
# DOCTORAL THESIS

# ANTECEDENTS OF RADICAL INNOVATION: AN EMPIRICAL RESEARCH

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# ANTECEDENTS DE LA INNOVACIÓ RADICAL: UNA INVESTIGACIÓ EMPÍRICA

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# Introduction and objectives

## Introduction and objectives

Globalization, with its profound economic, social and political changes, together with increasingly rapid and significant technological advances, and growing competition in the vast majority of sectors and markets all characterize a highly complex and turbulent competitive environment, in which companies and organizations try to achieve success in order to guarantee their long-term continuity. In this context, it has been pointed out that innovation is one of the mechanisms to improve companies' competitiveness (Marvel and Lumpkin, 2007) and, for this reason, numerous studies attempt to find out what characterizes innovative companies and what factors underlie their success (for instance, Brentani, 1989; Cooper, 1979; Cozijnsen et al., 2000).

Literature distinguishes between different types of innovation and proposes a number of classifications and denominations according to their characteristics (Garcia and Calantone, 2002; Harmancioglu et al., 2009; Veryzer; 1998). One of the most widely recognized and studied classifications in the academic field is the differentiation made between incremental and radical innovation (Dewar and Dutton, 1986; Marvel and Lumpkin, 2007; McDermott and O'Connor, 2002). These categories allow innovations to be classified according to the degree of change they produce in the organization (Damanpour, 1996).

Some authors consider that radical and incremental innovation are two extremes within a single continuum, and place these concepts at the limits of the scale when they measure the degree of innovation (Alexander and Van Knippenberg, 2014; Avlonitis and Salavou, 2007; Joshi and Sharma 2004). However, measuring innovation in this way may present some biases since, in certain cases, it excludes or does not reflect the reality of the companies that develop both types of innovation (Baker and Sinkula, 2007; Gupta et al., 2006). For this reason, some researchers analyze the antecedents and consequences of radical and incremental innovation considering them as two separated and differentiated constructs (Chang et al., 2014). Although the difference between the two types of innovation is not always clear (Engen and Holen, 2014; Koberg et al., 2003), the characteristics of these concepts and the effects they have for organizations are completely different, and so they also need to be managed differently (Leifer et al., 2001). Consequently, numerous academic papers advocate the study of their

antecedents, barriers and consequences in a differentiated manner (Damanpour, 1996; Sandberg and Aarikka-Stenroos, 2014; Slater et al., 2014).

To clarify the differences between the two types of innovation, the features that characterize each of them must first be highlighted. Incremental innovation is focused on improving existing processes or products, while radical innovation needs completely new ideas and requires a higher level of creativity (Büschgens et al., 2013). In short, it could be said that incremental innovation entails doing things better, while radical innovation means working in a different way (Bessant et al., 2014). Incremental innovation is related to satisfying existing needs in the market and improving the current supply, whereas radical innovation is related to satisfying latent needs and generating new products and markets (Baker and Sinkula, 2007; Benner and Tushman, 2003; Lin et al., 2013). Ultimately, it may be stated that incremental innovation is focused on achieving immediate objectives, while radical innovation has a long-term horizon (Alexander and Van Knippenberg, 2014; Marvel and Lumpkin, 2007).

Radical innovation represents a bigger challenge for organizations than incremental innovation (Büschgens et al., 2013) because, by involving a greater degree of innovation and creativity, it must face greater risks in both its development and its commercialization (Alexander and Van Knippenberg, 2014; Damanpour, 1996; López-Cabrales et al., 2008; Sorescu et al. 2003; Stringer 2000). Nonetheless, it also helps to achieve better performance and more positive results, which makes it possible to compensate for the uncertainties and risks faced (López-Cabrales et al., 2008; Rubera and Kirca 2012; Sorescu and Spanjol 2008). The greatest difficulty linked to the development and commercialization of radical innovation, along with its potential to improve the performance of companies, is that it requires a greater effort to know what elements allow organizations to develop innovations that may be successful.

Herrmann et al. (2007) highlight two dimensions that may be found in the majority of definitions and characterizations of radical innovation: technology and market. For an innovation to be considered radical, it must be new for the organization that develops it and it has to be based on new knowledge and technology with respect to what existed previously (Keupp and Gassman, 2013). For this reason, radical innovation is associated with an idea of discontinuity in relation to the previous experience of an organization

(Bessant et al., 2014; Keupp and Gassman, 2013; Majchrzak et al., 2004). Moreover, from the point of view of the market, radical innovation must present a high degree of novelty for consumers and offer advantages that clearly improve the benefits that could be obtained with current products and services. Therefore, radical innovation can be defined as new products based on new technologies that offer new benefits to consumers, and satisfy their needs better than the existing supply (Chandy and Tellis, 1998; Chandy and Tellis, 2000).

However, radical innovation is not limited to just new products – it can also refer to completely new services or production processes (Alexander and Van Knippenberg, 2014; Leifer et al., 2001; O'Connor and McDermott, 2004; O'Malley et al., 2014) that generate a revolutionary change (Pavitt, 1991). They are often "foundational innovations" that serve as a basis for many later technical developments (Datta and Jessup, 2013: 355). In short, it involves organizations entering into "unknown territory" and experimenting with new processes, and avoiding systematization (O'Connor and McDermott, 2004: 11). Therefore, radical innovation is associated with an organization's desire to do things differently and move away from routines (Keupp and Gassman, 2013).

The benefits related to radical innovation are very important and different authors highlight the positive effects that this type of innovation has for organizations, as well as for the economies of countries. Thus, in the literature we can find different types of advantages of radical innovation:

- It is fundamental for companies' long-term success (Herrmann et al., 2007; Leifer et al., 2001; McDermott and O'Connor, 2002; Szymanski et al., 2007).

- It allows better performance to be achieved (Gatignon et al., 2002; Leifer et al., 2001).

- It establishes the bases on which future products and services are developed (McDermott and O'Connor, 2002).

- It helps to improve results and to maintain competitive advantage (Chang et al., 2014; Slater et al., 2014).

- It improves profitability and the competitive position of companies (Baker et al., 2014; Nijssen et al., 2005).

- It allows companies to clearly differentiate themselves from competitors (Gatignon and Xuereb, 1997) and to obtain non-financial benefits, such as those related to the image of the company and consumer satisfaction (Avlonitis et al., 2001).

- It helps to react quickly to changes in the environment and to the evolution of consumer needs (Slater et al., 2014).

- It favors the economic growth of companies and nations (Büschgens et al., 2013; Tellis et al., 2009; Sorescu et al., 2003).

- It can also provide temporary advantages, since competitors need time to learn and catch up with new innovations and this time can be used by companies to obtain better results and strengthen their competitive position (Chang et al., 2014).

In addition, radical innovation implies profound changes in the market, thereby generating uncertainty for the companies that compete in it (Büschgens et al., 2013). These changes may favor the companies that develop these innovations (Tushman and Anderson, 1986). When a radical innovation appears on the market, leading companies may find their dominant position compromised and obtain poorer results (Herrmann et al., 2007; Stringer, 2000). This type of innovation displaces current products, creates new product categories, and transforms the relationship between consumers and suppliers (Leifer et al., 2001). Companies that do not adapt quickly to this new situation may lose their dominant competitive position and be overtaken by competitors that propose radical innovations (Chandy and Tellis, 2000; Tushman and Anderson, 1986). Therefore, small "outsider" companies can reach leadership positions and dethrone large companies that do not know how to adapt to the new environment marked by

innovation, and end up destroying the competitive positions held until that moment (Chandy and Tellis, 2000; Tellis et al., 2009). In short, radical innovation redefines and destroys existing markets, and helps to create new market opportunities, some of which were inconceivable until the moment of their appearance (Benner and Tushman, 2003; Herrmann et al., 2007; Marvel and Lumpkin, 2007; Tellis et al., 2009). This type of innovation may also create entry barriers to other competitors. The first companies that introduce new products in the market may benefit from being pioneers and, in addition, hamper the entry of other competitors, for instance, through patents (Szymanski et al., 2007).

However, radical innovation not only benefits companies or organizations, but also allows consumers to gain advantages from it. It offers unprecedented benefits compared to the products and technologies existing on the market until that moment (Chandy and Tellis, 2000; Slater et al., 2014). Consequently, consumers perceive a higher value in the new offer, are more satisfied, and are willing to pay a higher price for highly innovative products. This may help to cover the high costs associated with the development of radical innovation (Chang et al. al., 2014; Szymanski et al., 2007).

Despite the benefits and advantages that companies may accomplish through radical innovation, it is not common for organizations to initiate projects to develop this type of innovation (Damanpour, 1996; Rice et al., 2001). Sorescu et al. (2013) point out that the vast majority of radical innovations come from a minority of companies. Developing this type of innovation is very complicated, given that companies must overcome a large number of barriers and difficulties (Sandberg and Aarikka-Stenroos, 2014).

Generally, radical innovation is associated with high levels of risk and uncertainty (Alexander and Van Knippenger, 2014; Bessant et al., 2014; López-Cabrales et al., 2008). These are complex processes (Sandberg and Aarikka-Stenroos, 2014) with an uncertain evolution that usually encounter unexpected difficulties (Alexander and Van Knippenger, 2014). Therefore, the expected results are difficult to predict in advance (O'Connor and McDermott, 2004; Rice et al., 2001). All these factors mean that the risk of not achieving success is high (Alexander and Van Knippenger, 2014), as evidenced by the fact that the failure rate of radical innovation is especially high (Chiesa and Frattini, 2011; Cooper, 2011).

Radical innovation entails the mobilization of many resources. It usually requires high capital investments, as well as a lot of time, because its development involves long-term work (McDermott and O'Connor, 2002; Story et al., 2011). This type of innovation requires new abilities and processes in the organization (Tushman and Nadler, 1986), which forces companies to introduce important changes into their production systems, distribution or relations with customers (Stringer, 2000), thereby pushing up the costs of the R&D or marketing departments, and demanding higher investments in technologies and markets (López-Cabrales et al., 2008).

In addition, once developed, radical innovation must face a tough test in the market. The process of adoption by consumers is more complex, which hinders its commercialization (Leifer et al., 2001; Slater et al., 2014). This type of innovation generates more doubts and uncertainties among consumers (Hoeffler, 2003), as they are not familiar with it. Consumers may not accept a new product if they do not clearly perceive its advantages in relation to the existing offer (López-Cabrales et al., 2008). In addition, its use may require new learning by clients, thus demanding a change in their behavior (Cabello Medina et al., 2011; McNally et al., 2010; McDermott and O'Connor, 2002). On the other hand, when an innovation presents a degree of novelty that is so high that it becomes impossible to compare it with the existing supply, it may cause potential consumers to fail to understand it and to underestimate its importance (McNally et al., 2010; Moreau et al. al., 2001; Veryzer, 1998).

Additionally, radical innovation may generate resistances and conflicts among the members of the organization (Janssen et al., 2004). The risks and uncertainties of radical innovation not only compromise the future of companies and organizations, but may also affect the reputation and career of the people who develop these projects (Alexander and Van Knippenberg, 2014). Due to the uncertainties and difficulties associated with radical innovation, these projects, to be able to advance, need to make a greater effort to engage members of the organization and sources of funding, and to convince the potential target group of consumers (Starbuck, 2014).

All this means that radical innovation may produce unexpected or undesired results (Starbuck, 2014). Not all radical innovations succeed. Some, despite fulfilling all the characteristics to be considered radical, do not achieve a significant impact on the

market (Bagga et al., 2016). In the worst case scenario, when a radical innovation fails or does not work, all these difficulties may compromise the future or viability of the company (Herrmann et al., 2007).

On the other hand, the study of radical innovation has been carried out from the point of view of the factors that affect its development and also the consequences that this type of innovation has for organizations and economies. Within the studies that analyze the factors that affect radical innovation, two large blocks may be differentiated: those that focus on the factors that facilitate, promote or positively relate to it (for example, Dewar and Dutton, 1986; Ettlie et al., 1984, Germain, 1996; Herrmann et al., 2007; Koberg et al., 2003, Leifer et al., 2001; O'Connor and McDermott, 2004; Rice et al. 2001; Subramaniam and Youndt, 2005), and those that have a negative effect or act as barriers to radical innovation (Bessant et al., 2014; Sandberg and Aarikka-Stenroos, 2014), this second group having received less attention from researchers (Sandberg and Aarikka-Stenroos, 2014).

In addition, the study of radical innovation has been carried out from different approaches. Thus, we find studies that analyze radical innovation by focusing on technology (Abernathy and Clark, 1984; Henderson and Clark, 1990; Govindarajan and Kopalle, 2006), while others take into account variables related to the market, such as research focused on the development of new products (Slater et al., 2014), new services (Engen and Holen, 2014), design (Verganti, 2008) or meaning and experiences for the consumer (Verganti and Oberg, 2013).

In the academic literature we may find other terms to denominate this type of innovation. Generally, these are very close or related concepts that are even used as synonyms of radical innovation (Leifer et al., 2001; Marvel and Lumpkin, 2007; O'Connor and McDermott, 2004; O'Connor and Rice, 2001; Stringer 2000). These terms include: discontinuous innovation (Veryzer, 1998), disruptive innovation (Christensen et al., 2006), really new products (Golder et al., 2009), revolutionary innovations or breakthrough innovations (Leifer et al., 2001; O'Connor and Rice, 2001), exploratory innovation, truly innovative innovation or new innovation to the world (Baker and Sinkula, 2007). However, other researchers dissociate themselves from the use of these concepts as synonyms and consider that these different terms refer to different things

(Alexander and Van Knippenberg, 2014; Chang et al., 2014; Govindarajan et al., 2011). In addition, Sandberg and Aarikka-Stenroos (2014) point out that this terminological diversity, and the different interpretations that are made of all these concepts, can make it more difficult to understand the factors that affect radical innovation.

The success of this type of innovation requires multiple facilitators both inside and outside organizations (Yang et al., 2014). Different authors and studies from a number of disciplines have proposed theories about the facilitators or promoters of this type of innovation, considering factors that are both external and internal to the organization (Tellis et al., 2009; Damanpour, 1996). Tellis et al. (2009) emphasize the importance of the factors related to the organizational culture; Keupp and Gassman (2013) study the impact of organizational resources on the development of radical innovation; Marvel and Lumpkin (2007) focus on the influence of workers' experience and education; López-Cabrales et al. (2008) highlight the willingness to take risks; Damanpour and Gopalakrishnan (1998) analyze the influence of the organizational structure on radical innovation; and Alexander and Van Knippenberg (2014) focus their study on work teams.

Given that the possible results that may be achieved with radical innovation have a highly beneficial potential for companies and countries, managers and public administrations are aware of its importance and try to promote and encourage it (Tellis et al., 2009). This thesis aims to go deeper into the study of the factors that may promote or facilitate its development. The debate on the organizational conditions and capacities that promote or prevent the emergence of radical innovation is continuous (Sainio et al., 2012). However, despite the numerous studies that explore its antecedents, some authors consider that, unlike other types of innovation, the processes related to radical innovation are not well documented and that it is therefore essential to continue to work on furthering knowledge about them (McDermott and O'Connor, 2002; O'Malley et al., 2014; Sandberg and Aarikka-Stenroos, 2014; Story et al., 2014). López-Cabrales et al. (2008) consider that the study of the organizational characteristics related to radical innovation is still an interesting field for research and call for studies to be conducted on alternative organizational variables to those traditionally analyzed and which may promote radical innovation.

Based on an exhaustive review of the literature on radical innovation, the aim of the present thesis is to continue the study initiated by other researchers in an attempt to respond to current research needs and offer new results that can expand the existing knowledge in the field of the factors that may promote radical innovation in the organizational context. The elements put forward in this thesis are related to leaders' behaviors, organizational learning, the structure of organizations, and information systems. Throughout four chapters, relationships between these elements are proposed as a way to explain their influence in promoting radical innovations within companies.

The first two chapters of the thesis are focused on leadership as a promoter of radical innovation. Previous studies highlight the positive relationship between leadership and innovation, and analyze the effects of different types of leadership on innovation (for example, Aragón-Correa et al., 2007; Engelen et al., 2014; Mumford et al., 2002). However, some authors suggest that more research is required in this field and claim that it is necessary to continue studying the role played by leaders in the development of radical innovation (Chang et al., 2012; Denti and Hemlin, 2012).

When studying the role that leaders play in organizations, it is necessary to take into account the changing and turbulent conditions of the environment in which they carry out their activity. The characteristics of the new competitive context are modifying the way companies work, which demands new styles of management that move away from the classic transactional styles (Avolio et al., 1999; Zhu et al., 2005). Some examples of these new styles of leadership, which in turn are related to innovation, are transformational, authentic, spiritual, servant or ethical leadership. However, the study of leadership styles and their consequences for the organization presents some difficulties. The excessively broad nature of these concepts means that the results are difficult to interpret (Rosing et al., 2011; Yukl, 2012), thereby making it necessary to focus the study of leadership on specific aspects of the same, such as leader behavior or traits of the leader (Yukl, 2010).

One of the elements that characterize transformational, authentic, spiritual, servant and ethic leadership is the altruistic behavior of leaders (Brown and Treviño, 2006; Barbuto and Wheeler, 2006). Despite having been highlighted as an interesting line of research (Dinh et al., 2014), this type of behavior has not been studied enough and there is little

research that considers this concept as such (for instance, Mallén et al., 2015a). For this reason, there are no previous studies that relate altruistic leader behavior to innovation. However, some researchers have related altruism with innovation in the family business field (Kraiczy et al., 2014) and several studies have linked leadership styles that include altruism among their characteristics to innovation (Aragón-Correa et al., 2007; Fry, 2003; Rego et al., 2012; Yidong and Xinxin, 2012; Yoshida et al., 2014). Furthermore, Rosing et al. (2011) state that the effects of the different leadership styles on innovation differ considerably from one to another and suggest the intervention of other complementary processes to facilitate innovation. For this reason, diverse studies have stressed the mediating role of other variables and constructs in order to explain the relationship between the two concepts (for instance, Aragón-Correa et al., 2007; Rego et al., 2012).

Leadership does not occur in a vacuum and needs to be analyzed in conjunction with the context in which it takes place (Porter and McLaughlin, 2006; Dinh et al., 2014). One of the contextual factors related to both leadership and innovation is organizational learning (Aragón-Correa et al., 2007). Leadership style has a great influence on organizational learning (Berson et al., 2006), and its effects on it may vary depending on the type of leadership. Traditional and authoritarian styles may have a negative effect on organizational learning, whereas, in contrast, current modern styles seem to promote it (Aragón-Correa et al., 2007). In addition, leadership styles that include altruistic behavior among their characteristics also boost learning in organizations (Fry, 2003; García-Morales et al., 2008).

Learning in organizations is a complex process that may be studied from different approaches. Among them, organizational learning capability (OLC) stands out as one of the most significant (Chiva et al., 2007; Chiva and Alegre, 2009). OLC refers to the organizational factors or characteristics that facilitate organizational learning or help the organization to learn (Chiva and Alegre, 2009). It is usually a multidimensional construct that includes different variables. For example, Chiva et al. (2007) identify five facilitators of organizational learning: experimentation, risk taking, interaction with the external environment, dialogue, and participative decision-making.

Altruistic behavior promotes the factors that make up OLC, such as communication (Gersick et al., 1997), experimentation or risk taking (Tierney et al., 1999). On the other hand, OLC and the factors it is made up of have a positive effect on the innovative capacity of companies (Alegre and Chiva, 2008; Jerez-Gómez et al., 2005). Therefore, we hypothesize that altruistic leader behavior may influence the development of radical innovation through OLC. This idea is included in the first chapter of the thesis under the title "The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study".

The development of radical innovations in itself is not a guarantee of success for companies. As previously stated, these projects must face many uncertainties and difficulties that may compromise the viability of the organizations. For this reason, it is essential to know the mechanisms that allow companies to increase their chances of success with these innovations. However, this idea of success must be put into context. Although innovation is a potential source of great benefits, it is a process that must be managed in a responsible fashion because, in itself, it is not necessarily positive (Broberg and Krull, 2010). That is to say, organizations must not innovate at any price, focusing on maximizing profits. They must also take into account the consequences and implications that this activity has for society and the environment.

The current economic and productive system seems unsustainable in the long term, as suggested by the constant news about pollution, corruption, financial scandals or inequalities. In this sense, a new vision is needed to do business – one which addresses the demands of citizens, who are increasingly aware of the social problems and the impact of organizations on the environment. This new trend in the business field may help to meet the challenges associated with the sustainability of the planet (Heuer, 2010; Karns, 2011). A more sustainable development needs innovative business solutions that go beyond the traditional goal of maximizing profits (Osburg, 2013). This new mindset supposes a radical change in the way organizations work that means innovating both in products and services as well as in the processes to develop and commercialize them. Waite (2013) states that through leadership, it is possible to promote creativity and innovation and, in turn, the willingness to achieve results that are not only economic but also social and environmental. For this reason, in this context, there is a need for new

attitudes, behaviors and leadership styles that are more responsible and aware of the impact of organizations on the environment (Broberg and Krull, 2010).

One behavior related to current styles of leadership, such as servant and ethical, and linked to the concern for the impact of organizations on both society and the environment is stewardship. In the present competitive context, this type of behavior generates an increasing interest in research (Barbuto and Wheeler, 2006; Kupelwieser, 2011). Leaders' stewardship behavior goes beyond the needs of the organization and seeks to benefit society (Barbuto and Wheeler, 2006; Heuer, 2010) by thinking in the long term and about the well-being of future generations (Caldwell et al., 2008; Hernandez, 2008). The concern for sustainability and social problems is related to innovation by promoting changes that bring improvements to society. Schmidpeter (2013) claims that it is necessary to take a great leap forward in innovation in order to achieve a sustainable future.

Although, from a theoretical point of view, companies agree to incorporate socially responsible principles, reality shows that many of them are reluctant to actually go ahead with their incorporation for fear of compromising their profits (Waite, 2013). For this reason, it is necessary to investigate the effect that the incorporation of this type of values has for organizations. In the second chapter of the thesis, entitled "How to achieve successful innovations through leader's stewardship behavior? The effect of radical innovation", the hypothesis that leaders' stewardship behavior promotes the development of successful radical innovations is proposed.

The changes that are needed in the traditional definitions of leadership, along with the uncertainty of the competitive environment, are modifying the way companies and organizations work and transforming their structures. Organizational structure refers to the way in which work is divided and coordinated (Mintzberg, 1979). Although there are different types of organizational structure, one of the best known classifications is that which distinguishes between organic and mechanical structure (Burns and Stalker, 1961). While the mechanical structure is characterized by rules, work specialization or hierarchy, the organic one refers to decentralized organizations, with little hierarchy and formalization. For this reason, the latter are the most appropriate for working in uncertain contexts, because they are more flexible and allow the circulation of

information among departments and rapid adaptation to changing conditions (Droge et al., 2008; Ramezan, 2011).

The study of organizational structure is not new. However, in recent years new research has emerged and has revived interest in the subject (Claver-Cortés et al., 2012; Mallén et al., 2015b). Different studies reveal a positive link between the organizational structure and innovation, although others do not reach the same conclusions. In addition, results regarding the different types of organizational structure and the types of concrete innovation they facilitate are often incongruent (Ettlie et al., 1984; Olson et al., 1995). Despite the diversity of results, there seems to be a positive relationship between organizational structure and innovation, but the dispersion in the results and the conclusions reached to date require more research. Therefore, some authors suggest the possibility of analyzing new mediating elements that may explain why this disparity of results occurs (Droge et al., 2008; Menguc and Auh, 2010).

Some researchers point out that the study of the effects of organizational structures must be conducted together with the specific capabilities of the company (Mallén et al., 2015b). One of the most relevant organizational capacities related to innovation is learning (Alegre and Chiva, 2008) and, within organizational learning, we can differentiate between adaptive and generative learning. Chiva et al. (2010) consider that few studies have analyzed the factors that promote both types of learning. However, these authors highlight the need to explore the antecedents of generative learning in greater depth due to its potential to promote radical innovations.

Generative learning is related to both organic organizational structures and radical innovation. The organizational characteristics of organic structures seem to promote generative learning (Fiol and Lyles, 1985; Vera and Crossan, 2004), which in turn facilitates radical innovation (Baker and Sinkula, 2002).

Despite the studies that link both organizational structure and organizational learning with radical innovation, these concepts have been studied in isolation or in combination with other variables. We are unaware of the existence of any studies that analyze these concepts jointly. The objective of this thesis is to study the effect of these elements on radical innovation. Therefore, Chapter 3, entitled "How to promote radical innovation?

The importance of organic structure and generative learning", proposes a model that attempts to explain the influence of the organic structure on radical innovation, using generative learning as a mediating variable.

On the other hand, this doctoral thesis questions the role played by information systems in the development of radical innovation. In a changing environment, having quality information may help to cope with the difficulties and uncertainties associated with this type of innovation. Sinkula (1994) emphasizes that information allows companies to act proactively and creatively. In addition, Amara and Landry (2005) point out that the greater the novelty is, the more information organizations need to be able to develop the innovation. Collecting and managing information, however, is an expensive and complicated process. This is the reason why systems are needed to gather, access and share information in an appropriate manner so as to be able to take decisions, including those related to innovation. For all these reasons, some authors have linked information systems with innovation (for example, Popovič et al., 2014).

In recent times, technological development has enabled companies to access large amounts of information, thereby modifying the way organizations work and facilitating the appearance of a new type of user of information systems that is more accustomed to working with applications and managing their information needs. This evolution in the information technologies makes it necessary to have quality systems that allow companies to locate, among the sea of available data, useful and relevant information (Burcharth et al., 2015). There are several criteria to measure the quality of an information system. One of the most accepted among researchers and professionals is end-user computing satisfaction (Aggelidis and Chatzoglou, 2012; Bokhari, 2005). The satisfaction of the end-user is defined as the affective attitude toward a computer application of the people who directly interact with it (Doll and Torkzadeh, 1988). This is a multiple construct that requires the subjective evaluation of five subscales that measure content, accuracy or precision, format, and timeliness of information, as well as the ease of use of a computer application (Somers et al., 2003).

Although, as mentioned, information systems are necessary to promote innovation, other elements must be taken into account to explain their positive effect. Literature highlights organizational learning for its ability to transmit, share and transform

knowledge among all members of the organization. Blazevic and Lievens (2004) claim that organizational learning is vital during the innovation process because it helps to transform technological and market information into products demanded by the market. Choo (1996) states that one of the strategic uses of information occurs when organizations create, organize and process information to generate new knowledge through organizational learning. This new knowledge is subsequently used to develop new products and services, which improves the current offer as well as organizational processes. In addition, by improving the processing of available information, organizational learning may be very important to develop radical innovations, because it helps companies to act ahead of their competitors and compete in environments characterized by large changes in markets and technologies (Santos-Vijande et al., 2012).

For these reasons, this doctoral thesis analyzes the mediating role of OLC in the relationship between quality information systems and radical innovation. OLC highlights the factors that enable companies to learn.

Despite the importance of quality information systems to promote innovation, to the best of our knowledge there is no evidence of previous studies that relate it to radical innovation. Neither is there any research relating, in the same model, the concepts end-user computing satisfaction, organizational learning capability, and radical innovation. Therefore, in Chapter 4, entitled "End-user computing satisfaction and radical innovation: the mediating effect of organizational learning capability", we propose that end-user computing satisfaction positively influences radical innovation through the effect of OLC.

Through empirical research, this doctoral thesis seeks to analyze the hypotheses presented in the conceptual model. The population under study is composed of 402 companies and has been gathered from different lists and databases of companies that manage human resources in an excellent way. Specifically, the lists and databases are the following: "Top Companies to work for" and "Top Employers" from CRF (87 companies); companies from the ranking prepared by the consultant Great Place to Work (112 companies); the "Merco Personas" ranking, which includes the companies that are best valued by their workers (70 companies); companies highlighted by the

magazine “Actualidad Económica” (91 companies); and the list of cooperatives from the Spanish Business Confederation of the Social Economy (42 companies).

Regarding the sample obtained and the methodology followed to conduct the research, we must highlight some particularities that characterize the different studies of the present doctoral thesis. The studies "The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study" (Chapter 1), "How to promote radical innovation? The importance of organic structure and generative learning" (Chapter 3) and "End-user computing satisfaction and radical innovation: the mediating effect of organizational learning capability" (Chapter 4) were conducted with the responses from a sample of 251 human resources managers. Data were collected between October and December 2010. The study "How to achieve successful innovations through leader’s stewardship behavior? The effect of radical innovation" (Chapter 2), however, was conducted with a sample of 150 questionnaires, which were answered by both human resources and innovation managers. The information gathering was carried out at two different times, October and December 2010, and May and June 2015. The methodology used to test the hypotheses in each study was structural equation modeling.

This introduction is followed by the four chapters with the different models that make up the doctoral thesis. Finally, a general discussion of the results obtained and the overall conclusions reached are presented.

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# Chapter 1

The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study.

# The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study.

## 1.1 INTRODUCTION

Radical innovation is now an essential factor for the growth and success of firms and national economies (Büschgens et al., 2013; Tellis et al., 2009). Radical innovations transform markets, create new markets and stimulate economic growth (Marvel & Lumpkin, 2007). Firms that develop radical innovations tend to dominate markets and increase their international competitiveness (Atuahene-Gima, 2005). Managers, governments and public administrations have consequently become aware of the importance of radical innovation, and are endeavoring to promote and encourage it (Tellis et al., 2009).

There is an ongoing debate on which organizational conditions and capabilities promote or prevent the emergence of different types of radical innovation (Sainio et al., 2012). The success of this type of innovation requires a wide range of facilitators, both within and outside organizations (Yang et al., 2014). Various studies have attempted to unravel what those facilitators are (e.g., Herrmann et al., 2007; Koberg et al., 2003), although some authors consider that, unlike other types of innovation, antecedents and processes related to radical innovation are not well documented (McDermott & O'Connor, 2002; O'Malley et al., 2014).

Leadership style is one of the most important individual factors that promote firm innovation (Aragón-Correa et al., 2007; Mumford et al., 2002). Leaders can take decisions to introduce new ideas into the organization, set specific goals and encourage innovation among their subordinates (Aragón-Correa et al., 2007). They can also create an environment in which employees feel protected, take risks, and are therefore more inclined to innovate (Nutt, 2002). Some authors such as Denti and Hemlin (2012) also call for more research on leadership when what the organization aims is to achieve radical innovations. Chang et al. (2012) argue that many of the main determinants of radical innovation may still be unidentified and propose leadership as one of the issues to be considered in future research.

The levels of integration and interdependence required in the new working environments demand leadership styles such as transformational, authentic, spiritual,

servant or ethical leadership, which go beyond classic transactional styles (Bass & Avolio, 1993; Bass, 1997; Avolio et al., 1999; Zhu et al., 2005). Furthermore, although some studies (Elenkov & Manev, 2005; Schweitzer, 2013) have shown that transactional styles can promote innovation, because they focus more on standards and rules their effect is lower than other leadership styles, such as transformational leadership.

Transformational, authentic, spiritual, servant and ethical leadership appear to coincide in one of their most important characteristics, namely, altruism (Brown & Treviño, 2006; Barbuto & Wheeler, 2006). Hence, altruistic leader behavior is regarded as a shared issue that cuts across these contemporary leadership styles. However, Dinh et al. (2014: 42) assert that most extant theories, even transformational leadership, have failed to investigate altruistic leader behaviors sufficiently. Further research on this topic therefore seems necessary.

Moreover, leadership research and theory have been criticized as being too segmented, and calls have been made for more integration of findings from different leadership approaches (i.e., integrating leader traits, leader behaviors, follower cognitions, situational/contextual factors [see Yukl, 2010: 491]). On the other hand, the research on the effects of broadly defined leader behaviors has limitations that make the results difficult to interpret (Yukl, 2012). Rosing et al. (2011) consider that traditionally studied leadership styles are too broad in nature and they can have widely differing effects on the organization because they might both foster and hinder innovation. In light of the above considerations, the present research does not focus on a particular leadership style, but on a specific leadership behavior (altruistic leader behavior), as studied by other authors (Mallén et al., 2015; Owens & Hekman, 2011).

Although altruistic leader behavior is an important topic it has attracted less attention in the literature. To our knowledge, no previous research has linked it with radical innovation. Some studies have related altruism with innovation. Kraiczy et al. (2014), for example, highlight reciprocal altruism as one of the specific characteristics of family firms, and one of the most relevant elements that may facilitate the development of new products. Moreover, previous studies show that new leadership styles—such as those referred to above in which altruism is a main feature—influence the organizational ability to innovate. There are many studies relating transformational leadership to

innovation (Aragón-Correa et al., 2007; Birasnav et al., 2013; Gumusluoglu & Ilsev, 2009). For example, Aragón-Correa et al. (2007) observe the simultaneous influence of transformational leadership and organizational learning on innovation. Cheung and Wong (2010) found that the positive relationship between transformational leadership and followers' creativity is stronger when there is a high degree of support from leaders for tasks and relationships. Yoshida et al. (2014) found that servant leadership fosters employee creativity and team innovation through individual relational identification and collective prototypicality with the leader; Rego et al. (2014) evidenced that authentic leadership predicts employees' creativity; Yidong and Xinxin (2013) showed that innovative work behavior was positively related to both individual perception of ethical leadership and group ethical leadership. Fry (2003) considers that spiritual leadership is essential to achieve a learning organization and that, in turn, such businesses are more creative and innovative. Therefore, leadership seems to clearly influence innovation but the research has not explored which particular leader behavior has this effect, nor on which particular type of innovation, such as radical innovation. Zacher and Roising (2015) state that it remains unclear which specific leadership behaviors best predict innovation.

