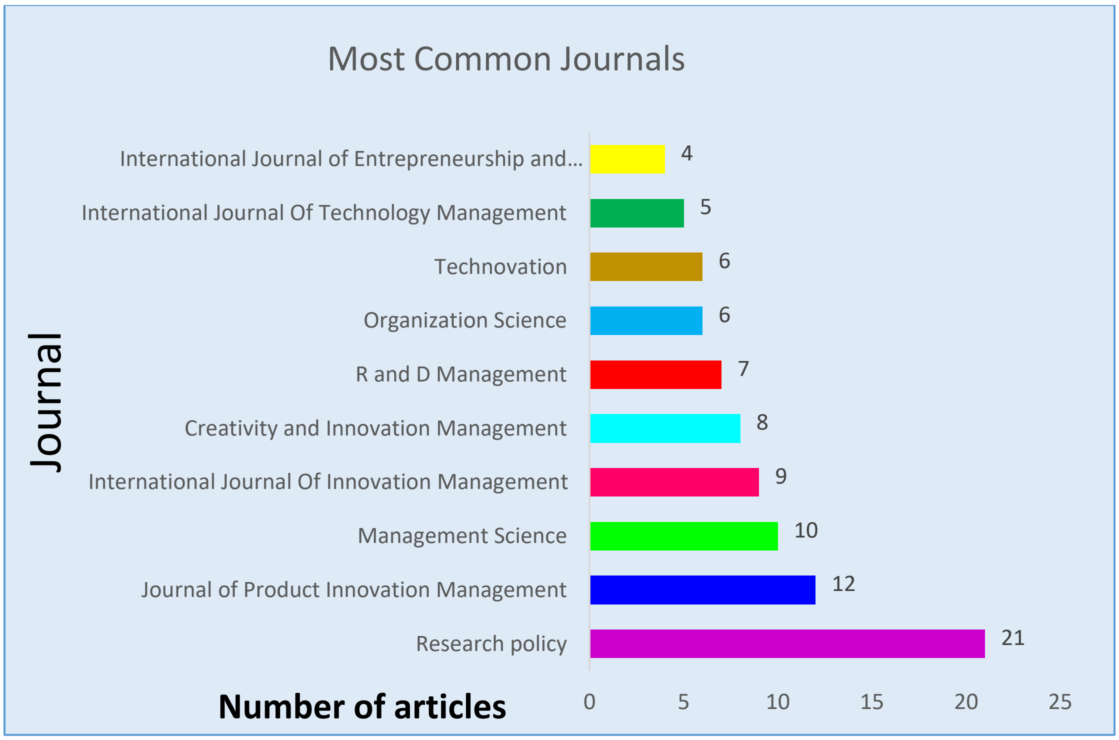
Table 11 Number of Articles by Journal

Journal	Journal rating
Research policy	4
journal of product Innovation Management	4
Management scence	4*
international journal of Innovation Management	2
creativity and innovation Management	1
R and D Management	3
Organization Science	4*
Technovation	3
international journal of Technology Management	2
international journal of Enttrepreneurship and Innovation Management	1

Source: Own database constructed from The Academic Journal Quality Guide (2010)

The top ten journals by number of articles published are listed in Figure 16. Research Policy is top, followed by Journal of Product Innovation and Management Science when it comes to the number of papers related to user innovation.

Figure 16 Most commom journal publishing articles on user innivation

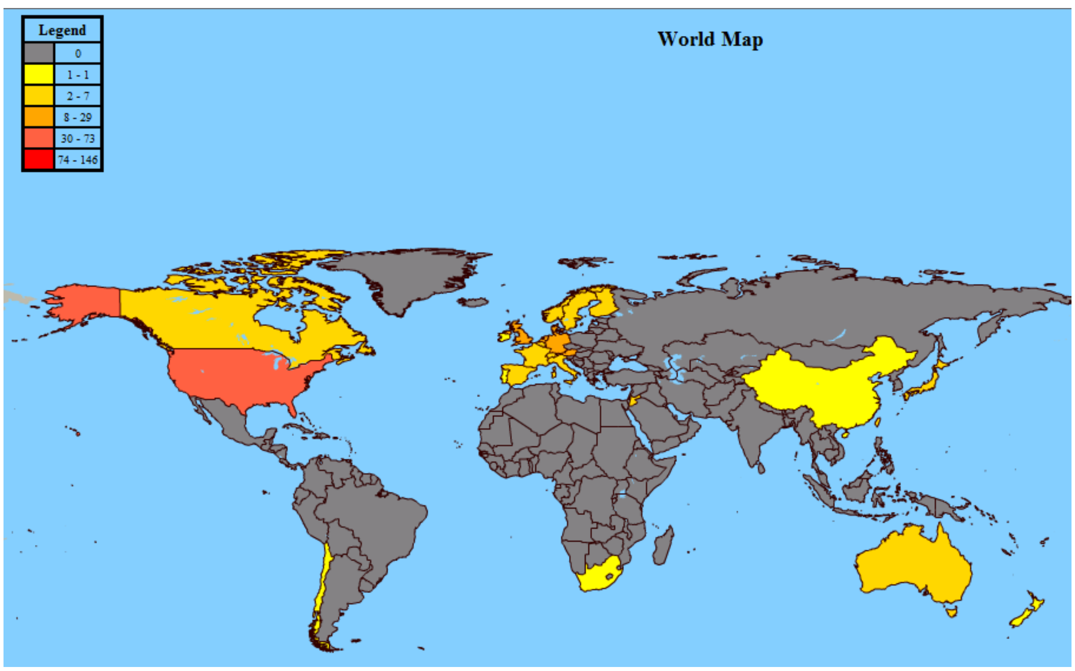


Source: Computed based on the data set

3.2.5.5. Which are the most representative countries that have contributed to the development of user innovation?

The user innovation community has increasingly growing during the last 10 years. The community of scholars is spread all around the world, being The United States, Germany, United Kingdom, Austria, Denmark, Netherlands, Sweden, Italy, Belgium, and Finland are the most representative countries that have contributed to the development of the field. Figure 17 shows geographical distribution of the author's affiliations.

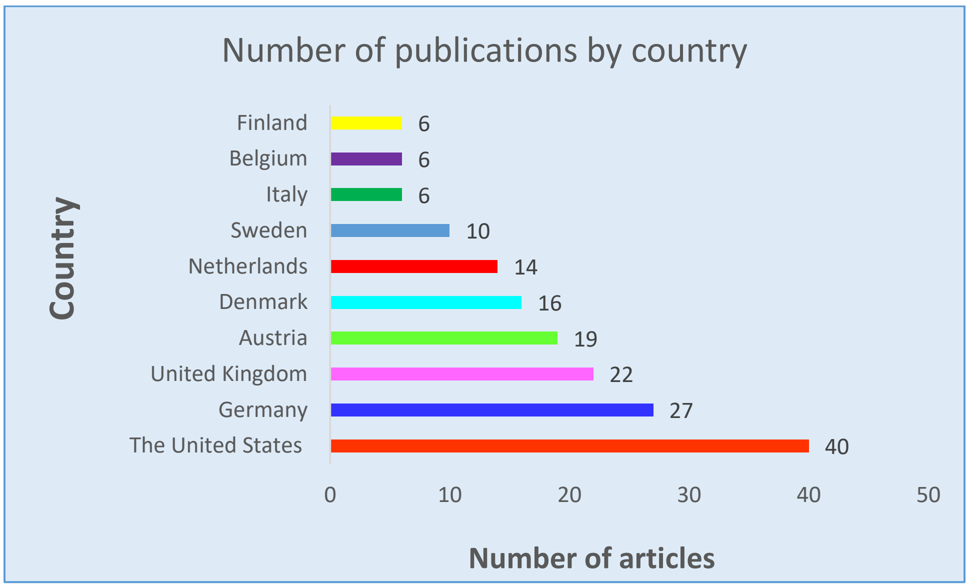
Figure 17 Geographical Distribution



Source: Computed based on the data set

Figure 18 shows the number of publications for the most representative countries. It is noted, there is still dearth research on user innovation in emerging countries.

Figure 18 Number of publications by country



Source: Author´s elaboration

3.2.5.6. What have been the main contributions to the field from the conceptual, analytical and empirical perspectives?

3.2.5.6.1. Conceptual contributions

The author classifies the literature on user innovation based on the advancement of the following categories: conceptual, analytical, and empirical research. In order to identify the main contributions to the field, a closer analysis of all articles is performed, the author classifies the literature on user innovation based on the number of citations that each article has and the advancement of each article into the conceptual, analytical and empirical categories.

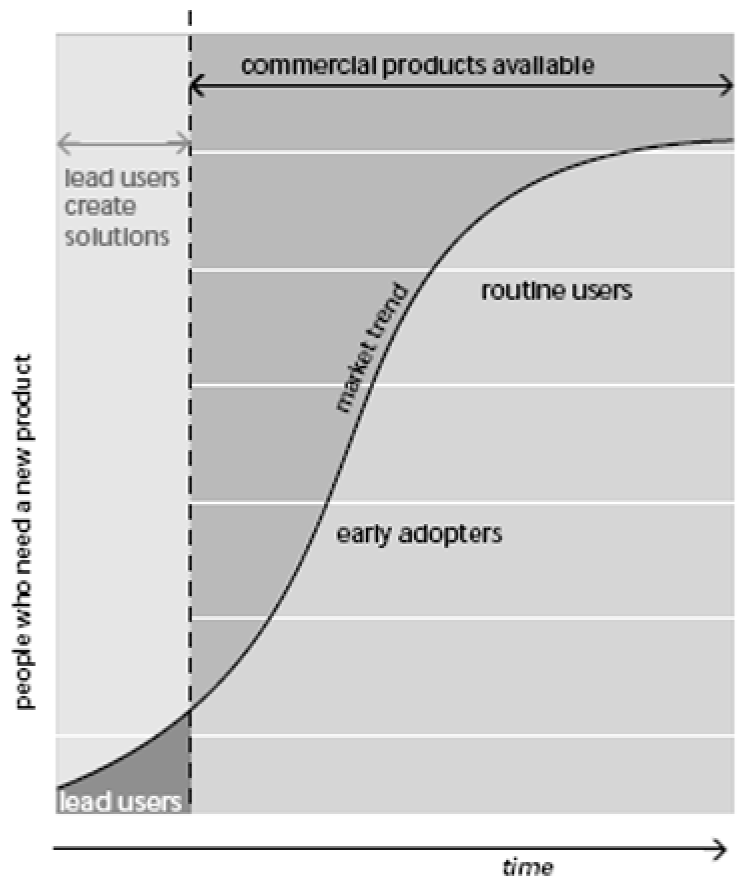
Conceptual Research (1970 – 1999)

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. Out of seven papers published between 1970 and 1999 and classified as conceptual contributions, four papers were also categorized as empirical contributions; theory was typically developed and tested through empirical studies.

The seminal work by Von Hippel (1986) mentioned lead users are denoted by two characteristics: being ahead of a trend and recognizing expected benefits. Lead users are typically ahead of the entire adoption curve Von Hippel (2005). According to Rogers (1995), the very first and second group of adopting an innovation are the innovators and the early adopters respectively; however, giving the characteristics of lead users, it is noted that lead users are even ahead of them.

Consequently, lead users are not the same as early adopters. Figure 19 explains the Lead User Curve, it means, the shape of the market trend and show lead users have needs that are well ahead of the trend.

Figure 19 Lead user curve



Source: Von Hippel, Thomke, & Sonnack (1999)

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´ role and types; 4. Online user communities; 5. Toolkits; 6. User entrepreneurship; 7. User innovation.

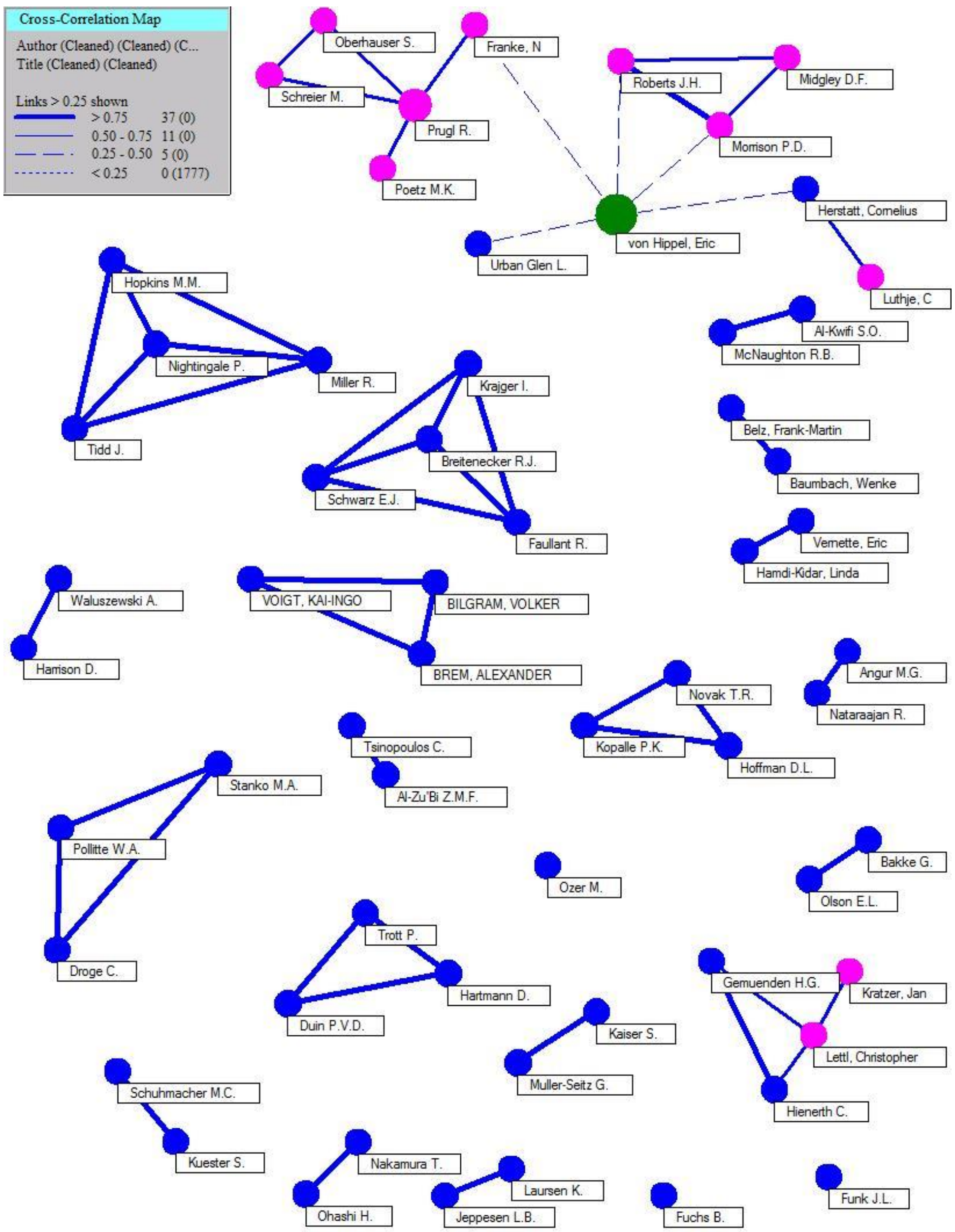
Lead users research stream

Studies on lead users' category has spread out and steadily increased particularly from 2000 onwards. 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.

Lead user community

There are 53 relations among the network. There are 59 authors working in this research stream. Three out of 59 authors work alone. The remaining 56 authors work with company or at least a research partner. Figure 20 represents lead user network.

Figure 20 Lead User Network Map



Source: Computed based on the data set

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). In the same way, Hoyer, et al. 2010 identified the lead users as a segment of consumers who might be especially willing and able to participate in co-creation activities, and defined the intensity of co-creation as the extent to which firms rely on co-creation to develop products within a particular stage of NPD.

Those firms, with high intensity of co-creation activities, rely exclusively on consumers for their development activities in that stage. As a result, 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). As an example, Hoyer, et al. 2010, presented the case of a T-shirt manufacturer called Threadless.com, whose customers are allowed to create the t-shirts graphic designs and submit them online. Customers and web site visitors can vote on the submitted designs and the most popular design is put into production and sale. The customers whose designs are chosen for sale receive a monetary compensation. However, there exist some restrictions that might restrain co-creation in NPD from its full advancement. Hoyer, et al. 2010 identified four barriers: 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.

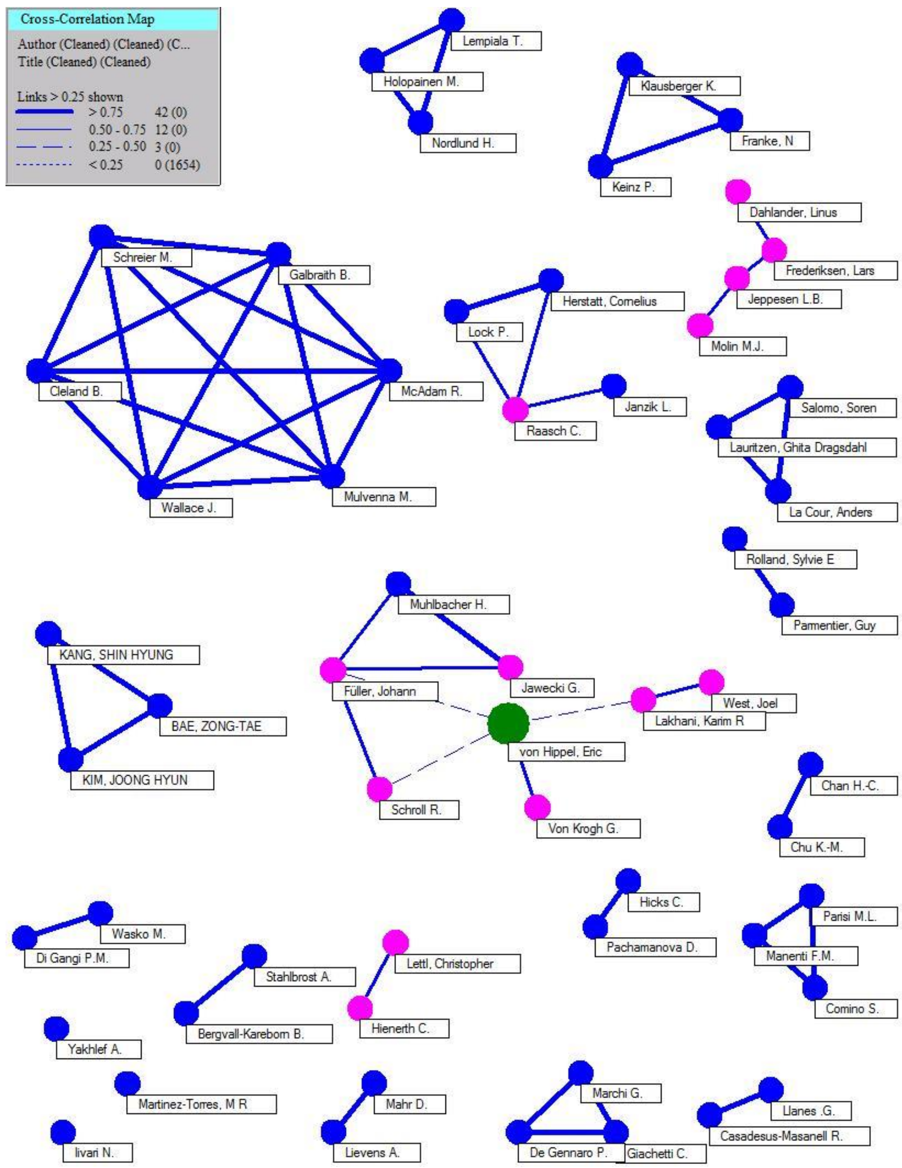
On the other hand, Kuusisto, Kuusisto, & Yli-Viitala (2013) demonstrated that working together with customers and users in innovation increases the likelihood of producing services that are actually valued and desired in the market. Regarding the motivators of consumer participation in co-creation, although 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).

Kuusisto, et al. 2013 pointed out customers can create outstanding contributions to service innovation and there are amounts of studies that endorse this statement. However, there are no guidelines on the strong consolidation of users in the service development process. Therefore, they proposed an eight steps tool for the integration of customers in this process. Additionally, they introduced a second tool for selecting the best-customer new service development method. According to their evaluation, both tools looked like to be very useful for business practitioners because they boosted the systematic efforts for service development and helped to identify the key concerns that need to be discussed and decided upon.

NPD/NSD and Co-creation community

There are 59 authors working in this research stream. Three out of 59 authors, work alone. The remaining 56 authors work with company. Figure 21 represents NPD and NSD network.

Figure 21 NPD/NSD Co-creation Network Map



Source: Computed based on the data set

Users´ role and types research stream

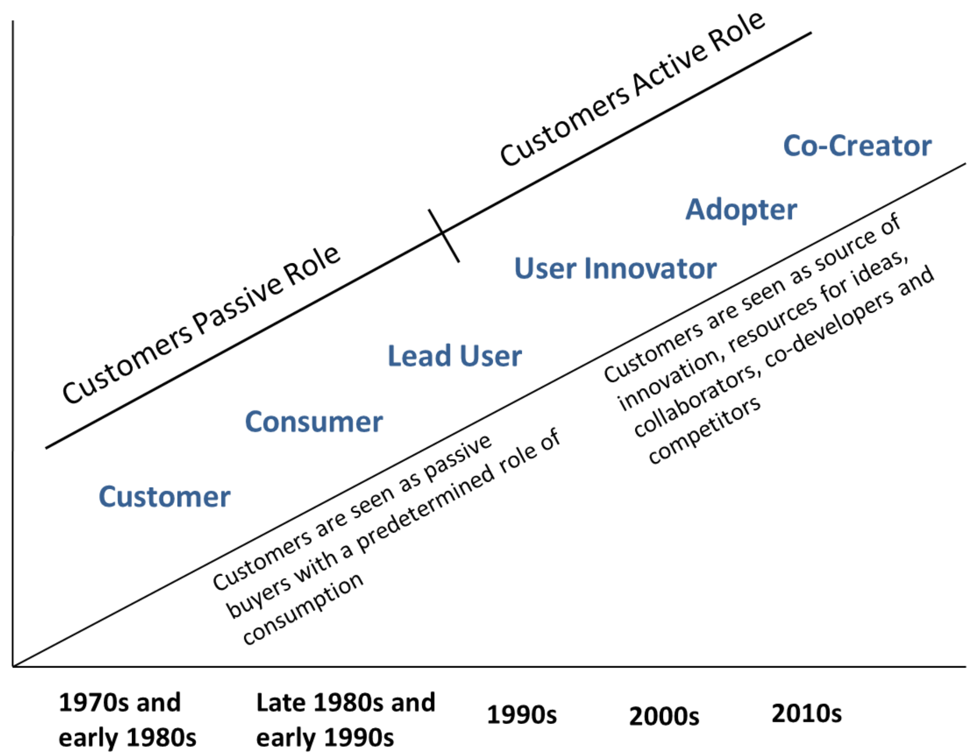
In this thesis, another research stream has been identified: users´ role and types. Von Hippel's work, beginning in the 1970s, has been the first in studying the role of users as innovators Von Hippel (1976). Additionally, Bogers, Afuah, & Bastian, (2010) is one of the most cited papers in regards to 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., 2012). Figure 22 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).

At the end of 1970s VonHippel in his seminal paper titled "A customer-active paradigm for industrial product idea generation", took a risk and provided the first comparison between a manufacturer active paradigm to a customer active paradigm.

VonHippel (1977) proposed users are capable of perceiving the need for the product innovation, inventing or modifying the new product or service in respond to their need, building the prototype, proving the prototype's value in use by applying it and diffusing detailed information about their innovation. His early research focused on analyzing the role of users in innovation activities took some period of time to be understood by the academia and the industry.

Figure 22 Users´role from Passive to Active



Source: Adapted from 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. During that time, customers started participating providing feedback about the services or goods manufacturers sold to them. 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.

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. Early Adopters look to adopt and use innovation to achieve a revolutionary improvement, they are the ones who purchase the product or service soon after its launch are play a key role in the diffusion of the feature and capabilities of the new product or service (Slater and Mohr, 2006; Frattini, Bianchi, Massis, & Sikimic. (2014).

Bogers, et al. (2010) explored the role of users in two different ways: as post-implementation adopters and users as source of innovation-related knowledge. In the first way, consumer users help other users to better adopt the producer's product in order to meet their needs or those of other users. In this group, the earliest adopters initiate diffusion and play a critical role as communicators to later adopters (Foxall, 1995; Lüthje, 2004). In the second way, user as source of innovation-related knowledge users play a more active role during the innovation processes, co-creating or contributing to the development of a new product.

Nowadays, there is no secret that users are able to contribute to successful innovations and new product or service development. They are part of enhanced and sophisticated networks; they joint efforts in conjunction with firms to co-create market acceptance for products and services (Prahalad, and Ramaswamy, 2000),

User Types

Literature related to user types has evolved into a several classifactions or users. Starting by Von Hippel (1986) who is the first researcher in proposing the concept of lead users and ending with Pongtanalert and Ogawa (2015) who proposed a recent and a new classification of users according to whether or not users share their innovations and belog to communities. Table 12 shows a summary of different user types and their characterics.

Table 12 User Types and Characteristics

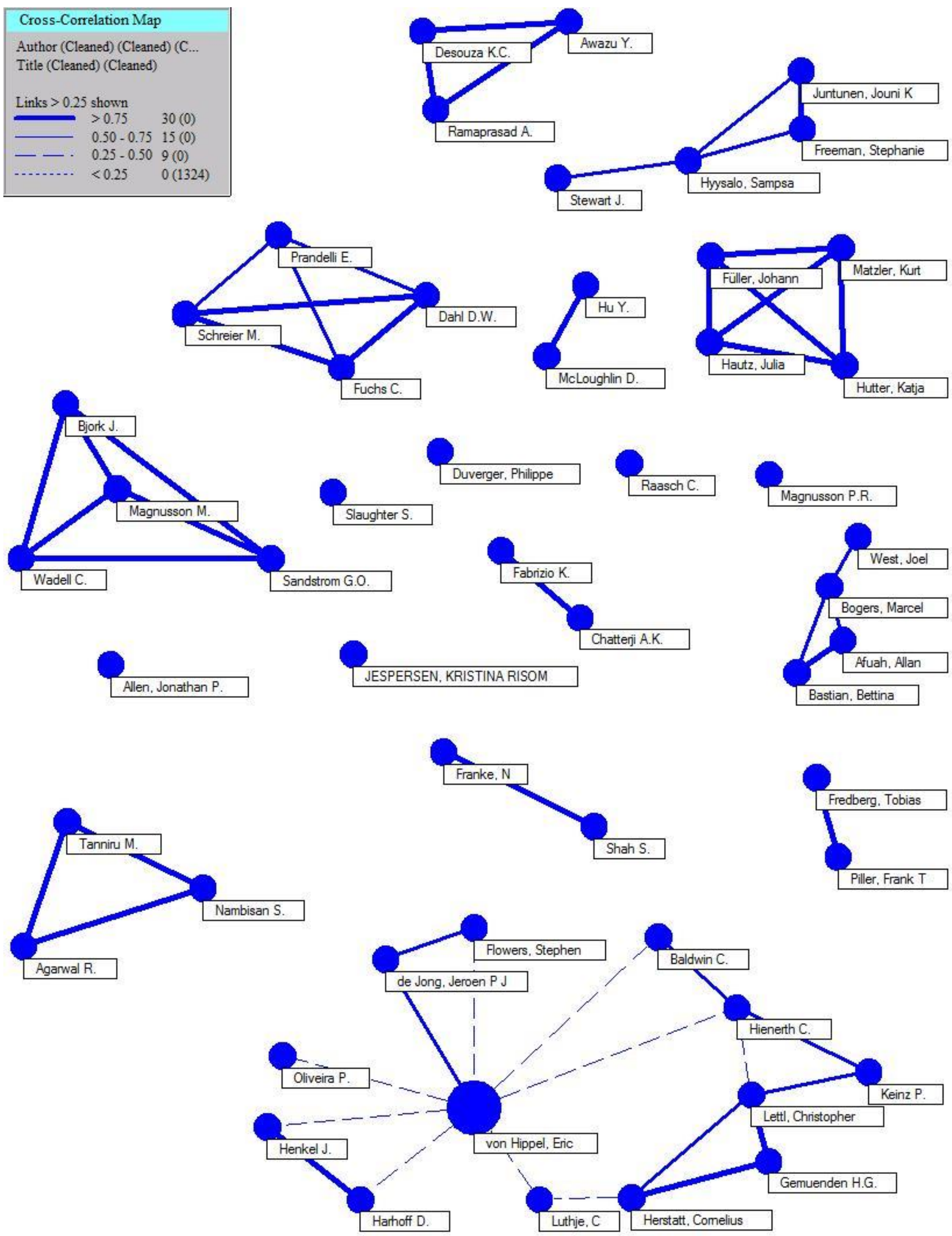
Source	Type of user	Characteristics
Von Hippel, E. (1986)	Lead users	Lead users face needs that will be general in a marketplace before the bulk of that marketplace encounters them, and they are positioned to benefit significantly by obtaining a solution to those needs.
Rogers (2003)	Early Adopters	The relatively earlier adopters in a social system are no different from later adopters in age, but they have more years of formal education, are more likely to be literate, and have higher social status.
Baldwin, Hienerth, & Von Hippel, E. (2006)	User innovator	Seek to develop new designs for their own personal use or (in the case of user firms) internal corporate benefit. Designing for use and testing by use are the essential characteristics of user-innovators
Von Hippel (2007)	User	"Users" are those firms or individual consumers that expect to benefit from using a product or a service.
Gault and Von Hippel, E. (2009)	User-innovators	Firms or individual consumers that benefit from using a product or a service they develop.
	Producer innovator	Firms or individuals that benefit from selling a product or a service they develop.
	Lead users	Lead users are a subset of all users.
Baldwin and von Hippel, E. (2011)	Single user innovator	Single firm or individual that creates an innovation in order to use it.
	Producer innovator	Single, non-collaborating firm. Producers anticipate profiting from their design by selling it to users or others: by definition they obtain no direct use-value from a new design.
Frattini, Bianchi, Massis, & Sikimic. (2014)	Early Adopters (AEs)	EAs are a specific category of adopters who purchase the new product soon after its launch and well before the average client because they perceive a compelling reason to use it.
Pongtanalert and Ogawa. (2015)	Revealing innovators	User-innovators that share their innovations with others but do not belong to communities
	Silent innovators	User-innovators who neither share innovations nor belong to communities
	Social innovators	User-innovators who tend to share their innovations and belong to communities.

