



The Influence of Leaders' Stewardship Behavior on Innovation Success: The Mediating Effect of Radical Innovation

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Abstract

As stated by previous researchers, in an increasingly competitive environment, organizations need to develop successful innovations to compete and survive in the long term. Furthermore, sustainability and social issues are gaining increasing importance, to the extent that they are now a matter of high concern for firms and for society. Therefore, organizations cannot improve their results at any price and must be responsible for the consequences of their activities, including innovation. In these conditions, a growing demand for new leadership styles and behaviors arises to face this complex context. Stewardship is a leadership behavior that shows great concern for the impact of the organization's activity on society. A quantitative study has been conducted with the purpose of providing empirical evidence of the relationship between leaders' stewardship behavior and innovation success, using radical innovation as an explanatory variable. To confirm the hypotheses, structural equations were used on a dataset from a sample of 300 questionnaires from Spanish companies. The study empirically validates the proposed conceptual model. Results show how radical innovation fully mediates the relationship between leaders' stewardship behavior and innovation success.

Keywords Stewardship · Leadership · Radical innovation · Innovation success

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

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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 et al. 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, 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.

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.

Literature Review and Hypotheses

From the review of the literature on the variables presented in the study, we have developed a conceptual model (Fig. 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.

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

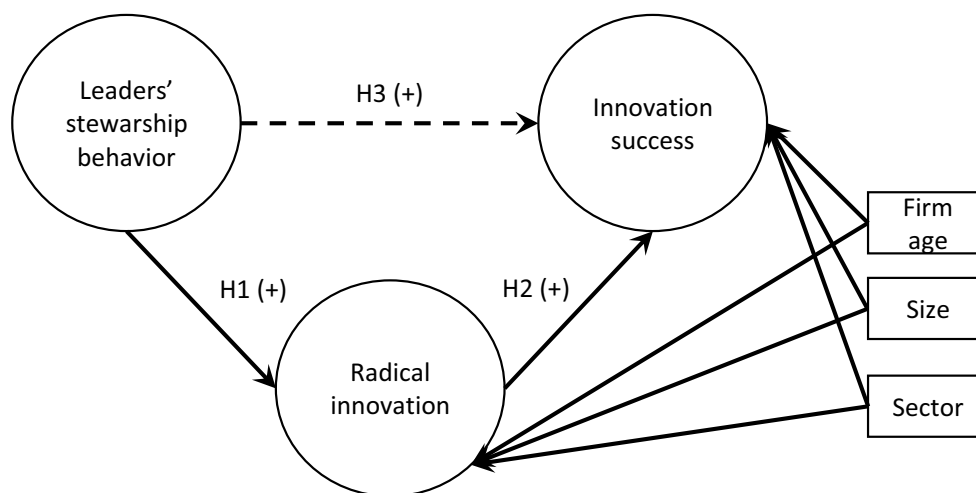


Fig. 1 Conceptual model

(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).

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. (2017) 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.

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. 2001).

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 start-ups 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 and 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.

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 et al. 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 et al. 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.

Research Methodology

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 2-year 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 5 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 2 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.

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 α .

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 α 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 2 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 α 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 2 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 α of this construct is 0.95.

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 1000 employees (21.3%), and firms with more than 1000 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%).

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.

Results

Descriptive Statistics and Psychometric Properties of the Measurement Scales

The data analysis began with the descriptive statistics. Table 1 exhibits means, standard deviations, and factor correlations. The psychometric properties of the measurement scales were evaluated by following accepted

Table 1 Factor correlations, means, and standard deviations

	Means	SD	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

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

ST stewardship, IS innovation success, RAD radical innovation

*Significant correlation ($p < 0.05$); **significant correlation ($p < 0.01$)

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: $\chi^2(df) = 262.45 (206)$; $p = 0.00$; CFI = 0.976; RMSEA = 0.043. The Chi-square statistic was nonsignificant, and all the standardized estimates were significant and in the expected direction.

The results of the reliability analysis were also satisfactory. Cronbach's α coefficient values and the compound reliability values were equal to or exceeded 0.8 (Table 2), 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, pp. 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 2).

Finally, discriminant validity exists when the square root of the average variance extracted is greater than the construct correlations, suggesting that each construct

Table 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)

In parentheses, extracted mean variance

ST stewardship, IS innovation success, RAD radical innovation

relates more strongly to its own measures than to others (Table 3).