However, although leadership influences innovation, companies do not always achieve the same results. Rosing et al. (2011) argue that this is because the influence of factors other than leadership has to be considered in fostering innovation. In this regard, many studies have analyzed how certain variables and constructs mediate the leadership-innovation relationship (e.g., Birasnav et al., 2013). Leadership is not a process that can be explained in isolation; it has to be considered within an organizational context (Porter & McLaughlin, 2006). One of the contextual factors identified in the literature that is closely related to both innovation and leadership is organizational learning capability.

The present research empirically analyzes whether altruistic leader behavior influences organizational capability to develop radical innovations through organizational learning capability. To this end, an empirical study was conducted in the Spanish firms most valued by their employees. The study population comprised 402 firms from databases or listings of organizations that regard employees as core elements in their businesses, that employees consider as good firms to work for, and that prioritize human resource

management. The main reason for choosing this population is that these organizations can act as a reference for other companies because of their good results. It is therefore relevant to examine what happens in them.

The databases from which the organizations were taken use different criteria to estimate excellence in human resources management, such as environment and work culture, working conditions, talent development (including aspects like motivation, recognition, training and career development), or commitment to the community, the environment and innovation.

The paper is organized as follows: in the next section we briefly discuss the literature on radical innovation, altruistic leader behavior and organizational learning capability. Then, drawing from the previous research, we provide a theoretical review of the relationships between the study variables. Section 4 describes the methodology used to analyze the research hypotheses. Finally, the results, conclusions and proposals for future research are presented, together with some of the study's limitations.

## 1.2 LITERATURE REVIEW

### 1.2.1 Radical innovation

Radical innovation is a widely studied concept and its importance for companies has been recognized in numerous studies (e.g., Sandberg & Aarikka-Stenroos, 2014; Story et al., 2014). Radical innovation is often compared to incremental innovation (Koberg et al., 2003; Damanpour & Gopalakrishnan, 1998), although the difference between the two is not always clear (Koberg et al., 2003; Henderson & Clark, 1990). However, it is important to distinguish between these two types of innovation because the competences and skills needed to develop radical innovations clearly differ from those required for incremental innovations (Story et al., 2014). Incremental innovations are based on prior knowledge and consist of substantial product, service or process improvements that, although they have a certain degree of novelty, do not clearly break away from the already existing product, service or process (Jiménez-Jiménez & Sanz-Valle, 2012). In contrast, the main objective of radical innovation is to launch a completely new product or process (O'Connor & McDermott, 2004), or introduce a

revolutionary shift in technology (Dewar & Dutton, 1986) and in design (Verganti, 2008). Radical innovations are foundational innovations that serve as the basis for many subsequent technical developments (Datta & Jessup, 2013). In short, through radical innovations organizations move to into "unknown territory" and experiment with new processes, thereby eluding systemization.

The appearance of such innovations causes important and profound changes in the competitive environment. Leading companies can be threatened, and established incumbents are sometimes displaced by new challengers (Ansari & Krop, 2012), destroying markets and creating new ones. When an organization introduces a radical innovation its competitors' products may become obsolete, and the market may be dominated by a new standard (Nijssen et al., 2005). Therefore, radical innovations have the potential to derail incumbent competitors that cannot promptly respond to the challenges posed by competition (Büschengs et al., 2013; Chandy &Tellis, 2000).

Radical innovation is very difficult to achieve and is typically associated with high risk, complex and uncertain projects (Büschgens et al., 2013; López-Cabrales et al., 2008; O'Connor &Mc Dermott, 2004). Such innovation requires major investments in time—it normally involves long–term efforts—and in capital (Story et al., 2011) to develop completely new products and processes whose success is difficult to predict. Since results cannot be ascertained beforehand, it is hard to know whether these products and processes will ensure a return on investment.

Nevertheless, despite this uncertainty radical innovation can provide multiple benefits to organizations, such as allowing companies to establish themselves or to grow substantially (Herrmann et al., 2007); by improving their competitive position and increasing their market power, their value and sales also improve and they become more profitable (Baker et al., 2014; Nijssen et al., 2005).

Due to the importance of radical innovation, several authors and studies from different disciplines have proposed theories about the facilitators that foster it, taking into account both external and internal organizational factors (Tellis et al., 2009; Damanpour, 1996). Tellis et al. (2009) underline the importance of internal factors, which are related to organizational culture. López-Cabrales et al. (2008) identify organizational characteristics that promote radical innovation as an area of great interest

and importance. In this regard, several studies have examined the effect on radical innovation of factors such as employees' experience and education (Marvel & Lumkin, 2007), risk taking (López-Cabrales et al., 2008), experimentation (O'Connor et al., 2008), or informal networks (O'Connor & McDermott, 2004).

### 1.2.2 Altruistic leader behavior

House et al. (1999, p. 184) define leadership as the ability of an individual to influence others, motivate them and facilitate their contribution to the effectiveness and success of the organization. Leadership can be considered as the non-coercive action of motivating people to act in a certain way (Popper & Lipshitz, 1993).

Following Simmons (1991), altruism: (1) is the willingness to do things that seek to increase the welfare of others, not one's own, (2) is voluntary, (3) is intentional, involving helping others, and (4) expects no reward. Therefore, altruism is the feeling or tendency to do good for others, even at the expense of personal gain.

Altruistic behavior is a type of prosocial behavior that seeks to help others without considering the personal consequences that it can entail. In the specific case of altruistic leaders, this behavior would seek the follower's growth and development more than his or her own. This type of behavior is voluntary and is characterized by perceiving and understanding others' problems, being empathetic, and not looking for reward of any kind. In this context, Clarkson (2014) considers that altruistic behavior involves some degree of self-sacrifice. Lemmon and Wayne (2014) state that any egoistic benefits deriving from altruistic concern, such as feelings of benevolence or self-satisfaction, cannot be considered as goals to be achieved through this kind of behavior because they are just incidental consequences of it. Avolio and Locke (2002) distinguish between altruistic behavior and helping others because sometimes help is given for selfish motives, such as getting a project finished or pursuing organizational success.

Rosopa et al. (2013) state that people in companies who behave altruistically are perceived as more emotionally stable, extraverted, open to experience, agreeable, and conscientious. They are also more highly valued than those who do not behave in this way.

The concept of altruistic leader behavior differs from other concepts that include altruism in their definition, such as organizational citizenship behavior (OCB) and some types of leadership (for example, servant, authentic and spiritual leadership). Organ (1988) classified OCB into five distinct dimensions, including altruism. However, although altruism is part of this concept, civic behavior does not imply altruism per se. For example, Bolino et al. (2004) give some examples of civic behavior in organizations that are not at all altruistic, such as promotions, salary increases, the expectation of quid pro quo, etc. On the other hand, altruistic behavior is implicit in some conceptualizations of leadership styles, such as spiritual, authentic and servant leadership, but it is not a style in itself. These styles of leadership are multidimensional constructs, broader than altruistic behavior, and include other possible types of behavior. Therefore, the fact that a leader behaves altruistically does not imply that he or she will necessarily be categorized under one of these theories of leadership, because a broader set of behaviors are involved.

The literature also states that altruistic behavior may have negative consequences for employees who act in this way (Bolino et al., 2013). Behaving altruistically means employees perform functions or tasks that go beyond formal requirements. This includes, for example, working overtime or assuming additional responsibilities that require more effort and can contribute to stress (Bolino &Turnley, 2005).

### 1.2.3 Organizational learning capability

Organizational learning capability is defined as the organizational and managerial characteristics or factors that facilitate the organizational learning process or allow an organization to learn (Chiva et al., 2007; Chiva & Alegre, 2009). Organizational learning and its facilitating factors have been shown to have various effects, including a beneficial effect on organizational performance (e.g., Prieto and Revilla, 2006) or innovation (Alegre & Chiva, 2008). Jerez-Gómez et al. (2005) consider that organizational learning capability is a key element to improve efficiency and organizational capacity to innovate and grow, while other authors state that organizational learning capability is one of the strategic means of achieving long-term organizational success (Liao & Wu, 2010).

The organizational learning capability concept has been widely studied and several authors have proposed different dimensions to explain it. Organizational learning capability normally appears as a multidimensional construct (Chiva et al., 2007, Goh & Richards, 1997; Hult & Ferrell, 1997; Jerez-Gómez et al., 2005, Yeung et al., 1999). These authors propose a set of contextual variables that facilitate learning in organizations. The present study follows the approach of Chiva et al. (2007), whose integrative conceptualization of organizational learning capability includes proposals from the social perspective, the individual perspective and learning organization. These authors identified five facilitating factors of organizational learning, namely: experimentation, risk acceptance, interaction with the environment, dialogue, and participation in decision making. This conceptualization of organizational learning capability also takes into account that learning can be either internal or external to the organization.

Experimentation is defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically (Chiva et al., 2007), and is the most commonly used dimension in the organizational learning literature. Nevis et al. (1995) consider that experimentation involves trying out new ideas, being curious about how things work, or carrying out changes in work processes. Risk taking is understood as tolerance of ambiguity, uncertainty and errors, because taking risks implies the possibility of errors and failures. Interaction with the external environment is defined as the scopes of relationships with the external environment. The external environment of an organization is defined as factors that are beyond the organization's direct control or influence, such as universities, competitors or research centers. Dialogue is defined as a sustained collective inquiry into the processes, assumptions and certainties that make up everyday experience (Isaacs, 1993:25). Dialogue includes communication, diversity, teamwork and collaboration. Schein (1993, p.47) believes that dialogue is a basic process with which to build a shared understanding. Finally, participative decision making refers to the level of influence employees have in the decision-making process (Cotton et al., 1988).

## 1.3 HYPOTHESES

Based on the above discussion, we propose a conceptual model (figure 1) that integrates the effects of altruistic leader behavior and organizational learning capability on radical

innovation. Altruistic leader behavior better explains radical innovation when the mediating effect of organizational learning capability is considered. In other words, this type of leader behavior not only may have a direct effect on radical innovation but may also create an organizational context that fosters experimentation, risk taking, participative decision making, dialogue and interaction with the external environment which, in turn, facilitates radical innovation.

### 1.3.1 Altruistic leader behavior and organizational learning capability

Leadership is one of the predictors the literature considers essential to develop organizational learning (Atwood, 2010; Berson et al., 2006). Nevertheless, leaders do not always have a positive impact in promoting learning in organizations, since it is leadership style that plays a key role in this process. Some authors warn that traditional and authoritarian leadership styles hinder or inhibit organizational learning (Aragón-Correa et al., 2007; Berson et al., 2006) while more recent leadership styles such as transformational, servant, spiritual, and authentic leadership encourage learning in organizations (Aragón-Correa et al., 2007; Berson et al., 2006; Fry, 2003; García-Morales et al., 2008; Gardner et al., 2005; Lloréns-Montes et al., 2005). Moreover, Vera and Crossan (2004) clarify the effects of leadership style when stating that transactional leadership fosters adaptive learning, and transformational leadership promotes generative learning. Consequently, it seems that leadership in general, and new leadership styles in particular, have a positive effect on organizational learning capability.

Leadership styles such as servant, spiritual, transformational or authentic leadership that include altruism as one of their main drivers have been identified in the literature as antecedents of organizational learning capability. For example, García-Morales et al. (2008) empirically demonstrate that transformational leadership facilitates the development of organizational learning. Fry (2003) claims that spiritual leadership is essential to achieve a learning organization. The literature has also shown that other constructs related to altruism, such as organizational citizenship behavior, have a positive influence on organizational learning (Chang et al., 2011).

While authoritarian forms of leadership may actually inhibit learning, leadership styles in which altruistic leader behavior is a relevant characteristic encourage individual and

team learning by loosening leader control and creating a safe and supportive environment where people feel they can take risks, make mistakes, create dialogue and be supported in a manner that is necessary for learning to occur (Fry et al., 2005).

Leaders who show a deep concern and awareness for their followers' needs create a sense of shared risk taking (Ryan & Tipu, 2013). Jobs that involve risk taking cannot be managed through systems of control and formal monitoring (McDonough & Leifer, 1986) and therefore they require elements that create an atmosphere of trust and support in the organization. Perceptions of support allow followers to feel more autonomy and a level of freedom to challenge the status quo and pursue projects with risks and unknown outcomes (Tierney et al., 1999). People take risks if they feel secure, so by creating a climate of psychological safety, leaders can increase learning from mistakes and failures and encourage members of the organization to suggest novel ideas (Yukl, 2012).

In addition, Sosik et al. (2009) argues that the trend of integrating altruism in leadership research reflects the new business environment that emphasizes ethics, teamwork, and collaboration through a more transparent decision-making process. Clarkson (2014) considers that altruism favors cooperation due to concern for others. Furthermore, the literature suggests that altruism is positively related to information exchange (Daily & Dollinger, 1992) and communication (Gersick et al., 1997). Therefore, it seems reasonable to assert that altruism in organizations enables interaction with others, by positively contributing through dialogue and communication, and also enhances opportunities for interaction with the external environment.

In conclusion, altruistic leader behavior could be related to factors that facilitate organizational learning capability, promoting an organizational climate that allows participative decision making, experimentation, risk taking, interaction with the external environment and dialogue. Therefore, we propose the following hypothesis:

H1: Altruistic leader behavior has a positive effect on organizational learning capability.

### 1.3.2 Organizational learning capability and radical innovation

Organizational learning capability and its facilitating factors have a positive effect on innovation performance in organizations (Alegre & Chiva, 2013; Baker &Sinkula, 2007; Jiménez-Jiménez & Sanz-Valle., 2011; García-Morales et al., 2011; Hurley & Hult, 1998, Onag et al. 2014). In addition, organizational learning may be associated to creativity (Amabile et al. 1996), which although it does not involve innovation, is a preliminary step in its development.

Experimentation is one of the organizational aspects that foster innovation (Ryan & Typu, 2013) and authors such as Koberg et al. (2003) highlight it as one of the elements that stimulate radical innovation. Employees have to be managed so that they feel secure to search and experiment with new knowledge (Amabile et al., 1996). Risk taking is necessary to generate new ideas (Amabile et al., 1996). Therefore, organizations must create an environment of trust which encourages employees to raise new proposals that allow organizations to innovate.

Making use of external knowledge has become a critical component in a company's capacity to innovate (Krammer, 2014). Openness to the external environment enables exploitation and transformation of external knowledge, and in turn integrates external elements in the process of generating new products. These external elements could be, for example, consumers (Joshi & Sharma, 2004), universities and research centers (Pedler et al., 1997; Azagra-Caro et al., 2006) or collaborating firms through alliances (Chipika & Wilson, 2006).

Team member diversity, openness to new ideas and communication are part of the dialogue dimension. Smith et al. (2005) and López-Cabrales et al. (2008) consider that introducing new products and services into the market depends on the ability of organizational members to share knowledge. Consequently, teams are essential to generate ideas and knowledge (Thompson, 2003; LópezCabrales et al., 2008). Furthermore, there seems to be a consensus in the literature that multidisciplinary teams have a positive effect on innovation (e.g., Wheelwright & Clark, 1995; López-Cabrales et al., 2008). Koberg et al. (2003) state that links between individuals from different units is one of the factors that favor radical innovation.

Participative decision making increases motivation to learn and stimulates creative thinking, leading to the development of new ideas, which is essential to innovation (Hurley & Hult, 1998).

Many other studies have examined the relationship between organizational learning and innovation. Some studies confirm the proposed relationship by analyzing firms from different countries such as Iran (Tohidi et al., 2011) or Spain (Santos-Vijande et al., 2012). Fernández-Mesa et al. (2013) find that organizational learning capability enhances product innovation through the mediation of design management capability in small and medium enterprises. These arguments lead to the next hypothesis:

H2: Organizational learning capability has a positive effect on radical innovation.

### 1.3.3 Altruistic leader behavior and radical innovation: the mediation of organizational learning capability

Characteristics of leaders who behave altruistically include empathy, concern for others, helping others or concern for their welfare. Leadership styles that are able to recognize other people's emotions accurately help to manage anxiety in individuals who work in turbulent, constantly changing, and uncertain environments (Jansen et al. 2009), such as those faced by organizations that develop radical innovations. Consequently, altruistic behavior may foster radical innovation.

Leadership and different leadership styles are related to innovation; however, the results obtained with each type differ significantly. Some authors suggest that the heterogeneity of results may be because to be a good leader for innovation implies complementary processes (Rosing et al., 2011). Leadership in organizations does not take place in a vacuum; it takes place in organizational contexts (Porter & McLaughlin, 2006, p. 559). Avolio (2007) argues that context should be considered in all theories of leadership, because it can affect and be affected by leadership effectiveness. Nevertheless, Dinh et al. (2014) suggest that although context is central to the emergence and manifestation of leadership processes, it is an under-researched topic and needs further investigation. In relation to the subject of the present research. O'Malley et al. (2014) consider that the organizational context required for the development of radical innovations is marked by

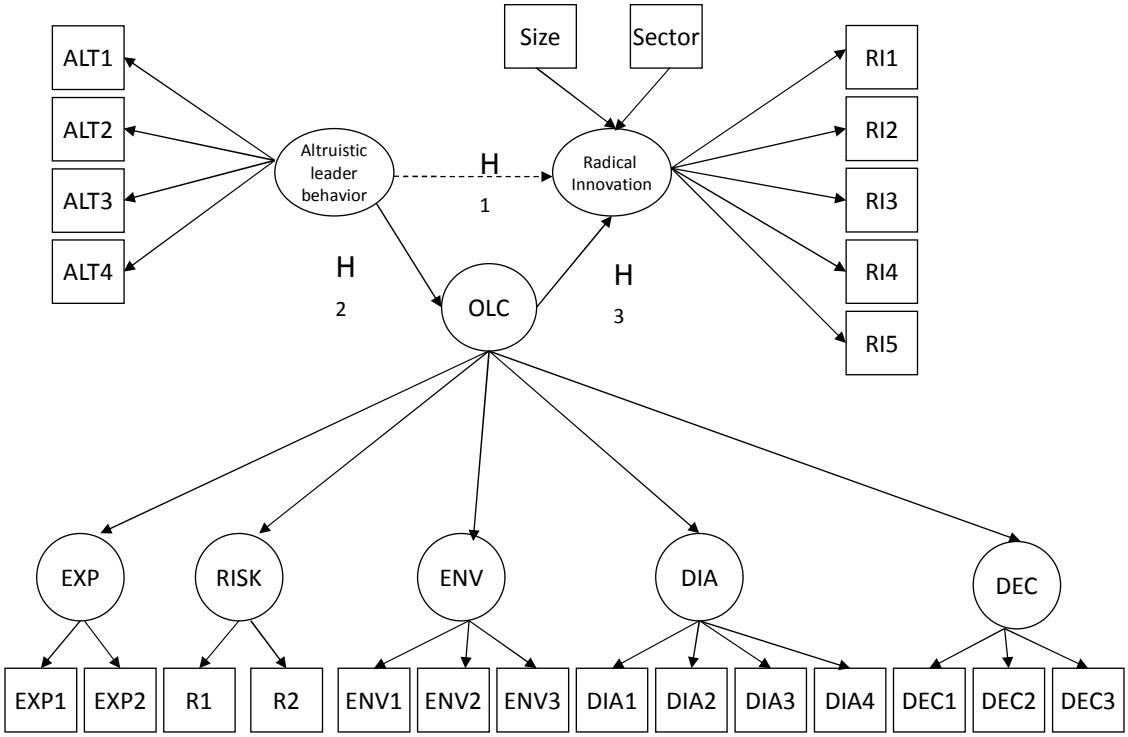
a high degree of informality, intense communication and cooperation amongst actors, a lack of decision-making rules, and the emphasis on creativity and risk-taking.

One of the contextual factors the literature has identified as being closely related to both innovation and leadership is organizational learning capability and, as noted above, several studies show that it has a mediating effect between some types of leadership and innovation. Brown and Posner (2001) state that "by accentuating the importance of learning and establishing a context where employees want to and are able to learn, leaders will be more capable of strengthening their organizations for future challenges and increasing competitive and innovative abilities". The organizational learning process consists of acquiring, disseminating and using knowledge, and is therefore closely related to product innovation performance (Alegre & Chiva, 2008:317). Some authors argue that individuals share information because of prosocial attitudes (Constant et al., 1994; Hung et al., 2011). Wang and Noe (2010) explain that altruism is one of the reasons why individuals share knowledge, although Taylor (2006) states that while it is true that high levels of altruism are needed to encourage knowledge sharing, knowledge of the subject may be necessary too. Akgün et al. (2007) show that people who demonstrate care and concern for one another and have the ability to understand others' feelings foster an environment that encourages experimentation, the acceptance of new ideas, information exchange and external openness. Demonstrating care and concern for one another and having the ability to understand others' feelings are dimensions of individuals' emotional capability, and the same authors found that this capability influences organizational product innovativeness via learning capability.

Consequently, leaders who behave altruistically foster the dimensions or factors that facilitate organizational learning, which in turn can enhance radical innovation. These findings therefore imply that:

H3: The relationship between altruistic leader behavior and radical innovation is mediated by organizational learning capability.

**Figure 1.1 Conceptual model: altruistic leader behavior, organizational learning capability and radical innovation**




*Note: OLC = Organizational learning capability; EXP = Experimentation; RISK= Acceptance of risk; ENV= Interaction with the external environment; DIA = Dialogue; DEC = Participative decision-making.*

## 1.4 RESEARCH METHODOLOGY

### 1.4.1 Data collection

The study focuses on a population of 402 Spanish firms that are valued by their employees as excellent places to work or companies that stand out for their human resources management. The population was compiled using databases and lists that reflect the Spanish companies with these characteristics. Data was obtained from the CRF Institute's 'Top Companies to Work For' and 'Top Employers', firms from the Great Place to Work consulting company list, and the Merco Personas list of best companies to work for, published by the journal Actualidad Económica in August 2010.

The fieldwork was carried out between October and December 2010. The questionnaire was addressed to managers, preferably human resources managers, with at least two

years' experience in the firm. We considered that these managers have an overall view and an in-depth knowledge of the organization because of their position and their experience within it. Through their close contact with different departments, they can provide an accurate picture of what happens in their organizations, and are therefore a reliable source of information to evaluate the company as a whole. To encourage participation, respondents' anonymity was guaranteed, and the data were aggregated for the analysis, which encourages respondents to answer more honestly, thereby increasing the reliability of the results.

The questionnaire consisted of 23 items measured using a five-point Likert scale. All indicators were expressed in a positive way and respondents had to express their agreement or disagreement with each statement included in the questionnaire. The survey was completed via telephone interviews since this technique is useful when interviewing people who are hard to reach, as in the case of the directors of major companies in this study. Finally, a sample of 251 valid questionnaires was obtained, representing 62.44% of our sampling frame; this percentage can be considered satisfactory.

The questionnaire was administered in Spanish to all participants. While the organizational learning capability scale was originally designed in Spanish, the altruistic leadership and radical innovation scales were developed in English. In order to ensure the accuracy of the translation, a double-back translation procedure was utilized. This technique involves translating the original Spanish version of measurement scales into English, then retranslating it into Spanish, and comparing it with the original version.

### 1.4.2 Measurement instruments

The choice of measurement instruments was based on a previous literature review in order to decide which scales best meet the research needs. The measurement scales selected have already been used and validated by other researchers in previous studies. The scales' reliability was assessed using Cronbach's alpha.

#### Radical innovation

Gatignon et al.'s (2002) five-item scale was used to measure radical innovation. This construct demonstrated an acceptable reliability, with a Cronbach's alpha of 0.893 (table 2).

**Organizational learning capability**

The scale developed by Chiva et al. (2007) and Chiva and Alegre (2009) was used to measure organizational learning capability. This scale consists of five dimensions (experimentation, risk acceptance, interaction with the environment, dialogue, and participation in decision making) and a total of 14 items. All the dimensions comprising organizational learning capability are reliable, obtaining values for Cronbach's alpha above 0.8 (table 2).

**Altruistic leader behavior**

Barbuto and Wheeler (2006) developed a questionnaire to measure servant leadership with five subscales: altruism, organizational stewardship, persuasive mapping, wisdom and emotional healing. The subscale for altruism covers behaviors that reflect altruistic values. The construct is reliable with a Cronbach's alpha of 0.799.

### 1.4.3 Control variables

We used firm size and sector as control variables. Participants were asked to classify their firms according to the number of employees into one of the six categories suggested in the questionnaire (frequencies for each category in our sample appear in brackets): fewer than 50 employees (13.9%), between 50 and 100 employees (21.5%), between 101 and 250 employees (25.9%), between 251 and 500 employees (23.9%), between 501 and 1,000 employees (10.4%), and firms with more than 1,000 employees (4.4%). We also distinguished between manufacturing and service firms:28.7% of the organizations belonged to manufacturing sectors, while 71.3% were from service sectors.

### 1.4.4 Analyses

Structural equations and the statistical software package EQS 6.1 were used to empirically validate the model. We used the maximum likelihood (ML) estimation method with robust estimators. All the Chi square values presented in the paper correspond to the statistical goodness-of-fit tests devised by Satorra and Bentler (1994).

During both the research design and the data analysis stages we followed recommendations to prevent or assess the effect of Common Method Variance (CMV)

(e.g., Chang et al., 2010). In the research design stage we first contacted all the participants to explain the motives behind the study and the importance of the research, and to inform them that their anonymity and the confidentiality of their responses would be guaranteed (MacKenzie and Podsakoff, 2012). The questionnaire was structured by separating the items of each construct, and responses were obtained at different moments, with a separation of three months between independent and dependent variables (MacKenzie et al., 2012; Podsakoff et al., 2012). Finally, we also made the commitment to provide all participants with feedback on our research, thus encouraging them to be honest and precise in their responses.

Once the data had been collected, several statistical analyses were run to evaluate CMV. The techniques used were Harman's test, common latent factor (e.g., Johnson et al., 2011) and common marker variable techniques (Lindell and Whitney, 2001). In all three cases the conclusion was that CMV was not a problem in our research.

We then tested the structural models corresponding to the proposed hypothesis following the approach taken by Tippins and Sohi (2003) to verify the existence of the mediating effect of organizational learning capability on the relationship between altruistic leader behaviors and radical innovation (hypothesis 3). This procedure involves estimating two structural models. The first corresponds to a direct effect model that tests the effects of the predictors on the dependent variables. In the present research, it involved estimating the direct effect of altruistic leader behaviors on radical innovation (figure 3). For mediation to exist, the direct effect between altruistic leader behaviors and radical innovation must be significant. The second model is a mediated model that includes the intermediate variable. This model corresponds to hypothesis 3 and considers the following effects: the effect of altruistic leader behaviors on organizational learning capability, the influence of organizational learning capability on radical innovation, and the direct effect of altruistic leader behaviors on radical innovation. Then we tested the mediated model. Certain conditions must be met for mediation to be supported: (1) the significant relationship between altruistic leader behavior and radical innovation, observed in the direct effect model, must decrease considerably or disappear in the partial mediation model; (2) the partial mediation model must explain more variance in radical innovation than the direct effect model; (3) there must be a significant relationship between organizational learning capability and

radical innovation; (4) in the mediation model, there must be a significant relationship between altruistic leader behavior and organizational learning capability.

Finally, we used bootstrapping to evaluate the significance of the mediated effect. This is an additional method recommended for testing mediation that does not impose the assumption of normality of the sampling distribution (Preacher & Hayes, 2008). MacKinnon, Coxe and Baraldi (2012) suggest the use of bootstrapping methods to determine the significance of the mediated effect along with a confidence interval for the indirect effect.

## 1.5 RESULTS

### 1.5.1 Descriptive statistics and psychometric properties of the measurement scales.

The data analysis begins with the descriptive statistics. Table 1 exhibits means, standard deviations, Cronbach's alpha and factor correlations. The psychometric properties of the measurement scales were evaluated by following accepted practices in the literature (Anderson & Gerbing 1988), namely, by studying their dimensionality, reliability, and content, convergent and discriminant validity (Tippins and Sohi 2003).

In the case of the organizational learning capability construct, following Chiva and Alegre (2009) we checked the fit of the second-order factor model (Fig. 2) to support the proposed multidimensionality of this concept, with excellent results (Satorra-Bentler Chi square = 86.40; p value = 0.12; SB Chi square/df = 1.20; BBNFI = 0.930; BBNNFI = 0.984; CFI = 0.987; RMSEA = 0.028).

Regarding the structure of the constructs, in addition to Confirmatory Factor Analyses (CFA), we followed the more commonly used approach (advocated by Anderson and Gerbing, 1988) of assessing a full measurement model that include all the variables. Testing a full measurement model establishes the structure of the variables in the context of other variables measured in the study, and ensures that the measures used in the study are distinct from one another. The overall fit of this general measurement model was as follows: Chi square (df) = 299.56 (222); p = 0.00; CFI = 0.963; RMSEA

= 0.037. The Chi square statistic was non-significant and all the standardized estimates were significant and in the expected direction.

The results of the reliability analysis are also satisfactory. Cronbach's alpha coefficient values and the compound reliability values are equal to or exceed 0.8 (Table 2), above the minimum accepted value of 0.7 (Nunnally 1978). In addition, the average variance extracted presents values above the recommended minimum of 0.5 (Nunnally 1978) for the three constructs included in the model.

The procedure followed to select the measurement scales supports content validity. The variables used to measure organizational learning capability were taken from the scale proposed by Chiva et al. (2007) and Chiva and Alegre (2009), who carried out a thorough literature review before proposing and validating their scale. The altruistic leader behavior dimension items were taken from a scale validated in a previous study (Barbuto and Wheeler, 2006), in which altruistic leader behavior was introduced as one component of servant leadership. Finally, radical innovation was measured with the scale validated by Gatignon et al. (2002).

To evaluate convergent validity, the average variance extracted (AVE) should be 0.5 or above (Fornell and Larcker, 1981, p. 45-46). The AVE is above the recommended minimum for all constructs (table2).

For discriminant validity to exist, the square root of the AVE must be greater than the construct correlations, suggesting that each construct relates more strongly to its own measures than to others.

**Table 1.1 Factor correlations, means, standard deviations and Cronbach's alpha**

| | Mean | s.d. | AL | RI | Exp | Risk | Env | Dia | Dec |
|---|---|---|---|---|---|---|---|---|---|
| AL | 3.43 | 0.67 | (0.89) | | | | | | |
| RI | 3.79 | 0.45 | 0.23** | (0.80) | | | | | |
| Exp | 3.99 | 0.56 | 0.36** | 0.25** | (0.80) | | | | |
| Risk | 3.37 | 0.85 | 0.19** | 0.15* | 0.31** | (0.84) | | | |
| Env | 3.69 | 0.67 | 0.13* | 0.16** | 0.18** | 0.27** | (0.83) | | |
| Dia | 4.13 | 0.55 | 0.38** | 0.33** | 0.40** | 0.28** | 0.35** | (0.85) | |
| Dec | 3.47 | 0.68 | 0.37** | 0.24** | 0.33** | 0.32** | 0.36** | 0.50** | (0.87) |

*Notes: For the standard deviations and factor correlations, we used the mean of the items making up each dimension. Cronbach's alpha coefficients are given in parenthesis.*
** Significant correlation ($p < 0.05$). Other correlations not marked with an asterisk present a significant correlation at $p < 0.01$.*

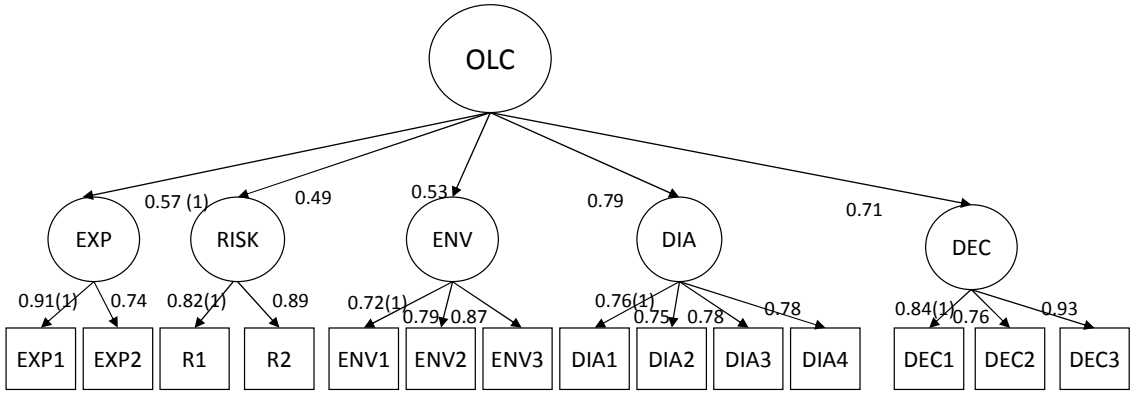
*Note: AL =Altruistic leadership behavior; RI= Radical innovation; EXP = Experimentation; RISK= Acceptance of risk; ENV= Interaction with the external environment; DIA = Dialogue; DEC = Participative decision-making.*

**Table 1.2 Reliability of the measurement scales**

| Construct | Composite reliability | Extracted mean variance |
|---|---|---|
| Altruistic leadership behavior (4 items) | 0.901 | 0.696 |
| Radical innovation (5 items) | 0.811 | 0.465 |
| Experimentation (2 items) | 0.811 | 0.684 |
| Acceptance of risk (2 items) | 0.845 | 0.732 |
| Interaction with the external environment (3 items) | 0.836 | 0.631 |
| Dialogue (4 items) | 0.851 | 0.589 |
| Participative decision-making (3 items) | 0.881 | 0.713 |

*(*) The Cronbach's alpha coefficient for the experimentation and risk acceptance dimensions, both with two items, was performed using SPSS 17.0 software; EQS 6.1 software was used for the other dimensions. Following Chiva and Alegre (2009), factor loadings obtained from the second-order organizational learning capability factor model were used to calculate the composite reliability and average variance extracted for these two dimensions.*

**Figure 1.2 Confirmatory Factor Analyses for Organizational Learning Capability (OLC)**




| | |
|---|---|
| S-B chi-square | 86.40 |
| d.f. | 72 |
| P-value | 0.12 |
| S-B chi-square/d.f. | 1.20 |
| BBNFI | 0.930 |
| BBNNFI | 0.984 |
| CFI | 0.987 |
| RMSEA | 0.028 |

| | Alpha | CR |
|---|---|---|
| EXP | 0.80 | 0.81 |
| RISK | 0.84 | 0.83 |
| ENV | 0.83 | 0.84 |
| DIA | 0.85 | 0.85 |
| DEC | 0.88 | 0.88 |

*(1) The parameter was equaled to 1 to fix the latent variable scale. Parameter estimates are standardized. All parameter estimates are significant at a 95% confidence level.*

*Note: OLC = Organizational learning capability; EXP = Experimentation; RISK= Acceptance of risk; ENV= Interaction with the external environment; DIA = Dialogue; DEC = Participative decision-making.*

### 1.5.2 Testing the research hypotheses

The results of the direct effect model confirm that a significant relationship exists between altruistic leader behavior and radical innovation. The value of the structural parameter corresponding to the influence of altruistic leadership behavior on radical innovation is statistically significant (α= 0.256). Thus, the first condition is satisfied and allows us to continue with the analysis, estimating the mediated model which corresponds to hypothesis 3.