Source: Author´s elaboration

Users Research Stream Community of Scholars

There are 54 authors working in this research stream. Von Hippel represents the biggest node due to his number of publications in this category. Figure 23 shows the Users Network Map.

Figure 23 Users Network Map



Source: Computed based on the data set

Online user communities research stream

Other research stream is online user communities. The advent of information and communication technologies (ICTs) has enabled end users to organize and share innovations through the creation of online communities (Di Gangi & Wasko, 2009). Hienerth & Lettl (2011) indicated:

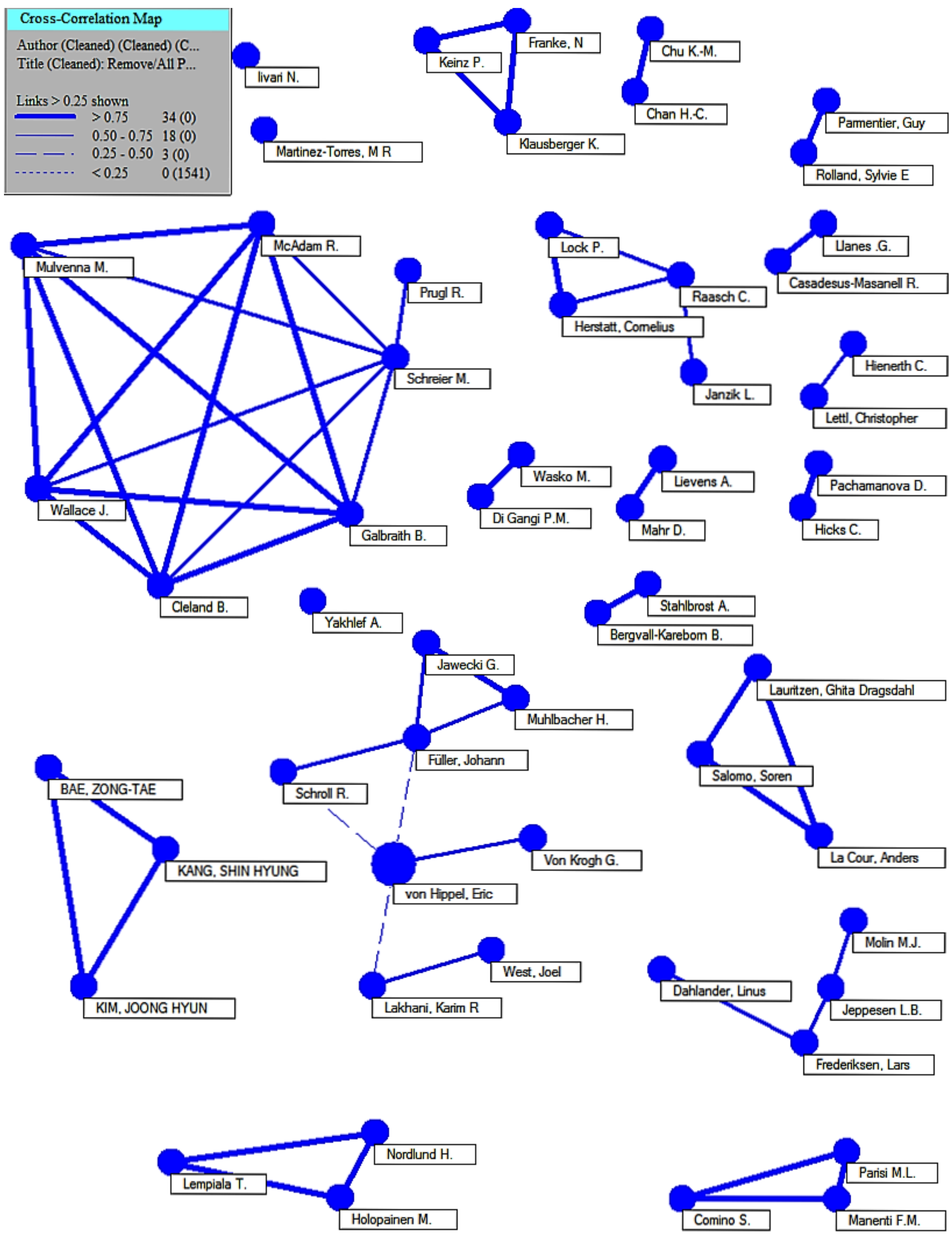
> …user communities are platforms where users from different backgrounds but with a common interest in a specific topic or field share their experiences and exchange diverse information and knowledge…, to post and solve particular problems, to develop innovative ideas or to develop new technologies for existing or new applications (p. 177).

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.

Online User Communities authors network

There are 55 authors working in this research stream. This field has spread out in the last years. Eric Von Hippel has been identified as the author who have published the greatest number of articles (five) in this research stream. Figure 24 represents user entrepreneurship network.

Figure 24 Online User Communities Network Map



Source: Computed based on the data set

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). Von Hippel and Katz (2002) suggested that toolkits should fulfill five basic requirements: (1) Trial and error learning: toolkits users should receive feedback in order to evaluate and improve the process. (2) Solution space: includes all combinations and possible solutions to account only the ones that are producible to the manufacturer. (3) User friendliness: how the users perceive the quality of interaction with the toolkit (time, intellectual effort, fun, satisfaction with the developed solution). (4) Modules and components library: these components allow users to choose different functionalities for their convenience (programming languages, visualization tools, help menus, drawing software, etc). (5) Transferring customer solutions: the solution developed by the user should be transferred to the manufacturer and translated into the manufacturer´s "language".

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). Toolkits for user innovation enable users to innovate for themselves. Von Hippel & Katz (2002) indicated users can apply toolkits to design products and services that fit their own needs precisely, at a lower cost; as both computerized design and computerized production technologies progressively reduce the fixed costs associated with the design and production of novel products.

Toolkits and Co-creation

The term Toolkits is also related to Co-Creation. Kristensson, Matthing, & Johansson (2008) defined Co-Creation as the teamwork with customers for the purposes of innovation; according to the conception of co-creation, if a user is involved in the production of a good or service, the outcome will be improved because the customer can adapt the product as he or she desires. The difference between "co-creation" and "customization" is based on the degree of involvement of the customer; in general, the customer plays a less active position in customization than in co-creation. In customization, the customer's role is usually restricted to the termination of the innovation phase and involves providing suggestions for incremental changes to an almost complete model (Kristensson, et. all, 2008). According to Bartl, Jawecki, & Wiegandt (2010), the objective of co-creation toolkits is to provide the users with online applications which allow them to develop and transfer their creativity into solutions. Various co-creation modules such as configuration tools or drag&drop features constitute a playful experience, resulting in a high commitment of users. For example, interactive development kits allow users to build an invention concept with certain feature dimensions receiving instant feedback on their actions and decisions (Bartl, et. all, 2010).

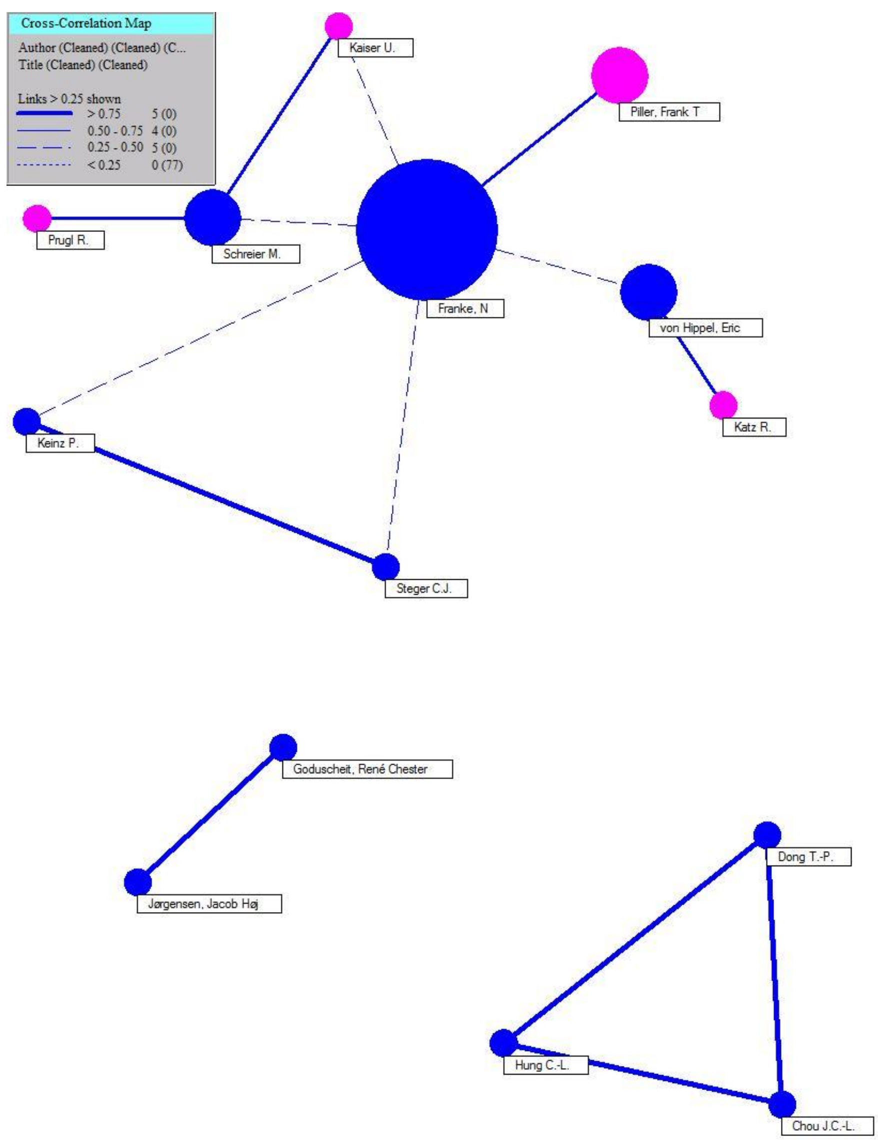
In their study, Füller, Hutter & Faullant (2011) found that the co-creation experience impacts greatly in the number of suggestions, designs and ideas proposed by the customers. As long as customers perceive an autonomous, enjoyable, and competent experience in the co-creation of products, they free their potential and materialize better solutions. The co-creation experience not only boosts up the quantity of ideas, but also the quality of them. The authors suggest that companies have to abstain from excessive control and guidance in their toolkits platforms to encourage customers´ creativity and participation. The co-creation experience should be characterized by autonomy, joy, and competence (Füller, et. al, 2011).

On the other hand, Piller, F., Ihl, C., & Vossen, A. (2011) proposed three dimensions for the concept of Co-Creation with customer: (1) Stage in the innovation process, which refers to the moment when the customer co-creation activities arrive in the product development process (front-end or back-end activities). (2) Degree of collaboration, which makes allusion to the relationship between the company and the users (a binary collaboration between a company and one user at a time, or a network of customers that collaborate among themselves). (3) Degree of freedom, which indicates the kind of task assigned to the customer (a narrow and predefined task with few degrees of freedom, or an open and creative task with many degrees of freedom).

Toolkits community

There are 14 authors working in this research stream. Nicolous Frank represents the biggest node due to his number of publications and also the biggest network. Figure 25 represents toolkits network.

Figure 25 Toolkits Network Map



Source: Computed based on the data set

User entrepreneurship research stream

User entrepreneurship has become a research stream in which several articles have extended the knowledge of the user entrepreneurs and entrepreneurship literature (Autio, Esmt, & Frederiksen, 2013; Chandra & Sunny Yang, 2012; Shah and Tripsas, 2007). Through this literature review, 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.

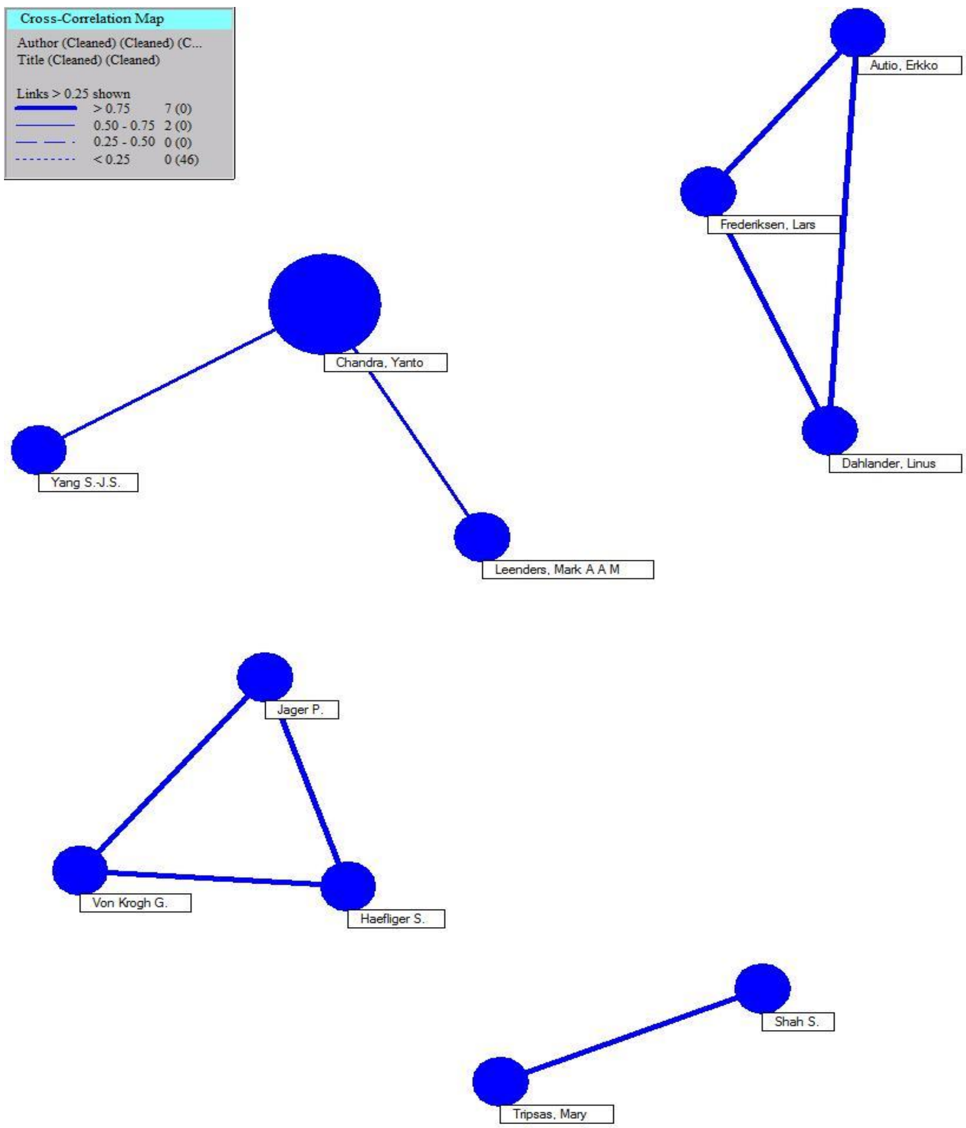
Shah & Tripsas, (2007) is one of the most cited papers in this research stream. In their work, the mentioned user entrepreneurs are distinct from other types of entrepreneurs in that they have personal experience with a product or service and derive benefit through use in addition to financial benefit 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).

Moreover, Shah & Tripsas, 2007 defined user entrepreneurship as the commercialization of a new product and/or service by an individual or group of individuals who are also users of that product and/or service. Conceptually, they proposed two types of user entrepreneurs: professional-users and end-users; the first group corresponds to those users who are embedded in a firm and employ a product in their professional lives; however, they face a need for improvement and leave their firm in order to develop and commercialize a solution. The second group is the end-user entrepreneurs, who utilize a product in their day-to-day lives; they have personal experience with a product or service and obtain a profit from the product commercialization.

User entrepreneurship community

There are 11 authors working in this research stream. This is a field to explore deeply. Chandra Yarto represents the biggest node due to his number of publications in this category. Figure 26 represents user entrepreneurship network.

Figure 26 User Entrepreneurship Network Map



Source: Computed based on the data set

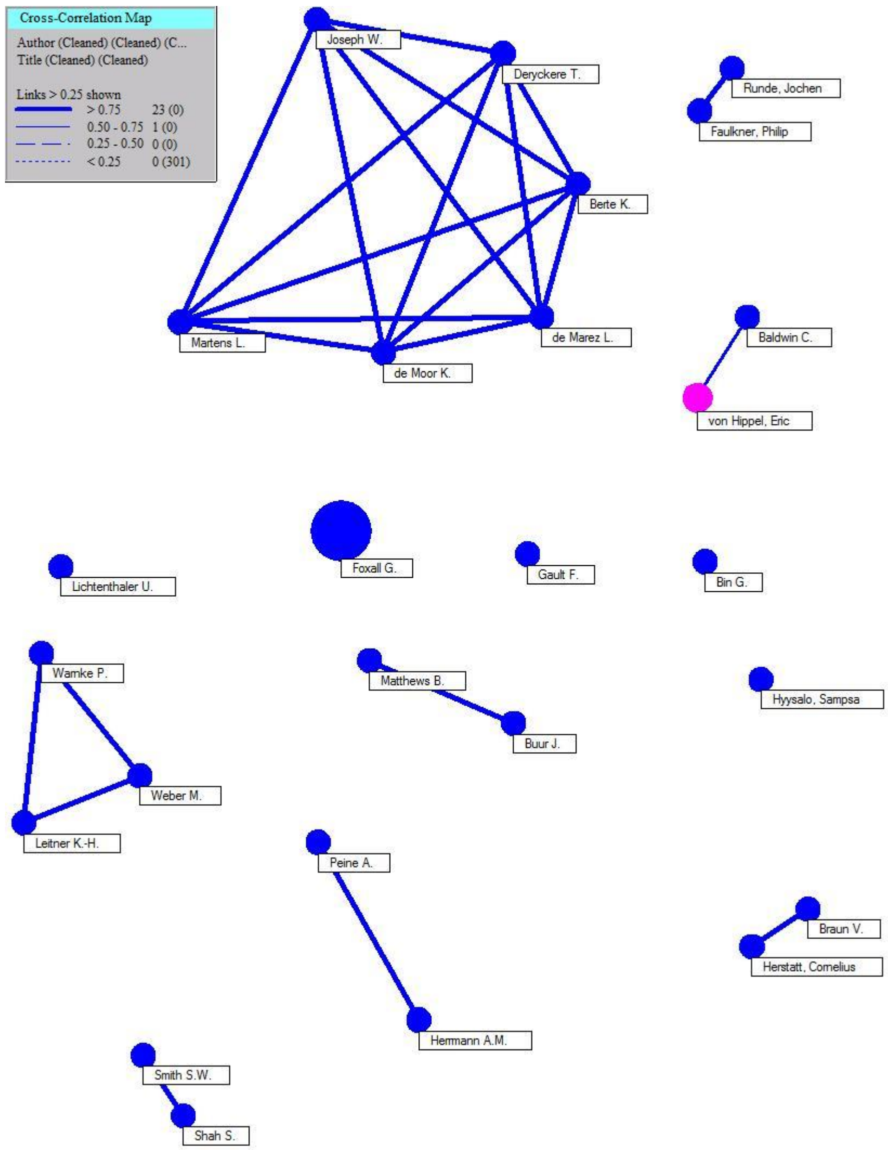
User innovation research stream

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).

User innovation community

Figure 29 shows the relations among those authors who have published articles related to the user innovation stream. Foxal represents the biggest node, as he published three articles classified in this category. Twenty-six authors have been categorized in this research stream: Five authors work alone: Foxal, Bing, Lichtenhaler, and Gault. The remaining 21 authors work in groups. Figure 27 represents user innovation network.

Figure 27 User Innovation Network Map



Source: Computed based on the data set

3.2.5.6.2. Analytical Contributions

Analytical Research (1970 – 1999)

In this period of time, only 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. The results showed the inter-correlation in the data were captured by the model and therefore, the proposed model was valid for their purpose. The structural analysis of the LISREL indexes confirms "that the basic quality that drives the firm to be among the first to adopt a new product/service (innovatorship) has a positive effect on the basic quality of the firm becoming a lead user (lead-usership)".

Analytical Research (2000 – Present)

For this period of time, articles that contribute the most for the analytical research were classified within the following research streams: Users, Toolkits and Lead Users.

For the Users stream, the most cited papers are Harhoff, Henkel y von Hippel (2003) and Baldwin, Hienerth and von Hippel (2006). 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. The study applies four variables to the case of two firms each of one may have developed an innovation. The users´ decisions to adopt or not to adopt an improved innovation are modeled in a sequential-move game. The authors found the proposed model has a good fit with the real world conditions presented in open source software, copper-interconnections, clinical chemistry analyzers and OPACs (Online Public Access) 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 "test case" for the development of the theory is a case history of rodeo kayaking. For the study, the authors classified the kayak manufacturing innovations into major and minor categories, determined the source of each innovation and coded the source as user, user-manufacturer and manufacturer, and concluded the rodeo kayaking industry was an appropriate test case to construct the model. The model is based on the inverse relation between the value of the best pre-existing design and the cost of purchasing the option (the expected payoff to a call option). The first result of the model is that search redundancy is reduced within communities. The second result is that all community members will 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. The purpose of the authors is to understand this concept´s actual value from the customer´s perspective. To answers their research question, the authors focus their study on a watch toolkit, in which the users engage only in the visual aspects of the watch design. Through a trial-and-error learning and immediate feedback functions, the watch toolkit allows reaching at least 650 million different possible product designs. By the development of four different experiments, the authors found the products designed by the users were very heterogeneous, the willingness-to-pay for a self-designed watch is almost twice as higher as the best-selling model available on the market, 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. Specifically, the authors try to identify if lead users among children can be identified by the nature of their social networks and the relation between children´s creativity and their identification as lead users. For this purpose, the authors developed an empirical study among 16 school-groups encompassing 366 children, in the age ranges of 7 to 12 years old, in the Netherlands. To gather the necessary information, the authors used a questionnaire to be answered by the children. 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.

3.2.5.6.3. Empirical Contributions

Empirical Research (1970 – 1999)

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 - and so a supplier-developed system will predictably require multiple revisions before it fits the need. Users who cannot describe their need precisely are in this position for one or both of two reasons: They know what they want but cannot encode it precisely, and/or they themselves do not know what the "right" solution is prior to trial and error experimentation.

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. The authors pointed out the IT innovation initiation should be viewed through the lens of knowledge creation. A conducted Delphi study showed that managerial design actions in the form of mechanisms can enable knowledge creation, a user´s propensity to innovate in IT will eventually lead to the identification of innovative IT applications, and mechanisms that influence ability to explore should involve close interaction between IT staff and users in a positive and trusted climate, otherwise the interactions may not be productive.

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. Furthermore, the author was interested in how users and manufacturers learn about a new technology, and how they may apply the learning to create related innovations. The field study was focused on the innovations made to stressed-skin panels and showed that while 82% of the innovations were developed by individual residential builders, only 18% were made by manufacturers of stressed-skin panels. In addition, the study demonstrated that the users had solved the problem and used the solution for several years before the manufacturer introduced an innovation which accomplished the same function. Finally, the results from this study imply that the product development process or the product itself can be modified to take advantage of user innovations. These changes may include the explicit recognition of user innovations, which can be commercialized easily within the manufacturers existing product offerings, or the acknowledgement of new market opportunities to meet existing user needs.

In the User Innovation stream, 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. For this purpose, the article examined three theoretical approaches: (1) the appropriability of innovation benefit hypothesis; (2) the appropriability regimes hypothesis; and (3) the transactions cost approach to organizational structure as sources of explanation of the observed strategies. The article concluded the three hypotheses provide a useful framework for understanding the marketing of user-developed technology.

Empirical Research (2000 – Present)

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. The authors found phrases as "I help today because I have been helped in the past and/or I expect to be helped in the future", as an example of the motivation. The article focused the investigation on the Apache Usenet web site case, where de developers can post questions and answers for projects based on this "open source" software program. The results showed "that 98% of the effort invested by help providers was rewarding to those providers via a particular feature of the task setting." In addition, the public posting provides the developers the possibility of gaining reputation.

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 value that those users bring out to the organizational context. One of the study´s key findings is 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. A second key finding is the innovative user prefers the firm recognition over the peer recognition. A third key finding is that important contributors are made in firm-hosted user communities because the innovations come from leading-edge users.

On the Users stream, for this period of time, the article by Franke and Shah (2003) can be highlighted. This is the first study to review how user-innovators collect the information and assistance they need to develop their ideas and how they share the results. The findings of the study indicated that 40% of the innovations reported solve urgent problems for their innovators and 14.5% of the innovations are considered to be a completely new product by their innovator. Moreover, the 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. Innovators spend 32% more time per year in the community than Non-innovators do. Finally, the study suggested that monitoring some innovative user-communities may be an efficient method for identifying innovations made by users.

3.3. Concluding Remarks

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. The group of 23 top authors represent those scholars who have published more than 3 articles: von Hippel, Eric; Franke, N; Schreier M; Herstatt, Cornelius; Lettl, Christopher; Fueller, Johann; Hienerth C.; Prugl R.; Foxall, Gordon; Al-Zu'Bi Z.M.F.; De Jong, Jeroen P J; Frederiksen, Lars; Hyysalo, Sampsa; Jeppesen L.B; Keinz, Peter; Luthje, C; Morrison P.D; Piller, FT; Raasch C.; Shah S.; Tsinopoulos C.; Von Krogh G.; and Gemuenden H.G. The most prominent author analyzed by the date of their publication is von Hippel, Eric who have published the higher number of articles.

The analysis by journal shows the following are the most utilized academic journals to published literature on user innovation related topics: Research policy, Journal of Product Innovation Management, Management Science, International Journal of Innovation Management, Creativity and Innovation Management, R and D Management, Organization Science, Technovation, International Journal of Technology Management, International Journal of Entrepreneurship and Innovation Management.

The analysis by country demonstrated the countries with the greatest number of publications related to this research field are: The United States, Germany, United Kingdom, Austria, Denmark, Netherlands, Sweden, Italy, Belgium, and Finland. Research efforts in those countries have contributed to the development of this research field.

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. In the same manner, several avenues of future research have opened to junior and senior researchers and are mentioned in the final conclusions of this thesis.

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4. Chapter IV - Methodology, Field Work and Statistical Methods

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4.1. Introduction

This chapter describes specifics related to the methodology, field work, and statistical methods used in this study. Recalling the purpose of this thesis is to contribute to an increased understanding of user innovation (UI) by determining the characteristics of user innovators at the consumer level in emerging markets, particularly Colombia, this section describes the research design, variables, hypothesis, definition of the instrument to identify user innovators, the validation process of the scale, the application of a pilot test or prototype scale, the application of the final scale, exploratory and confirmatory factor analysis (CFA), correlation matrix per dimension after CFA, and sample and data collection.