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 Fig. 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 Figs. 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

Table 2 Reliability of the measurement scales

Construct	Composite reliability	BBNFI	Cronbach's α
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

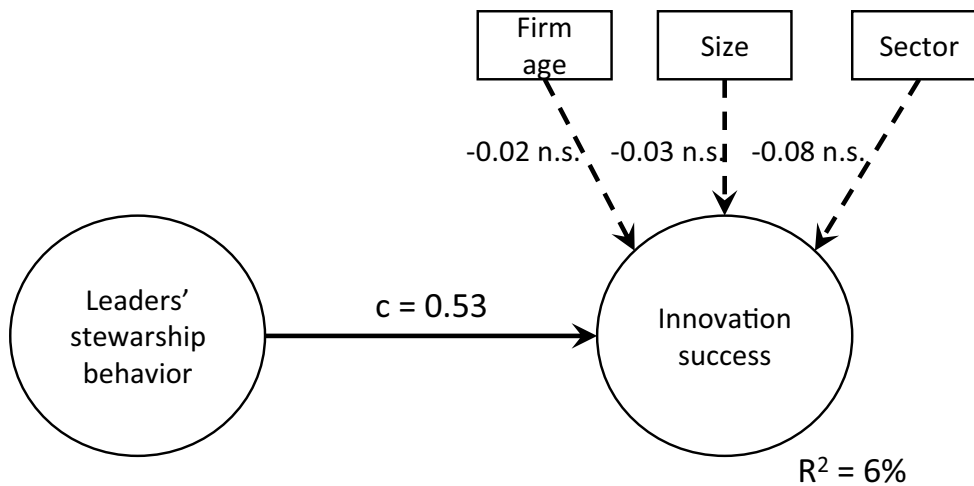


Fig. 2 Total effect model (without mediator)

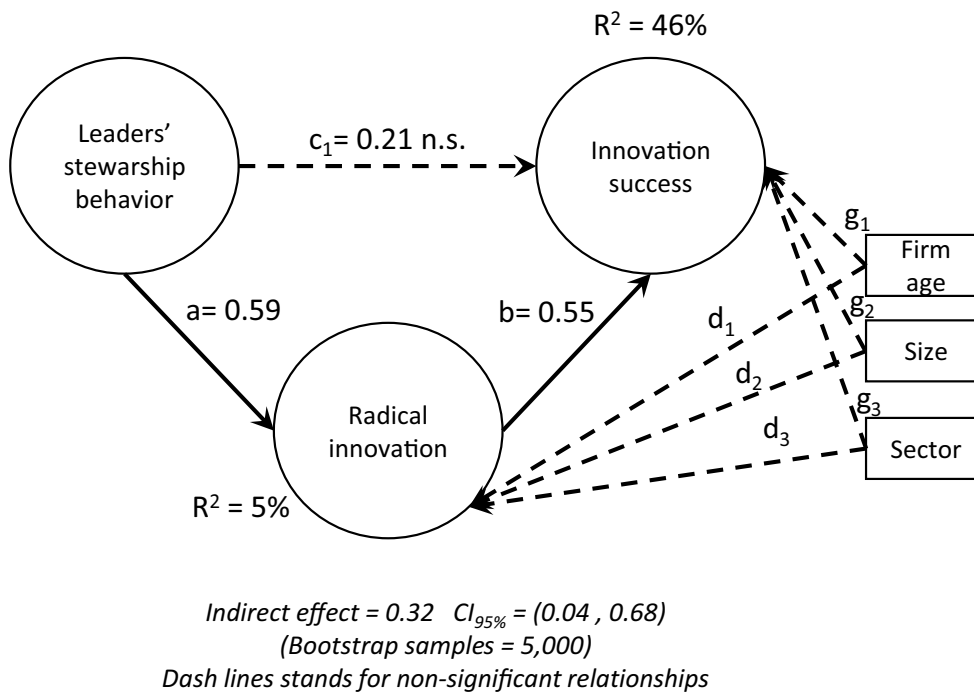


Fig. 3 Mediation model

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 nonsignificant ($c_1 = 0.21, t = 1.48, p > 0.05$). 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 behavior on innovation success is 0.32. The 95% bias-corrected confidence interval for the indirect effect (ab) based on 5000 bootstrap samples was entirely above zero (0.06–0.73). Thus, the indirect effect of leaders' stewardship behavior 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: $d_1 = 0.01$, $t = 0.53$, $p > 0.05$; firm size: $d_2 = 0.04$, $t = 0.56$, $p > 0.05$; sector: $d_3 = -0.04$, $t = -0.17$, $p > 0.05$) or on innovation success (firm age: $g_1 = 0.01$, $t = 1.06$, $p > 0.05$; firm size: $g_2 = -0.06$, $t = -1.14$, $p > 0.05$; sector: $g_3 = -0.06$, $t = -0.43$, $p > 0.05$).

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 provide further support for our hypotheses. First, and consistently with Hypothesis 1, stewardship behavior 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 $CI_{95\%} = (0.04, 0.68)$.

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, in terms of both 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).

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 et al. 2016).

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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Compliance with ethical standards

Conflict of interest Emilio Domínguez Escrig, Francisco Fermín Mallén Broch, Rafael Lapiedra Alcamí, and Ricardo Chiva Gómez declare that they have no conflict of interest.

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