The estimation of the mediated model shows a good fit, according to the values of chi-square and the fit indices (figure 4). As shown in table 3, the partial mediation model explains more variance than the direct effect model (0.213 vs. 0.072). In addition, the significant relationship between altruistic leadership behavior and radical innovation (α

= 0.256) shown in the direct effect model decreases considerably and is close to zero when it includes the mediating effect of organizational learning capability, and therefore it becomes non-significant (β1 = 0.012). Additionally, there is a significant relationship between altruistic leader behavior and organizational learning capability (β2 = 0.556), and organizational learning capability influences radical innovation (β3 = 0.445), confirming the mediating role of organizational learning capability in the altruistic leadership behavior-radical innovation relationship, as predicted in hypothesis 3.

The estimated indirect effect of altruistic leader behavior on radical innovation is 0.244. The 95% bias-corrected confidence intervals for the indirect effect are between 0.131 and 0.419, with a p-value of 0.001 for the two-tailed significance test. Hence, the standardized indirect effect of altruistic leader behavior on radical innovation is significantly different from zero at the 0.001 level and we can reject the null hypothesis of no mediation effect.

These four points, together with the bootstrap analysis, provide evidence to support our hypotheses, as reported in figure 4.

**Table 1.3 Structural equations to test the hypothesis that organizational learning capability mediates in the relationship between altruistic leadership and radical innovation.**

| **Structural equation** | $R^2$ |
|---|---|
| **Direct effect model** | |
| RI = 0.256*AL + 0.076*SIZE + 0.031*SECTOR | 0.072 |
| (t = 3.130) (t = 1.085) (t = 0.486) | |
| **Mediation effect model** | |
| RI = 0.012*AL + 0.445*OLC + 0.092*SIZE + 0.023*SECTOR | 0.213 |
| (t = 0.116) (t = 3.063) (t = 1.390) (t = 0.370) | |
| OLC = 0.556*AL | 0.309 |
| (t = 4.685) | |

**Figure 1.3. Direct effect model: Altruistic leader behavior and radical innovation**

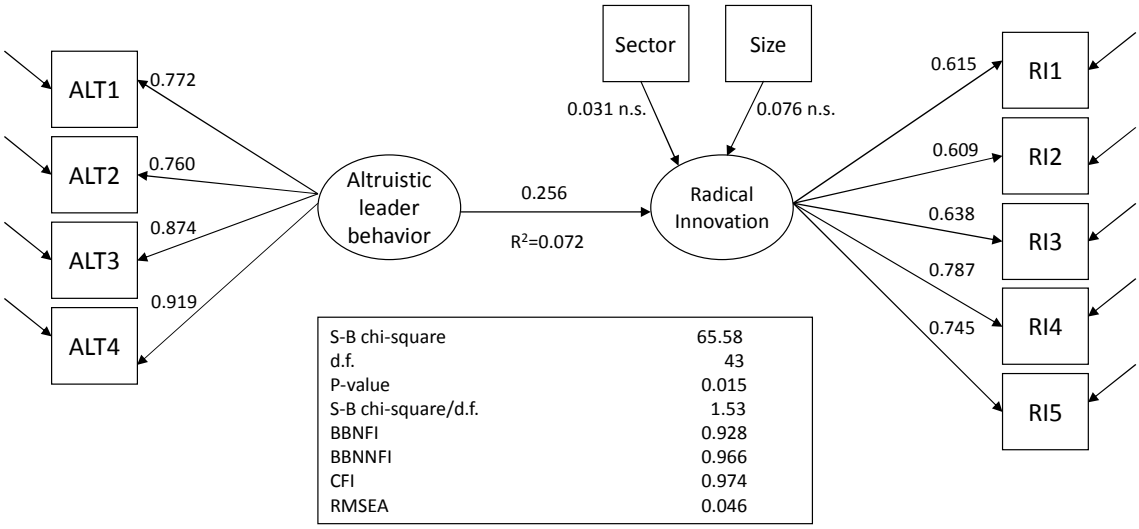
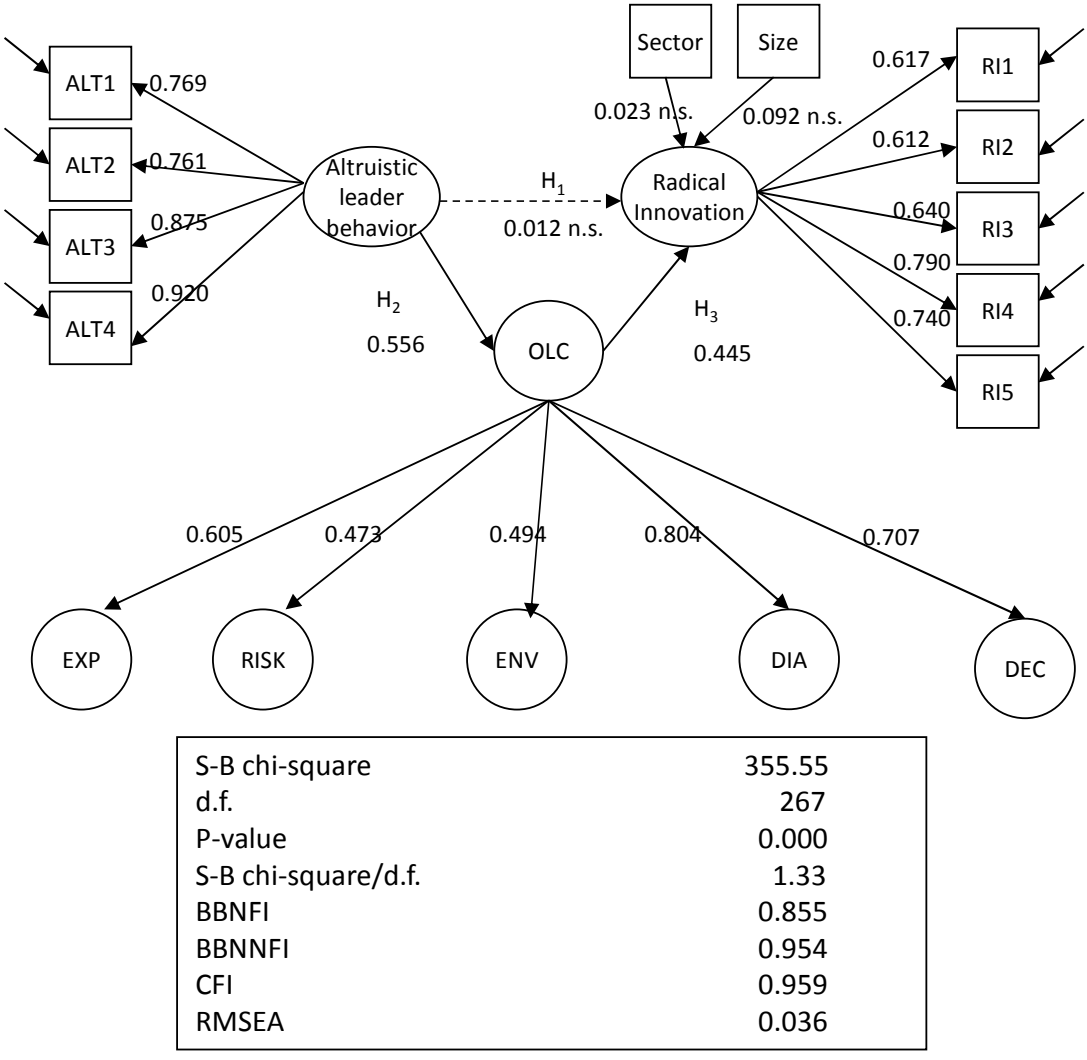



**Figure 1.4 Mediating effect model: Altruistic leader behavior, organizational learning capability and radical innovation.**



*Organizational learning capability (OLC) is a second-order factor. For the sake of brevity, only the first-order loadings are shown. The item loadings for these first-order factors are all significant at $p<0.001$.*

*Note: OLC = Organizational learning capability; EXP = Experimentation; RISK= Acceptance of risk; ENV= Interaction with the external environment; DIA = Dialogue; DEC = Participative decision-making.*

## 1.6 CONCLUSIONS

In the context of uncertainty and high competitiveness in which organizations operate, innovation has become an essential element to survive and achieve long-term success. Different types of innovation have engaged researchers' interest, particularly radical innovation, which has attracted a great deal of scholarly interest in recent years as reflected in the wealth of publications on this subject. Nevertheless, further knowledge is still needed on how to generate organizational environments in which radical innovations can thrive. Several authors have stressed the need to continue working on the antecedents of radical innovations and emphasize the importance of leadership as a facilitator of this type of innovation (Chang et al., 2012; Denti & Hemlin, 2012). The present study reflects this idea and analyzes a specific leader behavior category, altruistic leader behavior, and its influence on radical innovation. This type of behavior has been little studied (Dinh et al., 2014), despite being present in many relevant leadership styles, such as the transformational style, that are considered as alternatives to individualistic and selfish leadership styles.

Moreover, authors such as Koning et al. (2011) propose considering organizational context when studying the effect of leadership on innovation. Thus, the present study has aimed to empirically test the relationships between altruistic leader behavior, a specific context that fosters learning within organizations (OLC), and radical innovation. Results confirm the proposed conceptual model and the research hypotheses. The findings have important implications for the radical innovation literature, the organizational learning literature, and the leadership literature.

First, altruistic leader behavior is positively related to organizational learning capability, confirming hypothesis 1. Leaders who care for others unselfishly foster an organizational environment in which to experiment, discuss, take risks, interact with the

external environment and participate; in short, they create a climate that facilitates learning.

Second, this study offers empirical evidence that organizational learning capability increases radical innovation, confirming hypothesis 2. This result is consistent with previous research that related organizational learning to innovation (e.g., Alegre & Chiva, 2013; Baker &Sinkula, 2007; Jiménez-Jiménez &Sanz-Valle, 2011). It should also be noted that previous work used Chiva et al.'s (2007) instrument and related it directly with innovation (Alegre & Chiva, 2008). However, to our knowledge, no previous studies have related this construct to a certain type of innovation, such as radical innovation. Results confirm that organizational learning capability, measured by Chiva et al.'s scale, directly and positively affects radical innovation development.

Finally, altruistic leader behavior has a positive and indirect effect on organizational capability to develop radical innovations, mediated by organizational learning capability, confirming hypothesis 3. Organizational learning capability plays a key role in explaining how altruistic leader behavior affects radical innovation.

The present research contributes to increase understanding about the antecedents of radical innovation within organizations when the influence of altruistic leader behavior and organizational learning capability on radical innovation is empirically tested in the same model. It also confirms the positive relationship of each construct separately. Despite the growing body of research on radical innovation, to our knowledge this is the first study that relates the concepts of altruistic leader behavior and organizational learning capability to it. On another level, our research contributes to the leadership literature by focusing on altruistic leader behavior. Although altruism is included in different leadership styles, few studies have conceptualized it as such (Mallén, 2015; Sosik et al., 2009). The study also contributes to the organizational learning capability literature by highlighting the role of altruistic leader behavior in promoting an environment that fosters organizational learning and, in turn, radical innovation. Leaders who unselfishly care for others and seek to increase their welfare can foster an environment that facilitates experimentation, dialogue, risk taking, openness to the external environment and participative decision making. Akgün et al. (2007) state that altruism is a feeling of empathy and concern for others that helps one to consider and accept another person's opposing viewpoint. This allows the consolidation of a climate

of confidence and trust that fosters innovative and creative ideas by promoting communication, reducing the risk of unsatisfactory evaluation of the proposed ideas and facilitating decision making. Moreover, altruistic leader behaviors, through helping others, encourage employees to become involved with projects that go beyond their assigned tasks. These initiatives, as well as favoring dialogue between departments and the opportunity to make contact and communicate with the external environment, also promote experimentation when collaborating in completely new tasks.

The contributions of this research go beyond the academic field to the sphere of organizations and business. Our results suggest ideas for organizations that want to implement a working environment that fosters innovation performance in order to achieve radical innovations. Organizations face difficult challenges in a turbulent context characterized by constant and profound shifts, pushing them to innovate in order to be competitive. Organizations should be aware that fomenting altruistic leader behaviors encourages organizational learning, which in turn improves radical innovation. In principle, this idea may seem difficult to implement because promoting altruistic values is an unusual concept in the organizational world and is far removed from the ethos of many businesses.

Most managers work in stressful, time-constrained, and resource-limited environments that foster competition rather than cooperation, and self-interest rather than other orientations (Sosik, 2009:396). Nevertheless, for organizations to develop innovations, they must enable the appropriate environments and conditions that foster learning. By implementing leadership styles that are less egoistic and focus more on cooperation and helping others, they may achieve the radical innovations that are essential to organizational success in turbulent contexts.

For organizations to obtain altruistic leadership profiles, they must manage human resources policies, such as staff selection processes, training or evaluation of employees' performance. When recruiting new staff, for example, it may be desirable to seek profiles of people with a clear vocation for cooperation; altruistic behavior, as defined in the present study, should therefore be taken into account when defining the competences required, especially for managers and middle management. These profiles may, in turn, foster altruistic behavior in the organization. Leaders are models that other employees tend to imitate. Consequently, if leaders behave altruistically, they may help

to promote altruistic behaviors in the organization (Kanungo & Conger, 1993). Training may also be relevant when promoting an altruistic culture in the organizational environment. Rosen and Sims (2011) state that altruistic behavior is not necessarily an innate characteristic; they show that it can be promoted and encouraged and, therefore, it can be learnt. In addition, leadership can be developed (Crossan et al., 2013) and leadership traits such as egoism can be altered and improved through appropriate training programs (Hogan and Curphy, 1994). When evaluating employees' performance, it may be useful to include the altruistic behavior variable. This may help to transmit organizational values, explain the type of behavior required and, in turn, stimulate it. In short, this philosophy should be implemented in every human resources policy, all of which should be congruent with each other and aligned with the organization's strategy. Such initiatives may help to promote a culture and a working environment where concern and care for others override selfish and self-interested behaviors.

Despite the results, our research has certain limitations. The study was carried out on a particular population of organizations, so our results are obviously limited to this type of organization. The present study uses a sample of firms with an excellent human resource management record; our analysis was therefore of a heterogeneous sample in terms of size and industry, an aspect that could affect firms' organizational performance. Future research might consider conducting this study in firms from a single sector and of a similar size. It would also be interesting to perform this analysis in different countries. The survey uses single informants, which is the primary research design in most studies. Using a single informant can affect the results obtained due to the potential presence of common method bias. For this reason, it is advisable to collect responses for the dependent and independent variables from different information sources (MacKenzie et al., 2012; Podsakoff et al., 2012). Future research should consider using different informants for some variables, such as radical innovation. Although HR officers are experienced and have a global understanding of the company, R&D managers are likely to provide a more accurate response to innovation issues.

The study provides evidence of causality but cannot prove it by using cross-sectional data. Future research should attempt to overcome this limitation through longitudinal data. Finally, there is a need for further research on the antecedents that facilitate radical

innovation development. In addition, future studies should distinguish between incremental and radical innovation in order to learn whether our findings hold for both types of innovation. Future research should rectify and improve all the limitations detected in the present study.

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# Chapter 2

## How to achieve successful innovations through leader's stewardship behavior? The effect of radical innovation

# How to achieve successful innovations through leaders' stewardship behavior? The effect of radical innovation

## 2.1 INTRODUCTION

Innovation is one of the main mechanisms for organizations to improve their competitiveness and ensure their long-term survival. Globalization, increasing competition, profound social changes or continuous technological advances force companies to innovate in order to compete and succeed in a complex environment. For this reason, practitioners and scholars try to find out what factors help some companies to be more innovative than others.

However, it is not enough for organizations to develop any kind of innovations in order to ensure their continuity in the market and improve their performance and competitive position. It is essential for innovations to be successful (Cozijnsen et al., 2000). Innovation is an expensive and complicated process, subject to numerous uncertainties. While it is true that it can bring great benefits to organizations, it also carries many risks that could jeopardize the viability of a company (Sandberg and Aarikka-Stenroos, 2014). Therefore, it is important to know which mechanisms facilitate the development of innovative projects that may have a high rate of success. According to Cabello-Medina et al. (2011), successful innovation is considered the positive performance achieved by new products both commercially (sales, profitability, or market share) and non-financially (company image, customer loyalty, attraction of new consumers, profitability of other company products, or competitive advantage of the company).

Nonetheless, organizations should not develop innovations at any price, focusing only on the potential economic benefits they can obtain, without considering their ethical implications and consequences for society and the environment. As Broberg and Krull (2010) stated, creativity and innovation are not positive by themselves and need to be managed responsibly. Furthermore, leadership is one of the elements that determine the ability of companies to innovate, which, in turn, plays a key role in controlling the impact of organizations on society. Leaders seek to promote creativity and innovation, but they are also forced to act responsibly and achieve not only economic but also social

and environmental outcomes (Waite, 2013). Azapagic (2003) stated that for organizations to internalize the concern for sustainability, it is necessary to count on, among other factors, leadership. Nevertheless, there are many styles of leadership, and their effects may differ. Broberg and Krull (2010) considered that in an increasingly dynamic competitive environment in which business demands more responsibility, new approaches to leadership are required.

These new working environments need leadership styles that go beyond transactional styles (e.g., Avolio et al., 1999), such as transformational, spiritual, ethical or servant. However, some authors believe that these leadership styles have a broad nature and their effects on organizations are difficult to interpret (Rosing, 2011; Yukl, 2012). For a better understanding, more integration of the different leadership approaches, focusing on features of the leader, such as leader behaviors, contextual factors, etc., is required (Yukl, 2010). Given these considerations, this study focuses on a specific leader behavior, stewardship, which shows great concern for the impact of the organization's activity on society and the environment. Hernandez (2012, p.174) defined stewardship as "the extent to which an individual willingly subjugates his or her personal interests to act in protection of others' long-term welfare" and stated that these behaviors are a type of prosocial action that seek to have a positive effect on the others.

The study of stewardship has been gaining interest in recent years and several authors have tried to expand the literature on this concept. However, more research is needed because there is little information on the consequences of stewardship (Kuppelwieser, 2011). Some authors emphasize the importance of promoting stewardship behaviors in organizations in order to ensure the sustainability of the planet for future generations. For instance, Heuer (2010) stated that there is an added urgency to address the stewardship commitment of the private sector. Karns (2011) stressed the need to promote stewardship behaviors to strengthen an economy that incorporates a more humanistic and sustainable vision.

### 2.1.1 Radical innovation for sustainability

Our economic and productive system does not seem viable in the long term if current levels of pollution, consumption of raw materials, energy expenditure or social inequalities are maintained (Markman et al., 2016). Consequently, it seems compulsory to introduce radical changes to break with the economic paradigm maintained until the beginning of the present century. Concern for the future of society involves rethinking the current system and abandoning unsustainable patterns. Sustainable development demands innovative business solutions that go beyond the traditional objective of maximizing benefits (Osburg, 2013). Karns (2011) stated that a new business vision that goes beyond the culture of quick money and profit maximization is urgently needed. Old patterns have contributed to the development of unethical policies and the emergence of multiple scandals. This change will require creative and innovative solutions, involving a break with the past.

Innovation has been classified in different ways. One of the most popular types considers the magnitude of change or degree of novelty of the innovation (Cabello-Medina et al., 2011), so innovation exists along a continuum, from incremental to radical (Gatignon et al., 2002). The difference between the two types of innovation is not always clear (Koberg et al., 2003). Nonetheless, it is necessary to distinguish between the two types of innovation because the conditions to develop radical innovation clearly differ from those required for incremental innovation (Dewar and Dutton, 1986; McDermott and O'Connor, 2002; Story et al., 2014).

McDermott and O'Connor (2002) defined incremental innovation as extensions in existing products or minor improvements to existing processes. It is associated with the satisfaction of expressed needs and is considered the most common type of innovation (Baker and Sinkula, 2007). Radical innovation is a revolutionary or discontinuous change (Marvel and Lumpkin, 2007), a type of innovation that induces fundamental changes and a clear departure from existing practices in the organization (Crossan and Apaydin, 2010, p. 1168). Radical innovations have a high degree of novelty for the company that develops them, as well as for the market and the industry (Crossan and Apaydin, 2010). They are associated with the satisfaction of latent needs (Baker and

Sinkula, 2007), consist in fundamental changes that represent revolutionary modifications in technology (Dewar and Dutton, 1986) and serve as the basis for further technical developments (Datta and Jessup, 2013). Radical innovation may refer to a new product, service or production process (O'Malley et al., 2014). Product innovation is defined as the product or service introduced to meet the needs of the market or of an external user, and process innovation is understood as a new element introduced into production operations or functions (Alegre et al., 2005). In the present research, we focused the analysis on product and service innovation.

Radical innovation is the type needed to become truly responsible and sustainable and to overcome social and environmental issues. Shevchenko et al. (2016) pointed out that true sustainability requires firms to fundamentally change how they do business, and highlighted the importance of radical innovations to effectively achieve sustainability. Shu et al. (2016) showed that managers concerned about the natural environment foster radical innovation to a greater extent than incremental innovation.

On the contrary, incremental innovation does not eliminate the negative impacts of firms on the environment and society. Although organizations try to offset the social and environmental impacts of their activities through this type of innovation. It could be said, then, that companies become less unsustainable but not truly sustainable. By compensating for the negative impact inflicted, these innovations may assist companies in improving their negative image by helping them to appear ethical and fair, when in fact they maintain the same patterns and do not alter the way they do business. Nonetheless, the effects of these innovations are temporary. Given that the underlying problems remain, stakeholders will present new demands, thus increasing pressure on the firms and requiring new solutions (Shevchenko et al., 2016).

To sum up, many organizations are in favor, from a theoretical point of view, of incorporating sustainability and social and environmental issues in their activity, but in practice they are reluctant to carry them out for fear of losing benefits (Waite, 2013). Consequently, despite the increasing awareness of ethical, social or sustainable issues, companies are still prioritizing economic goals (Markman et al., 2016). We remain in a transition period where companies are not truly sustainable, but only focused on

reducing their impact on society and environment instead of eliminating it (Shevchenko et al., 2016). For this reason, it is necessary to study the consequences of incorporating these values in the organization, in order to highlight the potential benefits or positive outcomes they may achieve. Therefore, this research seeks to demonstrate empirically that leaders' stewardship behavior positively influences the ability of organizations to develop successful innovations thanks to radical innovation. The study was carried out between 2010 and 2015, with the participation of a group of companies with high ratings from their own workers in terms of human resources policies.

The next section reviews the literature on the variables under study and proposes hypotheses. Then, we analyze the relationships between the variables. The methodology used in the present research is explained and the main conclusions are presented. Finally, possible limitations of the study are analyzed and future research suggested.

## 2.2 LITERATURE REVIEW AND HYPOTHESES

From the review of the literature on the variables presented in the study, we have developed a conceptual model (Figure 1) that tries to explain the effects of leaders' stewardship behavior on innovation success through radical innovation. Stewardship behavior better explains the success of innovations when the mediator effect of radical innovation is taken into account.

### 2.2.1 Leaders' stewardship behavior

Stewardship theory has its roots in psychology and sociology, and it emerges as a counterpoint to agency theory which, from an economic approach, considers that managers are individualistic, selfish, opportunistic, and only look after their own interests. Stewardship theory points out that managers are not exclusively motivated by individualistic goals but also by collectivistic and pro-organizational objectives (Davis et al., 1997). Gini and Green (2014) considered that these leaders prioritize the needs, aspirations, and values of their followers by being at the service of others and seeking

the common good. Behaving in one way or another is a personal and conscious decision (Davis et al., 1997).

Stewardship behavior is motivated by higher-order needs (growth, self-fulfillment or achievement) and intrinsic factors (Davis et al., 1997). Hernandez (2012) stated that stewardship behaviors arise from two psychological mechanisms: a concern for others in the long term and an emotional connection with them. Leaders with this behavior identify themselves with the organization, use personal power to influence others, involve employees, promote participation, trust decision-making, etc. (Davis et al., 1997). Furthermore, stewardship is related to specific leadership styles. It is one of the factors that make up servant leadership (Barbuto and Wheeler, 2006) and one of the key elements of ethical leadership (Gini and Green, 2014).

The final addresses of stewardship behaviors are both the organization and the external community and its members (Hernandez, 2012). These leaders, although they work in private organizations and seek profits for their shareholders, go beyond the organizational interests, trying to meet the demands of society. Leaders who follow the principles of stewardship try to satisfy the general interest and want everyone to be able to benefit from the activity of their organizations (Heuer, 2010).

Stewardship behaviors take place within a context of intergenerational dilemmas. The consequences of decisions made in the present will be suffered by other people in the future, thereby relating this construct with sustainability (Hernandez, 2012). For instance, stewardship is related to the concern for ecology and environmental conservation (Karns, 2011). When thinking about future generations, organizations must control the consumption of natural resources used to carry out their activity, by not consuming more than is needed, thereby preserving the environment and saving global resources to serve the needs of future generations (Heuer, 2010). These leaders understand that organizations have a legacy to defend (Barbuto and Wheeler, 2006). They want to create long-term wealth and prioritize sustainability (Caldwell et al., 2008; Hernandez, 2008). Stewardship behavior looks for a positive change both in organizations and in society through the development and improvement of the

community, giving back to society what an organization perceives and leaving things better than the way they were found (Gini and Green, 2014).

These leaders must extend their commitment to all members of the organization to ensure that everybody works to achieve a positive legacy for the society. This requires organizations to develop the necessary conditions to expand stewardship behavior throughout the company. Hernandez (2008) stated that stewardship is not created through formal structures but rather through structures that help leaders to generate interpersonal and institutional trust, clarity in organizational strategy, and intrinsic motivation in followers that, in turn, encourages them to act with moral sense at the service of the organization. All members of the company must be responsible for their actions as well as their effects on society and the environment.

Finally, stewardship must be differentiated from altruism or organizational citizenship behavior because stewardship tries to benefit collective and wider interests, and focuses on the long term (Hernandez, 2012).

### 2.2.2 Leaders' stewardship behavior and radical innovation

Previous research has suggested that organizations with an orientation toward sustainability are likely to promote innovation in order to solve ecological, social or economic problems, to improve living conditions, and to create a better future for coming generations. In fact, innovation is an important means to deal with sustainability questions, by avoiding harm and doing good (Voegtlin and Scherer, 2017). To achieve a more sustainable development, a structural change in the way of producing and consuming is demanded (Shevchenko et al., 2016). Organizations have to proactively manage social and environmental concerns by innovating in products, services, and processes (Marcon et al., 2017). For instance, Dangelico and Pujari (2010) stated that the concern that companies have for social and ecological issues, usually motivated by an internal orientation or the personal commitment of top managers, is the reason to develop new green products. In addition, corporate environmental ethics, which include long-term sustainable thinking and consideration for multiple stakeholders' interests, positively affect green product and process innovation (Chang, 2011). Chakrabarty and

Wang (2012) related high R&D intensity in multinational corporations to sustainable practices. These companies adopt a long-term focus that may be beneficial for society and the environment in the future. Bocquet et al. (2013) highlighted that social and environmental concerns, when aligned with the corporate strategy, lead to enhanced technological innovation. Similarly, Dibrell et al. (2015) pointed out that firms can be more innovative when considering social demands and environmental issues.

Leaders play an essential role in promoting sustainable practices within their organizations by serving as models for other employees and making decisions to adopt and implement responsible initiatives (Rego et al., 2017). New leadership styles can contribute significantly to society through innovation that meets social needs (Klaus and Fernando, 2016; Maak et al., 2016). Stewardship behavior highlights the moral role of organizations to contribute to society and stresses concerns about the future. Accordingly, leaders that emphasize morality, social responsibility, and people orientation are more likely to promote innovative work behavior among employees (Yidong and Xinxin, 2013). Similarly, Nunn and Avella (2015) stated that leaders who prioritize moral values and are concerned for the long-term consequences of their decisions motivate employees and serve to enhance, inspire, and provide the foundation needed for innovation. In fact, employees motivated by prosocial behaviors that seek to benefit others are more likely to focus on novel ideas, as they perceive the usefulness of solving problems for people inside and outside the organization (Grant and Berry, 2011). Furthermore, business leaders who consciously consider the impact of corporations on the socioeconomic and environmental ecosystem find innovative solutions to social problems, uncover innovative ways to enhance social, environmental and economic issues, seek to create enduring social value and promote the betterment of humankind through responsible innovations (Nga and Shamuganathan, 2010).

Most of the innovations that pursue sustainability and long-term welfare are new to the world, and of a disruptive or radical nature. This is because what is needed is “a big step forward in innovative thinking in order to achieve a sustainable future” (Schmidpeter, 2013, p. 1). Accordingly, Bos-Brouwers (2010) stated that companies pursuing sustainability usually develop radical innovations, as they stress value creation. In the same vein, Dangelico and Pujari (2010) pointed out that innovation that meets green

objectives must be radical in order to contribute to the achievement of environmental sustainability. Concern about environmental issues and sustainability involves more than just implementing minor changes, as they often involve rethinking current processes and products (Shu et al., 2016).

Therefore, we propose the first hypothesis:

H1: Leaders' stewardship behavior has a positive effect on radical innovation

### 2.2.3 Radical innovation and innovation success

Innovation success has been used as a guideline to measure the results organizations achieve through innovation (Cabello-Medina et al., 2011). However, this is a very broad concept and what is meant by a successful innovation depends on how it is defined and interpreted. For example, within the same organization, some departments can appreciate the technological concepts of a new product, while others will be more interested in its financial performance (Cooper and Kleinschmidt, 1995). For this reason, when studying the success of innovations, some authors have focused their analyses on the economic performance achieved with innovation, such as market share, sales, profits, etc. (Cooper and Kleinschmidt, 1987). However, others have a broader view of what should be considered a successful innovation. Cabello-Medina et al. (2011) and Avlonitis et al. (2001) stated that, besides the results in the economic field, the consequences in the non-financial areas (a more positive image of the organization, maintenance of consumers, improving the profitability of other products, etc.) should be included in the analysis. The results that are taken as a measure of innovation success must be quantifiable or standardized in some way. Some are easily measurable, like economic results, while others are more complicated, such as those related to motivations or satisfaction. To be able to measure the results of an innovation project objectively, both types of measures must be taken into account (Cozijnsen et al., 2000). The present study has followed the approach of Cabello-Medina et al. (2011) and Avlonitis et al. (2001), using both financial and non-financial indicators to measure innovation success.

Factors that determine the success of innovation are diverse. Brentani (2001) stated that to know the factors that promote the development of successful innovations it is necessary to differentiate among innovation types or innovation grades because, depending on each category, the mechanisms needed might be substantially different. Moreover, she pointed out that most of the literature that tried to explain which factors facilitate successful innovations has ignored this fact. Brentani (2001) showed some of the elements that facilitate the success of radical product innovations, namely, offering a significant advantage, having an organization with a clear innovation strategy; developing a new product that is understandable by consumers; etc.

Competitive advantages obtained with radical innovation are better than those gained through incremental innovations (Baker and Sinkula, 2007; Chandy and Tellis, 2000). It is essential therefore for organizations, and many authors relate it with success and survival in the long-term. For example, it is crucial to renew or maintain the competitive position of a company (Chandy and Tellis, 1998) and allows companies to establish themselves or to grow substantially (Herrmann et al., 2007). Slater et al. (2014) stated that radical product innovations offer unprecedented customer benefits, substantial cost reductions, or the ability to create new businesses, any of which should lead to superior organizational performance. Additionally radical innovations may have a positive effect in a not strictly financial sense, improving company’s image, building loyalty among existing customers, attracting new customers, etc. (Avlonitis et al., 2011).

When radical innovations appear, important and profound changes in the competitive environment occur. Companies leading the market often lose their dominant position when a radical innovation is introduced. Small new companies entering the market have the ability to eliminate incumbent companies by radical innovation (Chandy and Tellis, 1998). When it is introduced in the market, it may cause the organizational skills and existing products of competitors to rapidly become obsolete (Chandy and Tellis, 2000; Yang et al., 2014). Therefore, radical innovations have the potential to derail those incumbent competitors that are unable to respond promptly to the challenges posed by competition. However, radical innovation is not only an ability of new competitors, and both startups and established or leading companies can develop it (Sorescu et al., 2003).

Gatignon and Xuereb (1997) showed that there is a positive relationship between innovation success and radical innovation. The more the innovations are differentiated from existing products and services, the greater the advantage an organization can achieve. Therefore, the greater radicalness is, the better the results of innovation will be.