The research design proposed by the author started with a literature review to explore the user innovation field and obtain a comprehensive review of this field. The results of the systematic literature review were disclosure in the previous chapter. In this section, the reader can examine the development of the entire study following the methodological steps to ensure rigourosity, reliability, and validity. Finally, an explanation of the sampling method and data collection is exposed.

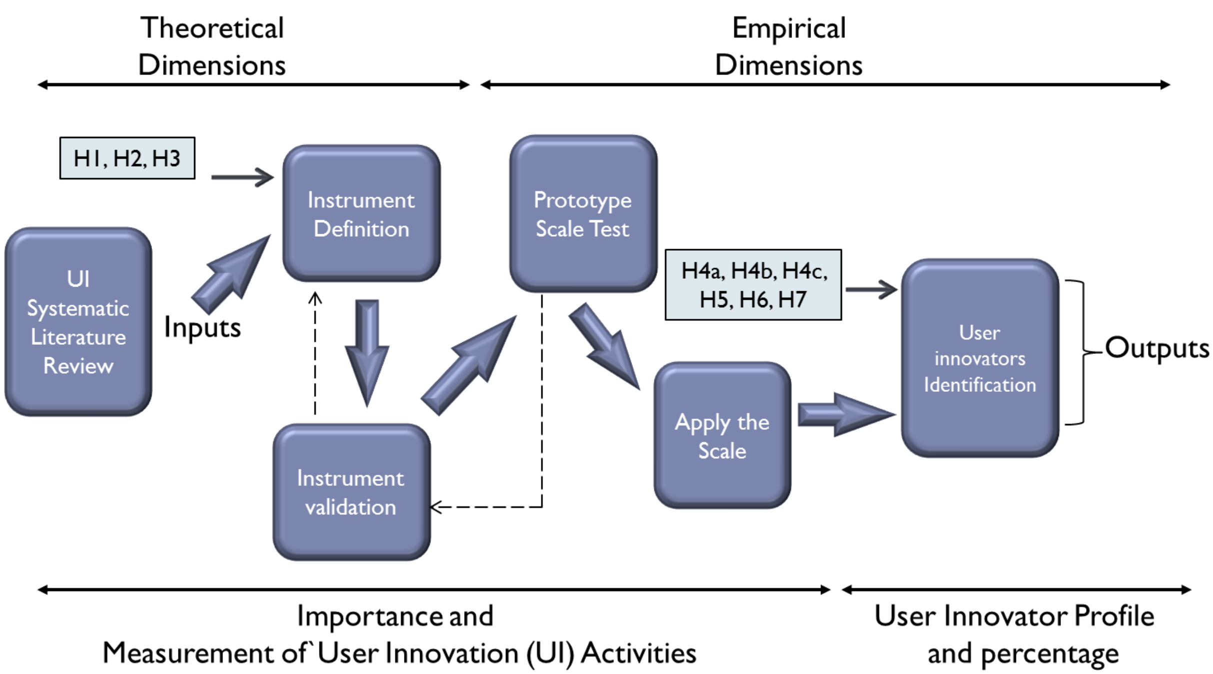
4.2. Research design

The purpose of this study is to contribute to an increased understanding of user innovation (UI) by determining the characteristics of user innovators at the consumer level in emerging markets, particularly Colombia. In order to do that, this study has a cross-sectional quantitative design with a descriptive scope. A cross-sectional study consists of taking information from a group of participants at a single point of time and it is the most appropriate to this research, as it commonly used to describe features of the user innovators (Rindfleisc, Malter, Ganesan, & Moorman, 2008).

The starting point of this research design consists of performing the systematic review of the literature. Later on, after reviewing preview studies, the author formulated the hypothesis and decided the most appropriate instrument for the research. As part of the instrument definition, the author was particularly interested in applying the scale developed by Mujika-Alberdi et al., (2015) because of its cross-industrial approach, simplicity, and practicability to to be used in regions with a varied level of development. Figure 28 illustrates the research design.

Then, the validation process started with adapting the instrument to a new cultural context, in this case, Colombian context. Subsequently, a prototype of the scale was achieved. A pilot test was necessary to prove the instrument, ensure an understanding of the question and enhanced clarity. Afterwards, the first sample data set was obtained; a purification process was utilized by applying an Exploratory Factor Analysis. Consequently, the instrument was applied to a second sample data set. In this step, the author performed a data validation, apply an EFA, ensured internal consistency of the scale, and apply a Confirmatory Factor Analysis (CFA) to confirm unidimensionality, reliability, convergent and discriminant validity. Finally, after the instrument was rigorously validated and apply to the sample, the research designed directs to the output of obtain the user innovators profile and measure the percentage of user innovators.

Figure 28 Research Design



Source: Author´s elaboration

4.3. Variables

In this research, the author followed the work presented by Mujika-Alberdi et al., (2015) and the scale "Customers at the cutting edge" to identify advanced users. This research involves the following dependent variables:

1. **User leadership:** It refers to certain activities performed by those users who are aware of a need and can develop a completely new solution to address it (Mujika-Alberdi et al., 2015). Those users usually enjoy creating new things, provide suggestions to improve processes or products, develop new solutions and consider themselves as innovators. The characteristic ''User leadership'' is measured by a five-item scale. All the five items are derived from previous studies to identify advanced users and correspond to the scale proposed by Mujika-Alberdi et al. (2015). All items were measured on a one-to-five Likert-type scale, ranging from ''I totally agree'' to ''I totally disagree''. The internal consistency showed a Cronbach's alpha of 0.83.

2. **Creativity:** The creative potential that users display when they develop new and useful solutions for a problem reveal the strong connection between creativity and lead users. Previous studies have established that lead users are creative individuals (Mujika-Alberdi et al., 2013; Faullant, et al., 2015). Valuing the work by Mujika-Alberdi et al. (2015) and Faullant, et al (2012), the author measure the degree of creativity a four-item scale was utilized. All the four statements are derived and correspond to the scale proposed by Mujika-Alberdi et al. (2015) to identify advanced users. All items were measured on a one-

to-five Likert-type scale, ranging from ‘‘I totally agree’’ to ‘‘I totally disagree’’. The internal consistency showed a Cronbach’s alpha of 0.77.

3. **Skills for product development:** The aim of integrating advanced users into the NPD process is the creation of new and promising products or solutions to appeal to customers. Lead users constitute of a tremendous source of novel ideas and solutions that later on can be prototype and commercialized (Lilien, Morrison, Searls, Sonnack, & von Hippel, 2002). To measure the degree of skills for product development a three-item scale was used. All the three items are derived and correspond to the scale proposed by Mujika-Alberdi et al. (2015) to identify advanced users. All items were measured on a one-to-five Likert-type scale, ranging from ‘‘I totally agree’’ to ‘‘I totally disagree’’. The internal consistency showed a Cronbach’s alpha of 0.76.

Independent Variables:

Pongtanalert, & Ogawa, (2015) affirmed that most user innovation studies have not explored the demographics of user-innovators. Actually, few studies have reported an innovative user profile. For instance, Flowers et al. (2010) stated a higher tendency to innovate among males younger than 34 years old with high level of education in UK. In contrast, Ogawa & Pongtanalert, (2011) reported the tendency to innovate was more pronounced among people aged 55-64 with undergraduate or higher degrees in The USA and the tendency to innovate was more pronounced among men aged 60-64 holding a PhD degree in Japan. Similarly, Mujika-Alberdi et al. (2015) found male aged 31-50 and 51-60 with intermediate graduate studies have a higher tendency to innovate in Gipuzkoa. Hence, this research analyzes the profile and the demographics of user-innovators in an emergent country, such as Colombia. The independent variables utilized in this research are as follows:

1. Gender was measured as dichotomous variable, codified as 1 for men and 2 for women.

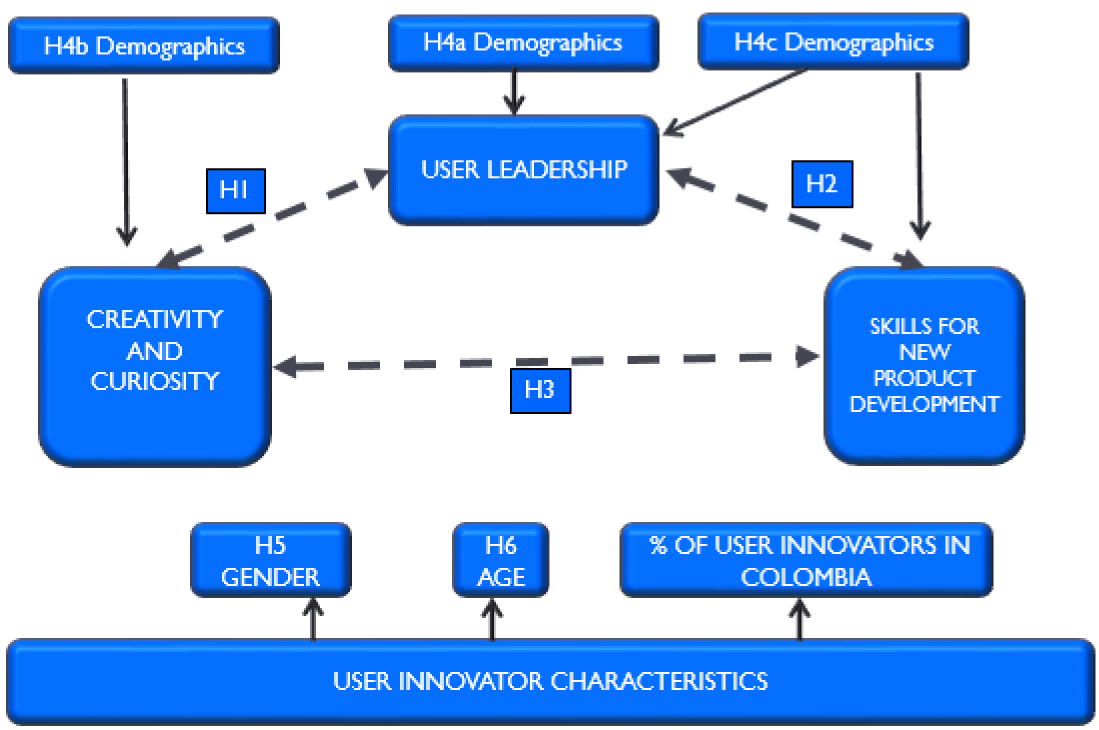
2. Age is a discrete variable that indicates the current age of the individual to time of survey application. Age was measured according to five categories of age ranges (1 = 18–30; 2 = 31–50; 3 = 51–60; 4 = Over 60).

3. Education is a variable that indicates the individual level of education. It takes values such as: 1 = Primary Education; 2 = Secondary Education; 3= Bachelor Student; 4 = Bachelor degree; 5 = Graduate Specialization Studies; 6 = Master; 7 = Doctorate.

4.4. Conceptual Model

After a review of the general literature on user innovation, this thesis finds valuable to study the user innovation phenomenon in emerging markets. Addressing the gaps in the literature related to user innovation in emerging markets and in accordance with the objectives of this research, figure 29 shows the conceptual model:

Figure 29 Conceptual Model



Source: Author's elaboration

4.5. Hypothesis

The hypotheses in this research are divided in three sets:

1. Correlations between the dimensions: User Leadership (UL), Creativity (CR), and Skills (SK) for product development.
2. Demographics and User leadership, Creativity, and Skills for product development
3. Percentage of user innovation

4.5.1. Correlations between the dimensions

User Leadership (UL) and Creativity (CR)

Faullant, Schwarz, Krajger, & Breitenecker (2012) demonstrated a link between lead userness individual creativity, proposing that those characteristics are fundamentally interrelated in a consumer goods field, such as kitchen appliances. On the other hand, Mujika-Alberdi et al., (2015) proved a higher correlation between the two dimensions: User Leadership (UL) dimension and Creativity (CR) dimension. In their study, they mentioned a Pearson correlation equal to .696 (Mujika-Alberdi et al., 2015).

Consequently, Faullant, et al (2012) and Mujika-Alberdi et al., (2015) also indicated the necessity to conduct further research to explore the connection between lead users and creativity, arguing it is valuable to validate their findings in other contexts. Based on lead user theory and supported by initial findings in this regards, this thesis intends to confirm the correlation between user leadership and creativity:

H1: There will be a correlation between User Leadership (UL) dimension and Creativity (CR) dimension

User Leadership (UL) and Skills for product development (SK)

By definition, lead users are positioned to benefit significantly by obtaining a solution to their needs (von Hippel, 1988, p. 107). Since lead users often try to find a solution to their need, they can provide valuable new product concept insights to manufacturers (von Hippel, 1988). In this sense, Gruner and Homburg (2000) found interacting with customers at the early and late stages of the new product development process can increase new product success.

Moroever, Hoyer, et al. 2010 indicated, firms have used well-established and common marketing research techniques such as focus groups at the early stages of NPD in which lead users have helped developing and narrowing down the product concept. Consequently, Hoyer, et al. (2010) pointed out involving consumers in the early stages of NPD can save both time and expense and reduce the risk of failure of the new product.

Understanding the link between lead user characteristics and the skills to develop new products, Mujika-Alberdi et al., (2015) proved a high correlation between the two dimensions: User Leadership (UL) dimension and skills to develop new products, (SK) dimension. In their study, they mentioned a Pearson correlation equal to .599. Accepting their invitation to replicate their study in other contexts, this thesis intends to confirm the correlation between UL and SK:

H2: There will be a correlation between User Leadership (UL) dimension and Skills for product development (SK) dimension

Creativity (CR) and Skills for product development (SK)

Creativity and Curiosity (CR) constitutes of a dimension that is closely related to the skills for product development (SK). For instance, Curiosity and skill development are among the ten motive categories that have been identified to explain why consumers engage in virtual co-creation (Füller, 2010). Consumers may engage in virtual co-creation or NPD processes just because they are curious about new things. In the same manner, consumers may engage in virtual new product development because they can improve their skill and gain additional knowledge (Füller, 2010).

In regards to the domain of user innovations, Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012) understood the creative output can be measured by asking whether an individual has ever improved existing products or had ideas for new products. Respect to user innovation, Creativity is an important dimension for the quality of the contributions that users can make or provide to the NDP process.

Recent research has demonstrated that lead users can be a remarkable source of novel ideas that later on can be realizable, prototyped and commercialized (Lilien et al., 2002). In this sense, Kristensson, P., Gustafsson, A., & Archer, T. (2004) mentioned users may contribute with original and valuable ideas in future product development processes. Thus, Mujika-Alberdi et al., (2015) confirmed a high correlation between the two dimensions: Creativity and Curiosity (CR) dimension and skills to develop new products (SK) dimension. In their study, they indicated a Pearson correlation equal to .424. Responding to the invitation to replicate their study in other contexts, particularly emerging markets, and this thesis intends to confirm the correlation between CR and SK

H3: There will be a correlation between Creativity (CR) dimension and Skills (SK) for product development dimension

4.5.2. Demographics

Related to user innovation field, few studies such as Hippel, Ogawa and Jong (2011) and Mujika-Alberdi et al., 2015 have worked on the demographics of those user innovators. In their publications, they mentioned consumer innovators are usually younger users, highly educated, with a technical expertise or knowledge, male, and single. However, von Hippel et al., (2011) pointed out the relative importance of demographic characteristics varied by country. For instance, in a country such as the U.K, a technical education had the most impact on the likelihood that a consumer will become an innovative user; In contrast, in the U.S., a higher education level (holding a bachelor's, master's or Ph.D. degrees) and finally, in Japan, it was gender.

Pongtanalert and Ogawa (2015) mentioned the absence of studies exploring the demographics of user-innovators. Consequently, Im, Bayus and Mason (2003) affirmed the necessity to conduct other studies and apply samples with different demographics profile and different regions including different countries to help generalize those findings. Supported by initial findings in regards to demographics of user innovators, this thesis intends to confirm whether demographics positively moderate the impact on the dimensions' subject to this study:

H4a: Demographics positively moderate the impact on having a higher user leadership dimension

H4b: Demographics positively moderate the impact on having a higher creativity dimension

H4c: Demographics positively moderate the impact on having a higher skill for product development dimension

Gender

Mujika-Alberdi et al. (2015) observed a relation between gender and the likelihood to become a user innovator. They indicated that men have done user innovation activities such as creating or modifying a product at significantly higher rates than women.

Similarly, Flowers et al. (2010) Ogawa & Pongtanalert (2011) specified a higher tendency to innovate among males. In contrast, Kratzer, J., & Lettl, C. (2008) could not affirmed that gender have any statistically significant impact on lead userness.

On the other hand, Pongtanalert & Ogawa (2015) classified user innovators as Silent innovators (those who neither share innovations nor belong to communities); Revealing innovators (those who share their innovations with others but do not belong to communities); and Social innovators (those who tend to share their innovations and belong to communities). In their study, they found silent innovators tend to be male when compared with Revealing innovators and Social.

Based on user innovation research and supported by initial findings in regards to demographics of user innovators, this thesis intends to confirm the following hypothesis:

H5: Gender (male) increase the likelihood to become a user innovator

Age

Flowers et al. (2010) reported a higher tendency to innovate among individuals younger than 34 years old in the UK. Contrary to the findings informed by Ogawa & Pongtanalert, (2011), they indicated in The USA and Japan, the tendency to innovate was more pronounced among people aged 55-64 and men aged 60-64 respectively.

In this sense, Pongtanalert & Ogawa (2015) mentioned significant differences were evident in gender, age and marital status among the three different types of user innovators in Japan. For instance, respondents between 20 and 29 years old tend to be social innovators and respondents between 60 and 69 years old tend to be revealing innovators.

Meanwhile, Mujika-Alberdi et al. (2015) found young adults between 31 and 50 years old and adults between 51and 60 years old had a higher propensity to innovate than other groups, but they did not found significant differences between. Consequently, as von Hippel et al., (2011) indicated, the relative importance of demographic characteristics varied by country. Therefore, based on previous studies and supported by initial findings in regards to demographics of user innovators, this thesis intends to confirm the following hypothesis:

H6: User innovators over 60 are less likely to develop or modify consumer goods

4.6. The instrument definition

The measurement scale consists of four sections: The first section gathers socio-demographic information (age, education level, income, technical training, and education level) that has proven to be relevant in identifying user innovators: The second one explores the creations made by consumer users. The third identifies modifications made by consumer users. The last section looks for user innovator characteristics based on three attributes: User leadership, Curiosity and creativity and Skills to develop products. The initial instrument subject to the entire process of validation is displayed in appendix 1.

For the last section, the final scale is composed as follows: User Leadership (UL) construct comprises 5; Curiosity and creativity (CR) construct consists of 4 items; and availability of time and skills to develop products (SK) construct involves 3 items. It is necessary to remember that the purpose of this scale is to look for user innovators. Consequently, a user innovator creates or modifies a product for their own benefit; therefore, in this research, the user innovator will be the individual who makes at least one of these actions.

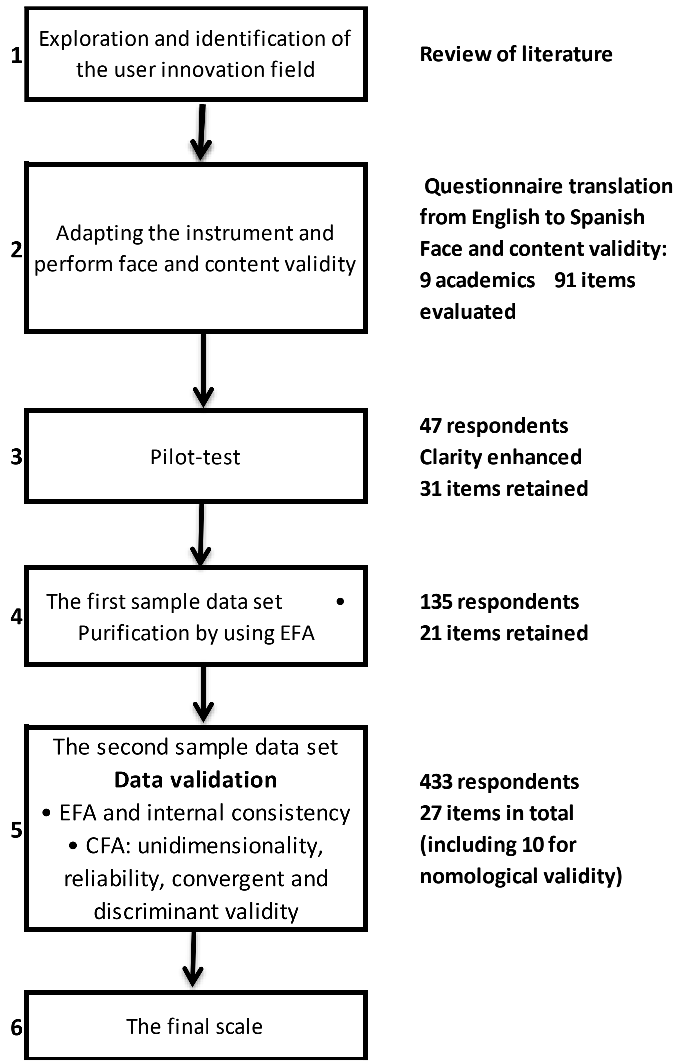
The original instrument illustrated by Flowers, et. al. (2010) has been validated in those countries that have estimated the percentage of user innovators, such as UK, Japan, United States, and Basque country (Gipuzkoa). Mujika-Alberdi, Gibaja-Martíns & García-Arrizabalaga (2015), designed an instrument to identify advanced users at consumer level. To the purpose of this thesis, the instrument provided by Mujika-Alberdi, et al (2015) has been chosen to apply in this research due to its simplicity and practicality. This scale has also been successfully tested and validated in a European region called Gipuzkoa. Following the invitation by Mujika-Alberdi, et al (2015) to consider this measurement scale and to apply it to an emerging market, we have validated and tested the instrument to a sample of adult consumers in Bogotá, Colombia

4.7. Validation process

To ensure the validity of this study, the author followed suggestions from Churchill (1979), Gerbing and Anderson (1988), and Moscoso, Gil, & Rodríguez (2000). The purpose of this scale is to identify user innovators in a non-representative sample in Colombia. Following the work proposed by Mujika-Alberdi, et al (2015) and responding to their research invitation, the author make the cross-cultural adaptation of the instrument and applied it to an emerging country. Mujika-Alberdi, et al (2015) named advanced users, in their research. They referred to those users who identify specific needs before other users see them and, who are capable to create or modify a new product to meet those needs. For the context of this study, those users comply with the definition of user innovators, proposed by Baldwin & von Hippel (2011), who defined a user innovator as a single firm or individual that creates an innovation in order to use it. Figure 31 illustrates the methodological steps involved in the validation process of the instrument.

The original instrument illustrated by Flowers, et. al. (2010) has been validated in those countries that have estimated the percentage of user innovators, such as UK, Japan, United States, and Basque country (Gipuzkoa). Mujika-Alberdi, Gibaja-Martíns & García-Arrizabalaga (2015), designed an instrument to identify advanced users at consumer level. To the purpose of this thesis, the instrument provided by Mujika-Alberdi, et al (2015) has been chosen to apply in this research due to its simplicity and practicality. This scale has also been successfully tested and validated in a European region called Gipuzkoa. Following the invitation by Mujika-Alberdi, et al (2015) to consider this measurement scale and to apply it to an emerging market, we have validated and tested the instrument to a sample of adult consumers in Bogotá, Colombia. Figure 30 shows the validation process.

Figure 30 Validation Process



Source: Adapted from Moscoso, Gil, & Rodríguez, (2000)

4.7.1. The instrument and face and content validity

In order to do so, the first step in the validation process has been adapting the instrument to a new cultural context. The international test commission (2010) provides detailed guidelines for adapting a test, understanding this process as the adjustment of the instrument to a new cultural context, seeking to keep linguistic, conceptual and measurement equivalence (ITC, 2010; Muñiz, Elosu & Hambleton, 2013).

The instrument utilized in this research to identify user innovators in Colombia has been translating and adapting to Colombian context. The Spanish translation of the instrument is part of the process to adapt the instrument to the Colombian context. As recommended by Carvajal, Centeno, Watson, Martínez, & Sanz Rubiales, (2011), in this research different methods of translation and adaptation were used. Maneesriwongul, W., & Dixon, J. K. (2004) suggested a forward-translation followed by testing of the target language version has the advantage of being applicable when only one translator is available. In this case, we utilized forward-translation with testing of bilingual subjects and the pilot study.

Translating and adapting process of the instrument was performed, recalling once again that a pilot study took place in order to ensure validity of the instrument to diminish cross cultural bias. A translation from English to Spanish was made and the operationalization and psychometric properties such as reliability and validity were examined. The translation of the instrument was carried out with the help of a bilingual expert in the subject; the result of this process was reviewed by two experts who conducted content, writing, clarity and grammar corrections. In addition to tests of clarity and appropriateness of the target language version, psychometric characteristics including internal consistency, reliability and indicators of validity were calculated.

In order to assess content and face validity, 91 items from the instrument were evaluated by nine academics and experts in business related areas. The evaluation criteria consisted of: coherence, relevance, and syntax. The judge's agreement through Fleiss´ Kappa was 0.89, and none of the items required modifications.

4.8. Pilot-test

After initial items were defined, a pilot-test was conducted to ensure whether the measurement scale was reliable and valid. Conducting a pilot-test is an important step in the validation of an instrument because it allows identifying those invalid items that need to be removed from the questionnaire (Anderson and Gerbing, 1991; Cheng, C. C., and Shiu, 2012; Stratman and Roth, 2002). A pilot test was a random sample of 47 adults, older than 18 years old studying undergraduate programs at the University. Those respondents ranged from 18 to 45 years old, 55% of them were female. They were asked to complete the questionnaire, to indicate any ambiguity and report any difficulty experienced when responding to the items. At this stage, some item wordings and punctuation were refined to give a better understanding to the respondents (e.g., "how much time have you spent" was replaced by "how many days have you spent").

4.8.1. The first sample set and pilot questionnaire

Following Churchill (1979), two sample sets were collected in order to purify the measure and to obtained preliminary estimates of reliability and validity. The first questionnaire survey was applied to sample of adults ranged from 21 to 34 years old; 51% of them were female and all of them were students of business administration undergraduate program. In order to purify the first sample, an exploratory factor analysis (EFA) was performed, in which three dimensions were found: 1. User leadership; 2. Curiosity and creativity, and 3. Time and skills to develop products.

4.8.2. Purifying the pilot questionnaire

4.8.2.1. First EFA

The first step to purify the pilot questionnaire was to run the EFA. The results are: Kaiser-Meyer-Olkin (KMO) was 0,852 and a significant result (p <0.00) for the Barlett test. Table 13 shows the results for KMO test. Analyzing the KMO, values from 0,8 to 1 are considered meritorious (Martinez and Sepulveda, 2012).

Table 13 KMO test first EFA

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,852
Bartlett's Test of Sphericity	Approx. Chi-Square	1854,812
	df	465
	Sig.	0,000

Source: Author´s elaboration

Following the consideration of Mujika-Alberdi, et al (2015), the number of factors chose to run the EFA was three. As a result, the three factors were extracted accounting for 44,926%, of the variance, with the first factor explaining 28,307%, the second factor 9,847%, and the third factor 6,152%. Table 14 illustrates the variance explained for the first EFA.

Table 14 Variance Explained First EFA Pilot Study

Total Variance Explained									
Component	Initial Eigenvalues			Extraction sums of Squared loadings			Rotation sums of Squared loadings		
	Total	% of variance	cumulative %	Total	% of variance	cumulative %	Total	% of variance	cumulative %
1	8,775	28,307	28,307	8,775	28,307	28,307	7,018	22,639	22,639
2	3,053	9,847	38,154	3,053	9,847	38,154	4,58	14,773	37,412
3	1,906	6,152	44,307	1,906	6,152	44,307	2,137	6,894	44,307

Source: Author´s elaboration

To run the EFA, the extraction method utilized was principal component analysis with varimax rotation. The results show the lowest communalities corresponded to items 3, 16, 23 and 31. Table 15 illustrates the communalities.

Table 15 Communalities First EFA Pilot Study

Communalities		
	Initial	Extratión
UL1	1,000	0,315
CR2	1,000	0,246
LINT(p3)	1,000	0,146
CR4	1,000	0,366
CR5	1,000	0,313
SK6	1,000	0,545
CR7	1,000	0,635
CR8	1,000	0,495
CR9	1,000	0,525
LINT(p10)	1,000	0,278
CR11	1,000	0,401
SK12	1,000	0,612
SK13	1,000	0,667
UL14	1,000	0,575
UL15	1,000	0,569
CR16	1,000	0,190
UL17	1,000	0,349

CR19	1,000	0,451
UL20	1,000	0,487
UL21	1,000	0,533
UL22	1,000	0,546
UL24	1,000	0,432
UL25	1,000	0,591
UL26	1,000	0,499
SK27	1,000	0,590
UL28	1,000	0,577
UL29	1,000	0,601
UL30	1,000	0,545
UL31	1,000	0,172
SK18RE	1,000	0,343
SK23RE	1,000	0,141
Extraction Method:Principal Component Analysis		

Source: Author´s elaboration

Finally, the rotated component matrix was obtained. According to the literature, Martínez, and Sepúlveda (2012) mentioned an approach to look at factorial loadings: values less than 0.3 are considered not significant; between 0.3 and 0.5, minimum acceptable; between 0.5 and 0.7, significant, and values greater than 0.7 are considered relevant. Following their consideration, in to run this EFA, items below 0.5 were eliminated. Consequently, Table 16 shows that item 1, 2, 3, 5, 10, 16, 23, 24, and 31 were not represented. According to Mujika-Alberdi, et al (2015), item 3 and 10 did not correlated as expected, and they were eliminated from their scale. Following the consideration of Mujika-Alberdi, et al (2015) and Martínez, and Sepúlveda (2012), and given the results, in this research, items 1, 2, 3, 5, 10, 16, 23, 24, and 31were eliminated.

Table 16 Rotated Component Matrix First EFA Pilot Study

Rotated Component Matrix a			
	Component		
	1	2	3
CR4	0,550		
SK6	0,710		
CR7	0,534		0,588
CR8	0,633		
CR9	0,656		
CR11	0,552		
SK12		0,646	
SK13		0,680	
UL14		0,748	
UL15		0,704	
UL17	0,583		
CR19	0,668		
UL20		0,638	
UL21		0,546	
UL22	0,694		
UL25		0,692	
UL26	0,641		
SK27		0,738	
UL28	0,673		
UL29	0,721		
UL30	0,671		
UL31			
SK18RE			0,554
Extraction method: Principal Component Analysis. Rotation Method: varimax with kaiser Normalization. a. Rotation convergent in 6 iterations			

Source**:** Author´s elaboration

4.8.2.2. Second EFA

To continue the process of purifying the scale, after eliminated items 1, 2, 3, 5, 10, 16, 23, 24, and 31, a second EFA was run. The results are: The KMO improved, it was 0,879 a significant result ($p < 0.00$) for the Barlett test was kept. Table 17 shows the KMO and Bartlett test results. Moreover, the three factors were extracted accounting for 54,146%, of the variance, with the first factor explaining 33,561%, the second factor 12,967%, and the third factor 7,618%. Table 18 shows the total variance explained.

Table 17 KMO Second EFA Pilot Study

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,879
Bartlett's Test of Sphericity	Approx. Chi-Square	1361,584
	df	231
	Sig.	0,000

Source: Author´s elaboration

Table 18 Variance Explained Second EFA

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,383	33,561	33,561	7,383	33,561	33,561	5,654	25,699	25,699
2	2,853	12,967	46,528	2,853	12,967	46,528	4,183	19,012	44,711
3	1,676	7,618	54,146	1,676	7,618	54,146	2,076	9,435	54,146

Source: Author´s elaboration

To run the EFA, the extraction method utilized was principal component analysis with varimax rotation. The results show the lowest communalities corresponded to items 4 and 18. Table 19 shows the communalities for the second EFA.

Table 19 Communalities Second EFA Pilot Study

Communalities		
	Initial	Extraction
CR4	1	0,279
SK6	1	0,542
CR7	1	0,657
CR8	1	0,596
CR9	1	0,614
CR11	1	0,425
SK12	1	0,703
SK13	1	0,688
UL14	1	0,580
UL15	1	0,583
UL17	1	0,348
CR19	1	0,494
UL20	1	0,501
UL21	1	0,526
UL22	1	0,597
UL25	1	0,638
UL26	1	0,552
SK27	1	0,593
UL28	1	0,597
UL29	1	0,621
UL30	1	0,552
SK18RE	1	0,227
Extraction Method: Principal Component Analysis.		

Source: Author´s elaboration

Additionally, Table 20 shows that item 18 is not properly represented. Rotated component matrix displays the distribution of the items among the three factors. According to the literature, Martínez, and Sepúlveda (2012) mentioned the factorial loadings between 0.5 and 0.7 are significant; each item in the rotated component matrix is above 0.5.

Table 20 Rotated Component Matrix Second EFA Pilot Study

	Component		
	1	2	3
CR4	0,525		
SK6	0,719		
CR7	0,633		0,504
CR8	0,707		
CR9	0,708		
CR11	0,607		
SK12			0,714
SK13		0,514	0,629
UL14		0,734	
UL15		0,720	
UL17	0,535		
CR19	0,699		
UL20		0,682	
UL21		0,600	
UL22	0,686		
UL25		0,777	
UL26	0,600		
SK27		0,606	
UL28	0,592		
UL29	0,655		
UL30	0,629		
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 14 iterations.			

Source: Author´s elaboration

4.8.2.3. Third EFA

Finally, after eliminating item 18, a third EFA was run and internal consistency of the scale was improved in terms of the variance. Although the KMO was 0,881, it is still meritorious. A significant result (p <0.00) for the Barlett test was kept. Table 21 shows the KMO test results for the third EFA.

Table 21 Third EFA Pilot Study KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,881
Bartlett's Test of Sphericity	Approx. Chi-Square	1341,491
	df	210
	Sig.	0,000

Source: Author´s elaboration

The three factors were extracted accounting for 56,208%, of the variance, with the first factor explaining 35,132%, the second factor 13,464%, and the third factor 7, 126%. Table 22 illustrates the variance explained for the third EFA.

Table 22 Total variance explained third EFA

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,378	35,132	35,132	7,378	35,132	35,132	4,336	20,645	20,645
2	2,827	13,464	48,596	2,827	13,464	48,596	3,805	18,119	38,765
3	1,598	7,612	56,208	1,598	7,612	56,208	3,663	17,443	56,208

Source: Author´s elaboration

To run the EFA, the extraction method utilized was principal component analysis with varimax rotation. The results show the lowest communalities corresponded to item 18. Table 23 illustrates the communalities.

Table 23 Communalities Third EFA Pilot Study

Communalities		
	Initial	Extraction
CR4	1,000	0,278
SK6	1,000	0,544
CR7	1,000	0,630
CR8	1,000	0,626
CR9	1,000	0,646
CR11	1,000	0,430
SK12	1,000	0,711
SK13	1,000	0,685
UL14	1,000	0,586
UL15	1,000	0,582
UL17	1,000	0,372
CR19	1,000	0,495
UL20	1,000	0,504
UL21	1,000	0,520
UL22	1,000	0,593
UL25	1,000	0,643
UL26	1,000	0,573
SK27	1,000	0,578
UL28	1,000	0,601
UL29	1,000	0,651
UL30	1,000	0,556
Extraction Method: Principal Component Analysis.		

Source: Author´s elaboration

To run the EFA, varimax rotation was utilized and items below 0.5 were eliminated. Table 24 displays the rotated component matrix. The distribution of the loadings within each factor is illustrated in Table 24 the rotated component matrix.

Table 24 Rotated Component Matrix Third EFA Pilot Study

Component Matrix[a]			
	Component		
	1	2	3
UL29	0,767		
UL28	0,726		
UL26	0,689		
UL22	0,660		
UL30	0,624		
UL17	0,558		
UL21	0,530		
SK27		0,760	
SK13		0,751	
SK12		0,750	
UL14		0,740	
UL15		0,669	
UL25	0,520	0,606	
UL20		0,565	
CR7			0,775
CR8			0,744
CR9			0,742
CR11			0,619
SK6			0,592
CR19			0,511
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 9 iterations.			

Source: Author´s elaboration

4.8.2.4. Assessing reliability

Following the literature, in this sample some of the items do not grouped in the same factors reported by Mujika-Alberdi, et al (2015). For instance, in this EFA, items from the User Leadership dimension mentioned in Mujika-Alberdi, et al (2015), UL14, UL15, UL20, and UL25, are grouped within the dimension SK -availability of time and skills to develop products. Moreover, items SK6 is grouped within CR dimension. In this research, items are grouped according to theoretical perspective, it means, original items are grouped in the proper and original dimension. Therefore, constructs are composed as follows: User Leadership (UL) construct consists of seven items (UL17, UL21, UL22, UL26, UL28, UL29, UL30); Curiosity and creativity construct is composed by five items (CR4, CR7, CR9, CR11, CR19); and availability of time and skills to develop products construct comprises three items (SK12, SK13, and SK27). Afterwards, reliability and internal consistency of the sale is calculated.

In assessing reliability and measuring internal consistency, Cronbach´s Alpha was used. The rule of thumb level suggested by Nunnally and Bernstein (1994) is a Cronbach´s Alpha higher than 0.70. The results for each of the constructs are: User Leadership (UL) construct = 0,864 with 7 items; Curiosity and Creativity (CR) construct = 0,793 with 5 items and availability of time and skills (SK) construct = 0,661 with 3 items. Table 25 shows the cronbach´s alpha for the pilot study.

Table 25 Cronbach's Aplha Pilot Study

Factor	Alfa de Cronbach	No. of elements
UL	0,864	7
SK	0,793	3
CR	0,761	5

Source: Author´s elaboration

Additionally, Martínez, and Sepúlveda (2012) suggested a look at to the correlation matrix between items. For the purpose of this EFA applied to the pilot study, tables 26, 27, and 28 show the correlation matrix between items. Martínez, and Sepúlveda (2012) recommended a moderate to high correlation values within each variable, it means, values greater than 0.30.

Table 26 UL Pilot Study Correlation Matrix between Items

	UL28	UL29	UL30	UL26	UL22	UL17	UL21
UL28	1,000						
UL29	0,640	1,000					
UL30	0,528	0,647	1,000				
UL26	0,574	0,559	0,464	1,000			
UL22	0,527	0,535	0,533	0,496	1,000		
UL17	0,384	0,433	0,406	0,424	0,315	1,000	
UL21	0,426	0,393	0,410	0,409	0,535	0,269	1,000

Source: Author´s elaboration

Table 27 SK Pilot study correlation matrix between items

	SK27	SK12	SK13	UL14	UL15	UL25	UL20
SK27	1,000	0,533	0,530	0,437	0,371	0,397	0,417
SK12	0,533	1,000	0,626	0,425	0,420	0,315	0,293
SK13	0,530	0,626	1,000	0,447	0,430	0,393	0,389

Source: Author´s elaboration

Table 28 CR Pilot study correlation matrix between items

	CR7	CR8	CR9	CR11	SK6	CR19
CR7	1,000	0,537	0,469	0,413	0,466	0,415
CR8	0,537	1,000	0,658	0,360	0,511	0,478
CR9	0,469	0,658	1,000	0,440	0,529	0,498
CR11	0,413	0,360	0,440	1,000	0,380	0,406
CR19	0,415	0,478	0,498	0,406	0,328	1,000

Source: Author´s elaboration

4.9. The second and final questionnaire

Internal consistency of the scale was also measure for the final questionnaire. Table 29 displays the KMO was 0,924 and the result (p <0.00) for the Barlett test was significant. Table 30 shows that three factors were extracted accounting for 53.695%, with the first factor explaining 38,899%, the second factor 8,790%, and the third factor 6,006%.

Table 29 KMO and Bartlett Test First EFA for Final Questionnaire

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,926
Bartlett's Test of Sphericity	Approx. Chi-Square	4066,284
	df	210
	Sig.	0,000

Source: Author´s elaboration

Table 30 Total variance explained first EFA for final questionnaire

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,169	38,899	38,899	8,169	38,899	38,899	4,272	20,344	20,344
2	1,846	8,790	47,689	1,846	8,790	47,689	3,508	16,707	37,051
3	1,261	6,006	53,695	1,261	6,006	53,695	3,495	16,644	53,695

Source: Author´s elaboration

To run the EFA, the extraction method utilized was principal component analysis with varimax rotation. The results in Table 31 show communalities above 0.4.

Table 31 Communalities for first EFA final questionnaire

	Inicial	Extracción
CR4	1,000	0,466
SK6	1,000	0,546
CR7	1,000	0,563
CR8	1,000	0,649
CR9	1,000	0,597
CR11	1,000	0,484
SK12	1,000	0,563
SK13	1,000	0,624
UL14	1,000	0,584
UL15	1,000	0,510
UL17	1,000	0,422
CR19	1,000	0,419
UL20	1,000	0,477
UL21	1,000	0,524
UL22	1,000	0,601
UL25	1,000	0,547
UL26	1,000	0,569
SK27	1,000	0,426
UL28	1,000	0,595
UL29	1,000	0,541
UL30	1,000	0,566
Método de extracción: análisis de componentes principales.		

Source: Author´s elaboration

To run the EFA, varimax rotation was utilized and items below 0.45 were eliminated. Table 32 displays the rotated component matrix and the distribution of the loadings within each factor.

Table 32 Rotated Matrix for first EFA final questionnaire

Rotated Component Matrix a			
	Component		
	1	2	3
UL14	0,743		
SK13	0,742		
SK12	0,723		
UL25	0,660		
UL15	0,631		
SK27	0,614		
UL20	0,582		
UL21	0,548		0,455
CR7		0,716	
SK6		0,679	
CR8		0,672	
CR4		0,656	
CR11		0,625	
CR9		0,573	0,517
CR19		0,560	
UL22			0,686
UL30			0,679
UL29			0,660
UL17			0,627
UL28			0,609
UL26			0,489
Extraction Method: Principal Component Analysis. Rotation method: varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.			

Source: Author´s elaboration

Mujika-Alberdi, et al (2015) reported three factors: User leadership (UL), curiosity and creativity (CR), and availability of time and skills to develop products. However, in this EFA, items UL14, UL15, UL20, UL21, UL25, which originally belonged to User Leadership construct, are grouped within availability of time and skills to develop products. Additionally, item SK6 is grouped within CR dimension. Following the literature, original items grouped in the proper dimension reported by Mujika-Alberdi, et al (2015), are considered for the Confirmatory Factor Analysis. On other words, User Leadership (UL) construct consists of five items (UL17, UL22, UL26, UL28, UL29, UL30); curiosity and creativity construct is composed by five items (CR4, CR7, CR9, CR11, CR19); and availability of time and skills to develop products construct comprises three items (SK12, SK13, and SK27). Afterwards, reliability and internal consistency of the sale is achieved. Nunnally and Bernstein (1994) suggested a Cronbach´s Alpha greater than 0.70. Table 33 illustrates Cronbach´s Alpha for each dimension; demonstrating reliability and internal consistency, because they are higher than 0.7.

Table 33 Cronbach´s Alpha for each dimension for final questionnaire

Variables	Alfa de Cronbach	No. of elements
CR4 CR7 CR8 CR9 CR11 CR19	0,804	6,000
SK12 SK13 SK27	0,772	3,000
UL17 UL22 UL28 UL29 UL30 UL26	0,835	6,000

Source: Author´s elaboration

4.9.1. Construct validity

Construct validity exists when a measure reliably and truthfully represents a unique concept (Zikmund, Babin, Carr, & Griffin, 2010 p.650). Construct validity is tested in this research by analyzing both convergent and discriminant validity. For the purpose of this study, Confirmatory Factor Analysis (CFA) has been chosen as the appropriate tool for assessing construct validity. As Zikmund, et al. (2010) mentioned, statistical procedures such as factor analysis are helpful in providing evidence of construct validity. A confirmatory factor analysis (CFA) was performed using EQS 6.1, applying the maximum likelihood procedure based on the covariance matrix.

4.9.1.1. Assessing goodness of fit

Many alternative indices to measure goodness of fit model have been developed. Hair et al. (2010), Pallant (2010) and Barret (2007) specified that the Chi-square statistic is a traditional measure for assessing overall model fit in covariance structure models. An acceptable measure is fit is the ratio between Chi-square and the degrees of freedom X2 / df (Cheng and Shiu, 2012; Koufteros, 1999). The X2 / df ratio suggested is between one and five (Cheng and Shiu, 2012; Marsh and Hocevar, 1988). Other measures of model fit used in this research are root mean square error of approximation (RMSEA) (Garver and Mentzer, 1999), the goodness of fit index (GFI) and the adjusted goodness of fit index (AGFI) (Jöreskog y Sörbom 1993; Moscoso, Gil, & Rodríguez, 2000), the Bentler comparative fit index (CFI) (Bentler, 1986), and the non-normed fit index (NNFI) (Garver and Mentzer,1999), and the normed fit index (NFI) (Bentler and Bonnet 1980; Hooper, Coughlan, & Mullen, 2008).

The 15 items of the scale were examined using CFA on the basis of EFA results (Gerbing and Hamilton, 1996). To achieve a goodness of fit model, an iteration process was required. During the iteration, three items were eliminated: CR4, CR11, and UL17. Table 34 shows the results indicating an acceptable model fit for M3 (x2/df = 2.9; GFI = 0.931; CFI = 0.935; NNFI = 0.915; RMSEA= 0.079) (Bentler and Bonett, 1980; Gerbing and Anderson, 1988), therefore, they confirm the unidimensionality of the constructs as all indices demonstrate acceptable fit of data to the model.

Table 34 CFA indices

Test / Indices	**Marker**	**X2**	**Degrees of freedom (df)**	**X2 / df ratio**	**RMSEA**	**CFI**	**NNFI**	**NFI**	**AGFI**	**GFI**
Acceptance value				1–5	<0.08.	>.90	0.80<0.95		>.80	>.90
M		340	87	3,9	0.082	0.900	0.879	0.871	0.853	0.894
M1	CR4	287	74	3,9	0.082	0.911	0.891	0.884	0.868	0.907
M2	CR11	204	62	3,3	0.073	0.936	0.920	0.912	0.898	0.930
M3	UL17	149	51	2,9	0.079	0.935	0.915	0.913	0.895	0.931

Source: Author´s elaboration

The list of those items removed from the analysis of the goodness of fit model through the iteration process is shown in Table 35. The iteration process changed the number of factors under the CR and UL constructs.

Table 35 Iterations for goodness of fit model

Code	Construct	Item(s) statements	Removed at
CR4	Curiosity and Creativity	I like being different	Iteration 1 (CR4)
CR11	Curiosity and Creativity	I like challenges	Iteration 2 (CR11)
UL17	User Leadership	I have the ability to transform new ideas into concrete projects	Iteration 3 (UL17)

Source: Author´s elaboration

4.10. The final scale

After a rigorous validity process, the final scale is composed by twelve items. Thus, three factors with a total of 12 items were resulted from CFA of first order factor model of fit. Results are shown in Table 36.

Table 36 Final scale for last questionnaire

Code	**Construct**	**Item(s) statements**
CR7	Curiosity and Creativity	I am a very curious person about new things
CR8	Curiosity and Creativity	I am a person with a great imagination
CR9	Curiosity and Creativity	I consider myself a creative person
CR19	Curiosity and Creativity	I enjoy imagining new things
SK12	Skills to develop new products	I prefer to repair a product for myself rather than ask someone
SK13	Skills to develop new products	I am a very curious person about the inner workings of the products
SK27	Skills to develop new products	If a product breaks, I try to repair it before buying a new one
UL22	User Leadership	Others consider me an innovator
UL26	User Leadership	I love creating new things
UL28	User Leadership	I can easily think of new things that I could create
UL29	User Leadership	I have suggested to others how they could improve processes or products
UL30	User Leadership	When other people around me have a problem, they come to meto see if I can create something

Source: Adapted from Mujika-Alberdi, et al (2015)

Additionally, the model was subjected to first order CFA using EQS 6.1. Figure 31 presents the results of the measurement model fit of the three factors. Factor 1 corresponds to SK factor, which includes the following variables: SK12; SK13; SK27. Factor 3 corresponds to CR which includes the following variables: CR7; CR8; CR9; CR19. Factor 3 represents UL construct, which includes the following items: UL22; UL26; UL28; UL29; UL30.

Figure 31 First order Model CFA

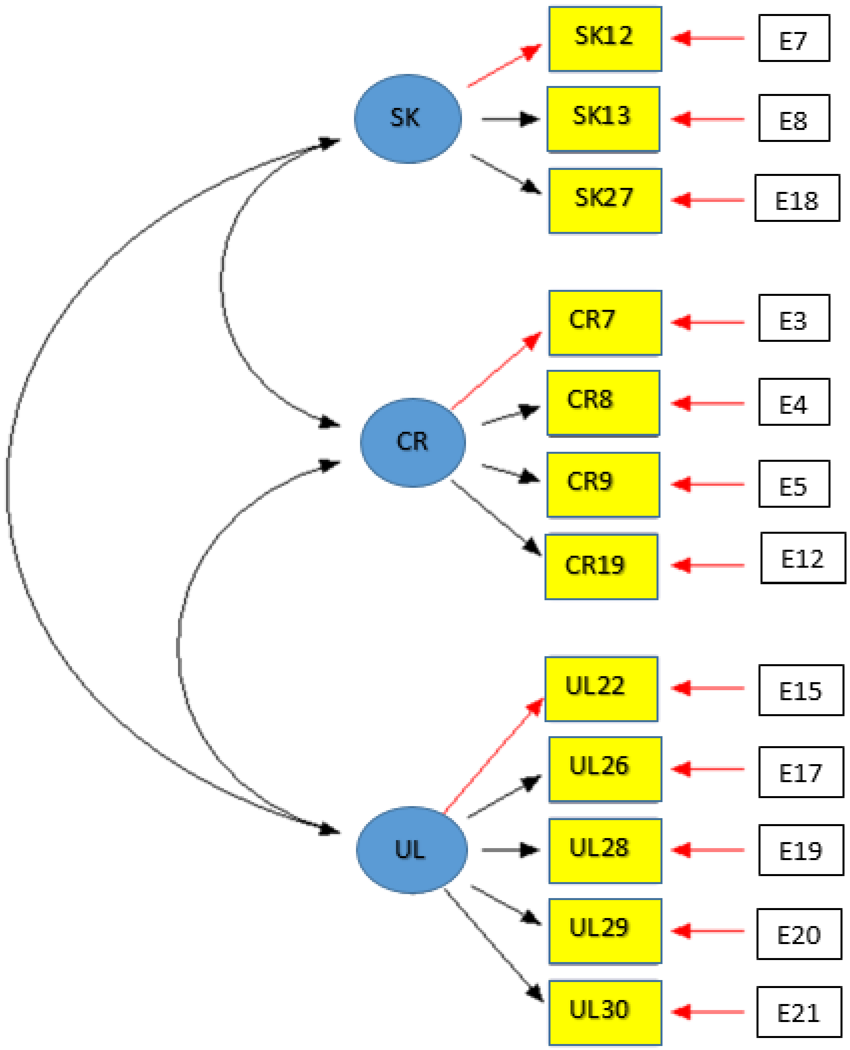


Figure X: EQS 6 modelo 4 feb 8. Eds Chi Sq.= 188.99 P = 0.93 RMSEA = 0.08

Source: Computed based on data set

The CFA was carried out to achieve a valid model fit for the data obtained as well as theoretical supports behind the developed model proposed by Mujika-Alberdi, et al (2015). The test of the first order implies that a total of 12 variables were fit and represented in three constructs: User leadership (UL), curiosity and creativity (CR), and time and skills to develop products (SK).

4.11. Convergent and discriminant validity

Convergent validity examines whether or not the items measuring the same construct are highly correlated (Hair et al., 2006). The value of average variance extracted (AVE) is used as an indicator for supporting convergent validity; the accepted value of AVE for each construct should be at least 0.50 (Fornell and Larcker, 1981).

Discriminant validity represents how unique or distinct are the measures of a construct (Zikmund, et al., 2010). To determine discriminant validity, it is necessary to take into account an AVE greater than the squared correlation between constructs (Anderson & Gerbing, 1988). In this research, the value of AVE was calculated utilizing the inter-correlation matrix and the square root of the AVE in the principal diagonal for each type of dimension (UL, CR, SK). As it is shown in the Table 37, the value of AVE in the principal diagonal in all cases is above 0.5 and it is greater than the correlation coefficients shown in the inter-correlations matrix, proven the discriminant validity. As it is reported by Zikmund, et al. (2010), a scale should not correlate too highly with a measure of a different construct. The rule of thumb indicates; when two scales are correlated above 0.75, discriminant validity may be questioned. Consequently, it is expected and observed in Table 37, the different dimensions display a significant correlation (convergent validity), and demonstrate they independent concepts (discriminant validity).

Table 37 Correlation matrix for final scale

	CR	SK	UL
CR	0,710		
SK	0,402	0,730	
UL	0,612	0,557	0,710
** p < .01. The values of the main diagonal (in italics) corresponding to the square root of AVE.			

Source: Author´s elaboration

4.12. Assessing reliability final questionnaire after CFA

Cronbach Alpha scores for the three factors from CFA of first order factor model (the iterated model) were measured, and the dimensions demonstrate acceptable reliabilities as suggested by Nunnally (1978) with scores that exceed the required > = 0.70. As it is observed in Table 38, the results for each Cronbach-Alpha of the dimensions' level of the CFA of first order model iterated are aceptable. Table 38 also shows the reliability indexes per dimension and per variables if an item is deleted from the scale. In all cases, the possible elimination of an item diminishes the reliability of the scale.

Table 38 Statistics total-item for each dimension

	Mean if item deleted	Variance if item deleted	Corrected correlation item-total	Multiple correlation squared	Cronbach´s alpha if item deleted
‘‘UL-User leadership’’: Cronbach's alpha: 0,830					
UL22	10,2309	11,816	0,627	0,411	0,797
UL26	10,5277	11,771	0,622	0,407	0,798
UL28	10,4180	11,432	0,644	0,423	0,792
UL29	10,6293	11,879	0,598	0,392	0,805
UL30	10,4896	11,465	0,647	0,446	0,791
‘‘CR -Creativity/Curiosity’’: Cronbach's alpha: 0 ,777					
CR7	6,4491	6,008	0,503	0,270	0,761
CR8	6,1921	4,961	0,725	0,617	0,644
CR9	6,1019	5,042	0,642	0,569	0,690
CR19	6,2674	5,914	0,468	0,224	0,780
‘‘SK -Availability of time and skills’’: Cronbach's alpha: 0,766					
SK12	5,1386	4,799	0,633	0,414	0,646
SK13	5,2540	4,953	0,628	0,409	0,653
SK27	5,4919	5,297	0,537	0,289	0,753

Source: Computed based on data set

4.13. Correlation matrix per dimension after CFA

Another valuable assessment in performing a factor analysis, is to look at the correlation matrix between items. According to Martínez, and Sepúlveda (2012), if there are some items with low correlations between variables, it is necessary to question the existence of those items in the scale. In this research, Tables 39, 40, and 41 show the correlation matrix between items. As a result, all variables have moderate to high correlation values with each other, because they are greater than 0.30 (Martínez, and Sepúlveda, 2012).

Table 39 Correlation matrix after CFA for UL

	UL22	UL26	UL28	UL29	UL30
UL22	**1,000**				
UL26	**,528**	**1,000**			
UL28	**,514**	**,549**	**1,000**		
UL29	**,414**	**,436**	**,473**	**1,000**	
UL30	**,521**	**,450**	**,487**	**,572**	**1,000**

Source: Computed based on data set

Table 40 Correlation matrix after CFA for CR

	CR7	CR8	CR9	CR19
CR7	**1,000**			
CR8	**,479**	**1,000**		
CR9	**,382**	**,752**	**1,000**	**,371**
CR19	**,382**	**,418**	**,371**	**1,000**

Source: Computed based on data set

Table 41 Correlation matrix after CFA for SK

	SK12	SK13	SK27
SK12	**1,000**		
SK13	**,603**	**1,000**	
SK27	**,485**	**,477**	**1,000**

Source: Computed based on data set

4.14. Sample and data collection

The sampling method used was not probabilistic for convenience. A measurement scale was administered to identify innovators to an unrepresentative sample of older adults to 18 users. The questionnaire was designed to be self-administered. The data collection was that each student was given three copies of the questionnaire to a sample of students of Business Administration from the Pontificia Universidad Javeriana in Bogotá. They were asked to answer one of the questionnaires themselves, give a questionnaire to an adult age from their parents and another questionnaire to an adult over 55 years. Fieldwork for data collection took place in 2014. 518 questionnaires, of which 433 were valid, with a response rate of 83.5% were received.

In order to avoid false positives answers, a cleaning process was applied. First, the author checked for originality: If the respondent knew of others who had developed an equivalent "home-made" product, or if he or she knew of an equivalent product available on the market, the case was excluded from the sample. Second, the author checked for innovations that consumers developed during their leisure time, to avoid those on the job innovations or those innovations developed at work, as those are already recorded in official innovation statistics. Finally, a database that systematizes all the information was created and the data was analyzed through SPSS 23.