However, radical innovations do not always have a positive result because they are difficult to interpret by the market, they are not understood or accepted. Cabello-Medina et al. (2011) conducted a study to differentiate the most successful innovative companies from the less successful. In this study they demonstrated that companies which are more successful with their innovations are those that provide unique products or services, as well as incorporating new technologies and meeting new consumer demands. However, the success of an innovation is lower if it is not understood by the market. Although radical innovations fulfill customer benefits better than existing products, given that they are unique, complex, unfamiliar, and provide a high degree of novelty, consumers need time to understand the new concept and its advantages. The adoption effort and the degree of learning are higher in this type of innovation. For these reasons, it is necessary to provide meaningful innovations to be accepted by consumers and markets. All this allows us to consider the second hypothesis.

H2: Radical innovation has a positive effect on innovation success

### 2.2.4 Leaders' stewardship behavior and innovation success: the mediation role of radical innovation

Stewardship behavior seeks to meet organizational goals such as profitability or sales growth, which leads to higher performance, promoting organizational success as a result (Davis et al., 1997). In addition, organizations that encourage sustainability-oriented innovation practices improve economic and non-financial performance (Maletič et al., 2016). Therefore, innovations with an ethical aim or which are socially responsible may also achieve good performance and be successful. For example, Halila and Rundquist (2011) stated that eco-innovations have an important impact on economic development

and may help to recover in periods of crisis. Tsen et al. (2006) pointed out that consumers are willing to pay more for environmentally friendly products. Therefore, bearing in mind the definition of innovation success adopted in the present study, it could be reasonably argued that stewardship behaviors may support innovation success.

There is greater social pressure that penalizes organizations that violate regulations and provides advantages to businesses that show a real commitment to solve social problems (e.g., by going beyond minimal compliance with rules and laws). Organizations know that incorporating corporate social responsibility as a part of their business will yield positive returns. If society perceives that an organization does not act responsibly toward the environment, people will react unfavorably to the organization, whose economic returns will be lower (Heuer, 2010). This has been demonstrated previously from a financial point of view. Organizations that do not work socially responsible strategies have poorer economic performance than those that do (Becchetti, 2012). With a more receptive market for these issues, companies that develop innovations to meet social and environmental challenges are more likely to be accepted and may get both financial and non-financial benefits.

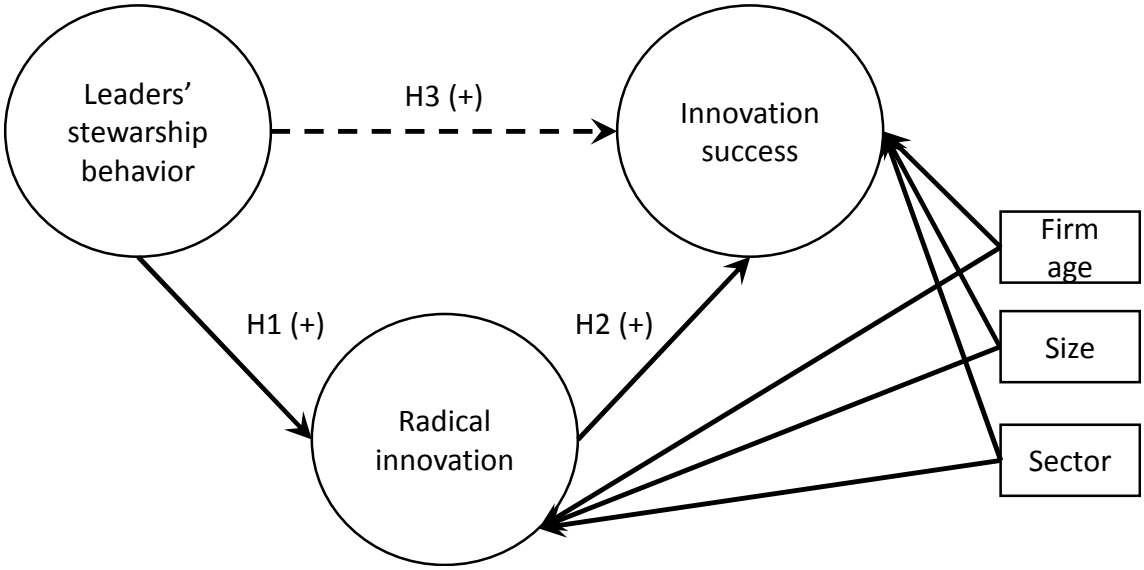
The social and environmental issues faced by the world nowadays require innovative solutions that involve breaking away from current economic and productive models because they are responsible for creating and exacerbating them. Somehow, it can be said that the concern for the welfare of others and the need to solve social and ecological issues force organizations to radically innovate. Incremental innovations do not change business models and represent temporary solutions to calm stakeholders and minimize the impact of the organization (Shevchenko, 2016). For instance, Plambeck (2013) stated that radically new business models are needed to achieve environmental sustainability. Schaltegger and Wagner (2011) stated that innovation for sustainability usually has the characteristics of a radical innovation. Cohen and Winn (2007) stated that by radically innovating in new technologies and business models, social and environmental conditions will be improved.

Poor organizational image or products that are incompatible with social values and concerns may be rejected by society. The success of an innovation not only depends on

the degree of novelty that it brings to the market, but must also be consistent with the values, needs, and concerns of society. Jepsen et al. (2014) noted that living standards are getting higher and are pushing companies to develop products and services that are not only profitable but also socially responsible. Szekely and Strebel (2013) claimed that companies may help to build a more sustainable society by innovating in products and services that help to fulfill a social need. Thus, the third hypothesis is proposed:

H3: The relationship between leaders' stewardship behavior and innovation success is mediated by radical innovation

**Figure 2.1. Conceptual model: leaders' stewardship behavior, radical innovation, and innovation success**

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## 2.3. RESEARCH METHODOLOGY

### 2.3.1 Data collection

The present study has been based on a sample frame of Spanish leading companies in human resources management and considered by their own employees as excellent places to work. The total sample frame was 402 companies and it was shaped from the following databases: CRF Institute's 'Top Companies to Work For' and 'Top Employers', firms from the Great Place to Work consulting company list, and the

Merco Personas list of best companies to work for, published by the journal Actualidad Económica. Guinot et al. (2016) stated that given the particular qualities and conditions shared by these firms, the relationships among the variables arising in these working environments can be a subject worthy of in-depth examination. Finally, a sample of 300 questionnaires was obtained from 150 different companies. Regarding the number of companies, we obtained a response rate of 37.3%. In this sense, we followed the simple random sampling technique. The questionnaire was addressed to human resources and innovation managers, with at least two years' experience in the firm. In each company we collected two different questionnaires; 150 were responded by human resources managers, while the other 150 were addressed to innovation managers.

The questionnaire addressed to human resources managers consisted of 5 items measured using a five-point Likert scale, while innovation managers answered 17 items measured with a seven-point Likert scale. All indicators were expressed in a positive way and respondents had to express their agreement or disagreement with each statement included in the questionnaire. The survey was completed via telephone interviews. This technique is useful to interview people who are hard to reach, as in the case of the managers of major companies in this study.

During both the research design and the data analysis stages we followed recommendations to prevent or assess the effect of Common Method Variance (CMV), such as obtaining the responses at different moments or using different scale endpoints (e.g., Chang et al., 2010). The fieldwork was carried out between October and December 2010, and May and June 2015. In 2010, interviewees answered questions related to the stewardship scale; in 2015, respondents gave information about radical innovation and innovation success. Although a period of five years was considered to test the effects of stewardship behaviors on radical innovation and innovation success, all the questions about innovation were focused on the innovations of the last two years.

As previous studies have used manager perceptions to evaluate leaders' behaviors in their organizations and human resources managers are a particularly reliable source to measure how they perceive different leadership styles in their companies (Birasnav, 2014), we chose them to test the stewardship behaviors of the leaders of their own

organizations. We considered that these managers have an overall view and an in-depth knowledge of the organization because of their position and their experience within it. Through their close contact with different departments, they can provide an accurate picture of what happens in their organizations, and are therefore a reliable source of information to evaluate the company as a whole. Innovation managers answered questions related to radical innovation and innovation success because of their profound knowledge in this field. Innovation manager is an employee whose responsibilities focus on the development of new products, services or processes. Given that organizations do not frequently use "innovation manager" as job title, they often create specific positions to oversee innovation teams. Respondents included product managers, R&D managers, technical managers or marketing managers, which have been professional profiles used to measure radical innovation in previous research (e.g., Cabello-Medina et al., 2011; McDermott and O'Connor, 2002). To encourage participation, respondents' anonymity was guaranteed, which motivates respondents to answer more honestly, thereby increasing the reliability of the results.

The questionnaire was administered in Spanish to all participants. In order to ensure the accuracy of the translation, a double-back translation procedure was utilized.

### 2.3.2 Measurement instruments

The choice of measurement instruments was based on a review of previous literature in order to decide which scales best meet the research needs. The measurement scales selected have already been used and validated by other researchers in earlier studies. The reliability of the scales was assessed using Cronbach's alpha.

#### Leaders' stewardship behavior

Stewardship behavior was measured using a scale based on the work developed by Barbuto and Wheeler (2006), who proposed five items to measure this behavior in leaders. Respondents evaluated the leaders of their company or organization by assessing the following items: 1) The leaders of this organization believe that the organization needs to play a moral role in society; 2) The leaders of this organization

believe that our organization needs to function as a community; 3) The leaders of this organization see the organization for its potential to contribute to society; 4) The leaders of this organization encourage me to have a community spirit in the workplace; and 5) The leaders of this organization are preparing the organization to make a positive difference in the future. The construct obtains a Cronbach's alpha of 0.85.

**Radical innovation**

The scale for measuring radical innovation was based on the studies of Marvel and Lumpkin (2007) and Gatignon et al. (2002). Respondents had to think only about the most important product or service innovations developed by their companies in the last two years, and then evaluated the extent to which they agreed or disagreed with the following items: 1) These innovations represent an entirely new type of product/service; 2) These innovations can be described as totally new innovations; 3) These innovations meet a want or a need that has not been addressed by other products/services; 4) These innovations involve a revolutionary change from the latest generation of these products; 5) These innovations could be described as a new product line; and 6) These innovations are significant or leading innovations. The reliability for this construct is guaranteed with a Cronbach's alpha of 0.93.

**Innovation success**

Innovation success is based on the scales of Avlonitis et al. (2001) and Cabello-Medina et al. (2011), which measure innovation success with financial and non-financial criteria. Again, respondents had to think about the most important innovations of the last two years. Items that measured innovation success were: 1) They were profitable; 2) Their total sales were high; 3) They had a large market share; 4) They exceeded their profit objectives; 5) They exceeded their sales objectives; 6) They exceeded their market share objectives, 7) They had a positive impact on the company’s perceived image; 8) They improved the loyalty of the company’s existing customers; 9) Their introduction enhanced the profitability of other company products; 10) They attracted a significant number of new customers to the company; and 11) They afforded the

company an important competitive advantage. The Cronbach's alpha of this construct is 0.95.

### 2.3.3 Control variables

Firm size, firm age and sector have been used as control variables because they may explain differences in innovation success and radical innovation. Several authors have shown the influence of these variables on innovation (Chandy and Tellis, 2000; Huergo and Jaumandreu, 2004). In addition, they have also been used as control variables in previous research (Cabello-Medina et al., 2011; Jiménez-Jiménez and Sanz-Valle, 2011; Reid et al., 2015).

With the aim of controlling for the sector of the organizations, respondents classified their companies into one of the two categories proposed in the questionnaire (frequencies for each category in our sample appear in brackets): manufacturing companies (30.0%) and companies from services sectors (70.0%).

Regarding firm size, the sample had the following distribution: fewer than 50 employees (20.7%), between 50 and 100 employees (15.3%), between 101 and 250 employees (19.3%), between 251 and 500 employees (20.7%), between 501 and 1,000 employees (21.3%), and firms with more than 1,000 employees (2.7%).

Finally, according to their age, companies were distributed as follows: less than 10 years (10.7%), between 11 and 20 years (22.7%), between 21 and 30 years (27.3%), between 31 and 40 years (12.7%), between 41 and 50 years (9.3%), and more than 50 years (17.3%).

### 2.3.4 Analyses

In order to test the hypothesized relationships, and in accordance with previous research (e.g., Hernandez et al., 2016), all analyses were performed with the PROCESS macro for SPSS (Hayes, 2013). Therefore, a bootstrapped confidence interval was employed to empirically validate the proposed indirect effect. SPSS and AMOS v.23 were also used

to obtain descriptive statistics as well as to assess psychometric properties of the measurement scales.

## 2.4. RESULTS

### 2.4.1. Descriptive statistics and psychometric properties of the measurement scales

The data analysis began with the descriptive statistics. Table I exhibits means, standard deviations, and factor correlations. The psychometric properties of the measurement scales were evaluated by following accepted practices in the literature (Anderson and Gerbing, 1988), namely, by studying their dimensionality, reliability, and content, convergent and discriminant validity (Tippins and Sohi, 2003).

Regarding the structure of the constructs, we followed the most commonly used approach (Anderson and Gerbing, 1988) of assessing a full measurement model that includes all the variables. Testing a full measurement model establishes the structure of the variables in the context of other variables measured in the study, and ensures that the measures used in the study are distinct from one another. The overall fit of this general measurement model was as follows: Chi square (df) = 262.45 (206); p = 0.00; CFI = 0.976; RMSEA = 0.043. The Chi square statistic was non-significant and all the standardized estimates were significant and in the expected direction.

The results of the reliability analysis were also satisfactory. Cronbach's alpha coefficient values and the compound reliability values were equal to or exceeded 0.8 (Table II), above the minimum accepted value of 0.7 (Nunnally, 1978).

The procedure followed to select the measurement scales supports content validity. The variables used to measure radical innovation were taken from the scales proposed by Marvel and Lumpkin (2007), and Gatignon et al. (2002). The leaders' stewardship behavior items were taken from a scale validated in a previous study (Barbuto and Wheeler, 2006), in which leaders' stewardship behavior was introduced as one

component of servant leadership. Finally, innovation success was measured with items from the scales validated by Avlonitis et al. (2001) and Cabello-Medina et al. (2011).

Convergent validity was evaluated through Bentler-Bonett's normed fit index (Bentler and Bonett, 1980) and average variance extracted (Fornell and Larcker, 1981, p. 45-46). According to Bentler-Bonett's normed fit index, when the value of a scale is above 0.9, there is strong convergent validity. Moreover, average variance extracted must be 0.5 or higher. All the constructs in the present study exceeded the recommended minimum values (Table II).

Finally, discriminant validity exists when the square root of the average variance extracted is greater than the construct correlations, suggesting that each construct relates more strongly to its own measures than to others (Table III).

**Table 2.1. Factor correlations, means, and standard deviations**

| | **Means** | **s.d.** | **ST** | **IS** | **RAD** |
|---|---|---|---|---|---|
| Leaders' stewardship behavior | 4.05 | 0.47 | 1 | | |
| Innovation success | 5.54 | 1.03 | 0.204* | 1 | |
| Radical innovation | 5.33 | 1.22 | 0.198* | 0.665** | 1 |

*Notes: For the standard deviations and factor correlations, we used the mean of the items making up each dimension. Cronbach's alpha coefficients are given in parenthesis.*

** Significant correlation ($p < 0.05$). Other correlations not marked with an asterisk present a significant correlation at $p < 0.01$.*

*Note: ST=stewardship; IS= innovation success; RAD= radical innovation*

**Table 2.2. Reliability of the measurement scales**

| Construct | Composite reliability | BBNFI | Cronbach's alpha |
|---|---|---|---|
| Leaders' stewardship behavior (5 items) | 0.87 | 1.00 | 0.85 |
| Innovation success (11 items) | 0.95 | 0.94 | 0.95 |
| Radical innovation (6 items) | 0.95 | 0.98 | 0.93 |

**Table 2.3. Discriminant validity**

| | ST | IS | RAD |
|---|---|---|---|
| Leaders' Stewardship behavior | (0.58) | | |
| Innovation success | 0.04 | (0.62) | |
| Radical innovation | 0.04 | 0.44 | (0.71) |

*Note: In parentheses, extracted mean variance. ST=stewardship; IS= innovation success; RAD= radical innovation*

### 2.4.2. Testing the research hypotheses

To test the first hypothesis, we examined the relationship between leaders' stewardship behavior and radical innovation ($a = 0.59$, $t = 2.65$, $p < 0.05$). In a second step and in order to test the second hypothesis, we explored whether radical innovation predicted innovation success ($b = 0.55$, $t = 10.26$, $p < 0.01$). Results provided support for both hypotheses.

Hayes (2012, p. 13) stated that modern thinking about mediation analysis does not require evidence of a total effect prior to the estimation of direct and indirect effects.

However, it should be noted that our results showed that the total effect was statistically different from zero ($c = 0.53$, $t = 2.87$, $p < 0.01$, see Figure 2). Bearing in mind this consideration, certain conditions must be met for mediation to be supported: (1) if a significant relationship between leaders' stewardship behavior and innovation success is observed in the model without the mediator construct (total effect model), it must decrease considerably or disappear in the mediation model; (2) the mediation model must explain more variance in innovation success than the total effect model; (3) there must be a significant relationship between radical innovation and innovation success; and (4) in the mediation model, there must be a significant relationship between leaders' stewardship behavior and radical innovation. Besides, the significance of the mediated effect should be tested using bootstrapping (Hayes, 2013; MacKinnon et al., 2012).

As shown in Figures 2 and 3, all the above conditions are met, thereby confirming the mediating role of radical innovation in the relationship between leaders' stewardship behavior and innovation success. Firstly, the significant relationship between leaders' stewardship behavior and innovation success ($c = 0.53$, $t = 2.87$, $p < 0.01$) shown in the total effect model not only decreases when it includes the mediating effect of radical innovation, but also becomes non-significant ($c1 = 0.21$, $t = 1.48$, $p > 0.05$). Moreover, the mediation model explains more variance than the model without the mediator (0.46 vs. 0.06). Additionally, there is a significant relationship between leaders' stewardship behavior and radical innovation ($a = 0.59$, $t = 2.65$, $p < 0.01$), which confirms Hypothesis 1, and radical innovation influences innovation success ($b = 0.55$, $t = 10.26$, $p < 0.01$), as predicted in Hypothesis 2. Finally, the estimated indirect effect of leaders' stewardship behaviour on innovation success is 0.32. The 95% bias-corrected confidence interval for the indirect effect (ab) based on 5,000 bootstrap samples was entirely above zero (0.06 to 0.73). Thus, the indirect effect of leaders' stewardship behaviour on innovation success is significantly different from zero and the null hypothesis of no mediation effect can be rejected. Therefore, Hypothesis 3 is also confirmed.

Regarding the control variables, none of them has a significant effect on radical innovation (firm age: $d1 = 0.01$, $t = 0.53$, $p > 0.05$; firm size: $d2 = 0.04$, $t = 0.56$, $p > 0.05$; sector: $d3 = -0.04$, $t = -0.17$, $p > 0.05$) or on innovation success (firm age: $g1 =$

0.01, t = 1.06, p > 0.05; firm size: g2 = -0.06, t = 1.14, p > 0.05; sector: g3 = -0.06, t = -0.43, p > 0.05).

Some authors (Becker, 2005; Hernandez et al., 2016) recommend supplemental analyses to strengthen the confidence in the results, the hypotheses being tested without any control variables. The analyses yield essentially the same results, which provides further support for our hypotheses. First, and consistently with Hypothesis 1, stewardship behaviour was significantly related to radical innovation (b = 0.51, t = 2.45, p < 0.05). Second, giving support for Hypothesis 2, radical innovation was positively related to innovation success (b = 0.55, t = 10.40, p < 0.01). Finally, in line with Hypothesis 3, bootstrap analysis yielded an indirect effect = 0.28 and a CI95% = (0.04, 0.68).

**Figure 2.2. Total effect model (without mediator): leader's stewardship behaviour and innovation success**

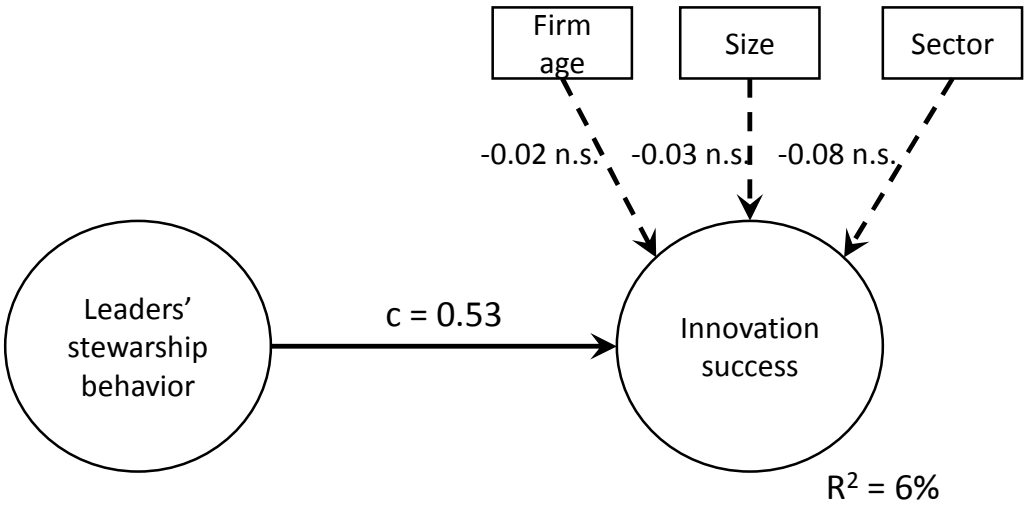
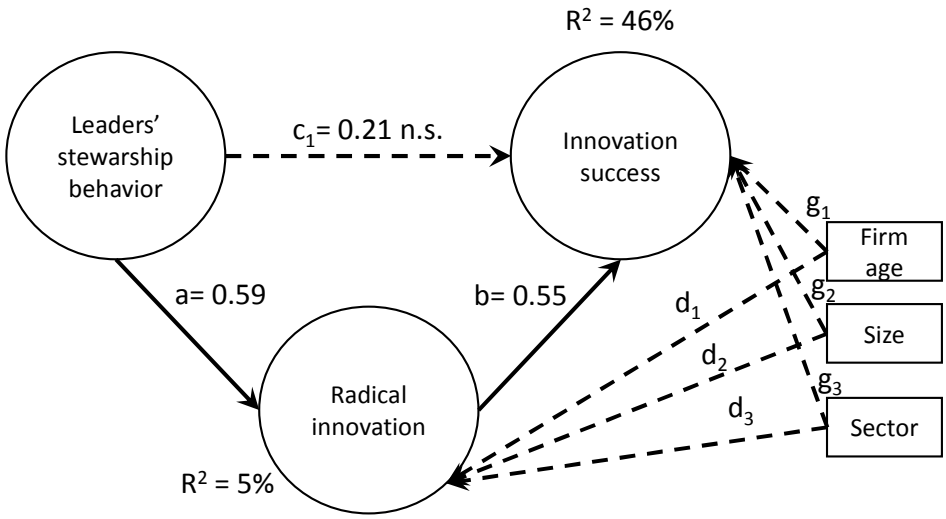


**Figure 2.3. Mediation model: leader's stewardship behaviour, radical innovation and innovation success**




*Indirect effect = 0.32 $CI_{95\%}$ = (0.04 , 0.68)*
*(Bootstrap samples = 5,000)*
*Dash lines stands for non-significant relationships*

## 2.5. CONCLUSIONS

Organizations are increasingly aware of social, environmental, and ethical issues, and attempt to promote positive changes that benefit society in the long term instead of minimizing harm (Markman et al., 2016). However, most companies are still prioritizing the economic goals over sustainability, relying on old patterns and implementing small changes to calm their stakeholders and improve their corporate image, in an attitude that should be considered unethical. In this sense, instead of becoming less unsustainable, firms should take a further step in order to be truly sustainable. The transition to this new paradigm will require engaging in radical innovations (Shevchenko et al., 2016). Nonetheless, unless organizations realize that the consequences of incorporating social and ethical values may be highly positive, they are unlikely to change current patterns. Therefore, this study covers an area of great interest to both academics and practitioners by proposing a model that deepens the knowledge about the factors that promote successful innovations, specifically through radical innovation and leaders' stewardship behavior.

All the research hypotheses have been confirmed. First, stewardship behavior promotes the development of successful innovations. Leaders who care for the impact of their organizations in society, as well as social issues and global threats, create a positive organizational climate that fosters the development of innovations which have a positive impact on organizations, both in terms of economic performance and non-financial benefits. Second, the study provides empirical evidence that radical innovation is positively related to innovation success. This relationship confirms what has been reported by previous studies (e.g., Gatignon and Xuereb, 1997). Finally, the last hypothesis shows that the relationship between leaders' stewardship behavior and innovation success is positively mediated by radical innovation.

Results have important implications for the literature on radical innovation, innovation success and stewardship behavior. The present research helps to gain more in-depth knowledge about the antecedents of radical innovation, provides information about the consequences of stewardship, and clarifies the mechanisms that facilitate innovation success. It is important to highlight the role of leaders' stewardship behavior. As internal processes and willingness to be sustainable are more important than external pressures from stakeholders to be truly sustainable (Shevchenko et al., 2016), it is necessary to disentangle which factors within the organization promote change in order to build a fairer society. Additionally, as incremental innovations do not change the nature of current products, services or business models, radical innovation is the way to disrupt current paradigms and achieve a more sustainable society (Shevchenko et al., 2016; Schaltegger and Wagner, 2011). And last but not least, this research helps to determine the factors that promote innovation success by focusing on a particular innovation type and a specific context, namely, studying leaders who are concerned about the impact of their organizations on society and the natural environment. In this sense, we have tried to overcome some of the common mistakes made in the studies that analyze the promoters of innovation success (Cozijnsen et al., 2000).

### 2.5.1 Implications for practitioners

Results obtained in the present study may help organizations to be more aware of the consequences of promoting stewardship behaviors in their companies. Concern for

major issues that globally affect people and the social consequences of business activity may have a positive potential for organizations. Companies that foster stewardship behaviors may promote radical innovation to succeed and ensure their continuity in the long term. Positive outcomes are not limited to the economic field but also include a range of non-financial benefits, such as organizational image. Organizations must internalize the idea that this kind of behavior should be part of their culture and managers have to expand these values among their subordinates. It must not be simply a slogan that is part of the marketing policies of a company to persuade some of the potential consumers or stakeholders. Through the present study we highlight the potential of stewardship behaviors to develop successful innovations that meet the needs of potential customers, tackle the problems of society and, in turn, provide positive outcomes to organizations. Benefits of stewardship are shared by both the organization and society, in a new working environment that is less selfish and more responsible. Companies wishing to promote such values should manage their human resources policies in such a way as to incorporate new employees who share these principles, and train current employees and managers to enhance stewardship behaviors. An example of training to promote stewardship behavior is the PricewaterhouseCoopers' Ulysses Program, in which participants work in community service projects, fighting against poverty-related problems or environmental issues in developing countries. This program promotes a socially responsible reflection on the role played by managerial leaders. For further information about the program, see Pless and Maak (2010). Some examples of policies that might be promoted by these leaders could be: relying on renewable natural resources, reducing pollution, avoiding sourcing from poor countries, respecting human rights, taking care of surrounding communities, and creating new products and processes that prioritize the preservation of nature and support the community, etc. (Shevchenko, 2016).

### 2.5.2 Limitations and future research

Despite the results, our research has certain limitations. The study was carried out on a particular population of organizations, so our results are obviously limited to this type of organizations, firms with an excellent human resources management record.

Our sample was heterogeneous in terms of size, age, and industry, an aspect that could affect firms' innovation success. Future research might consider conducting this study in firms from a single sector. Distinction between start-ups and incumbent companies might clarify the influence of organizational age in the studied variables. Focusing on large companies or SMEs, may help to disentangle the potential effect of organizational size on innovation. Moreover, given that innovation performance varies between countries (European Innovation Scoreboard, 2017), it would also be interesting to perform this analysis in different countries.

Additionally, this research did not differentiate between product, service or process innovation. Considering the specific features of these typologies, future studies should distinguish between these types of innovation and analyze the different stages of the innovation process. In addition, it would be advisable to study the influence of leaders' stewardship behavior on other variables related to innovation, such as firm innovativeness, administrative innovation, marketing innovation, etc. Other mediating variables must be considered, such as generative learning, organizational capability or organizational trust, because of their capability to promote innovation within organizations. Besides, more research should be conducted on the consequences of stewardship behavior, for instance, by analyzing its effect on organizational performance. Finally, and regarding radical innovation, it would be highly interesting to study whether changing course might come at the detriment of other initiatives related to corporate social responsibility.

This research is based only on the impressions of respondents, and hence future research might include, for example, objective indicators to measure innovation success. Finally, there is a need for further research on the antecedents that facilitate radical innovation development. Future issues of study might address the role played by some concepts that are related to the subject of the present research and are increasingly important, such as social innovation, corporate social responsibility, inclusive business models, social entrepreneurship or social businesses (Osburg and Schmidpeter, 2013). Other leadership styles related to stewardship, such as servant and ethical leadership, and their influence on radical innovation and innovation success should be studied. Future research should rectify and improve all the limitations detected in the present study.

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# Chapter 3

## How to promote radical innovation? The importance of organic structure and generative learning

# How to promote radical innovation? The importance of organic structure and generative learning

## 3.1 INTRODUCTION

The world today is experiencing major social, economic and technological changes. An industrial society, based on production, is in the process of becoming a post-industrial society, focused on knowledge. All this affects companies and organizations, which have to work in a constantly changing, increasingly unpredictable and difficult environment. In this context, companies must innovate to face growing competition and ensure their long-term survival.

This uncertain scenario is changing the classical way organizations work and is forcing them to reconsider their traditional leadership styles, labor relations or human resources policies, thereby transforming their structures. Organizational structure is a key element to generate innovations, and certain types of structure may facilitate or hamper it.

The most extended idea is that mechanistic structures hinder innovation, while organic structures promote it. However, a significant number of empirical studies obtained conflicting results (e.g., Cosh, Fu, and Hughes, 2012; Song and Chen, 2014). Accordingly, Cabello-Medina, Carmona-Lavado, and Cuevas-Rodríguez (2011) stated that the idea that organizations with organic structures are more innovative than those with mechanistic ones is too simplistic, and recommended (in view of the lack of conclusive findings) continuing to study these variables and their effect on innovation.

The present study was developed in response to the great deal of research that showed contrary or dissimilar conclusions. This suggested the need to study the mediating effects of additional factors that might better explain how organizational structures affect innovation (e.g., Menguc and Auh, 2010).

Additionally, although many studies have analyzed the relationship between organizational structure and innovation, past research has neglected how structural factors affect organizational learning (Chen and Chang, 2012). Furthermore, Espinosa and Merigó (2016) argued that few empirical studies have analyzed how the organizational design promotes or

hinders learning in the organizations, and considered that the study of organizational design as a promoter of learning demands further analysis. Moreover, Wang and Chugh (2014) pointed out that more research is needed to determine which organizational contexts are more favorable to facilitate different types of learning.

Given that organizational learning is also one of the facilitators of innovation (Chiva and Alegre, 2009), the present research was focused on the mediating role of generative learning to explain the positive relationship between organic structures and radical innovation. Although previous research related generative learning to radical innovation (Chiva, Grandío, and Alegre, 2010), some authors have called for caution with regard to this relationship. Explorative learning processes and innovation outcomes have been interpreted differently, leading to inconsistent conclusions and generalizations. With the aim of overcoming this limitation, and following the approach suggested by Li, Vanhaverbeke and Schoenmakers (2008), this study analyzed generative learning by considering the processes and factors that characterize it, and measured the degree of radicalness of the innovation.

In the following sections, a review of the literature is conducted. Considering previous research, relationships among the variables are also established. Subsequently, the methodology used to analyze the proposed hypotheses is detailed. The study finishes with the presentation of results, conclusions, suggestions for future research, and evaluation of the limitations of the present research.

## 3.2. CONCEPTUAL FRAMEWORK

### 3.2.1 Radical innovation

Radical and incremental innovation classify innovations according to the degree of change or novelty they bring. Despite this distinction, different authors state that these typologies are not absolute categories and that innovation exists along a continuum, from incremental to radical (Gatignon, Tushman, Smith, and Anderson, 2002).

Gatignon et al. (2002, p.107) defined incremental innovations as those that improve price/performance advance at a rate consistent with the existing technical trajectory, while

radical innovations advance the price/performance frontier by far more than the existing rate of progress. Although incremental innovation provides benefits for organizations (Sorescu and Spanjol, 2008), several authors have stressed the importance of radical innovation, because of its role in the survival and success of organizations in the long term (Chandy and Tellis, 1998), and emphasized the positive effects that it may have for businesses in comparison to incremental innovation (Sorescu, Chandy, and Prabhu, 2003). For example, radical innovations allow organizations to achieve competitive advantage in the market, challenge the dominant position of leader companies, improve the image of the organization or increase consumer loyalty, among other benefits (e.g., Baker and Sinkula, 2007; Chandy and Tellis, 1998). However, companies do not develop radical innovations so easily (Sorescu et al., 2003) because it is a very costly and complicated process, related to countless uncertainties (McDermott and O'Connor, 2002).

This type of innovation has a significant impact on a market and on the economic activity of firms in that market. However, it might not be apparent whether an innovation is disruptive until long after it has been introduced (OECD-EUROSTAT, 2005). Radical innovation can refer to a new product, service, or productive process (O'Malley, O'Dwyer, McNally and Murphy, 2014).

### 3.2.2 Organic organizational structure

Burns and Stalker (1961) differentiated between two types of organizational structures. A mechanistic structure is characterized by specialization of labor, hierarchy, top-down interaction, centralization in decision-making, and a rigid set of rules and norms. It is a highly formalized and rigid structure, based on authority. An organic structure is defined by being less hierarchical, having a scant division of labor, facilitating lateral communication among the members of the organization, etc.