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5. Chapter V – Results

CONTENT

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5.1. Introduction

In this chapter the main results of this study are presented. The findings stated in this section contribute to an increased understanding of user innovation (UI) field by reporting the existence of user innovation activities in a Latin America country, specifically Colombia. Furthermore, in accordance with the objectives formulated in the introduction chapter, the author provides information about the percentage of user innovators found in the sample and the characteristics of user innovators in Colombia. In this section the author responds to research questions such as what is the percentage of user innovators and what are the characteristics of user innovators in an emerging country, particularly Colombia?

It also offers a descriptive analysis and establishes the characteristics of user innovators at the consumer level in an emerging market, particularly in Colombia. In this study significant difrerences between gender and user innovation activities were found, as well as age and user innovators. Moreover, a relationship between the level of education of innovative users and user innovation activities such as creating or modifying a product is observed, however, no significant differences were found. It also provides an analysis by group of user innovators and user non-innovators, analysis by gender, analysis by technical qualifications (TQ), analysis by education, analysis by age.

Additionally, this chapter shows correlations between the variables such as user leadership (UL), curiosity and creativity (CR), and time and skills to develop products (SK). The results of this research show a high correlation between user leadership (UL) dimension and Creativity

(CR) dimension, as well as a high correlation between user leadership (UL) dimension and skills (SK) for product development dimension. Moreover, a correlation between Creativity (CR) dimension and Skills (SK) for product development dimension is also proved. Similarly, it provides a proof of the research hypothesis proposed by the author utilizing a statistical analysis.

5.2. Descriptive Analysis

A total of 433 valid questionnaires were analyzed. Out of those 433 respondents, 21 individuals reported, they have performed some kind of user innovation activity over the past three years. Recalling the definition of a user innovator proposed by Baldwin & von Hippel (2011), a user innovator is an individual who creates an innovation in order to use it; this research has found a number of 21 user innovators who have engaged in any kind of user innovation activity.

Those innovative users found in the sample, correspond to 11 (48%) were female and 10 (52%) were men. 67% were adults younger than 30 years; 14% were between 51 and 60 years; 10% were between 31 and 50 years and the remaining 10% were older than 60 years. In relation to their level of education, 52% were in college; 28% had completed their undergraduate university studies; 9.5% had master's degrees and the remaining 9.5% were technical or technological studies. Table 42 shows the data of the sample distribution.

Table 42 Distribution of the sample

Distribution of the sample (n=433)

	Gender	**Frequency**	**%**
Valid	Man	212	49,0
	Woman	221	51,0
	Total	433	100,0
	Age	**Frequency**	**%**
Válido	< 31	279	64,4
	31 - 50	55	12,7
	51 - 60	53	12,2
	> 60	46	10,6
	Total	433	100,0
	Education	**Frequency**	**%**
Valid	Primary Education	11	2,5
	Bachelor Student	254	58,7
	Secondary Education	43	9,9
	Bachelor degree	74	17,1
	Graduate Especialization Studies	32	7,4
	Master	15	3,5
	Doctorate	3	0,7
	Total	432	99,8
Not valid	No studies/No qualifications	1	0,2
Total		433	100,0
	Technical Qualifications (TQ)	**Frequency**	**%**
Valid	NO	384	88,7
	Yes	49	11,3
	Total	433	100,0

Source: Author´s elaboration

5.3. Research questions related to field work

After a review of the literature on user innovation, the following research questions arose:

1. Which are the characteristics of user innovators in an emerging country such as Colombia?

2. What is the percentage of user innovators?

5.3.1. What are the characteristics of the user innovators found in this study?

In this study significant difrerences between gender and user innovation activities were found. Moreover, related to age, young adults (31-50 years old) and adults (51-60 years old) are significantly engaged in user innovation activities than adults older than 60 years old. Among the findings is that those innovative users found in the sample under 60 years old, show a greater tendency to innovate than people older than 60 years old. A relationship between the level of education of innovative users and user innovation activities such as creating or modifying a product is observed, however, no significant differences were found. Table 43 shows the incidence of user innovation in the sample.

Table 43 Incidence of user innovation in the sample

Gender	Total	%	Non-innovators	%	Innovators	%
Men	212	49%	202	49%	10	48%
Women	221	51%	210	51%	11	52%
Total valid	433	100%	412	100%	21	100%
Age						
> 30	279	64%	265	64%	14	67%
31-50	55	13%	53	13%	2	10%
51-60	53	12%	50	12%	3	14%
< 60	46	11%	44	11%	2	10%
Total valid	433	100%	412	100%	21	100%
Education						

Primary Education	11	3%	11	3%	0	0%
Secondary Education	43	10%	41	10%	2	10%
Bachelor Student	253	59%	242	59%	11	52%
Bachelor degree	75	17%	69	17%	6	29%
Graduate Especialization Studies	32	7%	32	8%	0	0%
Master	15	3%	13	3%	2	10%
Doctorate	3	1%	3	1%	0	0%
Total Valid	432	100,0%	411	100%	21	100%
Invalid Questionnaire No studies/No qualifications	1	0,2%				
Technical Qualifications (TQ)						
No	384	89%	366	89%	18	86%
Yes	49	11%	46	11%	3	14%
Total	433	100%	412	100%	21	100%

Source: Author´s elaboration

Table 44 presents the items with significant differences (*p<0.05) between user innovators and user non-innovators. The questions UL 26 - I love creating new things and SK 27 - If a product breaks, I try to repair it before buying a new one show significant differences between innovators and non-innovators.

Table 44 Items with significant differences between innovators and non-innovators

Items	Mann-Whitney U Test	Wilcoxon W Test	Z	Sig.
UL22	4011	4242	-,589	,556
UL26	**2829**	**3060**	**-2,777**	**,005**
UL28	4065	4296	-,485	,628
UL29	3279	3510	-1,951	,051
UL30	4023	89101	-,562	,574
CR7	3625	3856	-1,337	,181
CR8	3877	4108	-,846	,397
CR9	3807	4038	-,953	,340
CR19	3654	3885	-1,263	,207
SK12	3889	4120	-,800	,423
SK13	3871	88949	-,835	,404
SK27	**2843**	**3074**	**-2,739**	**,006**

Source: Computed based on data set

5.3.2. The percentage of user innovators

Ogawa & Pongtanalert (2011) provided a comparison about the percentage of user innovators at the consumer level in the United States (US), Japan and UK. The results show that a significant percentage of the population in those countries has engaged in user innovation activities by creating or modifying a wide range of products. Ogawa & Pongtanalert (2011) pointed out that 5.2% of the population in the US and 3.7% of the population in Japan can be considered user innovators. For instance, table 45 compares the results of equivalent studies applied in Basque Country (Gipuzkoa) (Mujika-Alberdi, et al., 2013), the UK (Flowers et al., 2010), Japan and the United States (Ogawa & Pongtanalert, 2011) and the exploratory study performed in Colombia (Sánchez, 2016).

Table 45 User Innovations by Consumers from Basque Country, the United Kingdom, Japan, United States and Colombia

	Basque Country (n=506) (%)	The United Kingdom (n=1.173) (%)	Japan (n=2000) (%)	The United States (n=1992) (%)	Colombia (n=433) (%)
Only Creation	3.4	2.1	1.7	2.9	2.8
Only modification	3.2	4.5	2.5	2.8	2.4
Creation and modification	0.6	0.5	0.5	0.5	0.5
Creation or modification	5.9	6.2	3.7	5.6	4.8

Sources: Flowers et al. (2010); Ogawa & Pongtanalert (2011); Mujika-Alberdi, et al. (2010) and Sánchez (2016).

Comparing those results and the research reported by Sánchez (2016), the percentage of user innovation is lower than the one found in other studies, as noted in table 45. Among the 21 individuals characterized as innovative users, it was identified that 12 of them performed creating activities, ie, 2.8% of respondents in the sample had made at least one new product over the last three years; 11 individuals, that is, 2.5% had been substantially modified or improved a product and 2 individuals, ie 0.5% of the sample had made two types of activities, either creation and modification of a product.

In the sample of the study applied in Colombia, user innovation activities such as the creation of a new product correspond to 2.8%, similar to the percentages found in the US and UK. Similarly, the percentage of user activities aimed at modifying products, 2.5% in the sample, revealed alike results obtained in studies of Japan and the United States. Similarly, the percentage of individuals who are dedicated to creation and modification activities is equal to countries like UK, Japan, and USA and highly closed to the Basque Country.

Consequently, in an emerging market such as Colombia, user innovators do not represent a high percentage of the population, as reported by Sanchez (2016), user innovators represent 4.8% of the sample. This results cannot be dismissed, the percentage of user innovators coincide with the findings in similar studies reported by Mujika-Alberdi, et al., (2015), Flowers et al., (2010), Ogawa & Pongtanalert (2011).

5.4. Hypothesis Test

5.4.1. Correlations among dimensions

Lead usership, creative and curious, and skills for product development dimensions

Mujika-Alberdi et al., (2015) mentioned consumers at the cutting edge are leaders in new markets; they are creative and curious, and they have skills for product development. Those assumptions are supported by previous studies. For instance, Kratzer, and Lettl, (2008) reported lead user behavior inevitably refers to a certain degree of creativity and Lilien et. al, (2002) demonstrated that lead users constitute of a tremendous source of novel ideas and solutions that later on can be prototype.

Correlation among the three dimensions was calculated in order to test H1, H2 and H3. The results of this research show a high correlation between User Leadership (UL) dimension and Creativity (CR) dimension, it corresponds to 0,615. Moreover, there is high correlation between User Leadership (UL) dimension and Skills (SK) for product development dimension, it corresponds to 0,540. Finally, a correlation between Creativity (CR) dimension and Skills (SK) for product development dimension is also proved and corresponds to 0,385.

Table 46 displays the spearman correlations for the final scale.

Table 46 Spearman Correlations for final scale

Spearman correlation among dimensions				
			CR	SK
Spearman Rho	SK	Correlation coeficient	,385**	
	UL	Correlation coeficient	,615**	,540**
**. Correlation is meaningful at level 0,01 (bilateral).				

Source: Computed based on data set

5.4.2. Demographics and User leadership, Creativity, and Skills for product development

In this research, stepwise multiple regression in SPSS was utilized to determine whether the following predictors: Age, Education and Gender are significantly contributing to User Leadership, Curiosity and creativity and Skills for new product development.

The equation for the model utilizing multiple regressions is:

$$\boxed{Y = a_0 + a_1 x}$$

5.4.2.1. User Leadership

Table 47 shows that gender, age and education are predictors that contribute to the multiple regression model. In the case of gender, men score one and women score 2. As lower values indicate the existence of an innovative profile, in this model if someone is looking for innovators, he or she should look for a man who represents 1 and scores lower than a woman who scores 2. In this sense, the age of young people will score less than older individuals, it validates this model, as young individuals represent more innovative profile than older individuals. Finally, respect to education, the association is that education is a negative predictor. It means, the greater the education level, the lower the score in UL, therefore the more intensity to innovate. Recalling that an innovative profile score low, it also validates the model.

UL = 10,987 + 1,477*gender + 0,42*age - 0,411*education

Table 47 Regression model for UL

Model	**R**	**R square**	**Adjusted R square**	**Std Error of the**	
3	,236c	,055	,049	4,07046	
			Coeficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	10,987	,885		12,417	,000
GENDER	1,477	,392	,177	3,766	,000
AGE	,042	,013	,180	3,187	,002
EDUCATION	-,411	,190	-,123	-2,163	,031

Source: Computed based in data set

5.4.2.2. Curiosity and creativity

Table 48 shows age and education are predictors that contribute to the multiple regression model for CR dimension. In the case of the age, young people will score less than older individuals; this also validate this model, as young individuals represent more innovative profile than older individuals. Moreover, education acts as a negative value; It means, the greater the education level, the lower the score in CR. Recalling that an innovative profile score low, it also validates the model.

$$CR = 8{,}505 + 0{,}43*age - 0{,}43*education$$

Table 48 Regression model for CR

Model Summary						
Model	R		R square	Adjusted R square	Std Error of the Estimate	
1	,158[a]		,025	,023	2,97374	
2	,215[b]		,046	,042	2,94458	
a. Predictors: (Constant), AGE						
b. Predictors: (Constant), AGE, EDUCATION						
Coeficients[a]						
Model		No standard Coeficients		Standard Coeficients	t	Sig.
		B	Standard Error	Beta		
1	(Constant)	7,442	,309		24,102	,000
	AGE	,026	,008	,158	3,307	,001
2	(Constant)	8,505	,460		18,478	,000
	AGE	,043	,010	,258	4,500	,000
	EDUCATION	-,430	,139	-,177	-3,088	,002
a. Dependent Variable: CR						

Source: Computed based on data set

5.4.2.3. Skills for new product development.

Table 49 shows age and gender are predictors that contribute to the multiple regression model for SK dimension. In this case, the age of young people will score less than older individuals, it validates this model, as young individuals represent more innovative profile than older individuals. Gender are composed by men who scores one and women who score 2. As lower values indicate the existence of an innovative profile, in this model, men score lower than women, therefore, the model is validated as well.

$$SK = 5{,}335 + 0{,}31 * age + 1{,}023 * gender$$

Table 49 Regression Model SK Factor

Model	**R**	**R square**	**Adjusted R square**	**Std Error of the Estimate**		
2	,238[b]	0,057	0,052	3,08917		
Coeficients[a]						
Model		No standard Coeficients		Standard Coeficients	t	Sig.
		B	Standard Error	Beta		
2	(Constant)	5,335	0,554		9,624	0
	AGE	0,031	0,008	0,177	3,777	0
	GENDER	1,023	0,297	0,161	3,441	0,001

Source: Computed based on data set

5.4.2.4. Analysis by Gender

Although in the sample, among the 21 user innovators identified, 52% corresponds to women who engaged in any kind of creation or innovation activity, if the entire data of the sample would be analyzed, significant differences by gender are found. One of the major findings in this research coincides with prior studies such as Flowers et al. (2010) and Mujika-Alberdi, et al. (2015) in which the tendency to innovate was more pronounced in men rather than women. Looking at the sum of the ranges, men scores are less than women in all dimensions tested: Curiosity and creativity, skills to develop new products and user leadership. Recalling that lower values indicate that the subject has an innovative profile and vice-versa, higher values represent a subject with little or no innovative profile. Table 50 shows the existence of significant differences for gender.

Table 50 Significant differences for gender

GENDER		**N**	**Average range**	**Range total**
CR	Men	211	203,61	42962,00
	Women	221	228,81	50566,00
	Total	432		
SK	Men	212	195,78	41505,50
	Women	221	237,36	52455,50
	Total	433		
UL	Men	212	194,77	41291,00
	Women	221	238,33	52670,00
	Total	433		
Test Statistics				
		CR	SK	UL
Mann-Whitney U Test		20596,000	18927,500	18713
Wilcoxon W Test		42962,000	41505,500	41291
Z		-2,107	-3,471	-3,63131153
Sig.		0,035	0,001	0,00028198
a. Variable: GENDER				

Source: Computed based on data set

5.4.2.5. Analysis by Age

From the sample, all user innovators, disregard their age, reported to have been engaged in any kind of creation or innovation activity. Additionally, after applying Kruskall Wallis Test to the entire sample, significant differences were found among the different ranges of age.

Something to highlight in this analysis, is that UL dimension was the only one to have a normal distribution. In this order of ideas, an ANOVA was applied to UL factor. However, the variances were not equal and this is a requirement to a further analysis using ANOVA test. Nevertheless, it would be worth to say that ANOVA was significant reporting 0.06 and subgroups of individuals less than 60 years old having an innovative profile than those older than 60 years old. Table 51 shows significant differences after applying Kruskall Wallis Test to each factor: UL, CR, and SK.

Table 51 Analysis by age

AGE		**N**	**Average Range**
CR	Younger than 31	278	206,69
	Ages 31 - 50	55	220,35
	Ages 51 - 60	53	216,98
	Older than 60	46	270,62
	Total	432	
SK	Younger than 31	279	208,58
	Ages 31 - 50	55	214,67
	Ages 51 - 60	53	202,24
	Older than 60	46	287,85
	Total	433	
UL	Younger than 31	279	211,25
	Ages 31 - 50	55	209,51
	Ages 51 - 60	53	211,02
	Older than 60	46	267,73
	Total	433	
Test Statistics			
	CR	SK	UL
Chi-square	10,517	16,910	8,517
gl	3	3	3
Sig.	,015	,001	,036

Source: Computed based in data set

Some research has been focused on user innovation at the consumer level (Flowers, et al, 2010; Ogawa & Pongtanalert, 2011; Mujika-Alberdi et al., 2013). Those studies have showed the characteristics of user innovators in UK, Japan and the United States. For example, Flowers et al. (2010) reported some of the characteristics of user innovators and identified that male consumers engage in user innovation activities about twice as often as women; people younger than 34 years of age tend to innovate more frequently than other age groups and people with the highest level of formal education tend to innovate about twice as often as those with the least formal education.

Later on, Ogawa & Pongtanalert, (2011) replicated the study made in UK and carried out the research in Japan and the United Stated. They found in the United Stated the tendency to innovate was more pronounced among people aged 55-64, executives and independent professionals; people with undergraduate or higher degrees and those having technical education. In Japan, the tendency to innovate was more pronounced among men aged 60-64, with higher education level such as PhD.

5.5. Analysis by Group of user innovators and user non-innovators

In order to determine any difference between the groups, first, a Kolmogorov test was applied to identify if the data distribution was normal. Table 46 shows the results of Kolmogorov test. Consequently, the data was non-normal, thus, the Wilcoxon Mann Whitney test was performed. After applying the Wilcoxon Mann Whitney test, Table 52 y Table 53 shows no significant differences between the groups of user innovators vs. non-innovators.

Table 52 Kolmogorov test

<table>
<tr><th colspan="2"></th><th>CR</th><th>SK</th><th>UL</th></tr>
<tr><td colspan="2">Innovators (n)</td><td>21</td><td>21</td><td>21</td></tr>
<tr><td colspan="2">Non-innovators (n)</td><td>411</td><td>412</td><td>412</td></tr>
<tr><td rowspan="3">Maximum extreme differences</td><td>Absolut</td><td>0,174</td><td>0,122</td><td>0,143</td></tr>
<tr><td>Positive</td><td>0,000</td><td>0,040</td><td>0,020</td></tr>
<tr><td>Negative</td><td>-0,174</td><td>-0,122</td><td>-0,143</td></tr>
<tr><td colspan="2">Kolmogorov-Smirnov Z Test</td><td>0,778</td><td>0,545</td><td>0,637</td></tr>
<tr><td colspan="2">Sig.</td><td>0,580</td><td>0,928</td><td>0,812</td></tr>
</table>

Source: Computed based on data set

Table 53 Mann-Whitney Test

	CR	SK	UL
Mann-Whitney U	3563,000	3764,000	3654,000
Wilcoxon W	3794,000	3995,000	3885,000
Z	-1,355	-1,009	-1,205
Sig.	0,175	0,313	0,228
a. Variable: GROUP			

Source: Computed based on data set

5.6. Analysis by Technical Qualifications (TQ)

From the sample, 49 individuals reported to have some technical qualifications. Three out of those individuals, reported having had engaged in any kind of creation or innovation activity. However, as it is shown in table 54, after analyzing the data from the entire sample, no significant differences were found.

Table 54 Analysis by TQ

TQ		**N**	**Average Range**	**Range Total**
CR	NO	383	216,91	83075,50
	YES	49	213,32	10452,50
	Total	432		
SK	NO	384	218,68	83972,00
	YES	49	203,86	9989,00
	Total	433		
UL	NO	384	218,08	83743,00
	YES	49	208,53	10218,00
	Total	433		
Test Statistics				
		CR	SK	UL
Mann-Whitney U Test		9227,500	8764,000	8993
Wilcoxon W Test		10452,500	9989,000	10218
Z		-0,191	-0,784	-0,50456205
Sig.		0,849	0,433	0,61386647
a. Variable: TQ				

Source: Computed based in data set

5.7. Analysis by Education

From the sample, all user innovators reported to have had educational level higher than secondary studies. Therefore, a relationship between education and innovative profile is observed. However, after analyzing the data from the entire sample and applying kruskall test, no significant differences were found. Results are displayed in Table 55.

Table 55 Analysis by education

EDUCATION		**N**	**Average Range**
CR	Primary Education	11	249,32
	Bachelor Student	254	213,27
	Secondary Education	43	231,67
	Bachelor degree	74	215,30
	Graduate Especialization Studies	32	239,05
	Master	14	167,29
	Doctorate	3	98,83
	Total	431	
SK	Primary Education	11	267,55
	Bachelor Student	254	206,36
	Secondary Education	43	230,44
	Bachelor degree	74	235,10
	Graduate Especialization Studies	32	211,02
	Master	15	227,90
	Doctorate	3	230,33
	Total	432	
UL	Primary Education	11	252,36
	Bachelor Student	254	214,20
	Secondary Education	43	234,19
	Bachelor degree	74	226,05
	Graduate Especialization Studies	32	196,27
	Master	15	194,13
	Doctorate	3	118,00
	Total	432	
Test Statistics			
	CR	SK	UL
Chi-square	7,558	5,967	5,511
gl	6	6	6
Sig.	,272	,427	,480
a. Kruskal Wallis Test b. Variable: EDUCATION			

Source: Computed based in data set

5.8. Concluding Remarks

International studies have measured user innovation activities at the consumer-level and have reported a percentage of user innovation activities corresponding to 5.9% for Basque Country; 6.2% for the UK; 3,7% for Japan; and 5,6% for The United States. The percentage of user innovators found in this study is somewhat similar to the one reported in previous research. In an emerging market such as Colombia, user innovators do not represent a high percentage of the population, user innovators represent 4.8% of the sample.

Besides the existence of individuals performing some type of consumer innovation activities in Colombia, this study provides information related to the characteristics of user innovators. The research confirmed significant differences by gender and age. For instance, in Colombia, the tendency to innovate was more pronounced in men rather than women.

Related to age, young adults (31-50 years old) and adults (51-60 years old) are significantly engaged in user innovation activities than adults older than 60 years old. Consequently, individuals younger than 60 years old, show a greater tendency to innovate than people older than 60 years old.

This study examines user innovators from three different dimensions; user leadership, curiosity and creativity and skills for development. Quantitative analysis exhibits high correlations among those three dimensions. Moreover, by analyzing the user leadership dimension shows that gender, age and education are predictors that contribute to the multiple regression model. In this case, young males with a greater education level display more intensity to innovate.

In regards to curiosity and creativity (CR) dimension, age and education are predictors that contribute to the multiple regression model for CR dimension. It means, young individuals with a greater education level, represent a more innovative profile than other individuals in the sample. Finally, the skill for development dimension, it shows age and gender are predictors that contribute to the multiple regression model for SK dimension. As a result, males and young individuals represent a more innovative profile than older individuals.

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6. Chapter VI – Conclusions, limitations and future lines of research

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CONTENT

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6.1. Introduction

The fifth chapter gives an end to this thesis. On the one hand, this final chapter is devoted to summarize the general and most important conclusions that meet the initial objectives of the study. On the other hand, it proposes future lines of research to enable further progress in the knowledge of user innovation and finally, it describes the limitations of this research.

The main objective of this research was to provide a better understanding of user innovation by determining the characteristics of user innovators in emerging markets, particularly Colombia. In order to do that, this research performed a rigorous validation process of a measurement instrument and found existence of user innovators and user innovation activities in Colombia. The user innovators found in the sample, reported to be young adults under sixty years old in which the tendency to innovate was more pronounced in men rather than women.

This research also provided a systematic and comprehensive review of user innovation literature, this chapter summarizes the main results and describe several lines of future research were found. It also provides different research questions in regards to streams such as are lead users, co-creation, user communities, and user entrepreneurship that need to be explored further.

Although some of the limitations encounter in this study are mentioned at the end of this chapter, arguably, the author can state user innovation and the role of user innovators constitute of an important mechanism of transformation and innovation that helps to promote the capacity for innovation, the progress and development of the regions.

6.2. Conclusions

This thesis provides a better understanding about user innovation in an emerging country such as Colombia. Based on previous studies and supported by initial findings in regards to user innovation, this study offers a reliable and valid scale to identify user innovators. Due to its cross-industrial approach, simplicity and practicality, this cross-market scale constitutes of a valuable measurement instrument that can be applied to regions with a varied level of development in order to identify user innovators.

This study provides a measurement scale that has surpassed a rigorous validity process. Both and exploratory factor analysis and a confirmatory factor analysis were performed. Internal consistency of the scale, unidimensionality, reliability, convergent and discriminant validity were confirmed.

A confirmatory factor analysis was carried out to achieve a valid model of good fit for the data obtained. The test of the first order implies that a total of twelve variables were fit and represented in three constructs: User leadership, curiosity and creativity, and time and skills to develop products. Consequently, the instrument is in accordance with previous studies and counts with theoretical support.

The results of this thesis are a worthy starting point to collect and document data on the existence of user innovators and user innovation activities in a country such as Colombia. International studies have measured user innovation activities at the consumer-level and have reported a percentage of user innovation activities of 5.9% for Basque Country; 6.2% for the UK; 3,7% for Japan; and 5,6% for the United States. In an emerging market such as Colombia, the percentage of user innovation activities found corresponds to 4.8% of the sample. These results cannot be dismissed; the percentage of user innovators is somewhat similar with prior studies reported in the literature.

In regards to the characteristics of user innovators, significant differences by gender are found. This finding coincides with prior theoritecal studies in which the tendency to innovate was more pronounced in men rather than women. Related to age, young adults (31-50 years old) and adults (51-60 years old) are significantly engaged in user innovation activities than adults older than 60 years old. Individuals younger than 60 years old, show a greater tendency to innovate than people older than 60 years old.

Respect to the literature on user innovation and their research streams and the user innovation community has increasingly growth and spread all around the world over the last ten years. Countries such as The United States, Germany, United Kingdom, Austria, Denmark, Netherlands, Sweden, Italy, Belgium, and Finland are the most representative ones that have contributed to the development of this research field.

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 findings about the existence of user innovation activities in Colombia provides a better understanding of the user innovation field and open the avenue of a new field of research in the area of innovation management, user innovation, new product development process, co-creation, lead users, social innovation networks involving users as sources of innovation, user innovators, user entrepreneurship, among others.

6.3. Impications for policy and practice

Policy Implications

Nowadays, research on user innovation is significantly important for policymaking. Gault (2012) has stated that policy implications of user innovation by both individual users and user firms are taking into account along with the importance of including consumer user innovation in official statistics. Therefore, it is highly important to know the existence of user innovation activities in a country and to have a thorough understanding of the dynamic of user activity so policymakers are able to formulate further debate on national innovation policy.

In Colombia, policymaking and innovation management are still based on producer centered models of innovation. Currently, there is an increasing need for statistical indicators that helps to measure user innovation. Even though the policy recognizes the role that users have in innovation processes, this research is relevant to Colombian context because it serves as the basis to a better understanding of user innovation activities in this country.

Knowing the existence of user innovators and consumer user innovation activities, having a systematic and rigorous research on user innovation, gathering statistics and documenting cases in regards to user innovation will provide the basis for a better understand of the field and will allow an informed policymaking. Consequently, this thesis provides the percentage of user innovation activities in Colombia and offers information related to the characteristics of user innovators in this country. As a result, this study contributes to gain a deeper understanding on user innovation activities, particularly an emergent market such as Colombia.

Managerial Implications

Incorporating users to modify commercial products and getting them involved into the company's innovation process represents a positive input in the development and field-test prototype designs. Nowadays it is valuable for manufacturers, as customers are a source of ideas for new and improved product lines. In this sense, this thesis represents a significant input for managers in the identification of innovative users.

This study intends to provide data about the characteristics of user innovators in Colombia. If might be valuable for firms to know the profile of user innovators, because firms will be in a better position to identify further users that may a have a better knowledge about their needs and therefore can assist them to create new products and services.

Co-creation offers is a new way to develop attractive solutions to customers in the market place. The aim of integrating innovative users into the co-creation and NPD process is the creation of new and promising products to appeal to customers. The measurement scale proposed in this study helps companies to identify user innovators who can be potentially involved in innovation processes.

Nowadays, integrating customers into NPD processes is crucial for companies to increase the likelihood of developing success products. User innovators and lead users constitutes of a group of consumers who can participate in co-creation and new product development activities. Nevertheless, the role of lead users and user innovators in the different stages of the co-creation and new product/service development process is still underdeveloped.

Additional avenues of future research relate to co-creation, integration of lead users and user innovators in different stages of new product/service development and co-creation activities are valuable for managerial practices. This research contributes to a better understanding and identification of user innovators in an emerging country such as Colombia and helps managers to identify customers´ segments who are more appropriate to integrate in new product and service development processes.

6.4. Future lines of research

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. In these sense, Hoyer, Chandy, Dorotic, Krafft, & Singh (2010) invited to answer research questions like should the firms 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 another avenue of future research 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?

There is also less clarity about how firms can identify consumers high on emergent nature in the development of new products (Hoffman, D. L., Kopalle, P. K., & Novak, T. P. 2010). 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, recalling the definition of Professional- entrepreneurs, who are those individuals embedded in an organization and employ a product in their professional life (Shah & Tripsas, 2007). A better understanding of professional- user entrepreneurs would be a welcome research to develop further this concept, as professional- user entrepreneurs may be an important source of entrepreneurial ventures in different industrial sectors.

Additionally, Shah & Tripsas (2007) suggest the need to better understand the process by which user firms might commercialize innovations originally developed by end-user entrepreneur for their own use. In the process of transform lead user innovations into a new corporate ventures, 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). Moreover, Shah & Tripsas (2007) point out a need to investigate the role of user entrepreneurs in the formation of non-profit ventures.

Autio, Esmt, & Frederiksen (2013), Kratzer & Lettl (2008) Olson and Bakka, (2001) von Hippel (1986) coincide on the need to apply longitudinal research design. (Autio, Esmt, & Frederiksen, 2013) confirm research on user entrepreneurship could be improved by adding aspects of individuals' network positions over time, the general evolution of a community network, and the exact timing of entrepreneurial actions. 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. Additionally, Chandra & Sunny Yang (2012) highlight entrepreneurship is a continuous process along the life of an innovator/entrepreneur; they welcome longitudinal studies to examine the dynamics of the disruptive opportunity development.

In the Online Users Communities future research, Von Hippel and Von Krogh (2003) propose the creation of an "intellectual genealogy" for open source software development projects. This genealogy would be a tool that allows the trace of major changes in the open source code. Empirical researchers will benefit from this tool as they will be able to differentiate critical from noncritical project attributes and behaviors, and to better understand the functioning of open source software development projects.

On the other hand, further studies on how firms structure technologies for innovation and govern their community of innovators are recommended by Jeppesen and Frederiksen (2006). Their article shows how innovative users prefer to be recognized by their firm instead of by their peers.

They also suggest addressing the difference between the Internet setting and the physically based communities, and identifying the effects on the firms that have their products innovated.

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. Defining the Community Construct, Interactions with and within communities, and Communities and Open Innovation are subjects still understudied and its exploration may provide important insights into the Online Users Communities research stream.

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, which is larger and diverse, examining the effects of collaborative design by users in regard to the final product, process satisfaction, heterogeneity, and WTP.

Future research is also required in the toolkits for consumer goods. The effect “I designed it myself” presented by Franke, Schreier, & Kaiser (2010) was studied in consumer goods like scarves, T-shirts, cell phone covers, skis, and watches, which are self-expressive and publicly consumed products. However, this effect has not been tested in utilitarian products like computers or to privately consumed products such as mattresses.

Moreover, Hung, Chou, and Dong (2011) propose, as an extension of their study, the confirmation of Web 2.0 (Second-generation of Internet business models) lead users as innovators in other types of Web businesses like portals, file exchanges, and auctions, which focus on different kinds of user interactions. Furthermore, innovative users should be motivated to participate in innovation, marketing communication, and product-development processes.

Finally, Goduscheit and Jørgensen (2013) recommend exploring the potential of user toolkits for innovation in actual applications, supported in the software or virtual worlds as the facilitators of the user toolkits for innovation approach. For these authors, having the non-specialist user capable of using more advanced toolkits might generate new insights for the manufacturers.

6.5. Limitations of the Research

As with all research, the results of this study need to be revised in shine of its limitations. It can be said that, due to strong economic constraints, it was not possible to select a representative sample of the population and the sampling is not probabilistic. Even though, questionnaires were distributed to a convenience sample, which was useful to extract an acceptable level of response.

Future research on user innovation may include large-scale surveys to allow a probabilistic sampling and generalization of national data. Additionally, it is suggested to perform a psychometric contrast on a representative sample to confirm the analysis. Obtaining answers from the study´s respondents, several years from now, would provide valuable insight into the changes of the characteristics of user innovators in Colombia. Future research may also confirm the study’s results in other settings and countries, potentially using a longitudinal approach.

7. Appendixes

7.1. Appendix 1

Cuestionario Número: ☐☐☐☐☐

1. **Esta encuesta es la primera parte de un trabajo de innovación que desarrollan los ciudadanos. Determinada la cantidad de innovación generada por la población, estamos interesados en contactar a los usuarios que muestran un perfil más innovador. Le agradecemos sinceramente que nos facilite los siguientes datos:**

1. Nombre: ____________________
2. Teléfono Fijo: ____________________ Telefono Celular: ____________________
3. Correo electrónico: ____________________
4. Dirección: ____________________

A. Es usted:
1. Hombre ☐ De _______ años cumplidos.
2. Mujer ☐ De _______ años cumplidos.

B. Por favor indique cuál de los siguientes trabajos describe mejor su empleo actual. Por favor seleccione una opción solamente
1. Directivo de una compañía .... ☐
2. Empleado .... ☐
3. Trabajador Independiente (consultor, abogado, contador) .... ☐

C. Indique su último nivel de estudios: Ya terminado ☐ En curso actualmente: ☐
1. Sin estudios .... ☐
2. Estudios primarios .... ☐
3. Estudios secundarios .... ☐
4. Estudios técnicos o tecnológicos ... ☐
5. Estudios universitarios .... ☐
6. Estudios de especialización .... ☐
7. Estudios de maestría .... ☐
8. Estudios de doctorado .... ☐
9. Semestre ____________________
10. Programa de Estudio o Carrera ______________

D. Tiene (o está estudiando) algún tipo de formación técnica?
1. NO ☐
2. SI ☐ Indíquela, por favor ____________________

2. **En los últimos tres años, ¿ha creado usted para su uso personal o el de su entorno más próximo (familia, amigos, vecinos) algún producto o servicio nuevo de cuya existencia en el mercado no tuviera conocimiento?**

1. NO ☐ Vaya a la pregunta 3, en la página siguiente.
2. SÍ ☐ ¿Cuántos productos nuevos ha creado en estos tres años? _______ productos.
Continúe con las preguntas **2A** a **2L** que figuran a continuación.

Ahora queremos saber algo más de ese producto nuevo que usted creó (o del más relevante de ellos, si es que usted creó varios).
Responda por favor a estas preguntas:

2A **¿Qué tipo de producto creó? (Por ejemplo: muebles, juguetes, aparatos electrónicos para el hogar, software)**

____

____

2B **Describa brevemente el nuevo producto que usted creó: (Por favor especifique los materiales y/o herramientas que utilizó con el mayor detalle posible)**

____

2C **¿En qué año creó usted este nuevo producto?** ______________

2D **¿Por qué creó usted el producto? Hasta que punto esta usted de acuerdo o en desacuerdo con las siguientes afirmaciones.**

	AFIRMACIONES	1.Totalmente de acuerdo	2. De acuerdo	3. Ni de acuerdo ni en desacuerdo	4. En desacuerdo	5. Totalmente en desacuerdo
2D.1	Porque lo necesitaba para mi uso personal					
2D.2	Porque disfruté haciéndolo					
2D.3	Porque quería aprender o desarrollar mis habilidades					
2D.4	Porque quería ayudar a alguien más por medio del producto creado					
2D.5	Porque era menos costoso que adquirir el producto en el mercado					

(2E) **Desde que tuvo la idea, ¿cuántos días ha dedicado al desarrollo de este nuevo producto hasta que usted o su entorno más próximo (familia, amigos, vecinos) pudo usarlo por primera vez?**

Aproximadamente _______________ días.

(2F) **¿Cuánto dinero en total ha destinado al desarrollo de este nuevo producto hasta que usted o su entorno más próximo pudo usarlo por primera vez?**
(No considere los gastos de comercialización si los hubo).

Aproximadamente ____________________ pesos.

(2G) **Responda por favor SÍ o NO a cada una de las siguientes afirmaciones:**

		SÍ (2)	NO (1)
2G.1	Para crear este nuevo producto yo ya disponía de las habilidades y conocimientos técnicos y no tuve que hacer nada especial, porque ya sabía cómo hacerlo.		
2G.2	Este nuevo producto lo hice prácticamente yo solo, aunque tuve que consultar a algún experto técnico.		
2G.3	Este nuevo producto lo hice prácticamente yo solo, aunque tuve que formarme por mi cuenta y buscar información al respecto.		
2G.4	Este nuevo producto lo hice prácticamente yo solo, aunque tuve que recurrir a algún otro tipo de asistencia o ayuda.		
2G.5	La creación de este nuevo producto fue en gran medida un trabajo en equipo de varias personas.		
2G.6	Mi entorno más próximo (familia, amigos, vecinos) me animó y apoyó para crear este nuevo producto.		

(2H) **Indíquenos por favor quién usa el nuevo producto creado por usted:**
(Puede marcar más de una opción)

1. Lo uso yo .... ☐
2. Lo usa mi familia .... ☐
3. Lo usan mis amigos, vecinos, etc .... ☐
4. El producto se comercializa y lo puede comprar cualquiera... ☐

(2I) **¿Ha compartido información sobre los detalles de este producto con otros consumidores o empresas?**

1. SÍ ☐ Continúe a la pregunta 2J
2. NO ☐ Siga a la pregunta 2K
3. No Sabe/No Responde ☐ Siga a la pregunta 2K

(2J) **Si la respuesta a la pregunta 2I fue SÍ. ¿Por qué compartió usted los detalles de su producto con otras personas o empresas? Hasta qué punto esta usted de acuerdo o en desacuerdo con las siguientes afirmaciones.**

	AFIRMACIONES	1.Totalmente de acuerdo	2. De acuerdo	3. Ni de acuerdo ni en desacuerdo	4. En desacuerdo	5. Totalmente en desacuerdo
2J.1	Porque quería que mi idea fuera aceptada o admirada por otras personas o empresas.					
2J.2	Porque quería que mi idea fuera desarrollada más a fondo por otras personas(quería el mejoramiento del producto).					
2J.3	Porque esperaba que mi idea fuera aceptada por otras personas o empresas y podría recibir beneficios económicos.					
2J.4	Porque me había beneficiado de las ideas de otras personas anteriormente.					
2J.5	No esperaba ningún beneficio o admiración (Lo compartí sin ninguna razón en particular).					

(2K) **Responda por favor SÍ o NO a cada una de las siguientes afirmaciones:**

		SÍ (2)	NO (1)
2L.1	Alguna persona u organización adquirió, adoptó o copió su creación		
2L.2	Recibió compensación por la adquisición, adopción o copia de su producto		
2L.3	Pertence a un club o comunidad con intereses particulares en el producto que usted creó		

(2L) **¿Ha pensado usted en patentar y registrar legalmente este nuevo producto?**

1. NO... ☐ Vaya a la pregunta 3, en la página siguiente.
2. Sí pero no lo he hecho, y me gustaría .... ☐ Vaya a la pregunta 3, en la página siguiente.
3. Sí y ya lo he hecho, mediante copyright o patente .... ☐ Vaya a la pregunta 3, en la página siguiente.
4. Sí y ya lo he hecho, haciéndolo dominio público .... ☐ Vaya a la pregunta 3, en la página siguiente.
5. Sí y ya lo he hecho, mediante licencia.................................. ☐ Vaya a la pregunta 3, en la página siguiente.

3. **En los últimos tres años, ¿ha cambiado usted sustancialmente para su uso personal o el de su entorno más próximo algún producto ya existente y lo ha mejorado de una manera tal que dicha mejora no existiera en el mercado o no tuviera conocimiento de la misma?**

Importante: para su uso personal o el de su entorno más próximo se refiere a que no es un uso relacionado con su actividad profesional o su trabajo.

1. NO ☐→ Vaya a la pregunta 4, en la página siguiente.
2. SÍ ☐→ ¿Cuántos productos ha modificado sustancialmente en estos tres años? _______ productos.
   Continúe con las preguntas **3A** a **3L** que figuran a continuación.

Ahora queremos saber algo más de esa modificación sustancial que usted hizo de un producto (o de la más relevante de ellas, si es que usted hizo varias). Responda por favor a estas preguntas:

3A **¿Qué tipo de producto modificó?** (En qué sección de una tienda se encontraría probablemente: muebles, juguetes, aparatos electrónicos para el hogar, software)

____

3B **Describa brevemente la modificación sustancial que usted realizó: (Porfavor especifique los materiales y/o herramientas que utilizó con el mayor detalle posible)**

____

____

3C **¿En qué año modificó usted este producto?** _______________

3D **¿Por qué modificó usted el producto?. Hasta que punto esta usted de acuerdo o en desacuerdo con las siguientes afirmaciones.**

	AFIRMACIONES	1.Totalmente de acuerdo	2. De acuerdo	3. Ni de acuerdo ni en desacuerdo	4. En desacuerdo	5. Totalmente en desacuerdo
3D.1	Porque lo necesitaba para mi uso personal					
3D.2	Porque disfruté haciéndolo					
3D.3	Porque quería aprender o desarrollar mis habilidades					
3D.4	Porque quería ayudar a alguien más por medio del producto creado					
3D.5	Porque era menos costoso que adquirir el producto en el mercado					
3D.6	Porque las empresas u otras personas no satisfacían mis necesidades					

3E **Desde que tuvo la idea, ¿cuánto tiempo ha dedicado a la modificación de este producto hasta que usted o su entorno más próximo pudo usarlo por primera vez?**

Aproximadamente _________________ días.

3F **¿Cuánto dinero en total ha destinado a la modificación de este producto hasta que usted o su entorno más próximo pudo usarlo por primera vez?** (No considere los gastos de comercialización si los hubo).

Aproximadamente _____________________ pesos.

3G **Responda por favor SÍ o NO a cada una de las siguientes afirmaciones:**

		SÍ (2)	NO (1)
3G.1	Para modificar este producto yo ya disponía de las habilidades y conocimientos técnicos y no tuve que hacer nada especial, porque ya sabía cómo hacerlo.		
3G.2	Esta modificación de producto la hice prácticamente yo solo, aunque tuve que consultar a algún experto técnico.		
3G.3	Esta modificación de producto la hice prácticamente yo solo, aunque tuve que formarme por mi cuenta y buscar información al respecto.		
3G.4	Esta modificación de producto la hice prácticamente yo solo, aunque tuve que recurrir a algún otro tipo de asistencia o ayuda.		
3G.5	La modificación de este producto fue en gran medida un trabajo en equipo de varias personas.		
3G.6	Mi entorno más próximo (familia, amigos, vecinos) me animó y apoyó para modificar este producto.		

(3H) Indíquenos por favor quién usa el producto modificado por usted:
(Puede marcar más de una opción)

1. Lo uso yo .... ☐
2. Lo usa mi familia .... ☐
3. Lo usan mis amigos, vecinos, etc .... ☐
4. El producto se comercializa y lo puede comprar cualquiera... ☐

(3I) ¿Ha compartido información sobre los detalles de la modificación con otros consumidores o empresas?

1. SÍ ☐ Continúe a la pregunta 3J
2. NO ☐ Siga a la pregunta 3K
3. No Sabe / No Responde ☐ Siga a la pregunta 3K

(3J) Si la respuesta a la pregunta 3I fue SÍ. ¿Por qué compartió usted los detalles de la modificación con otras personas o empresas? Hasta qué punto esta usted de acuerdo o en desacuerdo con las siguientes afirmaciones.

	AFIRMACIONES	1.Totalmente de acuerdo	2. De acuerdo	3. Ni de acuerdo ni en desacuerdo	4. En desacuerdo	5. Totalmente en desacuerdo
3J.1	Porque quería que mi idea fuera aceptada o admirada por otras personas o empresas.					
3J.2	Porque quería que mi idea fuera desarrollada más a fondo por otras personas(quería el mejoramiento del producto).					
3J.3	Porque esperaba que mi idea fuera aceptada por otras personas o empresas y podría recibir beneficios económicos.					
3J.4	Porque me había beneficiado de las ideas de otras personas anteriormente.					
3J.5	No esperaba ningún beneficio o admiración (Lo compartí sin ninguna razón en particular).					

(3K) Responda por favor SÍ o NO a cada una de las siguientes afirmaciones:

		SÍ (2)	NO (1)
3K.1	Alguna persona u organización adquirió, adoptó o copió su modificación		
3K.2	Recibió compensación por la adquisición, adopción o copia de su modificación		
3K.3	Pertence a un club o comunidad con intereses particulares en el producto que usted modificó		

(3L) ¿Ha pensado usted patentar y registrar legalmente este producto modificado por usted?

1. NO.. ☐ Vaya a la pregunta 4, en la página siguiente.
2. Sí, pero no lo he hecho, y me gustaría .... ☐ Vaya a la pregunta 4, en la página siguiente.
3. Sí y ya lo he hecho, mediante copyright o patente .... ☐ Vaya a la pregunta 4, en la página siguiente.
4. Sí y ya lo he hecho, heciéndolo dominio público .... ☐ Vaya a la pregunta 4, en la página siguiente.
5. Sí y ya lo he hecho, mediante licencia .... ☐ Vaya a la pregunta 4, en la página siguiente.

4. En los últimos tres años, ¿ha tenido usted la <u>idea</u> de crear un producto nuevo o modificar sustancialmente algún producto ya existente para su uso personal o el de su entorno más próximo, <u>pero esa idea no se ha materializado</u>?

Importante: para su uso personal o el de su entorno más próximo se refiere a que no es un uso relacionado con su actividad profesional o su trabajo.

1. NO ☐ → Vaya a la pregunta 5, en la página siguiente.
2. SÍ ☐ → ¿Cuántas ideas no materializadas ha tenido en estos tres años? _______ ideas.
   Continúe con las preguntas 4A a 4C que figuran a continuación.

Ahora queremos saber algo más de esa idea de crear un nuevo producto o de modificar sustancialmente alguno ya existente (o de la idea más relevante, si es que usted tuvo varias). Responda por favor a estas preguntas:

(4A) Describa brevemente la idea que usted tuvo y no pudo materializar:

____

____

(4B) Responda seleccionando una de estas dos afirmaciones:

La idea no la he materializado aún, pero tengo pensado seriamente hacerlo .... ☐
La idea no la he materializado aún ni pienso hacerlo... ☐

(4C) ¿Por qué no se ha materializado su idea? (Puede marcar más de una opción)

1. Por falta de tiempo .... ☐
2. Por falta de financiación .... ☐
3. Por falta de motivación... .... ☐
4. Por falta de conocimientos técnicos..... ☐
5. Por el qué dirán de mí .... ☐
6. Por otras razones (especifique) .... ☐

____

5.	Responda por favor cada una de las siguientes afirmaciones *(marque con una X cada fila)*					
	AFIRMACIONES	1. Totalmente de acuerdo	2. Parcialmente de acuerdo	3. Ni de acuerdo ni en desacuerdo	4. Parcialmente en desacuerdo	5. Totalmente en desacuerdo
5.1	Identifico necesidades o resuelvo problemas que otras personas aún no son capaces de identificar o captar.					
5.2	Soy una persona orientada/preocupada por mejorar las cosas (en el sentido de mejorar su eficiencia).					
5.3	No me sirven las cosas estándares; no me conformo con lo que hay.					
5.4	Me gusta ser diferente.					
5.5	Me gustan las cosas personalizadas, adaptadas a mis necesidades.					
5.6	Soy una persona habilidosa, ingeniosa.					
5.7	Soy una persona con mucha curiosidad por las cosas nuevas.					
5.8	Soy una persona con mucha imaginación.					
5.9	Me considero una persona creativa.					
5.10	Me interesa menos la apariencia de un producto que lo que pueda llegar a hacer.					
5.11	Me gustan los desafíos.					
5.12	Prefiero reparar un producto por mí mismo antes que encargárselo a alguien.					
5.13	Soy una persona con mucha curiosidad por el funcionamiento interno de los productos.					
5.14	Me gusta usar los productos de maneras que el fabricante no imaginó.					
5.15	Me gusta pensar en nuevos usos para las cosas existentes.					
5.16	Me esfuerzo por encontrar tiempo libre para mis aficiones.					
5.17	Tengo la habilidad de poder transformar nuevas ideas en proyectos concretos.					
5.18	Nunca desmonto un producto, porque sé que seré incapaz de montarlo.					
5.19	Disfruto imaginando cosas nuevas.					
5.20	Cuando veo un producto nuevo, puedo imaginar cómo me serviría para mi uso si lo modificara.					
5.21	Se me ocurren fácilmente nuevas aplicaciones para productos existentes.					
5.22	Los demás me consideran un innovador.					
5.23	Mientras un producto funcione bien, no me interesa como está elaborado.					
5.24	Me gusta experimentar.					
5.25	Además del uso habitual que la gente hace de un producto, yo también lo uso de otras maneras.					
5.26	Me gusta crear cosas nuevas.					
5.27	Si un producto se rompe, intento repararlo antes de comprar uno nuevo.					
5.28	Me resulta fácil pensar en cosas nuevas que podría crear.					
5.29	He sugerido a otros cómo podrían mejorar procesos o productos.					
5.30	Cuando otras personas de mi entorno tienen un problema, recurren a mí para ver si puedo crear algo.					
5.31	Me considero una persona inconformista.					

MUCHAS GRACIAS POR SU COLABORACIÓN

7.2. Appendix 2

Study	Source	Year	# Cites	Journal	* Research Scope 1. Exploratory, 2.descriptive, 3.correlational, 4. explicative	** Type of Contribution 1.Conceptual, 2.Analytical 3. Empirical 4. Conceptual & empirico 5. Analitico & empirico	Research streams	Gathering data	Analysis Method
S1	(G Angur & Nataraajan, 1998)	1998	3	Omega	4	2	Lead users	Questionnaire	Correlations and chi-square comparison
S2	(Foxall, 1978)	1978	40	Technovation	2	1	User innovation	Case study and Review of prior theoritecal studies	Qualitative analysis
S3	(Von Hippel, E. 1978)	1978	311	Research policy	2	1	User innovation	Review of prior theoritecal studies	Qualitative analysis
S4	(Bin, 2013)	2013	3	Industrial Marketing Management	3	2	User innovation	semi-structured interviewes on-line survey	Regression analysis
S5	(Kratzer & Lettl, 2008)	2008	44	Creativity and Innovation Management	3	2	Lead users	questionnaire and an experimental design.	Multiple regressions
S6	(Fuchs, Prandelli, Schreier, & Dahl, 2013)	2013	20	Journal of Marketing	3	3	Users	questionnaire survey	ANOVA
S7	(Tsinopoulos & Al Zu'bi, 2011)	2011	3	Production Planning and Control [1]	3	3	Lead users	questionnaire survey	Hierarchical regression model
S8	(Martínez-Torres, 2013)	2013	12	Expert Systems with Applications	2	2	Online user community	Bootstrap	Genetic algorithms

S9	(Hicks & Pachamanova, 2007)	2007	17	Business Horizons	2	2	Online user community	Review of prior theoritecal studies	Qualitative analysis
S10	(Lüthje, 2004)	2004	466	Technovation	3	4	Users	A written questionnaire mailed	LOGIT model
S11	(Tsinopoulos & Al-Zu'bi, 2012)	2012	7	International Journal of Operations and Production Management [1]	3	3	Product and Service Development and Co-creation	questionnaire survey europiean manufacturing companies randomly selected from different sectors within a range of industries including motor makers, health care products, electrical, chemical, and producers of specialist appliances	Hierarchical regression; regression; ANOVA
S12	(Martovoy & Dos Santos, 2012)	2012	8	International Journal of Entrepreneurship and Innovation Management	1	3	Product and Service Development and Co-creation	Semi-structured interviewes with open-ended questions	Qualitative analysis
S13	(Vernette & Hamdi-Kidar, 2013)	2013	16	International Journal of Market Research	3	5	Lead users	web-based questionnaire survey	Correlation and factor analysis Structural equation and **Bootstrap method**
S14	(Füller, Bartl, Ernst, & Mühlbacher, 2006)	2006	32	Internet Research	3	3	Online user community	Online Questionnaire	chi-square statistic, good model fit, CFA
S15	(Von Hippel, Jeroen P. J. de Jong &	2012	74	Management Science	3	3	Users	telephone interviewing Questionnaire	Probit Regression Model

	Flowers, 2012)								
S16	(Munksgaard & Freytag, 2011)	2011	16	Journal of Business and Industrial Marketing	1	3	Product and Service Development and Co-creation	Case Study	Qualitative analysis
S17	(Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010)	2010	370	Journal of service research	2	1	Product and Service Development and Co-creation	Review of prior theoritecal studies	Qualitative analysis
S18	(Füller, Mühlbacher, Matzler, & Jawecki, 2010)	2010	201	Journal of Management Information Systems	3	3	Product and Service Development and Co-creation	online questionnaire	GFI, AGFI, CFI, and NFI
S19	(Jeppesen & Molin, 2003)	2003	380	Technology Analysis and Strategic Management	1	3	Online user community	Interviewes, online archives (web logs, forum), homepages	Qualitative analysis
S20	(Füller, Matzler, Hutter, & Hautz, 2012)	2012	21	Creativity and Innovation Management	3	3	Users	Online questionnaire	binary logistic regressions, multinomial logistic regressions
S21	(Poetz & Prügl, 2010)	2010	44	Journal of Product Innovation Management	1	3	Lead users	coded interviews transcripts, previous lead user projects documentation	Qualitative analysis
S22	(Pedrosa, 2012)	2012	12	Creativity and Innovation Management	1	3	Product - Service Development	in-depth interviews	Qualitative analysis
S23	(Ernst, Hoyer, Krafft, & Krieger, 2011)	2011	102	Jounal of the academy of marketing science	3	3	Product - Service Development	Questionaire	bootstrapping, a variance inflation factor (VIF) analysis

S24	(Allen, 2012)	2012	1	Communications of the Association for Information Systems	2	3	Users	Name, description, tags, number of downloads, plugin homepage URL, and author homepage URL	chi-squared test
S25	(Song, 2005)	2005	99	Journal of Product Innovation Management	3	3	Product - Service Development	in-depth interviews and a questionnaire	Confirmatory factor analysis
S26	(Morrison, Roberts & Von Hippel, 2000)	2000	551	Management Science	3	4	Lead users	questionnaire and semi-structured interview	Logit Model and Factor Analysis
S27	(Livari, 2010)	2010	12	Information and organization	2	4	Online user community	case study, forum discussions	Fairclough's critical discourse analysis
S28	(Smith , Shah, 2013)	2013	10	Strategic Entrepreneurship Journal	3	3	User innovation	A dataset created by combining data from a number of sources, including CVC data, patent data, and premarket approval (PMA) data.	Regressions model
S29	(Gruner & Homburg, 2000)	2000	596	Journal of Business Research	2	3	Product - Service Development	Questionnaire	exploratory and confirmatory factor analysis
S30	(Franke, Keinz, & Klausberger , 2013)	2013	28	Organization Science	3	3	Online user community	Questionnaire	chi-square value (CMIN), (GFI), (AGFI), (IFI), (CFI), and (RMSEA).
S31	(Lauritzen, Salomo & La Cour)	2013	3	International Journal Of Technology Management	2	1	Online user community	Review of prior theoritecal studies	Qualitative analysis

S32	(Von Hippel, 1998)	1998	885	Management Science	1	3	Product - Service Development	semi-structured interviews	Qualitative analysis
S33	(Nakamura & Ohashi, 2012)	2012	1	Economics of Innovation and New Technology	2	2	Lead users	Case Study	Simulation analysis
S34	(Lau, Tang, & Yam, 2010)	2010	158	Journal of Product Innovation Management	3	3	Product - Service Development	questionnaire	Structural equation modeling with correlation and t-tests
S35	(Galbraith et al., 2013)	2013	4	Technology Analysis and Strategic Management	1	1	Online user community	post-eTM surveys and post-eTM interviews and case studies	Qualitative analysis
S36	(Lettl, Hienerth, & Gemuenden , 2008)		66	IEEE Transactions on engineering management	1	3	Lead users	multiple case study , In-depth interviews	Qualitative analysis
S37	(Hienerth & Lettl, 2011)	2011	53	Journal of Product Innovation Management	1	3	Online user community	multiple case study ,interviews with community members	Qualitative analysis
S38	(Magnusson , 2009)	2009	142	Journal of Product Innovation Management	3	3	Users	literature review and conceptual analysis	ANOVA test
S39	(Wadell, C., Ölundh Sandström, G., Björk, J., & Magnusson, M. 2013)		7	International Journal Of Technology Management	1	3	Users	questionnaire and semi-structured interviews	Social Network Analysis
S40	(Hienerth, Keinz, & Lettl, 2011)	2011	57	Long Range Planning	1	3	Users	multiple case study, interviews, participant observation, secondary data and netnography	Single content analysis using NVIVO