In organic structures, people are on the same level, without classifications. Decision-making is delegated to all possible levels, giving employees more freedom to adapt to changing circumstances. Organic structures are characterized by the lack of specialization of jobs. In them, barriers between departments disappear and work teams are formed by experts from different areas that work jointly (Martínez-León and Martínez-García, 2011). Nahm, Vonderembse and Koufteros (2003) stated that, in organic structures,

communication, both horizontal and vertical, takes place rapidly, easily and plentifully. Ramezan (2011, p. 92) noted that these structures promote informal communication and two loops of communications, downwards and upwards, between members with different ranks.

### 3.2.3 Generative learning

Organizational learning is one of the most referenced concepts in the academic and business fields (Chiva and Habib, 2015), and it can be considered one of the most relevant capabilities for organizations. The reasons why organizational learning has become so important are related with technological change, growing competence between companies, globalization or the need for innovation (Chiva and Alegre, 2009).

Some authors maintain that the theory of organizational learning is not complete if it does not differentiate between types of learning (Edmonson, 2002). Senge (1990) distinguished between adaptive and generative learning. Adaptive learning is characterized by improving existing capabilities and routines, while generative learning reformulates situations, develops new capabilities, and resolves ambiguous problems, allowing organizations to explore and develop new capabilities. In other words, generative learning implies doing new things, unlike adaptive learning, which entails doing things better (Edmonson, 2002).

Generative learning is considered the most advanced form of organizational learning (Santos-Vijande, López-Sánchez and Trespalacios, 2012). It happens when organizations are prepared to question long-held assumptions about their mission, customers, capabilities or strategy. It requires a new way of looking at the world based on the understanding of key issues as well as their relationship (Slater and Narver, 1995). It occurs when core organizational competencies are unlearned and new competencies are explored in a proactive sense (Morgan and Berthon, 2008, p. 1331). Chiva et al. (2010, p. 116) defined generative learning as “a process that involves searching for (implicit) order, which is a holistic understanding of anything or anyone we interact with”. Furthermore, “generative learning is developed individually or socially at the edge of chaos, through intuition, attention, dialogue and inquiry”.

Intuition is defined as a process of coming to direct knowledge without reasoning or inferring; it stimulates the creative cognitions that are essential to the generation and exploration of novel problem solutions and ideas (Calabretta, Gemser and Wijnberg, 2017). Attention is a state in which the mind is constantly learning without a center, around which knowledge gathers as accumulated experience. Dialogue is an attempt to perceive the world through new eyes, and inquiry is the aim to question any explicate order or knowledge. Inquiry and dialogue refer to an organization's efforts to create a culture that supports questioning and provides opportunities for employees to help in the recognition of problems, express their concerns, and provide feedback without fear of negative consequences (Malik and Garg, 2017).

Finally, generative learning has been given different names in the literature, such as double-loop learning, radical learning, higher-level learning, exploration learning or second-order learning (e.g., Arthur and Aiman-Smith 2001; Fiol and Lyles 1985; Senge, 1990).

## 3.3. HYPOTHESES

We propose a conceptual model (Figure 1) in which the effects of an organic structure on radical innovation are better explained when the mediating effect of generative learning is considered.

### 3.3.1 Organic structure and generative learning

Organizational structure is one of the factors that determine organizational learning (Fiol and Lyles, 1985). Forms taken by organizations influence learning because they determine how companies search for and process information so as to be able to cope with an uncertain environment (Vera and Crossan, 2004). Authors such as Martínez-León and Martínez-García (2011) stated that an organic structure facilitates learning creation further than a mechanistic one.

Furthermore, depending on the organizational structure adopted, the learning style promoted may be different. Fiol and Lyles (1985) stated that a mechanistic structure tends to reinforce behaviors from the past, so people learn from their experience, while an organic structure boosts changes in beliefs and actions. Accordingly, McGill, Slocum and

Lei (1992) linked the characteristics of an organic structure to generative learning and related mechanistic organizations to adaptive learning.

Generative learning needs an environment that supports change and the emergence of new ideas to question procedures, norms and organizational behaviors, change employees' beliefs, look beyond the current situation, and so forth. The context in which generative learning takes place is ambiguous and not defined, so the repetitive behaviors fostered by mechanistic structures do not make much sense. An organic structure makes changes in beliefs and actions possible, besides promoting a better assimilation of the new patterns that are proposed (Fiol and Lyles, 1985). Vera and Crossan (2004, p. 233) suggested that "open cultures, organic structures, adaptable systems, and flexible procedures facilitate the implementation of change and challenge institutionalized learning". So, at this point we propose the first hypothesis of the study:

Hypothesis 1: An organic structure has a positive effect on generative learning.

### 3.3.2 Generative learning and radical innovation

Generative learning is often associated to radical innovation, while adaptive learning is related to incremental innovation. Baker and Sinkula (2002) stated that higher-order learning processes (generative learning, double-loop learning) are the type of learning that facilitates radical innovation. Generative learning promotes an innovative perception of the world instead of an imitative view, which allows behaviors that inhibit new ways of doing things to be eradicated (Baker and Sinkula, 2007). Arthur and Aiman-Smith (2001) related second-order learning to radical innovation because it breaks the existing behavior and thinking patterns and facilitates the exploration of new forms of thinking and working. Slater and Narver (1999) stated that generative learning is, probably, the main force for radical innovation, ahead of other factors, and highlighted that adaptive learning is not enough to develop this kind of innovations. Herrmann, Gassmann and Eisert (2007) considered that the change in competences and markets demanded by radical innovation needs generative learning because it questions an organization's previous assumptions about its mission, customers, opportunities, etc., and which consequently breaks through learning barriers. Therefore, we pose the second hypothesis of the study.

Hypothesis 2: Generative learning has a positive effect on radical innovation.

### 3.3.3 Organic structure and radical innovation: the mediating effect of generative learning

Previous research has analyzed the effect of organizational structures on innovation both directly and using different mediating variables (Chen and Chang, 2012; Menguc and Auh, 2010). Some studies that analyzed the influence of organizational structure on innovation were focused on specific features such as formalization or centralization (Cabello-Medina et al., 2011; Chen and Chang, 2012), while few used scales to measure the degree of organicity in organizations. Although organizational structure has been identified as a factor that affects innovation, its effect varies depending on the type of structure. The seminal work by Burns and Stalker (1961) stated that organizations with an organic structure innovate more than those with a mechanistic structure. Some research has confirmed this assertion. For example, in a study conducted with commercial companies, Cooper (2005) concluded that organic structures enable innovation more easily than hierarchical structures, because these organizations empower employees and create trusting relationships, thereby facilitating creative and innovative processes.

Nonetheless, other studies have provided conflicting results. Cabello-Medina et al. (2011) stated that formalization has traditionally been negatively related to innovation because it is supposed that rules inhibit experimentation and creativity. However, the lack of norms and procedures may also be detrimental when it comes to innovating, and formal mechanisms may facilitate the management of the uncertainty related to innovation. Similarly, in organic structures, over-communication may lead to redundancy and time-wasting, thus hindering innovation. Likewise, Song and Chen (2014) found that both control and flexibility are necessary to trigger innovation. While flexibility encourages experimentation and risk taking, control-oriented actions establish strategic direction, clarify roles and promote coordination, which reduce uncertainty, avoid chaos and facilitate innovation. Furthermore, Cosh, Fu and Hughes (2012) demonstrated that formalization may be beneficial for innovation. Formality reduces role ambiguity, decreases the cost of coordination, and improves decision-making.

Regarding the relationship between the type of structure and the type of innovation promoted, organic structures seem to be related to radical innovation (e.g., OECD-EUROSTAT, 2005). Olson, Walker and Ruekert (1995) pointed out that more participative organizational structures are associated to radical innovation. These structures facilitate the flow of resources, communication, and knowledge and information transfer, which may help employees to face the challenges and uncertainties in the development of completely new products that have to be successful. Nahm et al. (2003) found that organizations with the characteristics of organic structures facilitate the successful implementation of radical innovations, as they broaden employees' understanding of problems and issues, encourage decision-making and knowledge transfer, etc. Moreover, some authors also highlight the negative effect of a mechanistic structure on radical innovation, considering that bureaucratic organizations promote short-term thinking, which leads to incremental improvements (e.g., Stringer, 2000).

Nevertheless, there are also contradictory results related with the different types of innovation promoted. Cabello-Medina et al. (2011) showed that a certain degree of formalization is needed to manage the complexity and uncertainty in the development of radical innovation, thus helping people to deal with risk. Cabello-Medina et al. also quoted Hage's work (1980), who related organizations with mechanistic structures to radical innovation, and Jelinek and Schoonhoven (1993), who pointed out that radical innovation cannot take place in organic structures because this type of innovation needs both creativity and discipline, making a certain degree of formalization necessary. Moreover, Chen and Chang (2012) showed that a high degree of formalization within organizations increases the degree of innovativeness through a stronger absorptive capacity. In addition, Cardinal (2001) conducted a study that supported behavior and input and output controls to promote radical innovation in the pharmaceutical industry. It is true that the scientific nature of this sector dictates specific procedures and processes in the development of new drugs which might not be applicable to other sectors or contexts. Furthermore, and contrary to their expectations, Menguc and Auh (2010) found that organic structures have a positive relationship with incremental innovation but not with radical innovation, concluding that radical innovation requires more than an organic and flexible structure. Finally, Holahan, Sullivan and Markham. (2014) found that projects aimed at developing radical innovations

are managed more inflexibly than incremental ones. More structure and less flexibility may help to face the risks associated with radical innovation.

This diversity in the results seems to indicate the existence of other factors to be considered when explaining the relationship between organizational structure and innovation (Menguc and Auh, 2010). Similarly, Chen and Chang (2012) stated that it is inadequate to relate organizational structures to innovation and consequently advocated for studying variables to mediate this relationship. Moreover, Droge, Calantone and Harmancioglu (2008) proposed that, although the literature recommends an organic structure to develop new products successfully, the effect of the organic structure on new product development is not direct and advocated for the mediation of other factors. The present research follows the approach adopted by Mallén, Chiva, Alegre and Guinot (2015), who considered that the effects of an organic structure must be investigated in conjunction with firm-specific capabilities, such as organizational learning.

Learning is an essential element to promote innovation (Alegre and Chiva, 2008), and generative learning questions established patterns as well as making it easier for organizations to go beyond simple improvements, which may trigger radical innovation (Chiva et al., 2010). Vera and Crossan (2004) stated that organizations that prioritize a democratic and open management style encourage innovation and double-loop learning. A flexible, decentralized, organizational structure with low formalization will favor a context that allows experimentation, reflection or the questioning of prevailing norms and values freely enough to promote radical innovation.

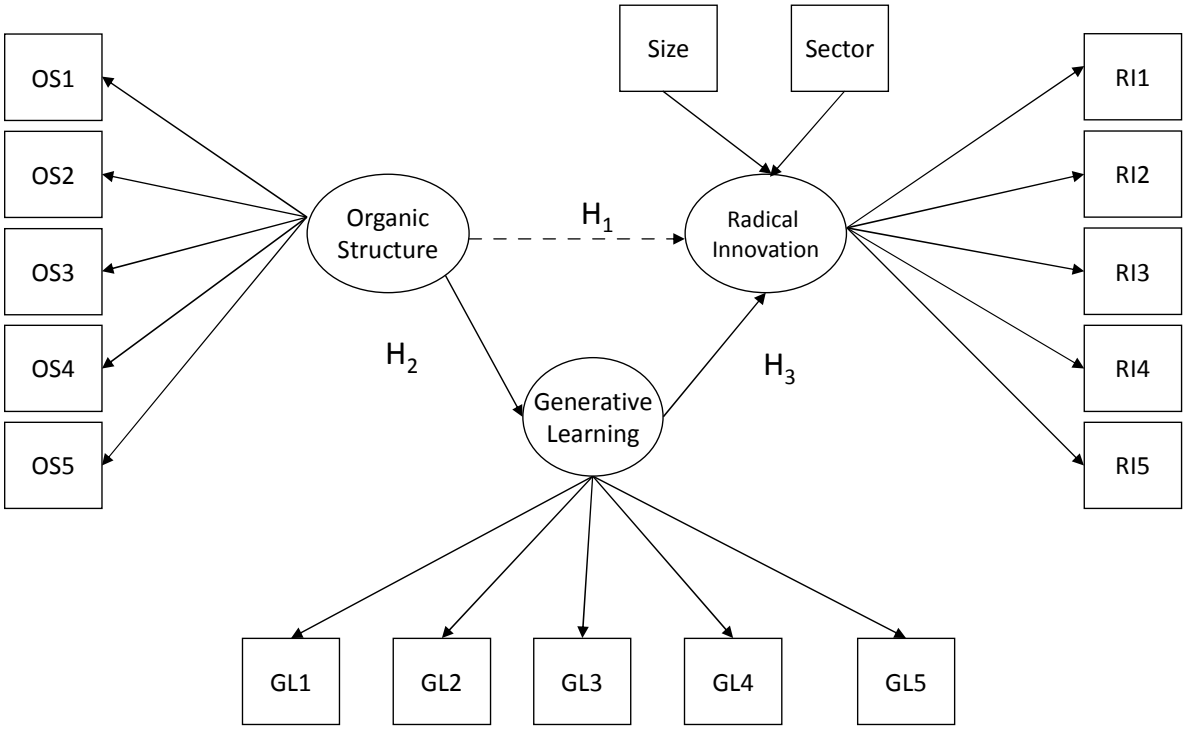
Organic structures remove barriers between departments, which will facilitate communication and multidisciplinary work teams, with a holistic view of the organization and a clearer knowledge of the external opportunities and threats (Slater and Narver, 1995). These teams can share, improve or create a broader variety of knowledge than working in isolation, which can promote new viewpoints that may result in creative and innovative ideas. In addition, with few hierarchical levels, employees will be motivated to take decisions. A stronger involvement of employees may promote critical thinking and innovation (Martínez-León and Martínez-García, 2011). In this vein, Nahm et al. (2003) considered that organic structures empower employees, so they will be prepared to cope

with intensive intellectual work to make decisions that enable firms to implement radical change.

Summing up, generative learning provides organizations with knowledge and ideas, while organic structures offer the appropriate system to optimally assimilate, share and use them to generate radical innovations. Therefore, this allows us to formulate our last hypothesis:

Hypothesis 3: The relationship between an organic structure and radical innovation is mediated by generative learning.

**Figure 3.1. Conceptual model: organic structure, generative learning, and radical innovation**




## 3.4. RESEARCH METHODOLOGY

### 3.4.1. Data collection

The population under study was based on a group of lists and databases of companies that manage human resources excellently and are highly valued by their own employees. The overall population reached a total of 402 companies.

The questionnaire was addressed to human resources managers with at least two years' experience in the organization. Their position and experience in the organization make them a reliable information source, since they have a holistic and profound view of the company as a whole.

Since the data collected came from a single informant, some measures were taken in the preparation phase of the study to avoid the effect of common method variance and endogeneity. To promote participation and increase the reliability of the responses, all the participants in the study were contacted to explain the objectives of the research and guarantee their anonymity (MacKenzie and Podsakoff, 2012). Questions were asked in different moments, with a separation of three months between independent and dependent variables (from October to December 2010), the order of the questions being changed at random (Jean, Deng, Kim and Yuan, 2016; Podsakoff, MacKenzie and Podsakoff, 2012). We also committed ourselves to communicate the findings of the study to all the participants in the study, encouraging them to be honest in their answers.

The questionnaire consisted of 15 items that interviewees had to evaluate through a 5-point Likert scale, in which 1 represented “completely disagree” and 5 “completely agree”. As the profile of the interviewees, managers of important companies, is not easily accessible, the means chosen to conduct the surveys was through phone interviews. The final sample was 251 valid questionnaires, which represented 62.44% of the companies in the population.

The questionnaire was addressed to the respondents in Spanish. The scales used to measure organic structure and generative learning were created in Spanish, while the radical innovation scale was originally developed in English. To ensure the accuracy of the translation, a double-back translation was utilized. In this method, the original Spanish scales were translated into English, then into Spanish once again. The final version was compared with the original one.

### 3.4.2 Measurement instruments

The measurement scales selected are based on previous studies. The appendix provides a detailed description of the measures used in this research. The reliability of the scales was assessed using Cronbach's alpha (Table 2).

#### Radical innovation

Gatignon et al.'s (2002) five-item scale was used to measure the degree of radicalness of an innovation, from incremental to radical. This scale has been applied by a number of empirical papers (e.g., Yang, Chou and Chiu, 2014). This construct demonstrated its reliability, with a Cronbach's alpha of 0.799.

#### Organic organizational structure

This scale was based on the work of Mallén et al. (2015). It measures the degree of organicity of the structure of a company, instead of analyzing certain specific variables of the organizational structure as in other studies. Although there are other scales to measure organicity in organizational structures, it was chosen because it was specially designed for studies that collect data through phone interviews, which is the method that was followed in the present research. The construct has a Cronbach's alpha of 0.845.

#### Generative learning

Although it is preferable to use previously validated scales, we decided to develop a new scale building on the work by Chiva et al. (2010), who, after reviewing the literature, analyzed the processes that characterize generative learning such as intuition, attention, dialogue or inquiry. This scale considers the processes and factors that lead to generative learning and that were not previously analyzed and incorporated into the organizational learning process. The scale is a response to the need to understand how generative learning takes place and is promoted within the organizations. Additionally, there are not many studies that have analyzed generative learning from a quantitative point of view. The existing scales that measure specifically generative learning did not meet the objectives of the present research. For instance, Morgan and Berthon (2008) studied generative learning

through a scale that, with two dimensions, measured idea generation and risk taking. Other scales, such as Baker and Sinkula (2007), did not go into the characteristics of generative learning in depth. In this scale, interviewees had to distribute 100 points among three typologies of learning to indicate the relative preference of each typology. Finally, other scales, such as that of Sessa, London, Pingor, Gullu and Patel (2011), were focused on students. An exploratory factor analysis (EFA) was conducted and the results suggested that the five proposed items make up the construct of generative learning. It has a Cronbach's alpha of 0.777.

### 3.4.3 Control variables

It is important to include control variables that have been documented in the literature as having a potential effect on the studied outcome. Company size, sector, firm age and market share were selected as control variables due to their potential influence on innovation, as noted in previous research (e.g., Chandy and Tellis, 2000; Sorescu et al., 2003). The inclusion of these variables may alleviate endogeneity issues related to omitted variables (Jean et al., 2016).

In terms of company size, 61.3% were small and medium-sized companies (250 employees or less) and 38.7% were large firms (more than 250 employees). With regard to sector, a distinction was made between service and manufacturing services, with the following final distribution: 28.7% of the organizations belonged to manufacturing sectors, while 71.3% were from service sectors. In this vein, the sample is heterogeneous as it is composed of companies from very different sectors. For instance, manufacturing companies include organizations from sectors such as pharmaceutical, food industry, household appliances or construction, while service companies are those related to sectors such as tourism, banking, retailing or consultancy. In terms of firm age, the sample is distributed as follows: 10 years or less (14.7%), between 11 and 25 years (37.8%), between 26 and 50 years (29.1%), between 51 and 100 years (16.3%), and more than 100 years (2.0%). Regarding the market share, respondents had to classify their companies in comparison to their largest competitor. The final sample shows that 5.2% of the companies have a smaller market share, 51.0% have a similar market share, and 43.8% have a larger market share, compared to their largest competitor.

### 3.4.4 Analyses

The present study utilized structural equations to empirically validate the proposed model through the statistical software AMOS-23. The maximum likelihood (ML) estimation method was employed.

Given that the scales were developed using relevant items selected from a common survey, we conducted a Harman's single factor test (Podsakoff and Organ, 1986) to control for common method variance, endogeneity, and to deal with the potential social desirability of the responses. The results of the CFA with the 15 indicators loading onto a single factor (Chi-square = 688,835; p-value = 0.000; NFI = 0.547; NNFI = 0.506; CFI = 0.577; RMSEA = 0.163; Chi-square/d.f. = 7.654) showed a poor fit, suggesting that the single factor does not account for all the variance in the data.

Moreover, additional tests were conducted to check whether endogeneity was a problem due to simultaneity. Following accepted practices (e.g., Antonakis, 2010; Govindaraju, Krishnan and Pandiyan., 2013; Li, Vertinsky and Zhang, 2013), we performed an augmented regression test and a two-stage least square regression analysis. We did not find evidence to support endogeneity in our model.

Then we tested the structural models corresponding to the proposed hypotheses. In particular, we followed the approach taken by Baron and Kenny (1986). To assess the significance of the mediated effect we used bootstrapping (MacKinnon, Coxe and Baraldi, 2012).

## 3.5 RESULTS

### 3.5.1 Descriptive statistics and psychometric properties of the measurement scales.

Table 1 shows data of means, standard deviations, and factor correlations. The psychometric properties of the measurement scales were evaluated by following accepted practices in the literature (Anderson and Gerbing, 1988).

Regarding the structure of the constructs, the common approach to assessing a full measurement model with all the variables was followed (Anderson and Gerbing, 1988). This method establishes the structure of the variables in the context of other variables measured in the study, ensuring that the measures used in the study are completely distinct from one another. The global fit of this general measurement model was: Chi-square (d.f.) = 141.214 (85); p = 0.000; CFI = 0.960; RMSEA = 0.051. The Chi-square statistic was non-significant and all the standardized estimates were significant and in the expected direction.

Reliability analyses also show satisfactory results. The values of Cronbach's alpha coefficient and the compound reliability values (Table 2) were above the minimum accepted value of 0.7 (Nunnally, 1978).

The selection of the measurement scales followed a procedure that supports content validity. The variables used to measure radical innovation were selected from the scale proposed by Gatignon et al. (2002). The organic structure items were taken from a scale validated by Mallén et al. (2015). Finally, generative learning was measured following the research by Chiva et al. (2010).

To assess convergent validity, we used normed fix index which value must be above 0.9 (Ahire, Golhar and Waller., 1996). All factorial loadings were above 0.4 (Hair, Anderson, Tatham, and Black, 1999) and their associated t-values were greater than 1.96 (Anderson and Gerbing, 1988). Both the NFI index (Table 2) and the factorial loadings suggest a high level of convergent validity for all the constructs.

For discriminant validity to exist, the AVE must be greater than the the square root of construct correlations, suggesting that each construct relates more strongly to its own measures than to others (Table 3).

**Table 3.1. Factor correlations, means and standard deviations**

| | Mean | sd | OS | GL | RI |
|---|---|---|---|---|---|
| Organic structure | 3.422 | 0.614 | 1 | | |
| Generative learning | 3.720 | 0.483 | 0.315** | 1 | |
| Radical innovation | 3.786 | 0.452 | 0.384** | 0.331** | 1 |

*Notes: For the standard deviations and factor correlations, we used the mean of the items making up each dimension. ** Significant correlation ($p < 0.01$). OS=organic structure; GL=generative learning; RI=radical innovation*

**Table 3.2. Reliability of the measurement scales**

| Construct | Composite reliability | BBNFI | Cronbach's Alpha |
|---|---|---|---|
| Organic structure (5 items) | 0.85 | 0.997 | 0.845 |
| Generative learning (5 items) | 0.82 | 0.981 | 0.777 |
| Radical innovation (5 items) | 0.81 | 0.972 | 0.799 |

**Table 3.3. Discriminant validity**

| | OS | GL | RI |
|---|---|---|---|
| Organic structure | (0.53) | | |
| Generative learning | 0.09 | (0.48) | |
| Radical innovation | 0.14 | 0.11 | (0.46) |

*Note: in parentheses, extracted mean variance. OS=organic structure; GL=generative learning; RI=radical innovation*

### 3.5.2 Testing the research hypotheses

The results of the direct effect model confirm the positive relationship between organic structure and radical innovation. The fit of the direct effect model is adequate: (chi-square (d.f.)= 109.85 (65); p-value = 0.00; NFI = 0.90; NNFI = 0.94; CFI = 0.96; RMSEA = 0.05). All the estimated parameters were significant and positive, with t-values exceeding the minimum threshold of 1.96, except in the case of the following control variables: size, sector and age.

The standardized parameter concerning the effect of organic structure on radical innovation was statistically significant ($\alpha = 0.421$; $t = 4.798$). With these results, the first condition to validate the proposed model was met, which allowed us to continue the analysis and test the hypotheses proposed in the mediating model (Figure 3).

Taking into account the chi-square values and the fit indices, it can be argued that the estimated mediating model showed good fit (chi-square (d.f.)= 215.71 (137); p-value = 0.00; NFI = 0.87; NNFI = 0.93; CFI = 0.95; RMSEA = 0.05). As in the direct effect model, all the estimated parameters were significant and positive, with t-values exceeding the minimum threshold of 1.96, except in the case of size, sector and age.

The mediating model explained more variance than the direct effect model (0.323 vs. 0.261). The significant relationship in the direct model ($\alpha = 0.421$, $t = 4.798$) decreased by including the mediating effect of generative learning but maintained its significance in the mediating model ($\beta 1 = 0.309$, $t = 3.623$). Consequently, these results verify that the relationship between organic a structure and radical innovation is mediated by generative learning. There is also a significant relationship between organic structure and generative learning ($\beta 2 = 0.401$, $t = 4.981$), and between generative learning and radical innovation ($\beta 3 = 0.277$, $t = 3.544$). All the hypotheses were confirmed (Table 4) and, according to the results (Table 5), the model shows a partial mediation.

The estimated indirect effect of organic structure on radical innovation is 0.111. The 95% bias-corrected confidence intervals for the indirect effect are between 0.036 and 0.204, with a p-value of 0.003 for the two-tailed significance test. Thus, the standardized indirect effect

of organic structure on radical innovation is significantly different from zero and the null hypothesis of no mediation effect can be rejected.

**Figure 3.2. Direct effect model: organic structure and radical innovation.**

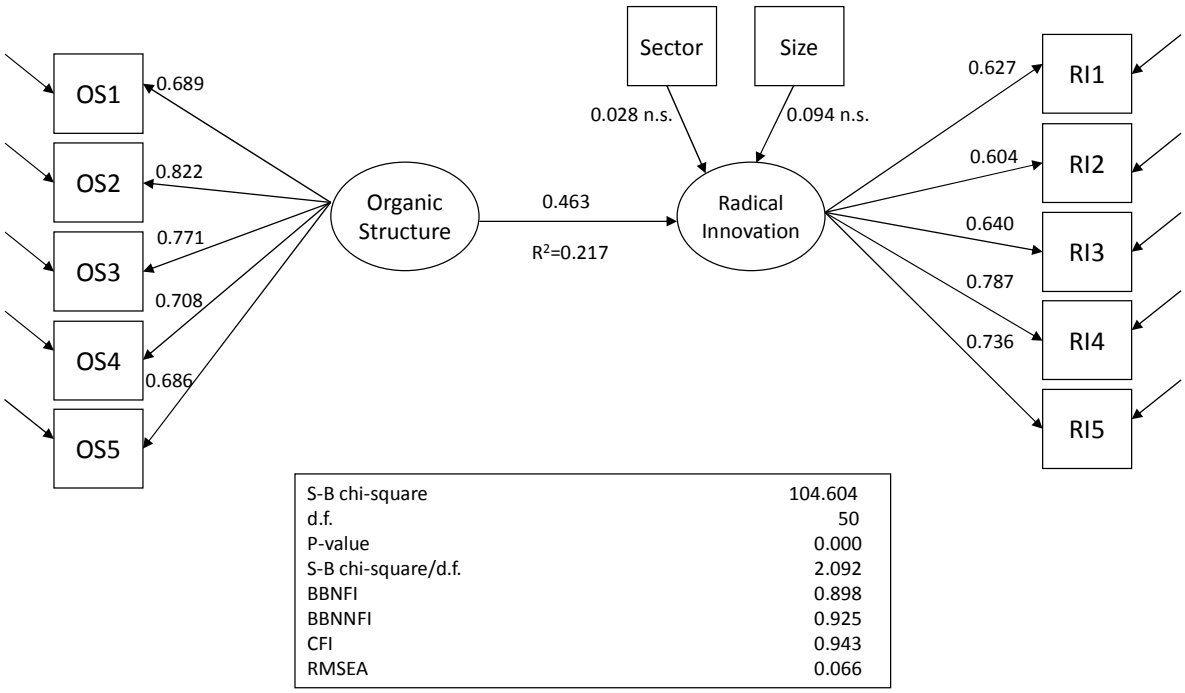
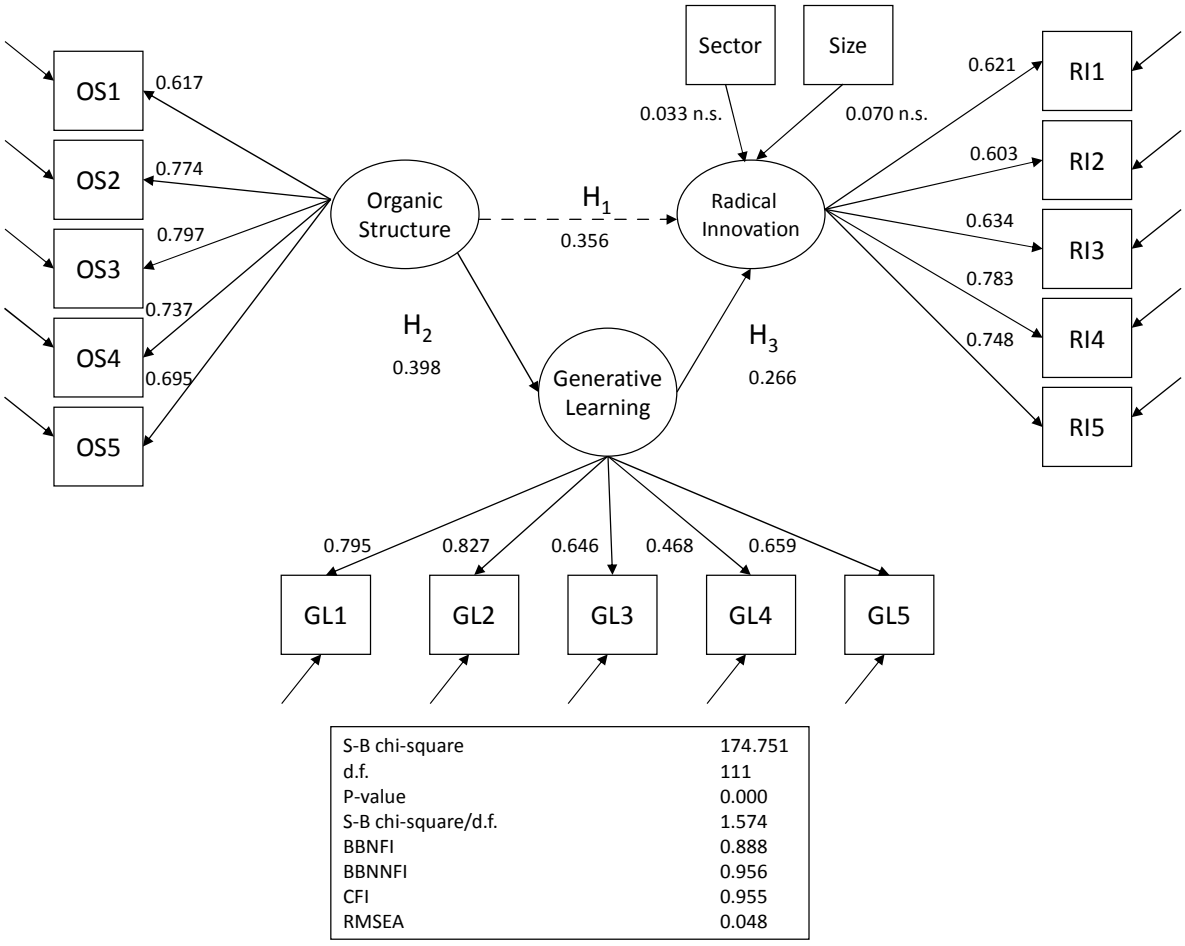


**Figure 3. Mediating effect model: organic structure, generative learning and radical innovation.**




## 3.6. DISCUSSION

There is an ongoing debate about the way in which the organizational design affects both innovation and learning within organizations. The hypothesis of the study is that organic structures promote generative learning which, in turn, favors radical innovation. Many of the assumptions about the relationships between these variables are still unclear. This study attempts to overcome the problems and weaknesses detected by previous research and contributes to the debate by analyzing the processes that characterize generative learning and measuring the degree of organicity of the structures and the radicalness of the innovations.

Results were consistent with the hypotheses proposed in the model. This research highlights the key role played by generative learning, which appears to be an essential

element to achieve radical innovation. Generative learning fuels the organization with new ideas and knowledge, and finds in the organic structure the best environment to promote radical innovation. However, this mediation is partial, which indicates that other factors not considered in the present study might, in turn, be affecting this relationship.

This research contributes to the organizational structure, organizational learning, and radical innovation literature. As there are few empirical studies that analyze the effects of organizational design on organizational learning (Espinosa and Merigó, 2016), this study widens the literature in this field by demonstrating the positive influence of organic structures on generative learning. An organic structure facilitates dialogue, the sharing of different points of view, the development of critical thinking, the contact between employees from different departments, a high degree of autonomy, etc., all of which gives workers the opportunity to create new knowledge, search for new solutions, question organizational norms and values or introduce new ideas. In addition, unlike the vast majority of studies that have analyzed organizational structure using different structural dimensions, this is one of the few studies that measures the degree of organicity in the organization. Additionally, this research clarifies the relationship between exploratory learning styles and innovation outcomes. By studying the processes related to generative learning and the degree of radicalness of the innovation, it is possible to understand what the mechanisms and factors facilitate radical innovation. Another contribution is the development of a scale to measure generative learning, following the proposal by Chiva et al. (2010), who suggested the need to measure this type of learning in organizations in order to relate it to aspects like innovation. This scale measures different processes that characterize generative learning, such as intuition, attention, dialogue or inquiry.