S41	(Ståhlbröst & Bergvall-Kåreborn, 2011)	2011	28	International Journal Of Entrepreneurship And Innovation Management	1	3	Online user community	online survey	Qualitative analysis
S42	(Marchi, Giachetti, & De Gennaro, 2011)	2011	40	Technovation	4	4	Online user community	netnographic technique	ordinary least squares (OLS) regression analysis
S43	(Schreier & Prügl, 2008)	2008	191	Journal of Product Innovation Management	3	4	Lead users	questionaire	t-tests ,
S44	(Song, Bij, & Weggeman, 2006)	2006	50	R and D Management	3	4	Product - Service Development	questionnaires, indepth interviews and Review of prior theoritecal studies	content analysis Ordinary least squares technique and regression
S45	(Herstatt, 1992)	1992	735	Journal of Product Innovation Management	2	1	Lead users	Case Study and interviews	Qualitative analysis
S46	(Comino, Manenti, & Parisi, 2007)	2007	79	Research Policy	2	3	Online user community	A dataset created by combining data from each project	Regression
S47	(Hopkins, Tidd, Nightingale, & Miller, 2011)	2011	22	R and D Management	2	3	Lead users	survey, case, and studies semi-structured interviews	Qualitative analysis
S48	(West & Lakhani, 2008)	2008	247	Industry And Innovation	2	1	Online user community	Review of prior theoritecal studies	Qualitative analysis
S49	(von Hippel, 2007)	2007	328	Industrial and corporate change	1	1	Online user community	Review of prior theoretical studies	Qualitative analysis
S50	(Franke & Shah, 2003)	2003	1094	Research Policy	1	3	Users	qualitative interviews, questionnaires	Regression analysis,

									Correlation analys
S51	(Chatterji & Fabrizio, 2012)	2012	37	Organization Science	2	2	Users	A dataset created by combining data from two existing databases	Regression model and Qualitative analysis
S52	(Lakhani & Von Hippel, 2003)	2003	1710	Research Policy	1	3	Online user community	questionnaire and case study	Qualitative analysis
S53	(Baldwin, Hienerth, & von Hippel, 2006)	2006	414	Research policy	1	2	Users	Review of prior theoretical studies and case study	Nash equilibrium model
S54	(Schuhmacher & Kuester, 2012)	2012	23	Creativity and Innovation Management	4	2	Lead users	idea contest for new online services	PLS structural equation modelling, bootstrapping
S55	(Spann, Ernst, Skiera, & Soll, 2003)	2009	95	Journal of product innovation management	2	3	Product - Service Development	Questionnaire	exploratory and confirmatory factor analysis
S56	(Yakhlef, 2005)	2005	34	European Journal of Innovation Management	1	1	Online user community	Review of prior theoretical studies	Qualitative analysis
S57	(Olson, E., Bakke, G., 2001)	2001	243	Journal of Product Innovation Management	1	3	Lead users	Case Study and interviews	Qualitative analysis
S58	(Autio, Esmt, & Frederiksen, 2013)	2013	28	Academy of management journal	3	1	User entrepreneur ship	Interviews, survey, and a web log (message archive) of all interactions in the Propellerhead user community	bivariate probit regressions
S59	(Slaughter, 1993)	1993	166	Research policy	2	3	Users	structured interviews	Qualitative analysis

S60	(Füller, Jawecki, & Mühlbacher , 2006)	2007	348	Journal of Business Research	2	3	Online user community	netnography and interviews with experts in the product field.	Qualitative analysis
S61	(Hung, Chou, & Dong, 2011)	2011	24	International Journal Of Information Management	1	3	Toolkits	Questionnaire	Factor analysis and t-test
S62	(Stewart & Hyysalo, 2008)	2008	93	International Journal Of Innovation Management	2	1	Users	Review of prior theoretical studies	Qualitative analysis
S63	(Franke & Piller, 2003)	2003	233	International Journal of Technology Management	1	1	Toolkits	semi-structured interviews and Review of prior theoretical studies	Qualitative analysis
S64	(Urban & von Hippel, 1988)	1988	1086	Management Science	1	4	Lead users	case study and questionaire	Qualitative analysis, cluster analysis and regression
S65	(Droge, Stanko, & Pollitte, 2010)	2010	70	Journal of product innovation management	1	3	Lead users	web log (message postings)	ANOVA analysis and content analysis
S66	(Schreier, Oberhauser, & Prügl, 2007)	2007	141	Marketing Letters	3	3	Lead users	questionnaire	t-tests and CFA
S67	(von Hippel, 1986)	1986	3980	Management Science	1	1	Lead users	Review of prior theoretical studies	Qualitative analysis
S68	(Prügl & Schreier, 2006)	2006	176	R and D Management	2	3	Toolkits	online survey	Qualitative analysis
S69	(Lettl, Herstatt, & Gemuenden , 2006)	2005	96	International Journal of Technology Management	1	3	Users	multiple case study, interviews	Qualitative analysis

S70	(Kaiser & Müller-Seitz, 2008)	2008	24	Industry And Innovation	1	3	Lead users	multiple case study, interviews	Qualitative analysis
S71	(Chandra & Sunny Yang, 2012)	2011	6	Journal of General Management	1	1	User entrepreneur ship	Review of prior theoretical studies	Qualitative analysis
S72	(Bogers & West, 2012)	2012	75	Creativity and Innovation Management	2	1	Users	Review of prior theoretical studies	Theoritical concepts
S73	(Foxall, 1988)	1988	50	Managerial and Decision Economics	2	3	User innovation	Review of prior theoretical studies	Qualitative analysis
S74	(Casadesus-Masanell et al., 2010)	2011	43	Management Science	3	2	Online user community	Review of prior theoretical studies	Qualitative analysis
S75	(Baldwin & von Hippel, 2011)	2011	256	Organization Science	2	1	User innovation	Review of prior theoretical studies	Mathematical model, and demand function to tes the model´s viability
S76	(Hu & McLoughlin, 2011)	2011	0	Technovation	3	2	Users	Review of prior theoretical studies	Historical, longitudinal regression analysis
S77	(Desouza, Awazu, & Ramaprasad , 2007)	2007	31	Technovation	1	1	Users	Review of prior theoretical studies and in depth interviews	Qualitative analysis
S78	(Belz & Baumbach, 2010)	2010	56	Creativity and Innovation Management	3	3	Lead users	Netnography	Qualitative analysis
S79	(Faulkner, P., & Runde, J., 2009)	2009	98	Academy of Management Review	2	1	User innovation	Review of prior theoretical studies	Qualitative analysis
S80	(JANZIK & RAASCH, 2011)	2011	18	International Journal of	3	3	Online user community	Netnographic approach	Qualitative analysis

				Innovation Management					
S81	(Lichtenthaler, 2011)	2011	350	Academy of Management Perspectives	2	1	User innovation	Review of prior theoretical studies	Qualitative analysis
S82	(Hippel & Krogh, 2003)	2003	1767	Organization Science	1	1	Online user community	Review of prior theoretical studies	Qualitative analysis
S83	(Nordlund, H., Lempiälä, T., & Holopainen, M. 2011)	2011	12	International Journal Of Entrepreneurship And Innovation Management	2	1	Online user community	Review of prior theoretical studies	Qualitative analysis
S84	(Nambisan, Agarwal, & Tanniru, 1999)	1999	362	MIS Quarterly	3	3	Users	Questionnaire survey and field study	multivariate analysis
S85	(Buu & Mattews, 2008)	2008	159	International Journal Of Innovation Management	2	1	User innovation	Review of prior theoretical studies	Qualitative analysis
S86	(Lilien, Morrison, Searls, Sonnack, & Von Hippel, n.d.)	2002	792	Management Science	1	3	Product - Service Development	Case study - Questionnaire survey	cross-sectional analysis and intertemporal analysis Qualitative analysis
S87	(Carbonell, P., Rodriguez-Escudero, A. I., & Pujari, D. 2012)	2012	20	Journal of services marketing	3	3	Product - Service Development	Questionary survey	Covariance-based path analysis Partial Least Squares (PLS)
S88	(Harhoff, Henkel, & Von Hippel, 2003)	2003	726	Research Policy	1	2	Users	Review of prior theoretical studies	Qualitative analysis and Game-theoretic model

S89	(von Hippel, Franke, & Prügl, 2009)	2009	72	Research policy	1	3	Lead users	Multiple case study Questionnaire	Montecarlo simulation
S90	(Franke & Von Hippel, 2003)	2003	717	Research policy	3	3	Toolkits	Online questionnaire	hierarchical cluster analysis
S91	(Kuusisto, Kuusisto, & Yli-Viitala, 2013)	2013	7	Service Industries Journal	2	1	Product and Service Development and Co-creation	Review of prior theoretical studies	Qualitative analysis
S92	(von Hippel & Katz, 2002)	2002	1021	Management Science	1	1	Toolkits	Review of prior theoretical studies	Qualitative analysis
S93	(Rohrbeck, Steinhoff, & Perder, 2010)	2010	37	Technology Analysis and Strategic Management	2	3	Product and Service Development and Co-creation	Review of prior literature and secondary data	Qualitative analysis
S94	(Di Gangi & Wasko, 2009)	2009	174	Decision Support Systems	1	3	Online user community	Case study	ANOVA Test
S95	(Nijssen, Hillebrand, De Jong, & Kemp, n.d.)	2012	10	Journal of product innovation management	3	3	Product and Service Development and Co-creation	Telephone interview and online questionnaire	Correlation analysis
S96	(Al-Zu'bi, Z. B. M., & Tsinopoulos , C. 2012)	2012	15	Journal of product innovation management	3	2	Lead users	Questionary survey	Hierarchical regression analysis
S97	(Wang, Y., & Li, D. 2013)	2013	3	Decision Support Systems	3	3	Toolkits	online questionnaire	ANOVA, WTP
S98	(N. Franke, Schreier, & Kaiser, 2010)	2010	223	Management Science	1	1	Toolkits	questionnaire and in-depth interview	ANOVA, WTP

S99	(Hoffman, D. L., Kopalle, P. K., & Novak, T. P. 2010)	2010	64	Journal of Marketing Research	1	1	Lead users	online questionnaire	CFI, Correlations and Standardized Regression
S100	(Shah & Tripsas, 2007)	2007	273	Strategic Entrepreneurship Journal	2	4	User entrepreneur ship	Case study and in-depth interviews	Qualitative analysis
S101	(Rolland, S., & Parmentier, G. 2013)	2013	2	International Journal of Market Research	1	3	Online user community	Case study and in-depth interviews	Qualitative analysis
S102	(Hienerth, 2006)	2006	214	R and D Management	1	3	Online user community	multiple case study, personal interviews	Qualitative analysis
S103	(Dahlander & Frederiksen, 2012)	2012	85	Organization Science	1	3	Online user community	case study, interviews, online questionnaire	Qualitative analysis
S104	(Harrison & Waluszewsk i, 2008)	2008	62	Research policy	1	3	Lead users	case study, face-to-face and telephone interviews, secondary data	Qualitative analysis
S105	(Raasch, Herstatt, & Lock, 2008)	2008	72	International Journal of Innovation Management	1	3	Online user community	Case study, interviews, questionnaire, review of prior literature	Qualitative analysis
S106	(Braun & Herstatt, 2008)	2008	34	International Journal of Innovation Management	1	3	User innovation	Case study and review of prior literature	Qualitative analysis
S107	(Funk, 2007)	2007	34	Technological Forecasting and Social Change	1	3	Lead users	Secondary data and interviews	Qualitative analysis
S108	(Langerak & Hultink, 2005)	2005	107	IEEE Transactions on Engineering Management	3	3	Product and Service Development and Co-creation	questionnaire	multiple regression analysis

S109	(Foxall, G. R. 1988)	1988	3	Advances in Consumer Research	2	4	User innovation	case study and Review of prior literature	Qualitative analysis
S110	(Al-Kwifi & McNaughto n, 2013)	2013	2	Journal of Business and Industrial Marketing	1	3	Lead users	case study, online questionnaire,personal interviews and review of prior empirical studies	Qualitative analysis
S111	(Schreier, M., Fuchs, C., & Dahl, D. W. 2012)	2012	37	Research policy	4	3	Users	questionnaire	Bootstrap analyses ANOVA ANOVA, willingness to pay (WTP) ANOVA
S112	(Luhje & Herstatt, 2004)	2004	371	Research policy	1	1	Lead users	Review of prior empirical studies	Qualitative analysis
S113	(Morrison, Roberts, & Midgley, 2004)	2004	299	Research policy	3	3	Lead users	questionnaire	Confirmatory factor analysis (CFA), regression and correlations analysis
S114	(Fredberg, T., & Piller, F. T. 2011)	2011	18	R and D Management	1	3	Users	case study, including expert interviews, observations, and document analysis	Qualitative analysis
S115	(von Krogh & von Hippel, 2006)	2006	427	Management Science	1	1	Online user community	Review of prior empirical studies	Qualitative analysis

S116	(Jeppesen & Laursen, 2009)	2009	72	Research policy	3	3	Lead users	online questionnaire, and a web logs, Interviews	Harman's one-factor test on the items included in our regression model
S117	(Kim, Bae, & Kang, 2008)	2008	45	International Journal Of Innovation Management	1	3	Online user community	multiple case study	Qualitative analysis
S118	(Ozer, 2009)	2009	37	Research policy	3	3	Lead users	questionnaire	CFA, Correlation test
S119	(Peine & Herrmann, 2012)	2012	20	Technological Forecasting And Social Change	2	1	User innovation	Review of prior literature	Qualitative analysis
S120	(Raasch, 2011)	2011	3	International Journal Of Technology Management	1	1	Users	Review of prior empirical studies	Qualitative analysis
S121	(Foxall, 1988)	1988	10	Journal of Marketing Management	2	4	User innovation	case study and Review of prior literature	Qualitative analysis
S122	(Faullant, Schwarz, Krajger, & Breitenecker, 2012)	2012	15	Creativity and Innovation Management	4	4	Lead users	case study a and questionnaire	Ordinary least squares (OLS) regression models and ordinal regression model
S123	(de Jong & von Hippel, 2009)	2009	77	Research policy	1	3	Users	questionnaire	Multivariate analysis, Binary logistic regression models
S124	(Fuchs, 2011)	2011	2	International Journal Of Entrepreneurship	1	3	Lead users	Case study, ethnography	Qualitative analysis

				And Innovation Management					
S125	(Warnke, Weber, & Leitner, 2008)	2008	12	International Journal of Innovation Management	1	1	User innovation	Review of prior literature	Qualitative analysis
S126	(Haefliger, Jäger, & Von Krogh, 2010)	2010	61	Research policy	1	3	User entrepreneur ship	case study, Review of prior literature, workshop, in-depth and semi-structured interviews,	Qualitative analysis, text analysis.
S127	(Füller, Schroll, & Von Hippel, 2013)	2013	11	Research policy	1	3	Online user community	case study, in-depth and semi-structured interviews, online survey	Qualitative analysis, Confirmatory factor analysis
S128	(Chandra & Leenders, 2012)	2012	29	Technovation	1	4	User entrepreneur ship	case study	Qualitative analysis
S129	(Hyysalo, n.d.)	2009	31	R and D Management	1	1	User innovation	Review of prior literature	Qualitative analysis
S130	(Gault, 2012)	2012	23	Science and public policy	2	1	User innovation	Review of prior literature	Qualitative analysis
S131	(Hyysalo, Juntunen, & Freeman, 2013)	2013	20	Energy Policy	1	3	Users	case study, in-depth interviews, semi-structured interviews internet forums	Qualitative analysis
S132	(Goduscheit , R. C., & Jørgensen, J. H. 2013)	2013	3	International journal of technology management	2	1	Toolkits	Review of prior literature	Qualitative analysis
S133	(Bilgram, V., Brem, A., & Voigt, K. I. 2008).	2008	162	International Journal of Innovation Management	2	1	Lead users	Review of prior literature	Qualitative analysis
S134	(De Moor, K., Berte, K., De Marez, L., Joseph,	2010	35	Science and public policy	1	3	User innovation	case study, survey, focus group	Qualitative analysis and factor analysis

	W., Deryckere, T., & Martens, L. 2010)								
S135	(Nishikawa, H., Schreier, M., & Ogawa, S. 2013)	2013	20	International Journal Of Research In Marketing	1	3	Product and Service Development and Co-creation	case study, in-depth interviews	OLS regressions, t-tests and Mann–Whitney U-tests
S136	(Lüthje, C., Herstatt, C., & Von Hippel, E. 2005)	2005	371	Research policy	1	3	Users	online questionnaire and internet forums	Qualitative analysis and logit model
S137	(Jespersen, K. R. 2010)	2010	29	International Journal of Innovation Management	4	3	Users	online questionnaire	hierarchical regression models
S138	(Bogers, M., Afuah, A., & Bastian, B. 2010)	2010	347	Journal of management	1	1	Users	Review of prior literature	Qualitative analysis
S139	(Trott, P., Duin, P. V. D., & Hartmann, D. 2013)	2013	1	Prometheus	1	1	Lead users	Review of prior literature	Qualitative analysis
S140	(Oliveira, P., & von Hippel, E. 2011)	2011	202	Research Policy	1	3	Users	Review of prior empirical studies, interviews	Qualitative analysis
S141	(Lettl, C., Herstatt, C., & Gemuenden, H. G. 2006)	2006	339	R and D Management	1	3	Users	multiple case study, interviews	content analysis, qualitative analysis

S142	(Franke, N., & Piller, F. 2004)	2004	521	Journal of Product Innovation Management	1	2	Toolkits	interviews, case study	Entropy coefficients, Monte-Carlo simulations and willingness to pay (WTP) analysis
S143	(Duverger, 2012)	2012	4	Creativity and Innovation Management	3	5	Users	Consensual Assessment Technique (CAT).	structured means modelling (SMM), Poisson distribution, confirmatory factor analysis (CFA), GFI, RMSEA, bootstrapping
S144	(Mahr & Lievens, 2012)	2012	87	Research Policy	3	3	Online user community	Case study, netnography and Consensual Agreement Technique	Pearson bivariate correlation test, ANCOVA, MANCOVA
S145	(Füller, 2006)	2006	157	Advances in Consumer Research	1	3	Product - Service Development	online questionnaire	confirmatory factor analysis, GFI, RMSEA, and Regression analysis
S146	(Jeppesen & Frederiksen, 2006)	2006	662	Organization Science	2	3	Online user community	Case study, Interviews, a Web-log, and questionnaires, netnography	Qualitative analysis, probit regression model, and multivariate regression analysis

8. Bibliography

Abad, F. J., Olea, J., Ponsoda, V., & García, C. (2011). *Medición en ciencias sociales y de la salud*. Madrid: Síntesis.

Allen, J. P. (2012). Democratizing Business Software: Small Business Ecosystems for Open Source Applications, 30(June), 483–496.

Al-Kwifi, S. O., & McNaughton, R. B. (2013). The influence of product features on brand switching: the case of magnetic resonance imaging equipment. Journal of Business & Industrial Marketing. http://doi.org/10.1108/08858621311330263

Al-Zu'bi, Z. B. M., & Tsinopoulos, C. (2012). Suppliers versus lead users: Examining their relative impact on product variety. *Journal of product innovation management*, *29*(4), 667-680.

Angur, M., & Nataraajan, R. (1998). A causal exploration of \`innovatorship' and \`lead-usership': a research note. Omega, 26(3), 437–442. http://doi.org/10.1016/S0305-0483(97)00059-5

Autio, E., Esmt, L. D., & Frederiksen, L. (2013). Information exposure, opportunity evaluation, and entrepreneurial action: An investigation of an online user community. Academy of Management Journal. http://doi.org/10.5465/amj.2010.0328

Baldwin, C., Hienerth, C., & von Hippel, E. (2006). How user innovations become commercial products: A theoretical investigation and case study. Research Policy, 35, 1291-1313.

Baldwin, C., & von Hippel, E. (2011). Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation. Organization Science. http://doi.org/10.1287/orsc.1100.0618

Barge-Gil, A. (2010): Open, Semi-Open and Closed Innovators. Towards an Explanation of Degree of Openness. Industry and Innovation, 17/6: p. 577–607.

Barret P (2007). Structural equation modeling: Adjudging model fit. University of Auckland, Management and Employee Relation Department, Commerce Building C.

Bartl, M., Jawecki, G., & Wiegandt, P. (2010). Co-creation in new product development: conceptual framework and application in the automotive industry. In Conference Proceedings R&D Management Conference–Information, Imagination and Intelligence, Manchester (Vol. 9).

Belz, F.-M., & Baumbach, W. (2010). Netnography as a Method of Lead User Identification. Creativity and Innovation Management, 19(3), 304–313. http://doi.org/10.1111/j.1467-8691.2010.00571.x

Bentler, P.M. and Bonnet, D.C. (1980), "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," Psychological Bulletin, 88 (3), 588-606.

Bentler, P.M., 1986. Structural modeling and psychometrika: a historical perspective on growth and achievements. Pshychometrika 51(1),35–51

Bilgram, V., Brem, A., & Voigt, K.-I. (2008). User-Centric Innovations in New Product Development — Systematic Identification of Lead Users Harnessing Interactive and Collaborative Online-Tools. International Journal of Innovation Management, 12(03), 419–458. http://doi.org/10.1142/S1363919608002096

Bin, G. (2013). A reasoned action perspective of user innovation: Model and empirical test. *Industrial Marketing Management*, *42*(4), 608–619. http://doi.org/10.1016/j.indmarman.2012.10.001

Bogers, M., Afuah, A., Bastian, B. (2010). User as Innovators: A Review, Crtitique, and Future Research Directions. Journal of Management, 36, 857-875.

Bogers, M., & West, J. (2012). Managing distributed innovation: Strategic utilization of open and user innovation. Creativity and Innovation Management, 21(1), 61–75. http://doi.org/10.1111/j.1467-8691.2011.00622.

Bolaños, E. R. L., Burneo, K., Galindo, H., & Berggrun, L. (2015). Emerging Markets Integration in Latin America (MILA) Stock market indicators: Chile, Colombia, and Peru. Journal of Economics, Finance and Administrative Science, 20(39), 74-83.

Braun, V., & Herstatt, C. (2008). The Freedom-Fighters: How Incumbent Corporations Are Attempting to Control User-Innovation. International Journal of Innovation Management. http://doi.org/10.1142/S1363919608002059

Buur, J., & Matthews, B. (2008). Participatory innovation: a research agenda, 189–192. Retrieved from http://delivery.acm.org/10.1145/1800000/1795269/p186-buur.pdf?key1=1795269&key2=3642773821&coll=GUIDE&dl=GUIDE&CFID=100781579&CFTOKEN=57220633

Carbonell, P. (2012). Performance effects of involving lead users and close customers in new service development. Journal of Services Marketing. http://doi.org/10.1108/08876041211266440

Carvajal, A., Centeno, C., Watson, R., Martínez, M., & Sanz Rubiales, A. (2011, April). ¿Cómo validar un instrumento de medida de la salud? In Anales del sistema sanitario de Navarra (Vol. 34, No. 1, pp. 63-72). Gobierno. Departamento de Salud

Casadesus-Masanell, R., & Llanes, G. (2011). Mixed Source. Management Science, 57(7), 1212–1230. http://doi.org/10.1287/mnsc.1110.1353

Cooper, D.R., & Emory, W.C. (1995). Business research methods. Homewood, IL. Richard D. Irwin.

Chandra, Y., & Leenders, M. a a M. (2012). User innovation and entrepreneurship in the virtual world: A study of Second Life residents. *Technovation*, *32*(7-8), 464–476. http://doi.org/10.1016/j.technovation.2012.02.002

Chandra, Y., & Yang, S. S. (2012). Managing disruptive innovation for corporate longevity. Journal of General Management, 37(2), 23–51.

Chatterji, A. K., & Fabrizio, K. (2012). How Do Product Users Influence Corporate Invention? Organization Science. http://doi.org/10.1287/orsc.1110.0675

Chesbrough, H. W. (2006). The era of open innovation. Managing innovation and change, 127(3), 34-41.

Churchill, G.A. (1995). Marketing research: Methodological foundations (6th ed.). FortWorth, TX: Dryden Press.

Churchill Jr., G.A. (1979). A paradigm for developing better measures of marketing constructs. Journalo f Marketing Research 16,64–73.

Comino, S., Manenti, F. M., & Parisi, M. L. (2007). From planning to mature: On the success of open source projects. Research Policy. http://doi.org/10.1016/j.respol.2007.08.003

Dahlander, L. and Wallin, M.W. (2006). A man on the inside: unlocking communities as complementary assets, Research Policy 35

Dahlander, L., & Frederiksen, L. (2012). The Core and Cosmopolitans: A Relational View of Innovation in User Communities. Organization Science. http://doi.org/10.1287/orsc.1110.0673

DANE (2005). Boletín Censo General. Recuperado el 28 de marzo de 2014, de http://www.dane.gov.co/index.php/poblacion-y-demografia/censos

Departamento Nacional de Planeación (2010). Plan Nacional de Desarrollo 2010-2014. Prosperidad para Todos. Bogotá: DNP.

DANE (2013). Encuesta de Desarrollo e Innovación Tecnológica en la Industria Manufacturera 2011- 2012. Boletín de Prensa. Available at: http://www.dane.gov.co

DANE (2015). Encuesta de Desarrollo e Innovación Tecnológica en la Industria Manufacturera 2013- 2014. Boletín de Prensa. Available at: http://www.dane.gov.co

De Jong, J.P.J. and E. von Hippel (2008). User Innovation in SMEs: Incidence and Transfer to Producers. Working paper EIM: Zoetermeer, The Netherlands.

De Jong, J.P.J. and von Hippel, E. (2009). Measuring user innovation in Dutch high tech SMEs: Frequency, nature and transfer to producers. MIT Sloan, Working Paper

De Jong, J. (2014). The empirical scope of user innovation. Revolutionizing Innovation: Users, Communities and open innovation MIT Press, Cambridge.

Departamento Nacional de Planeación (2009, 27 de Abril). Política nacional de ciencia, tecnología e innovación. (Documento 3582). Bogotá D.C., Colombia: DNP.

De Moor, K., Berte, K., De Marez, L., Joseph, W., Deryckere, T., & Martens, L. (2010). User-driven innovation? Challenges of user involvement in future technology analysis. Science and Public Policy, 37(1), 51–61. http://doi.org/10.3152/030234210X484775

De Navarra Carmines E, Zeller RA (1979). Reliability and validity assessment. Beverly-Hills, CA Saga Publications

Desouza, K. C., Awazu, Y., & Ramaprasad, A. (2007). Modifications and innovations to technology artifacts. Technovation, 27(4), 204–220. http://doi.org/10.1016/j.technovation.2006.09.002

Di Gangi, P. M., & Wasko, M. (2009). Steal my idea! Organizational adoption of user innovations from a user innovation community: A case study of Dell IdeaStorm. Decision Support Systems, 48(1), 303–312. http://doi.org/10.1016/j.dss.2009.04.004

Droge, C., Stanko, M. a., & Pollitte, W. a. (2010). Lead users and early adopters on the web: The role of new technology product blogs. Journal of Product Innovation Management, 27(1), 66–82. http://doi.org/10.1111/j.1540-5885.2009.00700.x

Duverger, P. (2012). Variety is the spice of innovation: Mediating factors in the service idea generation processcaim. Creativity and Innovation Management. http://doi.org/10.1111/j.1467-8691.2011.00621.

Ernst, H., Hoyer, W. D., Krafft, M., & Krieger, K. (2011). Customer relationship management and company performance-the mediating role of new product performance. Journal of the Academy of Marketing Science, 39(2), 290–306. http://doi.org/10.1007/s11747-010-0194-5

Faludi, J. (2014). Fifty shades of innovation–from open toward user, and open collaborative forms of innovation–an overview. Budapest Management Review, 45(11), 33-43.

Faullant, R., Schwarz, E. J., Krajger, I., & Breitenecker, R. J. (2012). Towards a comprehensive understanding of lead userness: the search for individual creativity. Creativity and Innovation Management, 21(1), 76-92.

Flowers, S., Henwood, F., 2010. Perspectives on User Innovation.Imperial College Press, London.

Flowers, S., Sinozic, T., & Patel, P. (2009). Prevalence of User Innovation in the EU Analysis based on the Innobarometer Surveys of 2007 and 2009. Pro Inno Europe-Innometrics.

Flowers, S. (2010). User Innovation: The developing policy research agenda. In Flowers, S., & Henwood, F. (2010). Perspectives on User Innovation. London: Imperial College Press.

Flowers, S., De Jong, J.P.J., von Hippel, E & Sinozic, T. (2010). Measuring user innovation in the UK. NESTA.

Foxall, G. (1986). A conceptual extension of the customer-active paradigm. Technovation, 4(1), 17-27.

Foxall, G. R. (1988a). Marketing new technology: Markets, hierarchies, and user-initiated innovation. Managerial and Decision Economics, 9(3), 237-250.

Foxall, G. R. (1988b). The theory and practice of user-initiated innovation. Journal of Marketing Management. http://doi.org/10.1080/0267257X.1988.9964071

Foxall, G. R. (1995). Cognitive styles of consumer initiators. Technovation,15(5), 269-288.

Franke, N. & Shah, S. (2003) How communities support innovative activities: an exploration of assistance and sharing among end-users. Research Policy, 32 (1), 157–178.

Franke, N., & Von Hippel, E. (2003). Satisfying heterogeneous user needs via innovation toolkits: The case of Apache security software. Research Policy, 32(7), 1199–1215. http://doi.org/10.1016/S0048-7333(03)00049-0

Franke, N., & Piller, F. (2004). Value creation by toolkits for user innovation and design: The case of the watch market. Journal of Product Innovation Management, 21(6), 401–415. http://doi.org/10.1111/j.0737-6782.2004.00094.x

Franke, N., von Hippel, E., & Schreier, M. (2006). Finding commercially attractive user innovations: A test of lead user theory. Journal of Product Innovation Management, 23, 301–315.

Franke, N., Schreier, M., & Kaiser, U. (2010). The "I Designed It Myself" Effect in Mass Customization. Management Science, 56(1), 125–140. http://doi.org/10.1287/mnsc.1090.1077

Franke, N., Keinz, P., & Klausberger, K. (2013). Does This Sound Like a Fair Deal?: Antecedents and Consequences of Fairness Expectations in the Individual's Decision to Participate in Firm Innovation. Organization Science, 24(5), 1495–1516. http://doi.org/10.1287/orsc.1120.0794

Fredberg, T., & Piller, F. T. (2011). The paradox of tie strength in customer relationships for innovation: A longitudinal case study in the sports industry. R and D Management, 41(5), 470–484. http://doi.org/10.1111/j.1467-9310.2011.00659.x

Fuchs, C., Prandelli, E., Schreier, M., & Dahl, D. W. (2013). All That Is Users Might Not Be Gold: How Labeling Products as User Designed Backfires in the Context of Luxury Fashion Brands. Journal of Marketing. Sep2013, 77(5), 75–91. http://doi.org/10.1509/jm.11.0330

Füller, J. (2006). Why consumers engage in virtual new product developments initiated by producers. Advances in Consumer Research, 33, 639–646.

Füller, J., Bartl, M., Ernst, H., & Mühlbacher, H. (2006). Community based innovation: How to integrate members of virtual communities into new product development. Electronic Commerce Research, 6(1), 57–73. http://doi.org/10.1007/s10660-006-5988-7

Füller, J., Jawecki, G., & Mühlbacher, H. (2006). Innovation creation by online basketball communities. Journal of Business Research, 60(1), 60–71. http://doi.org/10.1016/j.jbusres.2006.09.019

Füller, J. (2010). Refining virtual co-creation from a consumer perspective. California management review, 52(2), 98-122.

Füller, J., Mühlbacher, H., Matzler, K., & Jawecki, G. (2010). Consumer Empowerment Through Internet-Based Co-creation. Journal of Management Information Systems, 26(3), 71–102.

Füller, J., Hutter, K., & Faullant, R. (2011). Why co-creation experience matters? Creative experience and its impact on the quantity and quality of creative contributions. R&D Management, 41(3), 259-273.

Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012). Consumers' Creative Talent: Which Characteristics Qualify Consumers for Open Innovation Projects? An Exploration of Asymmetrical Effects. Creativity and Innovation Management, 21(3), 247–262. http://doi.org/10.1111/j.1467-8691.2012.00650.

Füller, J., Schroll, R., & Von Hippel, E. (2013). User generated brands and their contribution to the diffusion of user innovations. Research Policy, 42(6-7), 1197–1209. http://doi.org/10.1016/j.respol.2013.03.006

Funk, J. L. (2007). The future of mobile shopping: The interaction between lead users and technological trajectories in the Japanese market. Technological Forecasting and Social Change. http://doi.org/10.1016/j.techfore.2005.11.007

Furrer, O., Thomas, H. and Goussevskaia, A. (2008). The structure and evolution of the strategic management field: A content analysis of 26 years of strategic management research. International Journal of Management Reviews, 10, pp. 1-23.

Galbraith, B., Cleland, B., Martin, S., Wallace, J., Mulvenna, M., & McAdam, R. (2013). Engaging user communities with eParticipation technology: findings from a European project. Technology Analysis & Strategic Management, 25(3), 281–294. http://doi.org/10.1080/09537325.2013.764986

Gassmann, O., Enkel, E., Chesbrough, H. (2010). The Future of Open Innovation. R&D Management, 40(3), 213–220.

Gault, F., & Huttner, S. (2008). A cat's cradle for policy. Nature, 455(7212), 462-463.

Gault, F. & von Hippel, E. (2009). The prevalence of user innovation and free innovation transfers: implications for statistical indicators and innovation policy (No. 4722-09). Cambridge, MA: MIT. MIT Sloan School of Management. Retrieved from http://ssrn.com/abstract = 1337232

Gault, Fred (2011), User Innovation and the Market, UNU-MERIT Working Paper 2011-009, Maastricht: UNU-MERIT, pp. 18.
Gault, F. (2012). User innovation and the market. Science and Public Policy, 39, 118-128

Garver, M.S., Mentzer, J. T., 1999. Logistics research methods: employing structural equation modeling to test for construct validity. Journal of Business Logistics 201, 33–57.

Gerbing, D.W., Anderson, J.C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. Journal of Marketing Research 252,186–192.

Goduscheit, R. C., & Jrgensen, J. H. (2013). User toolkits for innovation- a Iiterature review.

Gruner, K. E., & Homburg, C. (2000). Does Customer Interaction Enhance New Product Success? Journal of Business Research, 49(1), 1–14. http://doi.org/10.1016/S0148-2963(99)00013-2

Haefliger, S., Jäger, P., & Von Krogh, G. (2010). Under the radar: Industry entry by user entrepreneurs. Research Policy, 39(9), 1198–1213. http://doi.org/10.1016/j.respol.2010.07.001

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). Multivariate data analysis (Vol. 6). Upper Saddle River, NJ: Pearson Prentice Hall.

Hair JF, William CB, Barry JB, Rolph EA (2010). Multivariate data analysis 7th Edition.

Harhoff, D., Henkel, J., & Von Hippel, E. (2003). Profiting from voluntary information spillovers: How users benefit by freely revealing their innovations. Research Policy. http://doi.org/10.1016/S0048-7333(03)00061-1

Harrison, D., & Waluszewski, A. (2008). The development of a user network as a way to re-launch an unwanted product. Research Policy, 37(1), 115–130. http://doi.org/10.1016/j.respol.2007.10.001

Henkel, J., & von Hippel, E. (2005). Welfare Implications of User Innovation. Journal of Technology Transfer, 30 ½, 73-87.

Herstatt, C. & von Hippel, E. (1992). From Experience: Developing New Product Concepts via the Lead User Method: A Case Study in a ‘‘Low Tech’’ Field. Journal of Product Innovation Management, 9(3), 213–21.

Hicks, C., & Pachamanova, D. (2007). Back-propagation of user innovations: The open source compatibility edge. Business Horizons. http://doi.org/10.1016/j.bushor.2007.01.006

Hienerth, C. (2006). The commercialization of user innovations: The development of the rodeo kayak industry. R and D Management. http://doi.org/10.1111/j.1467-9310.2006.00430.x

Hienerth, C., Keinz, P., & Lettl, C. (2011). Exploring the nature and implementation process of user-centric business models. Long Range Planning, 44(5-6), 344–374. http://doi.org/10.1016/j.lrp.2011.09.009

Hienerth, C., & Lettl, C. (2011). Exploring how peer communities enable lead user innovations to become standard equipment in the industry: Community pull effects. Journal of Product Innovation Management, 28(SUPPL. 1), 175–195. http://doi.org/10.1111/j.1540-5885.2011.00869.x

Hopkins, M. M., Tidd, J., Nightingale, P., & Miller, R. (2011). Generative and degenerative interactions: Positive and negative dynamics of open, user-centric innovation in technology and engineering consultancies. R and D Management, 41(1), 44–60. http://doi.org/10.1111/j.1467-9310.2010.00631.

Hoyer, W. D., Chandy, R., Dorotic, M., Krafft, M., & Singh, S. S. (2010). Consumer Cocreation in New Product Development. Journal of Service Research, 13(3), 283–296. http://doi.org/10.1177/1094670510375604

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. Articles, 2.

Hu, Y., & McLoughlin, D. (2011). Modifications and innovations to research solutions in the lab: A study on the post-adoptive usage behaviors of life scientists. Technovation. http://doi.org/10.1016/j.technovation.2011.05.001

Hung, C. L., Chou, J. C. L., & Dong, T. P. (2011). Innovations and communication through innovative users: An exploratory mechanism of social networking website. International Journal of Information Management. http://doi.org/10.1016/j.ijinfomgt.2010.12.003

Hyysalo, S. (2009). User Innovation and Everyday Practices: Micro-Innovation In Sports Industry Development. R&D Management, 39, 247-258.

Hyysalo, S., Juntunen, J. K., & Freeman, S. (2013). User innovation in sustainable home energy technologies. Energy Policy, 55, 490–500. http://doi.org/10.1016/j.enpol.2012.12.038

International test commission. International Test Commission Guidelines for Translating and Adapting Tests. (2010). Retrieved from http://www.intestcom.org/upload/sitefiles/40.pdf

International test commission. (2010). International Test Commission Guidelines for Translating and Adapting Tests. Retrieved from http://www.intestcom.org/upload/sitefiles/40.pdf

Im, Subin, Bayus, Barry L., and Mason, Charlotte H. "An Empirical Study of Innate Consumer Innovativeness, Personal Characteristics, and New-Product Adoption Behavior." Journal of the Academy of Marketing Science 31, no. 1 (2003): 61–73.

Janzik, L., & Raasch, C. (2011). Online Communities In Mature Markets: Why Join, Why Innovate, Why Share? International Journal of Innovation Management. http://doi.org/10.1142/S1363919611003568

Jeppesen, L. B., & Frederiksen, L. (2006). Why do users contribute to firm-hosted user communities? The case of computer-controlled music instruments. Organization Science, 17, 45-63

Jeppesen, L. B., & Laursen, K. (2009). The role of lead users in knowledge sharing. Research Policy, 38(10), 1582–1589. http://doi.org/10.1016/j.respol.2009.09.002

Jeppesen, L. B., & Molin, M. J. (2003). Consumers as Co-developers: Learning and Innovation Outside the Firm. Technology Analysis & Strategic Management. http://doi.org/10.1080/0953732031000160153l

Jespersen, K. R. (2010). User-Involvement and Open Innovation: the Case of Decision-Maker Openness. International Journal of Innovation Management, 14(03), 471–489. http://doi.org/10.1142/S136391961000274X

Jöreskog, K.G & Sörbom, D. (1993). LISREL8: Structural Equation Modeling with the SIMPLIS. Command language. Chicago, IL: Scientific Software.

Kaiser, S., & Müller-Seitz, G. (2008). Leveraging Lead User Knowledge in Software Development—The Case of Weblog Technology. Industry & Innovation, 15(2), 199–221. http://doi.org/10.1080/13662710801954542

Kim, J. H., Bae, Z.-T., & Kang, S. H. (2008). The role of online brand community in new product development: case studies on digital product manufacturers in korea. International Journal of Innovation Management. http://doi.org/10.1142/S1363919608002011

Koufteros, X.A., 1999. Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling. Journal of Operations Management 17,467–488.

Kristensson, P., Gustafsson, A., & Archer, T. (2004). Harnessing the creative potential among users. Journal of product innovation management, 21(1), 4-14.

Kristensson, P., Matthing, J., & Johansson, N. (2008). Key strategies for the successful involvement of customers in the co-creation of new technology-based services. International journal of service industry management, 19(4), 474-491.

Kratzer, J., & Lettl, C. (2008). A Social Network Perspective of Lead Users and Creativity: An Empirical Study among Children. Creativity and Innovation Management, 17(1), 26–36. http://doi.org/10.1111/j.1467-8691.2008.00466.x

Kuusisto, J., Kuusisto, A., & Yli-Viitala, P. (2013). Service development tools in action. The Service Industries Journal, 33(3-4), 352–365. http://doi.org/10.1080/02642069.2013.747520

Lakhani, K. R., & Von Hippel, E. (2003). How open source software works: “free” user-to-user assistance. Research Policy. http://doi.org/10.1016/S0048-7333(02)00095-1

Langerak, F., & Hultink, E. J. (2005). The Impact of New Product Development Acceleration Approaches on Speed and Profitability: Lessons for Pioneers and Fast Followers. IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, 52(1). http://doi.org/10.1109/TEM.2004.839941

Lau, A. K. W., Tang, E., & Yam, R. C. M. (2010). Effects of Supplier and Customer Integration on Product Innovation and Performance: Empirical Evidence in Hong Kong Manufacturers. Journal of Product Innovation Management, 27(5), 761–777. http://doi.org/10.1111/j.1540-5885.2010.00749.

Lettl, C., Herstatt, C., Gemuenden, H. (2006). Learning from users for radical innovation. International Journal Technology Management, 33(1), 25-45.

Lilien, G.L., Morrison, P.D., Searls, K., Sonnack, M., and von Hippel, E. (2002). Performance Assessment of the Lead User Idea-Generation Process for New Product Development. Management Science 48(8):1042–59.

Lilien, G.L., Morrison, P. D., Searls, K., Sonnack, M., & Hippel, E. Von. (2002). Process for New Product Development Performance Assessment of the Lead User Idea-Generation Process for New Product Development, (July 2014).

Lichtenthaler, U. (2011). Open innovation: Past research, current debates, and future directions. The Academy of Management Perspectives, 25(1), 75-93.

Lüthje, Christian. (2004). Characteristics of Innovating Users in a Consumer Goods Field. An Empirical Study of Sport-related Product Consumers. Technovation, 24(9), 683-95.

Lüthje, Christian, Herstatt, Cornelius, and von Hippel, Eric. (2005). User-innovators and "Local" Information: The Case of Mountain Biking. Research Policy, 34(6), 951-965.

Magnusson, P. R. (2009). Exploring the contributions of involving ordinary users in ideation of technology-based services. Journal of Product Innovation Management. http://doi.org/10.1111/j.1540-5885.2009.00684.x

Maneesriwongul, W., & Dixon, J. K. (2004). Instrument translation process: a methods review. Journal of advanced nursing, 48(2), 175-186.

Manolova, T., Carter, N., Manev, I. & Gyochev, B. (2007). The differential effect of men and woman entrepreneurs’ human capital and networking on growth expectancies in Bulgaria. Entrepreneurship: Theory and practice, 31(3), 407-426.

Mahr, D., & Lievens, A. (2012). Virtual lead user communities: Drivers of knowledge creation for innovation. Research Policy. http://doi.org/10.1016/j.respol.2011.08.006

Marchi, G., Giachetti, C., & De Gennaro, P. (2011). Extending lead-user theory to online brand communities: The case of the community Ducati. Technovation.

Marsh, H.W., Hocevar, D., 1988. A new, more powerful approach to multi trait multi-method analyses: application of second-order confirmatory factor analysis. Journal of Applied Psychology 73,107–117.

Martínez, C. M., & Sepúlveda, M. A. R. (2012). Introducción al análisis factorial exploratorio. Revista Colombiana de Psiquiatría, 41(1), 197-207.

Martínez-Torres, M. R. (2013). Application of evolutionary computation techniques for the identification of innovators in open innovation communities. Expert Systems with Applications. http://doi.org/10.1016/j.eswa.2012.10.070

Matthing, J., Sandén, B., Edvardsson, B. (2004). New Service Development: Learning from and with customers. International Journal of Service Industry Management, 15 (5), 479 – 498.

Ministry of Employment and the Economy. (2010). Demand and User-Driven Innovation Policy. Publication of Ministry of Employment and the Economy. Recuperado el 12 de marzo de 2014, de http://www.tem.fi/files/27547/Framework_and_Action_Plan.pdf

Moscoso, S. C., Gil, J. A. P., & Rodríguez, R. M. (2000). Validez de constructo: el uso del análisis factorial exploratorio-confirmatorio para obtener evidencias de validez. Psicothema, 12(2), 442-446.

Mujika-Alberdi., García, I., Gibaja, J. (2013). User Innovation in Gipzkoa a descriptive approach. Cuadernos de Administración, 26(4), 61-81.

Mujika-Alberdi, A., Gibaja-Martíns, J. J., & García-Arrizabalaga, I. (2015). Who is at the cutting-edge of market trends? Development of a scale for identifying “Lead-users”. Cuadernos de Economía, 38(107), 107-122.

Munksgaard, K. B., & Freytag, P. V. (2011). Complementor involvement in product development. Journal of Business & Industrial Marketing, 26(4), 286–298. http://doi.org/10.1108/08858621111127027

Muñiz, J., Elosua, P. Hambleton, R. (2013) Directrices para la traducción y adaptación de los tests: segunda edición. Psicothema, 25(2), 151-157

Nakamura, T., & Ohashi, H. (2012). Effects of re-invention on industry growth and productivity: evidence from steel refining technology in Japan, 1957–1968. Economics of Innovation and New Technology, 21(4), 411–426. http://doi.org/10.1080/10438599.2011.602538

Nambisan, S., Agarwal, R., & Tanniru, M. (1999). Organizational Mechanisms for Enhancing User Innovation in Information Technology. MIS Quarterly, 23(3), 365–395. http://doi.org/10.2307/249468

National Research Council. (2002). Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct. Washington, DC: The National Academies Press. Retrieved from http://www.nap.edu/openbook.php?record_id=10430&page=1

Nishikawa, H., Schreier, M., & Ogawa, S. (2013). User-generated versus designer-generated products: A performance assessment at Muji. International Journal of Research in Marketing. http://doi.org/10.1016/j.ijresmar.2012.09.002

Nunnally JC (1967). Psychometric Theory. New York: McGraw-Hill.

Nunnally JL (1978). Psychometric theory NY: McGraw-Hill

Nunnally JC, Bernstein IH (1994). Psychometric Theory (3rd ed.). New York: McGraw-Hill.

Oliveira, P., & Von Hippel, E. (2011). Users as service innovators: The case of banking services. Research Policy, 40(6), 806–818. http://doi.org/10.1016/j.respol.2011.03.009

Olson, EL and G Bakke (2001). Implementing the lead user method in a high technology firm: a longitudinal study of intentions versus actions. Journal of Product Innovation Management, 18(6), 388–395.

Ogawa, S., & Pongtanalert, K. (2011, June, 30). Visualizing Invisible Innovation Continent. Evidence from Global Consumer Innovation Surveys. SSRN Retrieved from http://ssrn.com/abstract=1876186

Ogawa, S., & Pongtanalert, K. (2013). Exploring Characteristics and Motives of Consumer Innovators. *Research Technology Management*, *56* (June), 41–49.

Ozer, M. (2009). The roles of product lead-users and product experts in new product evaluation. *Research Policy*.

Pallant J (2011). A step by step guide to data analysis using SPSS program survival manual 4th edition. Allen & Unwin 83 Alexander Street Crow‟s Nest NSW 2065 Australia.

Pedrosa, M. (2012). Customer Integration during Innovation Development: An Service Industry. Creativity and Innovation Managment, 21(3), 263–277.

Peine, A., & Herrmann, A. M. (2012). The sources of use knowledge: Towards integrating the dynamics of technology use and design in the articulation of societal challenges. Technological Forecasting and Social Change, 79(8), 1495–1512. http://doi.org/10.1016/j.techfore.2012.04.014

Piller, F. T., Ihl, C., & Vossen, A. (2010). A typology of customer co-creation in the innovation process. Available at SSRN 1732127.

Piller, F., Ihl, C., & Vossen, A. (2011). Customer co-creation: Open innovation with customers. Wittke, V./Hanekop, H, 31-63.

Poetz, M. K., & Prügl, R. (2010). Crossing domain-specific boundaries in search of innovation exploring the potential of pyramiding. Journal of Product Innovation Management, 27(6), 897–914. http://doi.org/10.1111/j.1540-5885.2010.00759.x

Pongtanalert, K., & Ogawa, S. (2015). Classifying user-innovators–An approach to utilize user-innovator asset. Journal of Engineering and Technology Management, 37, 32-39.

Prahalad, C.K., Ramaswamy. V. (2000) Co-opting customer competence, Harvard Business. Review 78 (1) 79–87.

Prügl, R., & Schreier, M. (2006). Learning from leading-edge customers at the Sims: Opening up the innovation process using toolkits. R and D Management, 36(3), 237–250. http://doi.org/10.1111/j.1467-9310.2006.00433.x

Raasch, C., Herstatt, C., & Lock, P. (2008). The dynamics of user innovation: Drivers and impediments of innovation activities. International Journal of Innovation Management, 12, 377-398.

Rindfleisch, A., Malter, A., Ganesan, S & Moorman, C. (2008). Cross-Sectional Versus Longitudinal SurveyResearch: Concepts, Findings, and Guidelines. Journal of Marketing Research, XLV, 261–279

Rogers, E. M. 1995. Diffusion of innovations. 4th ed. New York: Free Press

Rohrbeck, R., Steinhoff, F., & Perder, F. (2010). Sourcing innovation from your customer: how multinational enterprises use Web platforms for virtual customer integration. Technology Analysis & Strategic Management. http://doi.org/10.1080/09537320903498462

Sanchez, S.J. (2016). Innovación del usuario e identificación de usuarios innovadores – Un estudio exploratorio en Colombia. Cooperativismo y Desarrollo, 24(108). Sanchez, S.J. (2015). Innovación del usuario e identificación de usuarios innovadores – Un estudio exploratorio en Colombia. Cooperativismo y Desarrollo, 24(108).

Schreier, M., Fuchs, C., & Dahl, D. W. (2012). The Innovation Effect of User Design: Exploring Consumers' Innovation Perceptions of Firms Selling Products Designed by Users. Journal of Marketing, 76(5), 18–32. http://doi.org/10.1509/jm.10.0462

Schreier, M., Oberhauser, S., & Prügl, R. (2007). Lead users and the adoption and diffusion of new products: Insights from two extreme sports communities. Marketing Letters, 18(1-2), 15–30. http://doi.org/10.1007/s11002-006-9009-3

Schreier, M., & Prügl, R. (2008). Extending lead-user theory: Antecedents and consequences of consumers' lead userness. Journal of Product Innovation Management. http://doi.org/10.1111/j.1540-5885.2008.00305.x

Schuhmacher, M. C., & Kuester, S. (2012). Identification of Lead User Characteristics Driving the Quality of Service Innovation Ideas. Creativity and Innovation Management. http://doi.org/10.1111/caim.12002

Schweisfurth, T. (2013). Embdded Lead Users inside the Firm. Spinger Gabler. Hamburg, Germany.

Shah, S., Tripsas, M. (2007). The Accidental Entrepreneur: The Emergent and Collective Process of User Entreprenurship. Strategic Entrepeneurship Journal, 1, 123-140.

Slater, S. F., & Mohr, J. J. (2006). Successful development and commercialization of technological innovation: insights based on strategy type. Journal of Product Innovation Management, 23(1), 26-33.

Slaughter, S. (1993). Innovation and learning during implementation: a comparison of user and manufacturer innovations. Research Policy, 22(1), 81–95. http://doi.org/10.1016/0048-7333(93)90034-F

Song, M. (2005). Determinants of the Level of Knowledge Application: A Knowledge Based and Information Processing Perspective*. Journal of Product …, 430–444. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1540-5885.2005.00139.x/full

Song, X. M., Bij, H., & Weggeman, M. (2006). Factors for improving the level of knowledge generation in new product development. R&D Management, 36(2), 173–187. http://doi.org/10.1111/j.1467-9310.2006.00424.x

Ståhlbröst, A., & Bergvall-Kåreborn, B. (2011). Exploring users motivation in innovation communities. International Journal of Entrepreneurship and Innovation Management, 14(4), 298–314. http://doi.org/10.1504/IJEIM.2011.043051

Stewart, J., & Hyysalo, S. (2008). Intermediaries, Users and Social Learning in Technological Innovation. International Journal of Innovation Management, 12(03), 295–325. http://doi.org/10.1142/S1363919608002035

Trott, P., Duin, P. Van Der, & Hartmann, D. (2013). Users as innovators? Exploring the limitations of user-driven innovation. Prometheus, 31(2), 125–138. http://doi.org/10.1080/08109028.2013.818790

Tsinopoulos, C., & Al Zu'bi, Z. (2011). An outsourcing model for lead users: an empirical investigation. http://doi.org/10.1080/09537287.2011.648485

Urban, G., and von Hippel, E. (1988). Lead user analyses for the development of new industrial products. Management Science, 35, 569–582.

Van der Boor, P., Oliveira, P., & Veloso, F. (2014). Users as innovators in developing countries: The global sources of innovation and diffusion in mobile banking services. Research Policy, 43(9), 1594-1607.

Vernette, E., & Hamdi-Kidar, L. (n.d.). Co-creation with consumers: who has the competence and wants to cooperate?

Von Hippel, E. (1976). The dominant role of users in the scientific instrument innovation process. Research Policy, 5, 212-239.

Von Hippel, E. (1977). Transferring process, equipment innovations from user-innovators to equipment manufacturing firms. R&D Management, (8)1, 13–22.

Von Hippel, E. (1978a). Successful industrial products from customer ideas. Journal of Marketing, 42(1), 39–49.

Von Hippel, E. (1978b). A customer-active paradigm for industrial product idea generation. Research Policy, (7) 240-266.

Von Hippel, E. (1986). Lead users: A Source of Novel Product Concepts. Management Science, 32, 791-806.

Von Hippel, E. (1988) The sources of innovation. New York: Oxford University Press.

Von Hippel, E., Thomke, S., & Sonnack, M. (1999). Creating breakthroughs at 3M. Harvard business review, 77, 47-57.

Von Hippel, E. (2005) Democratizing Innovation. Cambridge MA: MIT Press.

Von Hippel, E. (2007). Horizontal innovation networks - By and for users. Industrial and Corporate Change. http://doi.org/10.1093/icc/dtm005

Von Hippel, E. (2009). Democratizing innovation: the evolving phenomenon of user innovation. International Journal of Innovation Science, 1(1) 29-40.

Von Hippel, E., Franke, N., & Prügl, R. (2009). Pyramiding: Efficient search for rare subjects. Research Policy, 38(9), 1397–1406. http://doi.org/10.1016/j.respol.2009.07.005

Von Hippel, E., & Katz, R. (2002). Shifting innovation to users via toolkits. Management science, 48(7), 821-833.

Von Hippel, E., Ogawa, S., & De Jong, J. P. (2011). The age of the consumer-innovator. MIT Sloan Management Review, 53(1), 27.

Von Hippel, E., & Von Krogh, G. (2003). Open source software and the “private-collective” innovation model: Issues for organization science. Organization science, 14(2), 209-223.

Von Hippel, E., & Von Krogh, G. (2006). Free revealing and the private-collective model for innovation incentives. R&D Management, 36(3), 295-306.

Von Hippel, E., Ogawa, S., de Jong, J., 2011. The age of consumer-innovator. MIT Sloan Manag. Rev. 53 (1), 27–33.

Wacker, J. G. (1998). A definition of theory: research guidelines for different theory-building research methods in operations management. Journal of operations management, 16(4), 361-385.

Wang, Y., & Li, D. (2013). Testing the moderating effects of toolkits and user communities in personalization: The case of social networking service. Decision Support Systems, 55(1), 31–42. http://doi.org/10.1016/j.dss.2012.12.045

Warnke, P. (2008). USER-CENTRIC INNOVATION, 12(3), 489–510.

West, J., & Lakhani, K. R. (2008). Getting Clear About Communities in Open Innovation. Industry & Innovation, 15(2), 223–231. http://doi.org/10.1080/13662710802033734

Yakhlef, A. (2005). Immobility of tacit knowledge and the displacement of the locus of innovation. European Journal of Innovation Management, 8(2), 227–239. http://doi.org/10.1108/14601060510594684

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2012). Business research methods. Cengage Learning.

Zita, J. E. B., & Lopes, A. H. (2011). User innovation in the business enterprise sector of Maputo Province in Mozambique. UNU-MERIT, Maastricht Economic and Social Research and Training Centre on Innovation and Technology.