### 3.6.1 Implications for practitioners

The study also has practical implications. Results suggest that an organic structure along with generative learning may help companies to develop radical innovations. As stated in the results, the mediating effect between these factors is partial. Thus, organizations must know that, to develop radical innovations, they will have to consider more factors because other elements not included in the study might influence this relationship.

However, managers should introduce the characteristic elements of organic structures into their companies if their objective is to develop radical innovation. For example, they could promote autonomous work, limit the number of hierarchical levels, reduce bureaucracy and control, or facilitate participative decision-making. Organizations will need employees with a holistic view of the company, not only from an internal point of view, but also with knowledge of the external environment. The aim is to have workers focused on not just one or a set of tasks that limit their view of the company. Multidisciplinary training and team work may help to achieve organizations with more horizontal structures. Flat organizations with few hierarchical levels may facilitate communication in all directions, thus promoting the flow of creative ideas that allow the development of radical innovation.

Additionally, organizations must facilitate a context that promotes critical and alternative thinking, giving employees freedom to rethink the way the organization works, and enabling the proposal of creative ideas. To achieve this environment, organizations should foster guidelines that facilitate intuition, attention, dialogue and inquiry.

Organizations may promote generative learning and radical innovation by taking care of their human resources policies. In the selection process, companies should seek workers that are able to work in freer environments with egalitarian relationships. Moreover, leaders that display confidence in the capabilities of their employees, facilitate decision-making, and promote autonomy may be appropriate to lead organizations with these structures. Additionally, other policies such as promotion and evaluation should consider generative learning, measuring whether organizational members question current norms and rules, prefer routine and repetition, or go beyond simple improvements.

### 3.6.2 Limitations and future research

The present study was focused on the mediating effect of generative learning in the relationship between organic structure and radical innovation. Considering that this study found a partial mediation, further research is needed to disentangle what other factors may influence the relationship between these variables. In the future, further research may study the mediating role played by other concepts related to these variables, such as organizational learning capability, for its potential to promote innovation (Alegre and Chiva, 2008), and include additional control variables such as firm turnover.

Future research should include incremental innovation in order to determine whether results can be extrapolated to other types of innovation or are limited to radical innovation. It would be important to analyze whether generative learning is also related to incremental innovation, and adaptive learning to radical innovation. To this end, a more complex model that analyzes ambidexterity would be useful. Do organic structures foster generative learning, adaptive learning or both? Consequently, how do they relate to radical and incremental innovation? Moreover, the same approach might be considered for mechanistic structures.

Another field of interest for future research is the antecedents of generative and adaptive learning, going beyond organizational design. For instance, as leadership is one of the main promoters of learning within organizations, it would be relevant to analyze how different contemporary leadership styles such as servant or ethical are related to these types of learning. Moreover, focusing on specific features of these leaders, such as forgiveness, altruism, empowerment, humility, stewardship, etc., may also be highly interesting.

Additionally, future research should investigate the effect of different organizational designs and learning types on other variables related to innovation, such as innovation success, firm innovativeness, innovation performance, product innovation, process innovation, etc.

Finally, scholars should continue to study the antecedents of radical innovation. For example, consideration should be given to determining which of the different factors or processes that make up generative learning is more important or has a stronger effect on radical innovation: intuition, attention, dialogue or inquiry.

The study was cross-sectional, so the relationships reflect a snapshot in time. Future longitudinal studies might evaluate the long-term effects of organic structures and generative learning on radical innovation. This study collected data from a single respondent, which may affect the results due to common method variance. Data obtained from different sources can help to solve this weakness (Podsakoff et al., 2012). Future research must be conducted addressing the questions to different members of the organization. For example, questions related to organic structure and generative learning could be answered by human resources managers, taking advantage of their overall view of

the organization, while radical innovation questions could be addressed to RandD managers, due to their specific knowledge about innovation issues.

Additionally, the study focused on a particular type of companies, namely, those excelling in human resources management, which limits the results to these types of companies. Moreover, the study was conducted in Spain, which, according to the European Innovation Scoreboard (2017), is a moderate innovator country. Future research should be conducted in other countries in order to compare the processes followed in countries with a different innovative performance. Moreover, the sample is heterogeneous, with companies of different sizes, age, sectors, and market share. As processes related to organizational learning and innovation may differ between industries (Fernández-Mesa and Alegre, 2015), future research should focus on companies from the same sector. In addition, as organizational size influences innovation, future research should also concentrate on large companies or SMEs. Finally, centering attention on start-ups or incumbent companies might clarify the influence of firm age on the variables studied.

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# Chapter 4

## End-user computing satisfaction and radical innovation: the mediating effect of organizational learning capability

# End-user computing satisfaction and radical innovation: the mediating effect of organizational learning capability

## 4.1 INTRODUCTION

Under conditions of uncertainty and high competition, such as those faced by companies in many sectors nowadays, innovation is one of the main mechanisms that allow organizations to increase their competitiveness and ensure their long-term continuity in the market. Among the different types of innovation distinguished in the literature, radical innovation occupies a prominent place as a means to achieve these objectives (Chandy and Tellis, 1998; McDermott and O'Connor, 2002), since it advances the price/performance frontier by far more than the existing rate of progress (Gatignon et al., 2002:1107), and is crucial for both organizational and economic growth (Büschgens et al., 2013).

Radical innovations present a high degree of novelty for both the firm that develops them and the market to which they are addressed. They represent revolutionary changes in technology (Dewar and Dutton, 1986) and are foundational innovations that serve as the basis for future technical developments (Datta and Jessup, 2013). Radical innovation can refer to a new product, service, productive process, etc. (O'Malley et al., 2014). Product innovation is defined as the product or service introduced to meet the needs of the market or of an external user, while process innovation is understood as a new element introduced into production operations or functions (Alegre et al., 2005). In the present research we have focused the analysis on product, service, and process innovation.

Yang et al. (2014) argue that radical innovation needs a wide range of facilitators, both within and outside the organizations. For instance, internal factors such as corporate culture (Tellis et al., 2009), internal knowledge sharing (Zhou and Li, 2012) or education and experience of the entrepreneurs (Marvel and Lumpkin, 2007) are antecedents of radical innovation. External factors such as political ties (Zhao et al., 2016), external market knowledge acquisition (Zhou and Li, 2012) or reliance on partners (Slater et al., 2014) appear to be drivers of this type of innovation. Nevertheless, some authors consider that antecedents and processes related to radical

innovation are not well documented (O'Malley et al., 2014). López-Cabrales et al. (2008) consider that studying the organizational characteristics related to radical innovation is still a promising field of study because much of the previous research has been focused on traditional parameters, proposing the analysis of alternative organizational variables.

Radical innovation involves working on highly complex, risky and uncertain projects (Büschgens et al., 2013). In these projects, good quality information systems may be decisive. Popovič et al. (2014:270) state that information systems "support timely decisions, provide information that enhances comparative advantage, promote innovation, and offer a means to manage the uncertainty inherent in the business environment".

In addition, the evolution of information technologies has enhanced the effect of information systems on innovation development (Jha and Bose, 2016). Sainio et al. (2012) suggest that, nowadays, there is a greater potential to innovate and achieve competitive advantages due to new information technologies and the Internet.

In recent times, the amount of information available has increased appreciably, which has been accompanied by the proliferation of systems to access and retrieve it. New information technologies have had a great impact at the organizational level, affecting the way people work within organizations and giving rise to a new type of worker. End-user computing emerged when personal computers allowed users to exert control over their own needs for information without depending upon centralized technologies or departments that managed these needs (Govindarajulu and Arinze, 2008). Nonetheless, although the development of communication and information technologies has improved access to information, detecting information that is both relevant and useful is difficult and requires intensive efforts (Burcharth et al., 2015). In this context, organizations make large investments to develop information systems to achieve their objectives. These investments will be successful if users are satisfied and use the information technology in an effective manner (Somers et al., 2003).

Bokhari (2005) states that the evaluation of the success of information systems is a complicated phenomenon by nature. It is difficult to obtain economic and quantitative measures to evaluate the success of an information system, so scholars and practitioners

use subjective measures to do so. The end-user computing satisfaction (EUCS) model is commonly used as a surrogate measure for information system success (Aggelidis and Chatzoglou, 2012). Although there are other means to measure the success of an information system, they present important shortcomings which make them inappropriate to this end, user satisfaction being the best measure of information system success (Lapiedra et al., 2011). EUCS is defined as the affective attitude toward a specific computer application by someone who interacts directly with the application (Doll and Torkzadeh, 1988).

Information systems have a positive impact on organizational performance (Abugabah et al., 2009) and provide a wide variety of benefits for organizations, such as competitive advantage or improvements in decision-making (Ghobakhloo and Tsang, 2015). However, although information systems are positively related to innovation (Popovič et al., 2014; Jha and Bose, 2016), the number of studies that analyze their influence on radical innovation is scarce. Taking into account that the promoters and the consequences of radical innovation are completely different to other innovation typologies and the paramount outcomes that may be achieved through this type of innovation (McDermott and O'Connor, 2002), it is essential to identify the factors that trigger radical innovation. Previous research on the antecedents of this type of innovation has been focused on elements related to organizational culture, organizational structure, leadership or external factors (Slater et al., 2014), underestimating the role played by information systems. This is surprising because innovation has been one of the most significant topics in the field of information systems (Jha and Bose, 2016). In this line, these authors state that research on information systems "does not answer questions related to the different antecedents that are essential for innovation generation for products/services and processes" (Jha and Bose, 2016:303). Consequently, and following Ghobakhloo and Tsang (2015), who call for more research on the potential benefits of information systems, the present study attempts to expand the knowledge related to information systems and innovation by using a measure of information system success to evaluate its influence on radical innovation.

Although information is essential to foster innovation, there are factors that may mediate this effect. Literature shows that organizational learning is one of them, as it

plays a key role in the assimilation and transfer of information and knowledge within organizations that, in turn, may promote innovation. For instance, Alegre and Chiva (2008:317) state that the organizational learning process is closely related to product innovation performance. Blazevic and Lievens (2004:374) argue that organizational learning is especially critical during innovation. In addition, organizational learning may be essential to develop radical innovations (Zhao et al., 2016), as, by improving information processing, it helps companies to act ahead of their competitors, and compete in contexts characterized by profound changes (Santos-Vijande et al., 2012). Chiva et al. (2014) state that innovation depends on organizational learning capability (OLC), through which new knowledge is developed, distributed, and used. In the present research, the mediating role of OLC is discussed. Although OLC is not the same as organizational learning, they are related ideas. OLC stresses the importance of the facilitating factors of organizational learning. These factors have been positively related to radical innovation in a context of information and knowledge management. For instance, Berends et al. (2007) highlight the importance of managing knowledge to promote radical innovation through different means such as experimentation, the scanning of information from external sources, the promotion of participative environments, and so forth.

Despite the fact that quality information systems are important to promote innovation, to our knowledge there is no previous research linking it to radical innovation. A review of the extant literature suggests that more investigations are required to gain a better insight into those relationships. In this vein, the present research tries to cover this gap and empirically analyzes whether EUCS facilitates radical innovation through OLC (Figure 1). To this end, an empirical study was conducted in a population of 402 Spanish companies.

## 4.2. LITERATURE REVIEW

### 4.2.1 Radical Innovation

Radical innovation has become an area of great interest for both scholars and practitioners. Understanding its antecedents and its implications for organizations is an unavoidable duty. Although there are various innovation classifications, one of most extended typologies is the difference between incremental and radical innovation (Dewar and Dutton, 1986).

Radical innovation facilitates better competitive positions (Baker and Sinkula, 2007; Chandy and Tellis, 2000), promotes long-term success and is crucial to renew or maintain the firm's competitive position (Chandy and Tellis, 1998; O'Connor and McDermott, 2004), allows companies to establish themselves or grow substantially (Herrmann et al., 2007), and offers unprecedented customer benefits, substantial cost reductions, or superior organizational performance (Slater et al., 2014).

Notwithstanding, radical innovation is difficult to achieve and is related to many risks and uncertainties. Sorescu et al. (2003) state that most radical innovations come from a minority of firms. In addition, it is hard to find support for radical innovation projects within organizations, as incremental ones are prioritized because they involve fewer risks and conflicts, and provide immediate rewards (Baker and Sinkula, 2007; McDermott and O'Connor, 2002). For this reason, it is common for organizations to seek a balance between the two types of innovation.

### 4.2.2 End-user computing satisfaction

End-user computing has been defined as that carried out by anyone who, as an information consumer, interacts directly with a computer-based information system (Doll and Torkzadeh, 1988). End-user computing has evolved over time. Nowadays, for example, end-users know more about computer-based technologies than those in the past (Govindarajulu and Arinze, 2008). Moreover, end-users can work with the system in real time, introducing data and making enquiries. For this reason, they have an accurate insight into the system's capacity to serve their needs (Roses, 2011), which

determines their satisfaction with the system. Aggelidis and Chatzoglou (2012:566) define EUCS as the "end-user's overall affective and cognitive evaluation of the pleasurable level of consumption-related fulfillment experienced with the information system".

Different authors have evaluated information system success through end-users' satisfaction and have developed instruments to measure it. Aggelidis and Chatzoglou (2012:567) state that EUCS "is probably the most widely used measure of information system success".

Doll and Torkzadeh (1988) developed a construct to measure EUCS through five subscales: content, accuracy, format, timeliness, and ease of use of a computer application. Information content refers to precise and sufficient data that meets users' needs; accuracy implies that the information received is correct; format refers to information presented in a clear and useful way; timeliness is the possibility of getting the information on time or having a system that provides up-to-date information; and ease of use refers to user friendliness. Previous research has shown the validity and reliability of this instrument, using different samples, computer applications, and business or cultural contexts (e.g., Somers et al., 2003).

### 4.2.3 Organizational learning capability

While organizational learning is the process by which organizations learn, by changing or modifying their mental models, rules, processes or knowledge (Alegre and Chiva, 2008), OLC refers to the organizational and managerial characteristics that facilitate that an organization may learn (Chiva and Alegre, 2009).

OLC is a multidimensional construct and different authors have suggested diverse variables that promote learning (Jerez-Gómez et al., 2005). The present study follows the approach by Chiva et al. (2007), who proposed five facilitating factors of organizational learning: experimentation, risk acceptance, interaction with the environment, dialogue, and participation in decision-making. This conceptualization considers that learning may be either internal or external to the organization.

According to these authors, experimentation involves the search for innovative solutions to problems, by using different methods and procedures, and is considered as one of the manifestations of creative environments. Risk-taking is related to the acceptance of errors, mistakes, and failure. The external environment is defined as factors that are beyond the organization's direct control or influence, which include other competitors, associations, educational centers, etc. Dialogue is a process of thought and collective inquisition by which people learn to think together. Finally, participative decision-making is defined as the level of influence that employees have in the decision-making process.

## 4.3. HYPHOTESES

### 4.3.1 End-user computing satisfaction and organizational learning capability

McGill and Slocum (1993:77) state that "information in a learning organization must be accurate, timely, available to those who need it, and presented in a format that facilitates its use". In addition, all the categories composing the OLC construct proposed by Chiva and Alegre (2007) appear to be linked to the main characteristics of a quality information system.

An adequate information system reduces uncertainty (Dewett and Jones, 2001) and provides timely information (Popovič et al., 2014). By reducing uncertainty, perceived risk decreases, which in turn facilitates risk-taking. In addition, these information systems stimulate experimentation, opportunity-seeking and the emergence of new initiatives (Simons et al., 2000).

Accurate and timely information encourages communication within firms (Santos-Vijande et al., 2012), which may foster interaction between people from different departments and the creation of multidisciplinary teams, thus triggering dialogue and knowledge sharing.

Organizations evolve by adapting to the continuous changes in the environment. The more turbulent the environment is, the more there is a need for organizations to learn (Popper and Lipshitz, 2000). Timely, relevant and integrated information strengthens relationships between businesses and customers, consultants, alliances, and suppliers (Yang et al., 2009). Therefore, the proper functioning of an information system fosters relationships with different agents in the external environment.

Systems that provide accurate, complete, timely, and relevant information, that meets users' needs, and are user-friendly promote greater satisfaction with the process among the people who make decisions (Bharati and Chaudhury, 2004). Quality information systems that guarantee effective decision-making, along with an environment that triggers communication and interaction between different departments, may create a context where firms encourage employees' participation in decision-making.

Therefore, we propose the following hypothesis:

Hypothesis 1: EUCS has a positive effect on OLC.

### 4.3.2 Organizational learning capability and radical innovation

Jerez-Gómez et al. (2005:279) consider that OLC is a key element to improve efficiency and organizational capacity to innovate and grow. Several studies have shown that OLC has a positive effect on innovation (e.g., Alegre and Chiva, 2013; Baker and Sinkula, 2007). Additionally, literature also points out that the dimensions of OLC, separately, are associated to innovation in general and radical innovation in particular.

Experimentation is one of the factors considered as crucial for radical innovation. O'Connor and McDermott (2004:11) state that "radical innovation requires organizations to move into unknown territory and experiment with new processes that largely elude systemization". In addition, radical innovation is promoted in organizational contexts that encourage risk-taking (Chang et al., 2012).

The dialogue dimension is comprised of team member diversity, openness to new ideas and communication. Teams made up of people from different areas have a positive

effect on innovation. Subramanian and Youndt (2005) state that innovation is a collaborative process, and communication, information dissemination, and both knowledge assimilation and knowledge sharing are vital elements for any type of innovation, including radical innovation. Although individuals can develop breakthrough ideas, these need to be circulated and disseminated within the organization to gain recognition and maximize their impact.

Openness to the external environment and making use of external knowledge are elements related to innovation. Chang et al. (2012) indicate that openness is one of the most influential determinants of radical innovation, as it enables organizations to work with ideas from different sources. Slater et al. (2014) state that external orientation facilitates radical innovation.

Participative working environments in which organizational members take part in decision-making also facilitate innovation. They increase motivation to learn and stimulate creative thinking, leading to the development of new ideas, which are essential for innovation (Hurley and Hult, 1998). Therefore, we hypothesize:

Hypothesis 2: OLC has a positive effect on radical innovation.

### 4.3.3 End-user satisfaction and radical innovation: the mediating role of organizational learning capability

Companies pay special attention to information systems, implementing new information technologies in order to, among other objectives, innovate (Tseng, 2008). However, mere access to information, in itself, does not ensure innovation. Information systems must provide the information that users need because both the lack and the excess of information can be harmful to innovation. Miller et al. (2005) suggest that a lack of information prevents the successful development of radical innovations. Datta and Jessup (2013) state that large amounts of information may overload the organizational capacity to process it, which, in turn, may cause confusion, thus discouraging innovation efforts.

Miller et al. (2005) highlight the critical need for quick, almost instantaneous, access to information because this accelerates the development of radical innovation. In addition, information accuracy may be essential to develop radical innovations. Having clear information is essential to innovate successfully (Bendoly et al., 2012). On the other hand, and regarding format, the way information is stored, transmitted, communicated or processed is an important but neglected means of facilitating the innovation process (Dewett and Jones, 2001:326).

However, other organizational factors must be taken into account in the study of how information is used to innovate. OLC may play an important role in sharing information and making it more accessible to innovate. The fact of having an information system with all the characteristics that favor end-user satisfaction may promote an organizational context where people engage in dialogue, share information and knowledge, suggest new ideas, experiment, interact with the external environment, participate in decision-making, and take risks. In short, an adequate information system may promote an environment that fosters learning and, in turn, innovation.

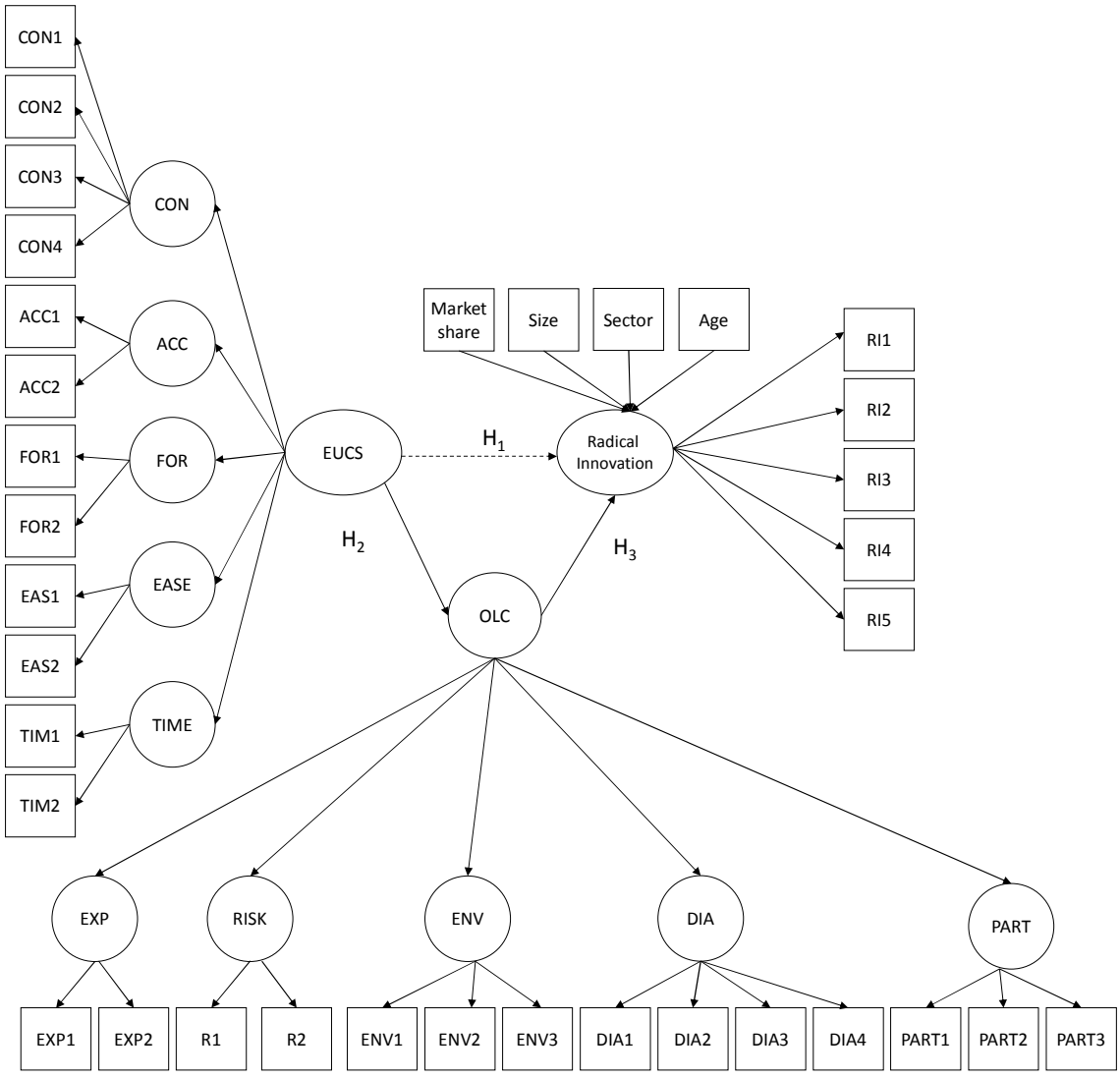
Improving the accessibility to quality information facilitates risk-taking (Lee et al., 2011), which is one of the factors that promote radical innovation (López-Cabrales et al., 2008). Innovation needs the transformation and exploitation of existing knowledge and, for this to happen, it is necessary that employees share information and knowledge (Jiménez-Jiménez and Sanz-Valle, 2011). Information is more likely to be shared among different departments when it is codified in an appropriate format (Lee et al., 2011). These authors suggest that people accept information and share it when they perceive it is valuable. In addition, in innovative processes, sharing relevant, new, trustworthy and meaningful information is more important than the amount of information. Through the exchange of information, employees improve their knowledge base, refine and test ideas to solve problems, and go beyond their routine work to develop new ideas (Blank, 2014), which may potentially lead to radical innovations.

Advances in information technologies allow access to knowledge that is beyond organizational boundaries. This external knowledge has become essential to innovate. Büschgens et al. (2013) argue that an external orientation fosters the collection of information from the environment, which triggers novel ideas. In addition, many radical

innovations are not developed by just one firm and need the collaboration of more companies (Miller et al., 2005), which requires information sharing. Consequently, we hypothesize:

Hypothesis 3: OLC positively mediates the relationship between EUCS and radical innovation.

**Figure 4.1. Conceptual model: EUCS, OLC and radical innovation**



## 4.4. RESEARCH METHODOLOGY

### 4.4.1 Data collection

The study was focused on a population of 402 Spanish firms, gathered from databases or listings of organizations that regard employees as core elements in their businesses, prioritize human resource management, and are considered by their own employees as good firms to work for. Mallén et al. (2015) state that because of the characteristics of these companies, many other firms use them as benchmarks in their own improvement processes and consider that the relationships among the variables arising in these working environments is a subject worthy of in-depth examination. On the other hand, the European Innovation Scoreboard (2017) provides a comparative analysis of innovation performance in the European Union, identifying the weaknesses and strengths of each country. According to this source, Spain is a moderate innovator and one of its relative strengths is in human resources.

The fieldwork was carried out between October and December 2010. The questionnaire was addressed to human resources managers, with at least two years' experience in the firm. Due to their position and experience, these managers had an overall view and an in-depth knowledge of the organization. Anonymity was granted to all the participants in the study.

The questionnaire consisted of 31 items that were measured using a five-point Likert scale. All indicators were expressed in a positive way and respondents had to express their agreement or disagreement with each statement included in the questionnaire. The survey was completed via telephone interviews. Finally, a sample of 251 valid questionnaires was obtained.

The questionnaire was administered in Spanish to all participants. While OLC was originally designed in Spanish, EUCS and radical innovation were first developed in English. In order to ensure the accuracy of the translation, a double-back translation procedure was used.

### 4.4.2 Measurement instruments

The selected measurement scales had already been used and validated by other researchers in previous studies. The reliability of the scales was assessed using Cronbach's alpha. To measure radical innovation, we used the scale developed by Gatignon et al. (2002), which comprises five items. This construct had a Cronbach's alpha of 0.80. The scale developed by Chiva et al. (2007) and Chiva and Alegre (2009) was used to measure OLC. All dimensions that comprise OLC obtained Cronbach's alpha values above 0.80. The scale developed by Doll and Torkzadeh (1988) was used to measure EUCS, and comprises 12 items and five subscales. Each dimension of EUCS obtained Cronbach's alpha values above 0.80.

### 4.4.3. Control variables

Firm size, sector, firm age, and market share were used as control variables. Regarding firm size, 61.3% were small and medium-sized companies (250 employees or less) and 38.7% were large firms (more than 250 employees). Besides, we have distinguished between manufacturing and service firms, obtaining the following sample: manufacturing sector (28.7%); service sector (71.3%). The sample is heterogeneous as it is composed of companies from very different sectors. For instance, manufacturing companies include organizations from sectors such as pharmaceuticals, household appliances or construction, while service companies are those related to sectors such as tourism, banking or consultancy. In terms of the age of the company, the sample is distributed as follows: 10 years or less (14.7%), between 11 and 25 years (37.8%), between 26 and 50 years (29.1%), between 51 and 100 years (16.3%), and more than 100 years (2.0%). Regarding the market share, respondents had to classify their companies comparing them with their largest competitor. The final sample shows that 5.2% of the companies have a smaller market share, 51.0% have a similar market share, and 43.8% have a larger market share than their largest competitor.

### 4.4.4. Analyses

The empirical validation of the model was performed using structural equations and the statistical software package EQS 6.1. We used the maximum likelihood estimation method with robust estimators.

Given that the scales were developed using relevant items selected from a common survey, we conducted a Harman's single factor test (Podsakoff and Organ, 1986) to control for common method variance and to deal with the potential social desirability of the responses. The results of the CFA with the 31 indicators loading onto a single factor (Chi-square = 2055.75; p-value = 0.00; NFI = 0.558; NNFI = 0.585; CFI = 0.613; RMSEA = 0.122; Chi-square/d.f. = 4.74) showed a poor fit, suggesting that the single factor does not account for all the variance in the data. In addition, data were collected at different moments and the order of questions was randomly changed (Chang et al. 2010; Podsakoff et al., 2003). Consequently, common method variance should not be a problem in the present research.

Then we tested the structural models corresponding to the proposed hypotheses. In particular, we followed the approach taken by Baron and Kenny (1986) to verify the existence of the mediating effect of OLC on the relationship between EUCS and radical innovation (Hypothesis 3). The significance of the mediated effect was tested using bootstrapping (MacKinnon et al., 2012).

## 4.5. RESULTS

### 4.5.1. Descriptive statistics and psychometric properties of the measurement scales

Table 1 exhibits means, standard deviations, and factor correlations. Psychometric properties of the measurement scales were evaluated by following accepted practices in the literature (Anderson and Gerbing, 1988).

In the case of the OLC construct, following Chiva and Alegre (2009), we checked the fit of the second-order factor model (Figure 2) to support the proposed multidimensionality of this concept (Chi-square = 93.246 p-value = 0.047; Chi-square/d.f. = 1.295; NFI = 0.947; NNFI = 0.984; CFI = 0.987; RMSEA = 0.034). In addition, the same analysis was performed to check the EUCS construct (Figure 3), which also yielded excellent results (Chi-square = 99.462; p value = 0.000; Chi-square/d.f. = 1.989; NFI = 0.966; NNFI = 0.977; CFI = 0.983; RMSEA = 0.063).

Regarding the structure of the constructs, in addition to CFA analyses, we also followed the more commonly used approach (Anderson and Gerbing, 1988), which involves

assessing a full measurement model that includes all the variables. The overall fit of this general measurement model was as follows: Chi-square (d.f.) = 555.69 (422); p = 0.00; CFI = 0.968; RMSEA = 0.036. The Chi-square statistic was non-significant, and all the standardized estimates were significant and in the expected direction.

The results of the reliability analysis were also satisfactory. Cronbach's alpha coefficient values and the compound reliability values were or exceeded 0.7, which is the minimum accepted value (Nunnally, 1978). Compound reliability values were between 0.7 and 0.9.

The procedure followed to select the measurement scales supports content validity. The variables used to measure OLC were taken from the scale proposed by Chiva et al. (2007) and Chiva and Alegre (2009). The EUCS variables were taken from a scale validated in a previous study (Doll and Torkzadeh, 1988). Finally, radical innovation was measured with the scale by Gatignon et al. (2002).

To assess convergent validity, we used the normed fit index, the value of which must be above 0.9 (Ahire et al., 1996). All factorial loadings were above 0.4 (Hair et al., 1999) and their associated t-values were greater than 1.96 (Anderson and Gerbing, 1988). Both the NFI and the factorial loadings suggest a high level of convergent validity for all the constructs.

For discriminant validity to exist, AVE must be greater than the square of the construct correlations, suggesting that each construct relates more strongly to its own measures than to others (Table 2).

## Table 4.1. Factor correlations, means and standard deviations

| | Mean | s.d. | Exp | Risk | Env | Dia | Part | Con | Acc | For | Ease | Time | RI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Exp | 3.99 | 0.56 | 1 | | | | | | | | | | |
| Risk | 3.37 | 0.85 | 0.31** | 1 | | | | | | | | | |
| Env | 3.69 | 0.67 | 0.18** | 0.27** | 1 | | | | | | | | |
| Dia | 4.13 | 0.55 | 0.40** | 0.28** | 0.35** | 1 | | | | | | | |
| Part | 3.47 | 0.68 | 0.33** | 0.32** | 0.36** | 0.50** | 1 | | | | | | |
| Con | 4.26 | 0.57 | 0.27** | 0.17** | 0.11 | 0.32** | 0.29** | 1 | | | | | |
| Acc | 4.19 | 0.66 | 0.30** | 0.17** | 0.09 | 0.29** | 0.28** | 0.82** | 1 | | | | |
| For | 4.19 | 0.64 | 0.28** | 0.21** | 0.14* | 0.31** | 0.36** | 0.79** | 0.83** | 1 | | | |
| Ease | 4.26 | 0.62 | 0.32** | 0.21** | 0.11 | 0.29** | 0.32** | 0.79** | 0.84** | 0.83** | 1 | | |
| Time | 4.22 | 0.65 | 0.30** | 0.21** | 0.12 | 0.33** | 0.32** | 0.78** | 0.83** | 0.83** | 0.86** | 1 | |
| RI | 3.79 | 0.45 | 0.25** | 0.15* | 0.16** | 0.33** | 0.24** | 0.25** | 0.21** | 0.18** | 0.18** | 0.18** | 1 |

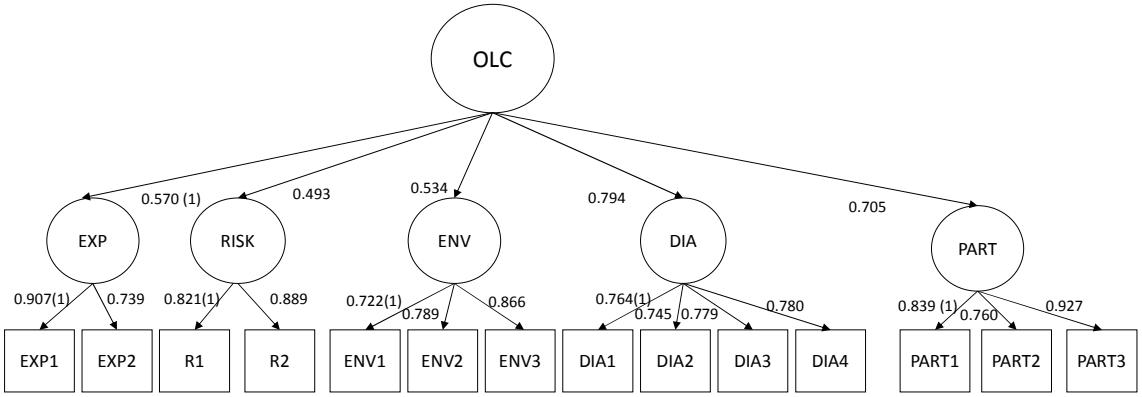
*Notes: For the standard deviations and factor correlations, we used the mean of the items making up each dimension. Cronbach's alpha coefficients are given in parenthesis.*
** Significant correlation ($p < 0.05$). Other correlations not marked with an asterisk present a significant correlation at $p < 0.01$.*

## Table 4.2. Discriminant validity

| | Exp | Risk | Env | Dia | Part | Con | Acc | For | Ease | Time | RI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Exp | (0.68) | | | | | | | | | | |
| Risk | 0.10 | (0.73) | | | | | | | | | |
| Env | 0.03 | 0.07 | (0.63) | | | | | | | | |
| Dia | 0.16 | 0.08 | 0.12 | (0.59) | | | | | | | |
| Part | 0.11 | 0.10 | 0.13 | 0.25 | (0.71) | | | | | | |
| Con | 0.07 | 0.03 | 0.01 | 0.10 | 0.08 | (0.89) | | | | | |
| Acc | 0.09 | 0.03 | 0.00 | 0.08 | 0.08 | 0.67 | (0.85) | | | | |
| For | 0.08 | 0.04 | 0.02 | 0.10 | 0.13 | 0.62 | 0.48 | (0.83) | | | |
| Ease | 0.10 | 0.04 | 0.01 | 0.08 | 0.10 | 0.62 | 0.71 | 0.69 | (0.88) | | |
| Time | 0.09 | 0.04 | 0.01 | 0.11 | 0.10 | 0.61 | 0.69 | 0.69 | 0.74 | (0.93) | |
| RI | 0.06 | 0.02 | 0.03 | 0.11 | 0.06 | 0.06 | 0.04 | 0.03 | 0.03 | 0.03 | (0.47) |

*Note: In parentheses, extracted mean variance*

## Figure 4.2. Confirmatory Factor Analysis for OLC

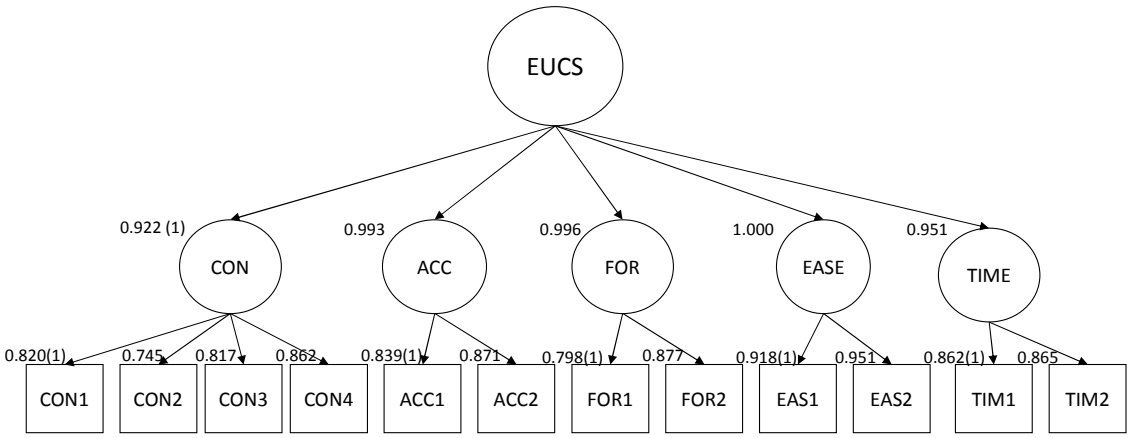



| | |
|---|---|
| chi-square | 93.246 |
| d.f. | 72 |
| value | 0.047 |
| chi-square/d.f. | 1.295 |
| NFI | 0.947 |
| NNFI | 0.984 |
| CFI | 0.987 |
| RMSEA | 0.034 |

| | Alpha | CR |
|---|---|---|
| EXP | 0.802 | 0.811 |
| RISK | 0.842 | 0.845 |
| ENV | 0.829 | 0.836 |
| DIA | 0.849 | 0.851 |
| PART | 0.871 | 0.881 |

*(1) The parameter was equaled to 1 to fix the latent variable scale. Parameter estimates are standardized. All parameter estimates are significant at a 95% confidence level.*

## Figure 4.3. Confirmatory Factor Analysis for EUCS




| | |
|---|---|
| chi-square | 99.462 |
| d.f. | 50 |
| value | 0.000 |
| chi-square/d.f. | 1.989 |
| NFI | 0.966 |
| NNFI | 0.977 |
| CFI | 0.983 |
| RMSEA | 0.063 |

| | Alpha | CR |
|---|---|---|
| CON | 0.883 | 0.885 |
| ACC | 0.841 | 0.845 |
| FOR | 0.819 | 0.825 |
| EASE | 0.847 | 0.932 |
| TIME | 0.930 | 0.854 |

*(1) The parameter was equaled to 1 to fix the latent variable scale. Parameter estimates are standardized. All parameter estimates are significant at a 95% confidence level. Note: EUCS= End-user computing satisfaction; CON= Content; ACC= Accuracy; FOR= Format; Ease= Ease of use; TIME= Timeliness.*

### 4.5.2. Testing the research hypotheses

The results of the direct effect model confirm that a significant relationship exists between EUCS and radical innovation. The value of the structural parameter corresponding to the influence of EUCS on radical innovation is statistically significant ($\alpha = 0.181$), which allows us to continue with the analysis, and hence estimate the mediated model (Hypothesis 3).

The mediated model shows a good fit (Figure 5). As can be seen in Table 3, the mediation model explains more variance than the direct effect model (0.201 vs. 0.127). In addition, the significant relationship between EUCS and radical innovation ($\alpha = 0.181$) in the direct effect model decreases considerably when it includes the mediating effect of OLC, becoming non-significant ($\beta1 = 0.027$). Additionally, there is a significant relationship between EUCS and OLC ($\beta2 = 0.473$), and between OLC and radical innovation ($\beta3 = 0.368$), which confirms the mediating role, as predicted by Hypothesis 3.

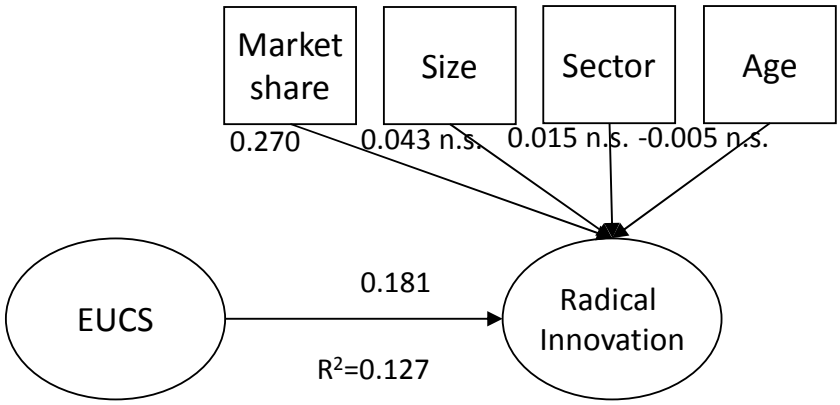
The estimated indirect effect of EUCS on radical innovation is 0.174. The 95% bias-corrected confidence intervals for the indirect effect are between 0.082 and 0.301, with a p-value of 0.001 for the two-tailed significance test. Hence, the standardized indirect effect of EUCS on radical innovation is significantly different from zero at the 0.05 level, and we can reject the null hypothesis of no mediation effect.

These four points, together with the bootstrap analysis, provide evidence to support our hypotheses.

**Table 4.3. Structural equations to test the hypothesis that OLC mediates in the relationship between EUCS and radical innovation.**

| Structural equation | R2 |
|---|---|
| **Direct effect model** | |
| RI = 0.181*EUCS + 0.270*MARKET + 0.043*SIZE+0.015*SECTOR+(-0.005)*AGE | 0.127 |
| (t =2.537) (t =3.751 ) (t =0.639 ) (t =0.227) (t =-0.069 ) | |
| **Mediation effect model** | |
| RI = 0.027*EUCS + 0.368*OLC + 0.188*MARKET + 0.068*SIZE+0.013*SECTOR+0.015*AGE | 0.201 |
| (t =0.331 ) (t =3.393 ) (t =2.725 ) (t = 1.033) (t =0.196) (t =0.229 ) | |
| OLC = 0.473*EUCS | 0.224 |
| (t = 4.824) | |

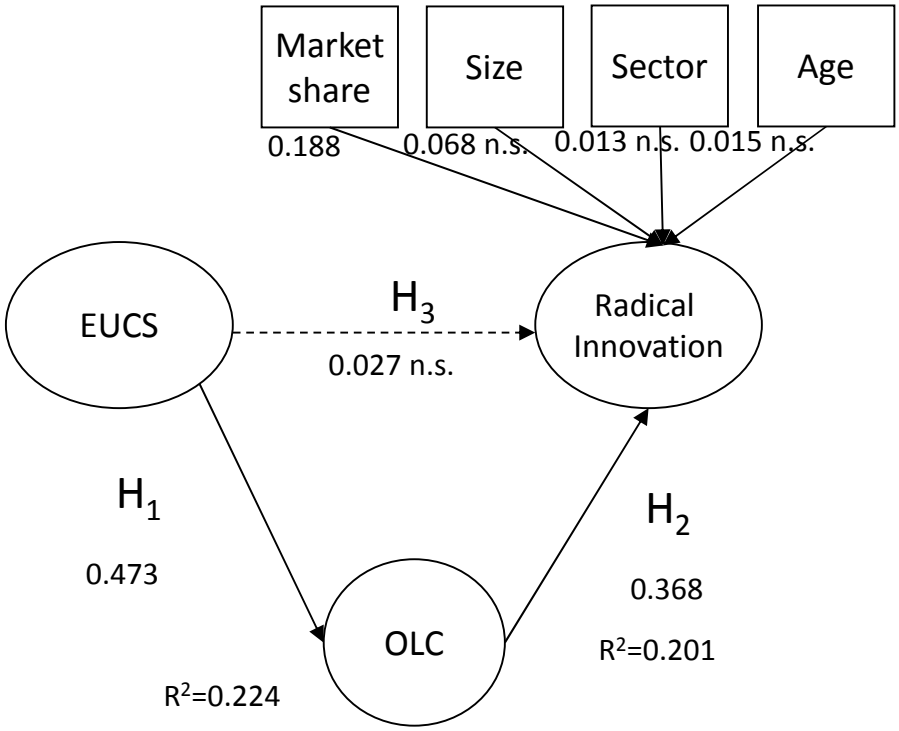
**Figure 4.4. Direct effect model: EUCS and radical innovation.**




| | |
|---|---|
| chi-square | 231.844 |
| d.f. | 174 |
| p-value | 0.002 |
| chi-square/d.f. | 1.332 |
| NFI | 0.934 |
| NNFI | 0.979 |
| CFI | 0.982 |
| RMSEA | 0.036 |

Note: EUCS= End-user computing satisfaction

**Figure 4.5. Mediating effect model: EUCS, OLC and radical innovation.**




| | |
|---|---|
| chi-square | 723.043 |
| d.f. | 538 |
| p-value | 0.000 |
| chi-square/d.f. | 1.344 |
| NFI | 0.874 |
| NNFI | 0.960 |
| CFI | 0.964 |
| RMSEA | 0.037 |

## 4.6. CONCLUSIONS

The present research contributes to extend the knowledge about alternative organizational factors that promote radical innovation, by showing the positive effect of EUCS and OLC on radical innovation. Results confirm the model and all the hypotheses proposed. Conclusions have significant implications for the EUCS literature, as well as the literature on OLC and radical innovation.

EUCS has a positive effect on OLC. As stressed in previous research, information quality boosts organizational learning, and the characteristics that define successful information systems promote experimentation, participative decision-making, risk-taking, dialogue, and interaction with the environment. Previous research has shown the importance of OLC to satisfy ERP users (Lapiedra et al., 2011), although it has overlooked the opposite effect. The present study goes a step further by uncovering the importance of EUCS to promote contexts that facilitate learning. Additionally, there is empirical evidence that OLC fosters radical innovation. This result is consistent with some previous studies that relate OLC to innovation (e.g., Alegre and Chiva, 2013; Baker and Sinkula, 2007). Finally, results show that OLC fully mediates the relationship between EUCS and radical innovation. Moreover, this study contributes to the radical innovation literature by offering a better understanding of the factors that trigger this type of innovation.

The present study has practical implications. The results obtained suggest ideas that can be used by those firms that want to develop an organizational context to encourage radical innovation. Organizations usually make major investments to implement the latest advances in information systems. Nonetheless, the results of the present study emphasize the importance of the human element within organizations. Although quality information systems are crucial to develop radical innovation, human resources play an important role in using them, by retrieving information, creating new knowledge and disseminating it, discussing and sharing ideas, inquiring, rethinking current patterns, etc. The management of this internal context is often ignored when implementing an information system (Lapiedra et al., 2011), so a relevant finding of the present study is the importance of facilitating a context to ensure learning. Organizations must prioritize mechanisms that promote experimentation, dialogue, participative decision-making, interaction with the external environment, and risk-taking.

Despite the results of the present research, certain limitations should be noted. Because this research was focused on a particular population of Spanish organizations, our results are limited to this type of organization. In addition, this group of organizations was heterogeneous and included different types of firms in terms of size, sector, age, and market share, which can influence their tendency to innovate. Previous research has highlighted the positive effect of these variables on innovation (e.g., Chandy and Tellis,

2000; Sorescu et al., 2003). However, the results of the present study showed that the effect of these control variables on radical innovation were non-significant, except in the case of market share. Our data showed that there is a positive link between market share and the development of radical innovations. Processes related to organizational learning and innovation may differ between industries, so future research should focus on companies from the same sector. In addition, as organizational size may influence innovation, future research could focus on a homogeneous sample in terms of size. Finally, distinguishing between start-ups and incumbent companies might clarify the influence of organizational age on the variables that have been studied. Moreover, taking into account the indicators of the European Innovation Scoreboard (2017), future studies should be conducted in other countries. The methodological approach could be quantitative or qualitative. While the former could be used to confirm our results, the latter could contribute to deepen our understanding of the underlying mechanisms that lead to innovation.

Future research should include incremental innovation in order to determine whether the results can be extrapolated to other types of innovation or are limited to radical innovation. In addition, this research did not differentiate between product, service or process innovation. Taking into account that these innovations present specific features, future studies should distinguish between these types of innovation and consider the different phases of the innovation process (idea generation, idea promotion, idea realization, and implementation stages). In addition, a combination of objective (number of new products) and subjective measures of innovation would also be advisable. Moreover, it would be interesting to study the influence of EUCS and OLC on other variables related to innovation such as innovation success, firm innovativeness, administrative innovation, marketing innovation, etc., along with their effect on organizational performance.

Although EUCS was used to measure the success of the information system in an organization, there is an ongoing debate regarding the best method to measure the impact of information systems in organizations (Abugabah et al., 2009). For this reason, future studies should use other measures that may evaluate the quality of the information systems, such as DeLone and McLean (2003), Van der Heijden (2004), and so forth.

The survey only uses single informants. Although using single informants is the primary research design in most studies, multiple informants would enhance the validity of the research findings. The study provides evidence of causality but cannot prove it by using cross-sectional data. Future research should attempt to overcome this limitation by using longitudinal data to evaluate the long-term effect of EUCs and OLC. The present research was focused on OLC as an intermediate variable between EUCS and radical innovation. It might be worthwhile incorporating into the model some types of learning, such as generative learning (Chiva et al., 2010), market-focused learning, internally focused learning or relationally focused learning (Weerawardena et al., 2006), due to their potential to influence innovation. Future research should rectify and improve all the limitations detected in the present study.

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# Chapter 5

## General discussion of the results

## GENERAL DISCUSSION OF THE RESULTS

The main objective of this research is to disentangle the factors that promote or are positively related to radical innovation and its success. To this end, four studies have been proposed, which suggest various facilitators of radical innovation: altruistic and stewardship leader behavior, organic organizational structure, end-user computing satisfaction, organizational learning capability (OLC), and generative learning. Through structural equation models, the effect of these factors on radical innovation was empirically analyzed, using a sample of Spanish companies characterized by their excellent management of human resources. These companies were included in databases and lists published in different media according to different criteria such as work culture, working conditions, talent development (including aspects such as motivation, recognition, training, and career development), and commitment to continuity, environment and innovation. Information was collected at different times, depending on the study. In addition, different samples and informants have been used. These variations in the methodology were introduced to improve the limitations encountered during the research.

The results obtained in each empirical study confirm all the hypotheses proposed in the present doctoral thesis. Therefore, they provide the existing literature with new ideas about the factors that promote radical innovation and its success. Results are of great importance because they expand the knowledge of the effects that elements such as altruistic and stewardship leader behavior, organizational learning capability or end-user computing satisfaction may have on radical innovation. These constructs had not previously been related to this type of innovation. In addition, it offers a new perspective of the relationship between organic organizational structure and radical innovation.

The results of the first study confirm the positive relationship between altruistic leader behavior and radical innovation, not only directly, but also through OLC. There are no previous studies that analyze the effects of this specific type of leader behavior on innovation. However, previous research has shown that leadership styles that incorporate altruism among their characteristics are positively related to innovation. Although these are different concepts which are not directly comparable, this study seems to be in the same line, confirming that there is a positive relationship between altruistic leader behavior and radical innovation. These results have important implications for the literature on

leadership. Firstly, because this thesis studies the altruistic behavior of leaders, a concept with high interest but underestimated in the academic field. On the other hand, the results of the research also have important implications for the literature about OLC by positively relating this concept with altruistic leader behavior and radical innovation.

The second study confirms the positive relationship between leader's stewardship behavior and innovation success, thanks to the mediating effect of radical innovation. There is no previous research that has studied the effect of leader's stewardship behavior on radical innovation. Evidence of this relationship that may be found in the academic literature comes from studies in which leadership styles that include this behavior, such as servant, are positively related to innovation. On the other hand, this study confirms the important role played by radical innovation to achieve success from both the financial and non-financial points of view. This finding is in line with previous research. The relevance of the results lies in the importance of stewardship to develop successful radical innovations. The study has implications for the literature about leader's stewardship behavior, by analyzing the effects of this behavior in organizations. It also has implications for the literature that studies the factors that promote innovation success.

The third study demonstrates the positive relationship between organic organizational structure and radical innovation, as well as the mediating role played by generative learning. In this case, the results indicate that this is a partial mediation, which means that there are other elements that also influence this relationship. Although a few previous studies have suggested that there is a positive relationship between organic structure and radical innovation, the existence of research that did not reach the same conclusions called for further study in this field in order to analyze the effect of new mediating variables. Therefore, this research clarifies the link between organic structure and radical innovation by highlighting the mediating role played by generative learning. This study also contributes to the literature on organic organizational structure and generative learning by confirming the positive relationship, pointed out in previous research, between organic structure and generative learning, and between generative learning and radical innovation. In addition, it empirically tests, for the first time, a scale to measure generative learning.

The results of the fourth study show that end-user computing satisfaction promotes radical innovation through OLC. To our knowledge, there are no previous studies that empirically analyze the relationship between end-user computing satisfaction and radical innovation. Results suggest that quality information systems, which guarantee user satisfaction, may promote an organizational context that fuels learning and, in turn, radical innovation. The study has important implications for the literature about end-user computing satisfaction, by demonstrating not only its positive relationship with radical innovation but also with OLC. Moreover, the scale to measure end-user computing satisfaction has been validated in an empirical study with Spanish companies that manage human resources in an excellent way.

All the results of the thesis contribute to the literature that studies the promoting factors of radical innovation, by highlighting altruistic and stewardship leader behavior, organizational learning capability, organic organizational structure, generative learning, and end-user computing satisfaction. For some of the concepts analyzed in this research, such as altruistic and stewardship leader behaviors, or end-user computing satisfaction, this is the first time that they have been related to radical innovation. Thus, these results represent a first step to continue to study their influence on this type of innovation in the future, by incorporating new mediating variables or modifying the context of the study.

On the other hand, despite the results obtained, the studies that make up this doctoral thesis have some limitations. The studies "The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study " (Chapter 1), “How to promote radical innovation? The importance of organic structure and generative learning" (Chapter 3), and "End-user computing satisfaction and radical innovation: the mediating effect of organizational learning capability" (Chapter 4) share the same methodology and, therefore, the same limitations. The study "How to achieve successful innovations through leader’s stewardship behavior? The effect of radical innovation" (Chapter 2) incorporates some changes that require its limitations to be considered in a specific way. The limitations of the studies and the improvements adopted are explained in the following.

The first limitation is valid for the four studies that make up the thesis and is related to the population selected to carry out the research. It consists of a group of heterogenous Spanish companies, which includes organizations from different sectors and of different sizes. Their common feature is the excellent management of human resources. Previous research has shown that the sector or the size of the company may be related to its ability to innovate. Therefore, future studies should take into account this particularity and select more homogeneous company samples, focusing on companies from a specific sector or of a similar size. In addition, comparative studies with organizations in other countries may be very interesting.

Three studies (Chapters 1, 3 and 4) were conducted using a single informant, which may affect the results due to the potential effect of the common method bias. For this reason, it is advisable to collect data using different respondents. The study "How to achieve successful innovations through leader's stewardship behavior? The effect of radical innovation" (Chapter 2) uses two different informants to answer the questions regarding the dependent and independent variables.

Additionally, the studies "The effect of altruistic leader behavior and organizational learning capability on radical innovation: an empirical study " (Chapter 1), "How to promote radical innovation? The importance of organic structure and generative learning" (Chapter 3) and "End user computing satisfaction and radical innovation: the mediating effect of organizational learning capability" (Chapter 4) provide evidence of causality but cannot prove it because they use transversal data. Future studies should improve this limitation through longitudinal data samples. The study "How to achieve successful innovations through leader's stewardship behavior? The effect of radical innovation" (Chapter 2) introduces a separation of five years in the collection of information about the dependent and independent variables.

This thesis focuses on analyzing the effects of different variables on radical innovation. In the future, it would be important to analyze their influence on incremental innovation with the aim of clarifying whether the conclusions of this thesis are exclusive for radical innovation or can be extended to other innovation typologies.

It is also necessary to continue studying the antecedents that favor the development of radical innovations in the organizational context. In this vein, there are some similar concepts, related to those that have been analyzed in this thesis, but whose effects on radical innovation have not yet been studied. Some of these concepts may be, for instance, corporate social responsibility, leader behaviors such as humility, authenticity or accountability, mindfulness, etc.

In order to continue advancing in the study of the factors that promote radical innovation, future research should improve the limitations detected in this doctoral thesis.

# Chapter 6

Conclusions

# CONCLUSIONS

In the current competitive context, marked by globalization, technological advances and growing competition, innovation is one of the necessary ways to improve companies' results and ensure their survival. Radical innovation, due to its potential positive effects, has become a field of great importance for research. For this reason, numerous studies try to find out what factors promote its development. However, the factors that facilitate radical innovation are not always clear. In the academic field, there have been a number of proposals to continue investigating the processes that promote the development of this type of innovation and its successful implementation.

The characteristics of radical innovation require that its consequences and antecedents must be studied specifically, differentiating this type of innovation from other typologies. In this line, the present investigation lies within the framework that attempts to expand the knowledge about the antecedents that promote radical innovation. To this end, it analyzes how radical innovation is affected by specific leader behaviors, such as altruism and stewardship, organic organizational structure, organizational learning capability, generative learning, and information systems. In addition, taking into account the difficulties associated with radical innovation and the potential negative effects it may have for organizations in case of failure, some considerations are also made to facilitate its success.

Given the need to expand the knowledge related to the way leaders promote radical innovation along with the obligation to introduce changes in how organizations are led, this thesis has focused on the role played by behaviors associated with new types of leadership in the development of radical innovations. Studying specific leader behaviors was motivated by the difficulty to interpret the results of research that focuses on leadership styles. Some studies indicate that leadership styles that incorporate altruism among their characteristics promote innovation. This positive relationship, which was intuited in previous research about altruistic behaviors and innovation, is confirmed in the present doctoral thesis. By focusing the study on the effects of this particular behavior, the results obtained confirm that altruistic leader behavior promotes radical innovation. This behavior has a positive and indirect effect on radical innovation, mediated by organizational learning capability. Altruistic leader behavior fosters an organizational context that promotes

experimentation, risk taking, dialogue, participatory decision-making and interaction with the external environment, which are aspects that, in turn, enhance radical innovation.

The potential benefits of radical innovation are very important for companies, organizations and the economies of countries. However, the risks associated with the development of this type of innovation, the uncertainty of the expected results or the possibility of failure suggest the need to know the mechanisms that favor radical innovations in order to be successful. In line with previous research, the results presented here confirm the relationship between radical innovation and its success. Radical innovations have a positive impact for organizations in both the financial and non-financial fields. The relevance of the conclusions presented in this research lies in the demonstration that the success of this type of innovation is promoted by leader's stewardship behavior.

As mentioned before, the current competitive environment requires new leadership styles in organizations that allow them to be competitive and face changing situations. In addition, society is increasingly aware of social and environmental problems, and monitors the impact of organizational activity on the environment. All this, along with the great global challenges that humanity faces, such as globalization or climate change, demand a radical transformation in the current economic model and in the way companies work. The objective is to achieve a more sustainable productive and consumption model, which is also fair for society. In this context, leaders and managers who show a concern for the footprint left by companies in society and the environment, and incorporate a long-term sustainable vision are increasingly important. The idea of sustainability requires fostering new ideas and taking a step forward in innovation. The results presented in this research confirm the positive relationship between leader's stewardship behavior and radical innovation. Conscious innovation, which addresses the problems and demands of society, may be more favorably received by a market that shows a growing concern about these issues. In addition, this type of innovations may be a gateway to improve the social perception of organizations and their financial performance.

The uncertain conditions of the environment, along with the changes in leadership styles needed to achieve radical innovation, require that organizations and companies work in a different way, which implies a transformation of their structures. There are previous studies that show that organic structures are the most appropriate ones to work in uncertain

contexts and promote innovation, especially of the radical kind. However, the existence of research that does not reach the same conclusions highlights the need to continue studying this relationship. Some researchers propose the mediation effect of other variables to explain the variety of results obtained. This study confirms the positive relationship between organic organizational structure and radical innovation, in line with previous studies. However, in this case, the results highlight the mediating role played by generative learning when explaining why organic structures are positively related to radical innovation. Although generative learning is related to both organic structure and radical innovation, there are no previous studies that analyze all these variables together. Results indicate that the mediation of generative learning in the relationship between organic structure and radical innovation is partial, which means that other elements also influence this relationship. For this reason, the study of how the organic structure influences radical innovation must not be closed at this point and further research needs to be conducted on the factors that intervene in this relationship.

Finally, the last study reaffirms the role of information systems to promote innovation. Although it has been stated that information has a positive effect on promoting innovation, to our knowledge there are no studies that, from an empirical point of view, have analyzed its influence on radical innovation. The evolution of new information technologies has revolutionized the way companies access and manage information, thereby transforming the profile of the end-user of these information systems. These users are more used to working with computer programs and applications. Although nowadays the amount of data available is much greater than in the past, the difficulty to manage that information has also increased. Consequently, it is necessary to have quality information systems to be able to access information and work with it, in order to achieve companies' strategic objectives, including those related to innovation. Given that the quality of information systems is difficult to measure objectively, it is necessary to do so through alternative measures, such as end-user computing satisfaction, one of the constructs most frequently used by researchers. One way to do this is by evaluating the format, utility, accuracy and timeliness of the information, as well as the ease of use of the computer applications through which the information is managed. This measure has not been used previously to assess the influence of information systems on innovation and, to our knowledge, this is the first time that it has been used for this purpose in empirical research.

However, the importance of information systems cannot be limited to simply providing access to data. It is necessary for the information to be distributed and transmitted to all the members of the organization with the aim of promoting the dissemination of knowledge and adequate decision-making. Results suggest that end-user computing satisfaction is positively related to radical innovation. This effect occurs both directly and indirectly, through the mediating effect of OLC. Thus, end-user computing satisfaction may favor an organizational context that fosters experimentation, dialogue, relationships with the external environment, and participative decision-making, which in turn will facilitate radical innovation.

The resulting conclusions contribute to the business field. Companies that are interested in developing radical innovations should promote leadership styles that go beyond transactional leadership styles. Through human resources polices such as selection and recruitment, they must seek professional profiles that stand out for their values in terms of altruism and responsibility and, through training, foster and enhance these behaviors among the members of the organization.

Given the relationship between organizational learning capacity and radical innovation, it is essential that companies enhance the factors that promote learning in the organizations that have been analyzed in this research such as experimentation, risk taking, dialogue, interaction with the environment, and participative decision-making.

On the other hand, companies must set up flexible and decentralized organizational structures, with little formalization, which can facilitate communication, reflection, and the questioning of the status quo. This organizational context enhances generative learning, thus boosting creative ideas that may promote radical innovations.

Finally, companies must take care of their information systems. Through them, members of the organization work and take decisions. A system that provides accurate and useful information, in an appropriate format and through applications that are easy to use, will facilitate communication between the members of the organization and the external environment. By being more and better informed, these workers will become more confident about the quality of the information available and will be able to participate in

decision-making, while also being more willing to experiment and take risks, thereby promoting an environment conducive to the development of radical innovations.

The present research is a small contribution to the extensive literature that analyzes the factors that promote radical innovation. Despite the positive results obtained, we must not forget the limitations of this study. These limitations are included in each of the chapters that make up this doctoral thesis, as well as in the discussion section of the general results. Therefore, in future research, it is necessary to continue to study all the factors analyzed in this thesis, in order to improve the limitations detected. In addition, following the recommendations of other researchers, we consider that the study of radical innovation is a field of high interest, and so we suggest continuing to analyze its antecedents and facilitating factors. As a result, the study of the promoters detected in this thesis will advance and new variables can be incorporated into the investigation.

# Chapter 7

## Resumen y conclusiones (en castellano)

# RESUMEN Y CONCLUSIONES (EN CASTELLANO)

## RESUMEN

El objetivo principal de esta investigación ha sido conocer los factores que promueven o se relacionan positivamente con la innovación radical y su éxito. Para ello se han planteado cuatro estudios que proponen diversos facilitadores de la innovación radical: el comportamiento altruista y el comportamiento responsable de los líderes, la estructura organizativa orgánica, los sistemas de información, la capacidad de aprendizaje organizativo y el aprendizaje generativo. A través de modelos de ecuaciones estructurales, se ha analizado empíricamente el efecto de estos factores en la innovación radical, utilizando una muestra de empresas españolas caracterizada por la excelente gestión que realizan de los recursos humanos. Estas empresas provienen de bases de datos y listados publicados en diferentes medios que utilizan, para conformarlos, criterios como el entorno y la cultura de trabajo, las condiciones de trabajo, el desarrollo del talento (incluyendo aspectos como la motivación, el reconocimiento, la formación y el desarrollo de carrera), o el compromiso con la continuidad, el entorno y la innovación. En función de los estudios, la recogida de información se ha producido en momentos distintos y se han utilizado diferentes muestras e informantes. Estas variaciones en la metodología se han introducido para mejorar las limitaciones encontradas durante el desarrollo de la investigación.

Los resultados obtenidos en cada una de las investigaciones empíricas confirman todas las hipótesis planteadas en la presente tesis doctoral. Por lo tanto, permiten aportar nuevas ideas a la literatura existente sobre los factores que promueven la innovación radical y su éxito. Los resultados obtenidos son de gran importancia porque expanden el conocimiento de los efectos que, sobre la innovación radical, tienen elementos que no habían sido relacionados previamente con este tipo de innovación, como los comportamientos altruista y responsable de los líderes, la capacidad de aprendizaje organizativo o la satisfacción de los usuarios finales con los sistemas de información. Además, ofrece una nueva perspectiva al estudio de factores que han sido investigados con antelación, como la estructura organizativa orgánica, tratando de dar respuesta a la diversidad de resultados que explican su relación con la innovación radical.

Los resultados del primer estudio confirman la relación positiva del comportamiento altruista del líder con la innovación radical, no sólo directamente, sino también a través de la capacidad de aprendizaje organizativo. No existen estudios previos que analicen este comportamiento concreto de los líderes sobre la innovación. Sin embargo, otras investigaciones han demostrado que los estilos de liderazgo que incorporan el altruismo entre sus características se relacionan de manera positiva con la innovación. Aunque se trate de conceptos diferentes y no directamente comparables, este estudio parece ir en la misma línea al confirmar que existe una relación positiva entre el altruismo de los líderes y la innovación radical. Estos resultados tienen importantes implicaciones para la literatura sobre el liderazgo, al estudiar el comportamiento altruista de los líderes, un concepto con elevado interés pero poco estudiado como tal. Por otra parte, los resultados de la investigación tienen también importantes implicaciones para la literatura sobre la capacidad de aprendizaje organizativo al relacionar positivamente este concepto con el comportamiento altruista del líder y la innovación radical.

El segundo estudio confirma la relación positiva entre el comportamiento responsable del líder y el éxito de la innovación, gracias al efecto mediador de la innovación radical. No existen investigaciones previas que hayan estudiado el efecto del comportamiento responsable de los líderes en la innovación radical. Los indicios que se encuentran en la literatura provienen de algunos estudios que demuestran que los estilos de liderazgo que incorporan este tipo de comportamiento, como el servicial, se relacionan con la innovación. Por otra parte, este estudio confirma el rol importante que desempeña la innovación radical para conseguir el éxito tanto desde un punto de vista financiero como no financiero, en la línea de lo que han apuntado numerosos investigadores en estudios previos. La relevancia de los resultados obtenidos se encuentra en destacar la importancia del comportamiento responsable de los líderes para conseguirlo. Este estudio tiene implicaciones muy importantes para la literatura del comportamiento responsable de los líderes, al analizar los efectos de este tipo de comportamientos para las organizaciones, así como para la literatura que analiza los factores que promueven el éxito de las innovaciones.

El tercer estudio demuestra la relación positiva entre la estructura organizativa orgánica y la innovación radical, así como el papel mediador que desempeña el aprendizaje generativo. En este caso, los resultados señalan que se trata de una mediación parcial, lo que indica que existen otros elementos que influyen en esa relación pero que no conocemos. Aunque

existían estudios anteriores que señalaban las relaciones positivas entre estructura orgánica e innovación radical, la existencia de investigaciones que no alcanzaban las mismas conclusiones demandaba seguir estudiando esta relación con la inclusión de otras variables mediadoras. Por ello, esta investigación aclara la vinculación entre estructura orgánica e innovación radical al destacar el rol mediador desempeñado por el aprendizaje generativo. Este estudio también contribuye a la literatura sobre estructura organizativa orgánica y aprendizaje generativo, al confirmar las relaciones positivas, apuntadas en investigaciones precedentes, entre estructura orgánica y aprendizaje generativo, y entre aprendizaje generativo e innovación radical. Además, permite testar empíricamente, por primera vez, una escala para medir el aprendizaje generativo.

Los resultados del cuarto estudio permiten afirmar que los sistemas de información de calidad, con los que los usuarios están satisfechos, promueven la innovación radical de manera indirecta mediante la capacidad de aprendizaje organizativo. Hasta donde alcanza nuestro conocimiento, no existen estudios previos que analicen empíricamente la satisfacción de los usuarios finales de un sistema de información con la innovación radical. Los resultados señalan que los sistemas de información de calidad que sean capaces de satisfacer las necesidades de sus usuarios finales, serán capaces de fomentar un contexto organizativo que promueva el aprendizaje y a su vez la innovación radical. El estudio tiene importantes implicaciones para la literatura sobre la satisfacción de los usuarios finales de los sistemas de información, al demostrar no sólo su relación positiva con la innovación radical sino también con la capacidad de aprendizaje organizativo. Además, se valida la escala de medición de la satisfacción de los usuarios finales de los sistemas de información en un estudio empírico con empresas españolas que gestionan los recursos humanos de manera excelente.

Todos los resultados obtenidos contribuyen a la literatura que estudia los factores promotores de la innovación radical, al destacar el efecto positivo de los comportamientos altruista y responsable de los líderes, la capacidad de aprendizaje organizativo, la estructura organizativa orgánica, el aprendizaje generativo y los sistemas de información de calidad en la innovación radical. Parte de los conceptos analizados en esta investigación es la primera vez que se estudian en relación con la innovación radical, como por ejemplo el comportamiento altruista del líder, el comportamiento responsable o la satisfacción del usuario del sistema de información. Por lo tanto, los resultados obtenidos suponen un

primer paso para continuar estudiando su influencia en este tipo de innovación en el futuro, con la incorporación de otras variables mediadoras o cambiando el contexto de estudio.

Por otra parte, a pesar de los resultados obtenidos, los estudios que componen esta tesis doctoral presentan algunas limitaciones. Los estudios "El efecto del comportamiento altruista del líder y la capacidad de aprendizaje organizativo en la innovación radical: un estudio empírico" (capítulo 1), "¿Cómo promover la innovación radical?: la importancia de la estructura orgánica y el aprendizaje generativo" (capítulo 3) y "Sistemas de información de calidad e innovación radical: el efecto mediador de la capacidad de aprendizaje organizativo" (capítulo 4) comparten la misma metodología y, por lo tanto, las mismas limitaciones. El estudio "¿Cómo conseguir innovaciones exitosas a través del comportamiento responsable de los líderes?: el efecto de la innovación radical" (capítulo 2) incorpora algunos cambios que exigen que sus limitaciones sean consideradas de manera específica. A continuación se distinguen las limitaciones entre estudios y las mejoras adoptadas.

La primera limitación es válida para los cuatro estudios que componen la tesis y se relaciona con la población de empresas seleccionada para realizar la investigación. Se trata de un conjunto de empresas españolas caracterizado por su heterogeneidad, que incluye organizaciones procedentes de diferentes sectores y con diferentes tamaños, cuyo rasgo común es la excelente gestión que realizan de los recursos humanos. Investigaciones previas han demostrado que el sector al que pertenece una empresa o el tamaño de la misma puede estar relacionado con la capacidad de las empresas para innovar, lo que podría influir en la gestión que realizan de la innovación radical. Por lo tanto, estudios futuros deberían tener en cuenta esta particularidad y buscar muestras de empresas más homogéneas, centrando la investigación en empresas de un sector específico o de un tamaño similar. Además, podrían plantearse estudios comparativos con organizaciones de otros países.

Tres de las investigaciones (capítulos 1, 3 y 4) se han desarrollado utilizando un único informante. Utilizar un único informante puede afectar a los resultados obtenidos debido a la potencial presencia del sesgo de método común. Por esta razón, es aconsejable recoger los datos utilizando diferentes fuentes de información. El estudio "¿Cómo conseguir innovaciones exitosas a través del comportamiento responsable de los líderes?: el efecto de

la innovación radical" (capítulo 2) utiliza dos informantes diferentes para contestar a las preguntas referentes a las variables dependientes e independientes.

Por otra parte, los estudios "El efecto del comportamiento altruista del líder y la capacidad de aprendizaje organizativo en la innovación radical: un estudio empírico" (capítulo 1), "¿Cómo promover la innovación radical?: la importancia de la estructura orgánica y el aprendizaje generativo" (capítulo 3) y "Sistemas de información de calidad e innovación radical: el efecto mediador de la capacidad de aprendizaje organizativo" (capítulo 4) proporcionan evidencia de causalidad pero no puede probarla al utilizar datos de corte transversal. Futuros estudios deberían solventar esta limitación mediante muestras de carácter longitudinal. El estudio "¿Cómo conseguir innovaciones exitosas a través del comportamiento responsable de los líderes?: el efecto de la innovación radical" (capítulo 2) introduce una separación de cinco años entre la formulación a los encuestados de las preguntas relativas a las variables independientes y dependientes.

La presente tesis se ha centrado en analizar los efectos de diferentes variables en la innovación radical. En el futuro, sería importante realizar dichos análisis para la innovación incremental con la finalidad de aclarar si las conclusiones de la presente investigación son extensibles a ambos tipos de innovación o son exclusivas de la radical.

También es necesario continuar investigando los antecedentes que favorecen el desarrollo de la innovación radical en las organizaciones. En este sentido, en la literatura se encuentran algunos conceptos similares o que tienen relación como los factores que se han analizado en la presente tesis pero cuyos efectos sobre la innovación radical no han sido todavía investigados. Algunos de estos elementos son, por ejemplo, el "mindfulness", la responsabilidad social organizativa o aspectos concretos del liderazgo como la sabiduría de los líderes.

Con el objetivo de seguir avanzando en el estudio de los factores que promueven la innovación radical, investigaciones futuras deberían mejorar las limitaciones detectadas en la presente tesis doctoral.

## CONCLUSIONES

En el actual contexto competitivo, marcado por la globalización, los avances tecnológicos y la creciente competencia, la innovación es uno de los caminos necesarios para mejorar los resultados de las empresas y garantizar su supervivencia. La innovación radical, por sus potenciales efectos positivos, se ha convertido en un campo de gran importancia para la investigación y, por esta razón, numerosos estudios tratan de averiguar cuáles son los factores que promueven su desarrollo. Sin embargo, los factores que facilitan la innovación radical no están siempre claros y, desde el ámbito académico, se lanzan propuestas para continuar investigando los procesos que permiten desarrollar este tipo de innovaciones e implantarlas con éxito.

Las características específicas de la innovación radical requieren que sus consecuencias y antecedentes se estudien de manera específica, diferenciándolas de otros tipos de innovación. En esta línea se enmarca la presente investigación, que trata de ampliar el conocimiento relativo a los antecedentes que promueven su desarrollo. Para ello, analiza los efectos sobre la innovación radical de comportamientos concretos de los líderes, como el altruista y el responsable, la estructura organizativa orgánica, la capacidad de aprendizaje organizativo, el aprendizaje generativo y los sistemas de información. Además, teniendo en cuenta las dificultades asociadas a la innovación radical y los potenciales efectos negativos que puede tener para las organizaciones en caso de fallo o fracaso, también se realizan algunas consideraciones para facilitar su éxito.

Ante la necesidad de ampliar el conocimiento relacionado con la forma en la que los líderes promueven la innovación radical unida a la obligación de introducir cambios en la manera de liderar las organizaciones en un entorno incierto y en permanente evolución, la presente tesis doctoral se ha centrado en el rol que desempeñan los comportamientos asociados a los nuevos tipos de liderazgo en la innovación radical. La elección de comportamientos concretos manifestados por los líderes ha sido motivada por la dificultad de interpretar los resultados de las investigaciones que se centran en estilos de liderazgo concretos. Algunos estudios indican que los estilos de liderazgo que incorporan el altruismo entre sus características promueven la innovación. Esta relación positiva que se intuía en las investigaciones previas entre comportamientos altruistas e innovación, se confirma en la presente tesis doctoral. Al centrar el estudio en los efectos de este tipo concreto de

comportamiento, los resultados obtenidos permiten afirmar que el comportamiento altruista de los líderes promueve la innovación radical. Este tipo de comportamiento tiene un efecto positivo e indirecto sobre la innovación radical, mediado por la capacidad de aprendizaje organizativo. El comportamiento altruista de los líderes fomenta un contexto organizativo que promueve la experimentación, la aceptación de riesgos, el diálogo, la toma de decisiones participativa y la interacción con el entorno, aspectos que a su vez potencian la innovación radical.

Los potenciales beneficios de la innovación radical son muy importantes para las empresas, las organizaciones y las economías de los países. Sin embargo, los riesgos asociados a los procesos de desarrollo de este tipo de innovación, la incertidumbre de los resultados alcanzados o la posibilidad de fracasar sugieren la necesidad de conocer los mecanismos que favorecen que las innovaciones radicales tengan éxito. Siguiendo la línea de otras investigaciones anteriores, los resultados que aquí se presentan confirman la relación entre la innovación radical y el éxito de las mismas, con un impacto positivo para las organizaciones tanto en el ámbito financiero como en el no financiero. La relevancia de las conclusiones presentadas en esta investigación se encuentra en demostrar que el éxito de este tipo de innovación se promueve por el comportamiento responsable de los líderes.

Como se ha comentado, el entorno competitivo exige nuevos estilos de liderazgo en las organizaciones que les permita ser competitivas ante las situaciones cambiantes. Además, la sociedad está cada vez más concienciada con los problemas sociales y medioambientales, y controla el impacto de su actividad en el entorno. Todo esto, unido a los grandes retos globales que afronta la humanidad, como la globalización o el cambio climático, exigen un cambio radical en el actual modelo económico y en la manera de trabajar de las empresas que permita alcanzar un modelo productivo y de consumo más sostenible y justo para la sociedad. En este contexto, destacan los líderes y directivos que muestran una preocupación por la huella que dejan las empresas en la sociedad y el entorno, e incorporan una visión sostenible a largo plazo que no sólo beneficie a las empresas y los accionistas para los que trabajan sino también a la sociedad en su conjunto. Esta idea de sostenibilidad exige fomentar nuevas ideas y dar un paso adelante en innovación. Los resultados que se presentan en esta investigación confirman la relación positiva entre los comportamientos conscientes y socialmente responsables de los líderes, y la innovación radical. Una innovación más consciente de los problemas y demandas de la sociedad puede ser acogida

más favorablemente por un mercado que muestra una creciente preocupación por estos temas, mejorando la percepción social de las organizaciones y el desempeño financiero de las mismas.

Las condiciones inciertas del entorno, unidas a los cambios en los estilos de liderazgo necesarios para conseguir la innovación radical, requieren que en las organizaciones y empresas se trabaje de manera diferente, lo que implica una transformación de las estructuras de las mismas. Existen estudios previos que demuestran que las estructuras orgánicas son las más adecuadas para trabajar en contextos inciertos y promover la innovación, especialmente la radical. Sin embargo, la existencia de investigaciones que no alcanzan las mismas conclusiones al analizar la relación entre estructura organizativa e innovación han movido a los investigadores a continuar estudiando esta relación y proponer la mediación de otras variables que puedan explicar la disparidad de resultados. Este estudio confirma la relación positiva entre estructura organizativa orgánica e innovación radical, en la misma línea que otros estudios previos. No obstante, en este caso, los resultados resaltan el rol mediador desempeñado por el aprendizaje generativo para tratar de explicar por qué la estructura orgánica se relaciona positivamente con la innovación radical. Aunque el aprendizaje generativo se relaciona tanto con la estructura orgánica como con la innovación radical, no se tiene constancia de estudios previos que analicen todas estas variables de manera conjunta. Los resultados señalan que la mediación del aprendizaje generativo en la relación entre estructura orgánica y la innovación radical es parcial, lo que significa que otros elementos influyen en esta relación. Por esta razón, el estudio de la influencia de la estructura orgánica en la innovación radical no puede cerrarse en este punto, siendo necesario seguir investigando los factores que intervienen en esta relación y permitan aclarar cómo afectan estas estructuras organizativas a la innovación radical.

Para finalizar, el último de los estudios reafirma el papel de los sistemas de información en la promoción de la innovación. Aunque se ha señalado el efecto positivo de la información para promover la innovación, no hay constancia de estudios que hayan abordado, desde una perspectiva empírica, la influencia de la misma en la innovación radical. La evolución de las nuevas tecnologías de la información ha supuesto una revolución en la manera en la que las empresas acceden y gestionan la información, transformando el perfil del usuario final que utiliza estos sistemas, más formados y acostumbrados a trabajar con programas y

aplicaciones informáticas. Aunque la cantidad de datos disponible es mucho mayor que en el pasado, la dificultad para gestionar esa información también ha aumentado. Es necesario disponer de sistemas de información de calidad que permitan a las empresas acceder y trabajar con ella para conseguir sus objetivos estratégicos, incluidos los relacionados con la innovación. Dado que la calidad de los sistemas de información es difícil de medir de manera objetiva, es necesario hacerlo a través de medidas sustitutivas, como la satisfacción de los usuarios finales de los sistemas de información, una de las más utilizadas por los investigadores. Una manera de hacerlo es valorando el formato, la utilidad, la precisión y la rapidez de la información, así como la facilidad de uso de las aplicaciones informáticas mediante las que se gestiona la información. Esta medida tampoco ha sido utilizada previamente para valorar la influencia de los sistemas de información en la innovación y, desde nuestro conocimiento, es la primera vez que se utiliza con este fin en una investigación empírica.

Sin embargo, la importancia de los sistemas de información no puede limitarse al simple acceso a los datos. Es necesario que la información se distribuya y transmita a todos los miembros de la organización para promover la difusión del conocimiento y la toma de decisiones acertadas. Los resultados señalan que los sistemas de información de calidad, con los que los usuarios finales están satisfechos, se relacionan de manera positiva con la innovación radical. Este efecto se produce tanto de manera directa como indirecta, a través del efecto mediador de la capacidad de aprendizaje organizativo. Por lo tanto, los sistemas de información que sean capaces de garantizar la satisfacción de sus usuarios ofreciendo información precisa, puntual, en un formato adecuado, que sea de utilidad, y en aplicaciones que no generen dificultades de uso, favorecerán un entorno organizativo que fomenta la experimentación, el diálogo, la toma de riesgos, la relación con el entorno y la toma de decisiones participativa, lo que a su vez facilitará la innovación radical.

Las conclusiones alcanzadas permiten contribuir desde una perspectiva práctica al ámbito profesional. Las empresas que apuesten por el desarrollo de innovaciones radicales deberán promover estilos de liderazgo que superen los clásicos estilos transaccionales. A través de políticas de recursos humanos como la selección y el reclutamiento, deberán buscar perfiles profesionales que destaquen por sus valores altruistas y responsables, y a través de la formación, potenciar este tipo de comportamientos entre los miembros de la organización.

Habida cuenta de la relación existente entre la capacidad de aprendizaje organizativo y la innovación radical, es fundamental que las empresas potencien los factores que promueven el aprendizaje en las organizaciones analizados en la presente investigación, como la experimentación, la toma de riesgos, el diálogo, la interacción con el entorno y la toma de decisiones participativa.

Por otra parte, las empresas deberán plantear estructuras organizativas flexibles, descentralizadas y con poca formalización que faciliten la comunicación, la reflexión, el cuestionamiento del status quo para que, en este contexto que potencia el aprendizaje generativo, se puedan plantear ideas creativas y promover la innovación radical.

Por último, es primordial que las empresas cuiden los sistemas de información mediante los que los miembros de la organización trabajan y toman decisiones. Un sistema que aporte información precisa, útil, en un formato adecuado, a través de aplicaciones que sean fáciles de utilizar mejorará la comunicación entre los miembros de la organización y los actores externos. Estos trabajadores, más y mejor informados, al mostrarse más confiados por la calidad de la información disponible, podrán participar en la toma de decisiones, se mostrarán más predispuestos a experimentar y tomar riesgos, desarrollando un ambiente propicio para el desarrollo de innovaciones de tipo radical.

La presente investigación es una pequeña contribución a la amplia literatura existente que analiza los factores promotores de la innovación radical. A pesar de los resultados positivos obtenidos, no hay que olvidar las limitaciones que presenta este estudio, recogidas en cada uno de los capítulos que componen esta tesis doctoral, así como en la sección de discusión de los resultados generales. Por esta razón, es necesario que se sigan estudiando todos los factores aquí analizados en futuras investigaciones para mejorar las limitaciones detectadas. Además, siguiendo las recomendaciones de otros investigadores, consideramos que el estudio de la innovación radical es un campo de elevado interés, por lo que sugerimos seguir analizando sus antecedentes y factores facilitadores, profundizando en el estudio de los promotores detectados en esta tesis e incorporando nuevas variables a la investigación.

# Appendices

# Appendix A: Questionnaires used in the research

## A.1 QUESTIONNAIRE 1

# Cuestionario Análisis Organizativo (2010)

## Dirigido a directivos con al menos 2 años de experiencia en la empresa (RRHH preferiblemente)

Estimado/a entrevistado/a,

En la Universitat Jaume I de Castellón estamos llevando a cabo una investigación sobre las mejores empresas españolas para trabajar o aquellas que mejor gestionan el factor humano, entre las que se encuentra su empresa.

Para ello, le agradeceríamos que respondiera a este cuestionario sobre aspectos organizativos. Sus respuestas serán totalmente confidenciales, y agrupadas junto al resto para ser estadísticamente tratadas.

Finamente, y si usted lo desea, cuando estos datos sean analizados, le podemos enviar un breve informe comparando su organización con el resto de las empresas estudiadas. En ese caso, indíquenos su email. Si tuviera cualquier duda, por favor no dude en contactarnos. Muchas gracias.

| | |
|---|---|
| Nombre de la Empresa/Organización: | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Número de empleados | **<50** | **50-100** | **101-250** | **251-500** | **501-1000** | **>1000** |

| | |
|---|---|
| Email: | |

**1. Por favor, responda a las siguientes preguntas <u>SOBRE SU EMPRESA U ORGANIZACIÓN</u>. Para responder, señale el número correspondiente a la respuesta que más se ajuste a su opinión; siendo 1 totalmente en desacuerdo y 5 totalmente de acuerdo.**

| Totalmente en desacuerdo | En desacuerdo | Ni de acuerdo ni en desacuerdo | De acuerdo | Totalmente de acuerdo |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**Sobre la experimentación:**

| | |
|---|---|
| 1. La gente recibe apoyo cuando presenta nuevas ideas | 1-2-3-4-5 |
| 2. Las iniciativas reciben a menudo una respuesta favorable, por lo que la gente se siente animada a plantear nuevas ideas | 1-2-3-4-5 |

**Sobre la aceptación de riesgos:**

| | |
|---|---|
| 3. Se estimula a los trabajadores para que acepten riesgos | 1-2-3-4-5 |
| 4. La gente a menudo se "lanza" hacia temas que desconocen | 1-2-3-4-5 |

**Sobre la interacción con el entorno externo:**

| | |
|---|---|
| 5. Forma parte del trabajo de todos recoger información sobre lo que pasa fuera de la empresa | 1-2-3-4-5 |
| 6. Tenemos sistemas y procedimientos para recibir, cotejar y compartir información del exterior de la empresa | 1-2-3-4-5 |
| 7. Se estimula la interacción con el entorno | 1-2-3-4-5 |

**Sobre el diálogo**

| | |
|---|---|
| 8. A los empleados se les anima a comunicarse entre sí | 1-2-3-4-5 |
| 9. Hay una comunicación abierta en los grupos de trabajo | 1-2-3-4-5 |
| 10. Los directivos facilitan la comunicación | 1-2-3-4-5 |
| 11. El trabajo en equipo entre personas de distintos departamentos es una práctica habitual | 1-2-3-4-5 |

**Sobre la toma de decisiones participativa**

| | |
|---|---|
| 12. Los directivos implican frecuentemente a los empleados en las decisiones importantes | 1-2-3-4-5 |
| 13. Se tiene en cuenta las opiniones de los empleados para decidir la política de la empresa | 1-2-3-4-5 |
| 14. La gente se siente involucrada en las principales decisiones de la empresa | 1-2-3-4-5 |

**Sobre la estructura organizativa**

| | |
|---|---|
| 15. En nuestra organización hay una cultura igualitaria (no jerárquica) | 1-2-3-4-5 |
| 16. Nuestra organización tiene una estructura plana (pocos niveles jerárquicos) | 1-2-3-4-5 |
| 17. Nuestra organización evita la departamentalización rígida | 1-2-3-4-5 |
| 18. A nuestros empleados se les da autonomía | 1-2-3-4-5 |
| 19. Hay una comunicación abierta en toda la organización | 1-2-3-4-5 |
| 20. Los puestos de trabajo son poco especializados | 1-2-3-4-5 |

**Sobre la innovación radical**

| | |
|---|---|
| 21. En nuestra organización se logran innovaciones que son una mejora sustancial de los productos, procesos o servicios existentes en el mercado | 1-2-3-4-5 |
| 22. Algunas innovaciones de nuestra empresa implican un cambio "revolucionario" (en diseño, tecnología etc.) | 1-2-3-4-5 |
| 23. Algunas innovaciones de nuestra empresa suponen un gran avance, ya que representan una nueva categoría de producto, proceso o servicio | 1-2-3-4-5 |
| 24. Algunas innovaciones de nuestra empresa satisfacen una necesidad o un deseo del mercado que ningún otro producto había conseguido satisfacer. | 1-2-3-4-5 |
| 25. Algunas innovaciones de nuestra empresa representan un avance importante (para la sociedad, mercado etc.) | 1-2-3-4-5 |

**Sobre el aprendizaje generativo**

| | |
|---|---|
| 26. En nuestra organización se cuestiona (inquiere) lo establecido | 1-2-3-4-5 |
| 27. En nuestra empresa se utiliza muy a menudo la intuición para la toma de decisiones | 1-2-3-4-5 |
| 28. En nuestra organización se analizan los temas y problemas de forma global, sistémica u holística | 1-2-3-4-5 |
| 29. En nuestra organización se reflexiona colectivamente sobre los temas o problemas | 1-2-3-4-5 |
| 30. En nuestra organización se suele ir más allá de la simple mejora de las cosas | 1-2-3-4-5 |

**Sobre el sistema informático**

| | |
|---|---|
| 31. El sistema informático proporciona la información adecuada | 1-2-3-4-5 |
| 32. El contenido de la información se ajusta a las necesidades de los miembros de la empresa | 1-2-3-4-5 |
| 33. El sistema proporciona informes apropiados | 1-2-3-4-5 |
| 34. El sistema proporciona suficiente información | 1-2-3-4-5 |
| 35. El sistema es exacto | 1-2-3-4-5 |
| 36. Los miembros de la organización parecen satisfechos con la exactitud del sistema | 1-2-3-4-5 |
| 37. El "output" se presenta en un formato útil | 1-2-3-4-5 |
| 38. La información es clara | 1-2-3-4-5 |

| | |
|---|---|
| 39. El sistema proporciona un acceso lógico e intuitivo a sus pantallas o entorno de trabajo, es decir, tiene un interfaz sencillo | 1-2-3-4-5 |
| 40. El sistema es fácil de utilizar | 1-2-3-4-5 |
| 41. Permite obtener la información cuando se necesita | 1-2-3-4-5 |
| 42. Permite obtener información actualizada | 1-2-3-4-5 |

**2. Por favor, responda a las siguientes preguntas SOBRE LOS <u>LÍDERES DE SU EMPRESA U ORGANIZACIÓN</u>. Para responder, señale el número correspondiente a la respuesta que más se ajuste a su opinión; siendo 1 totalmente en desacuerdo y 5 totalmente de acuerdo.**

| Totalmente en desacuerdo | En desacuerdo | Ni de acuerdo ni en desacuerdo | De acuerdo | Totalmente de acuerdo |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**Sobre altruismo**

| | |
|---|---|
| 43. Los líderes de esta organización ponen los intereses de la gente por encima de los suyos propios | 1-2-3-4-5 |
| 44. Los líderes de esta organización hacen todo lo que pueden para ayudar a la gente | 1-2-3-4-5 |
| 45. Los líderes de esta organización sacrifican sus propios intereses para satisfacer las necesidades de los demás | 1-2-3-4-5 |
| 46. Los líderes de esta organización hacen más de lo que deben para ayudar a los demás | 1-2-3-4-5 |

**Sobre la responsabilidad organizativa**

| | |
|---|---|
| 47. Los líderes de esta organización creen que la empresa debe jugar un papel ético en la sociedad | 1-2-3-4-5 |
| 48. Los líderes de esta organización creen que la empresa necesita funcionar como un equipo o una comunidad | 1-2-3-4-5 |
| 49. Los líderes de esta organización perciben la empresa por su potencial de contribución a la sociedad | 1-2-3-4-5 |
| 50. Los líderes de esta organización animan a la gente a tener un espíritu comunitario | 1-2-3-4-5 |
| 51. Los líderes de esta organización gestionan la empresa de forma que ofrezca algo positivo para la sociedad | 1-2-3-4-5 |

## A.2. QUESTIONNAIRE 2

### CUESTIONARIO SOBRE INNOVACIÓN (2015)

A/A: Director/a de innovación o similar

El siguiente cuestionario trata de analizar la innovación en empresas que destacan en dirección de RRHH. Las preguntas hacen referencia a distintos aspectos DE SU EMPRESA. En cada apartado se le indicará a qué hacen referencia las preguntas. Por favor, conteste escogiendo la opción que más se ajuste a la realidad en términos generales. Responder al cuestionario no le llevará más de 4 minutos. Es importante que sepa que los datos serán tratados de forma anónima y confidencial.

Para cualquier duda o aclaración en relación con el cuestionario, puede ponerse en contacto con el equipo de investigación IDEA (rchiva@uji.es) del Dpto. de Administración de Empresas y Marketing, Universitat Jaume I. Campus Riu Sec, s/n. 12071. Castellón.

Este proyecto está subvencionado por el Ministerio de Economía y Competitividad (ECO2011-26780) y la Universitat Jaume I (P1.1B2013-14).

Muchas gracias por su colaboración.

**Empresa:**

**Año de creación de la empresa:**

**País de la sede principal:**

**Número de empleados/as:**

**Facturación anual estimada (en euros):**

**Porcentaje estimado de facturación en el extranjero:**

**Edad del encuestado/a:**

**Género del encuestado/a (hombre/mujer):**

**Nivel educativo del encuestado:**

Educación obligatoria
Educación secundaria no obligatoria
Titulado superior universitario
Máster
Doctorado

**Antigüedad en la empresa del encuestado/a:**

| | |
|---|---|
| **Años** | |
| **Meses** | |

**Denominación del puesto de trabajo del encuestado/a:**

**Dirección Email del encuestado/a** (en el caso de que el encuestado desee recibir los resultados de la investigación)**:**

**Por favor responda a las siguientes preguntas SOBRE SUS INNOVACIONES DE PRODUCTO/SERVICIO EN LOS DOS ÚLTIMOS AÑOS utilizando la escala que aparece a continuación:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Totalmente en desacuerdo | En desacuerdo | Algo en desacuerdo | Ni de acuerdo ni en desacuerdo | Algo de acuerdo | De acuerdo | Totalmente de acuerdo |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Nuestras innovaciones fueron rentables | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Nuestras innovaciones tuvieron una elevada cuota de mercado | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. La introducción de nuestras innovaciones incrementó la rentabilidad de otros productos de la empresa | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Nuestras innovaciones atrajeron un número elevado de nuevos clientes a la empresa | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. Nuestras innovaciones otorgaron a la empresa una ventaja competitiva importante | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Ahora, por favor piense ÚNICAMENTE EN LAS INNOVACIONES DE PRODUCTO/SERVICIO MÁS IMPORTANTES DE LOS DOS ÚLTIMOS AÑOS y responda a las siguientes preguntas empleando la siguiente escala:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Totalmente en desacuerdo | En desacuerdo | Algo en desacuerdo | Ni de acuerdo ni en desacuerdo | Algo de acuerdo | De acuerdo | Totalmente de acuerdo |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. Estas innovaciones representan un tipo totalmente nuevo de producto | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. Estas innovaciones satisfacen un deseo o una necesidad que no ha sido satisfecho por otros productos | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. Estas innovaciones implican un cambio revolucionario con respecto a la última generación de esos productos | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. Estas innovaciones podrían ser consideradas como una nueva línea de producto | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. Estas innovaciones son innovaciones significativas o punteras | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

# Appendix B: Academic papers and conference presentations resulting from the research

## B.1 PAPERS RESULTING FROM THE THESIS PUBLISHED IN ACADEMIC JOURNALS

| | |
|---|---|
| **Title** | How does altruistic leader behavior foster radical innovation? The mediating effect of organizational learning capability |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Ricardo Chiva Gómez<br>Rafael Lapiedra Alcamí |
| **Journal** | Leadership & Organization Development Journal |
| **ISNN** | 0143-7739 |
| **Character** | International (scientific) |
| **Indexed in** | Web of Science |
| **Impact factor** | 0.864 (Management, Q4) |

| | |
|---|---|
| **Title** | The influence of leaders' stewardship behavior on innovation success |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Rafael Lapiedra Alcamí<br>Ricardo Chiva Gómez |
| **Journal** | Journal of Business Ethics |
| **ISNN** | 0167-4544 |
| **Character** | International (scientific) |
| **Indexed in** | Web of Science |
| **Impact factor** | 2.917 (Ethics, Q1) |

| | |
|---|---|
| **Title** | Promoting radical innovation through end-user computing satisfaction |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Rafael Lapiedra Alcamí<br>Ricardo Chiva Gómez |
| **Journal** | Industrial Management and Data Systems |
| **ISNN** | 0263-5577 |
| **Character** | International (scientific) |
| **Indexed in** | Web of Science |
| **Impact factor** | 2.948 (Computer Science, Interdisciplinary Applications, Q1) |

## B.2 PAPERS PRESENTED AT CONFERENCES

| | |
|---|---|
| **Title** | End-user computing satisfaction and radical innovation: the mediating role of organizational learning capability |
| **Conference** | OLKC 2015 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Ricardo Chiva Gómez<br>Rafael Lapiedra Alcamí |
| **Place** | Milan (Italy) |
| **Date** | 9-11 April |
| **Year** | 2015 |
| **Character** | International (scientific) |

| | |
|---|---|
| **Title** | El efecto del comportamiento altruista del líder y la capacidad de aprendizaje organizativo en la innovación radical: un estudio empírico |
| **Conference** | ACEDE 2015 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Ricardo Chiva Gómez<br>Rafael Lapiedra Alcamí |
| **Place** | Jaén (Spain) |
| **Date** | 21-23 June |
| **Year** | 2015 |
| **Character** | National (scientific) |

| | |
|---|---|
| **Title** | How does altruistic leader behavior foster radical innovation? The mediating effect of organizational learning behavior |
| **Conference** | BAM 2015 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Ricardo Chiva Gómez<br>Rafael Lapiedra Alcamí |
| **Place** | Portsmouth (United Kingdom) |
| **Date** | 8-10 September |
| **Year** | 2015 |
| **Character** | International (scientific) |

| | |
|---|---|
| **Title** | Stewardship leader behavior and innovation success: the role of radicalness |
| **Conference** | OLKC 2016 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Rafael Lapiedra Alcamí<br>Ricardo Chiva Gómez |
| **Place** | St Andrews (Scotland) |
| **Date** | 26-28 April |
| **Year** | 2016 |
| **Character** | International (scientific) |

| | |
|---|---|
| **Title** | Testing the effects of stewardship leader behavior on innovation success: the mediating role of radicalness |
| **Conference** | Eurkind GCW 2016 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Rafael Lapiedra Alcamí<br>Ricardo Chiva Gómez |
| **Place** | Valencia (Spain) |
| **Date** | 22-24 June |
| **Year** | 2016 |
| **Character** | International (scientific) |

| | |
|---|---|
| **Title** | Cómo conseguir innovaciones exitosas a través del liderazgo responsable: el efecto de la innovación radical |
| **Conference** | ACEDE 2016 |
| **Authors** | Emilio Domínguez Escrig<br>Francisco Fermín Mallén Broch<br>Rafael Lapiedra Alcamí<br>Ricardo Chiva Gómez |
| **Place** | Vigo (Spain) |
| **Date** | 26-28 June |
| **Year** | 2016 |
| **Character** | National (scientific) |