GAMIFICATION AS A TOOL TO OVERCOME CULTURAL BARRIERS IN OPEN INNOVATION: A THEORETICAL FRAMEWORK

Abstract

Open innovation is related to knowledge exchange between different agents, and it implies the blurring of the organizations frontiers. One of the main problems when implementing open innovation strategies is the existence of cultural barriers, such as structural inertia, the 'Not Invented Here' syndrome, and the 'Not Sold Here' syndrome. The objective of this research is to review how gamification might be an efficient tool to overcome the cultural barriers that open innovation processes frequently pose to organizations. We posit that a gamification approach can help to overcome those barriers through the promotion of communication, motivation and teamwork to create trust, creativity and engagement among participants. Organisations can take advantage of the arising opportunities of gamification and deal with the challenges of implementing an open innovation process.

Key words

Open innovation; gamification; cultural barriers; structural inertia; 'Not Invented Here' syndrome; 'Not Sold Here' syndrome.

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Introduction

Open innovation has increasingly changed the innovation model of the firms. Open innovation is defined as *a distributed innovation process that involves purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model* (Chesbrough and Bogers, 2014: 12). It has opened firms' boundaries to integrate external knowledge and commercialize internal technologies, engaging with multiple external actors. However, the shift to an open culture and the implementation of an open innovation process is not easily manageable. Open innovation literature has recognized the existence of numerous managerial challenges and organizational barriers to the implementation of open innovation strategies. Some scholars have described how firms try to overcome barriers in open innovation (Chesbrough and Crowther, 2006; Giannopoulou et al., 2011; Ollila and Elmquist, 2011; Pontiskoski and Asakawa, 2009), however, research studying the barriers that culture poses to open innovation and how to overcome them is still insufficient as per recent meta-analysis performed by Oumlil and Juiz (2016). Different cultural barriers may prove a burden for the success of open innovation processes. In this paper we focus on the three main cultural barriers –the structural inertia, the 'Not Invented Here' (NIH) syndrome, and the 'Not Sold Here' (NSH) syndrome- and explain how these barriers can be overcome. There is a need for the application of new methods that draw effective and practical conclusions. In particular, we propose that gamification can be used as a tool to face cultural barriers and improve the outcome of the open innovation process.

Gamification is an increasing tendency in companies. It can be defined as *the use of game design elements in non-game contexts* (Deterding et al., 2011: 2). Literature has argued numerous benefits of gamification implementation in some organizational processes such as creativity, motivation, engagement, teamwork and collaboration (Deterding et al., 2011; Kavaliova et al., 2016; Patricio, 2017; Plennert, 2017). In the domain of innovation processes gamification benefits have been documented at the ideation stage either internally fostering the knowledge transfer or externally promoting the productivity and creativity of ideas through effective crowdsourcing processes (Morschheuser et al. , 2016). Patrício et al. (2018) illustrate that beyond hedonic outcomes, i.e. motivation and engagement, gamification approaches to innovation also generate relevant social outcomes in the form of team spirit and consensus building, as well as utilitarian outcomes in the form of cognitive, creative thinking, and productivity.

Our goal is to provide a theoretical framework that explains how and why gamification might work best to overcome cultural barriers in the context of open innovation. Organisations can take advantage of the arising opportunities of gamification and deal with the challenges of implementing an open innovation process.

Our research contributes to the field of open innovation in two ways. First, we further develop the literature on cultural barriers of open innovation. Second, we propose a theoretical framework where we describe the main cultural barriers of open innovation and we explain how a gamification approach can help to overcome them.

The paper is structured as follows. First, we describe the main cultural barriers of open innovation. Second, we revise the theoretical background of open innovation and gamification. Third, we develop our theoretical framework on how gamification can help to overcome the cultural barriers of open innovation. Finally, we conclude with the theoretical contribution of the paper as well as the managerial implications of our model; and we highlight some limitations of our research and propose future research lines.

Open innovation and cultural barriers

The current competitive and globalized world has driven to the redesign of the innovation strategies of firms. Open innovation strategies should be an integral part of the business model of any innovative firm. As it has been evidenced in literature, open innovation allows the access to complementary resources, helps firms to adapt to the changing environment, contributes to the generation of new knowledge, enhances innovation outcomes, and increases market share and profitability of the firm (Chesbrough, 2006b; Dahlander and Gann, 2010; Huizingh, 2010; West and Bogers, 2017). Open innovation implies that an organization engages with different types of partners, using many sources of knowledge (Laursen and Salter, 2006). It combines, integrates and aligns both internal and external knowledge, generating a new knowledge recombination (Chesbrough, 2006b). Managing the open innovation process is key for the success of the firm.

Open innovation requires a significant effort in the creation of new routines and structures that supports the change (Bessant and Phillips, 2013). Moreover, an addressed organizational culture is essential to convert open innovation strategies into success (Aquilani et al., 2017; Herzog, 2011). The implementation of open innovation practices is not straight forward, but it requires a thoroughly process of implementation. Chiaroni et al. (2011) proposed an open innovation implementation process, understood as an organizational change process, which consists of three phases: 1) unfreezing, where the firm recognizes the need for change; 2) moving, referred to the actual implementation of the change, where new routines and procedures are applied and; 3) institutionalizing, which involves the consolidation of the change, providing support for the change and showing no way back to the previous status.

Culture might be defined as *a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems* (Schein, 1992: 12). To successfully implement open innovation, managerial capabilities and a change in organizational culture might be needed (Aquilani et al., 2017; Mortara and Minshall, 2011). We will focus on three specific sources of cultural barrier of those documented in the literature. The first one is the structural inertia. Structural inertia refers to the difficulties of firms to learn and adapt on time to the uncertain and changing environments (Hannan and Freeman, 1984). Firms that suffer from structural inertia have limited their innovative capabilities since it restricts them from making adjustments and changing the way they do things (Criscuolo et al., 2012; Katila and Shane, 2005). Open innovation requires a quick adaptation to environmental changes, so managers should remove any barrier that avoids moving forward on the innovation process.

Another relevant cultural barrier is the called 'Not-Invented-Here' (NIH) syndrome. It refers to the rejection of any idea from outsiders, only being accepted knowledge coming from inside the

firm (Katz and Allen, 1982). Literature has pointed out this syndrome as the foremost challenge on open innovation implementation (Chesbrough and Crowther, 2006; Mortara and Minshall, 2011). This syndrome is contrary to the open innovation foundations since open innovation recognizes that not all knowledge is inside the firm, but organizations should collaborate with external agents and combine internal and external knowledge (Chesbrough, 2003). Literature has evidenced that firms that suffer from that syndrome are less likely to rely on external sources (Veugelers and Cassiman, 1999) and they will tend to decrease the communication with external stakeholders (Almeida et al., 2003), avoiding the absorption of external knowledge.

Last and similar to the NIH, the 'Not-Sold-Here' (NSH) syndrome should be removed from firms to implement outbound open innovation strategies. This syndrome is described as unwillingness to commercialize unused internal technologies (Chesbrough, 2006a). The open innovation model argues that organizations should profit from others' use of company knowledge and technology (Chesbrough, 2003), rather than abandoning those technologies (Chesbrough and Chen, 2013).

Managers are responsible for overcoming these barriers and promoting a cultural change in organizations. Open innovation requires a risk-taking culture (Aquilani et al., 2017; Giannopoulou et al., 2011; Herzog, 2011; Ollila and Elmquist, 2011) that deals with the interaction of a broad range of knowledge sources and quickly adapts to the environmental changes. Cultural barriers removing is therefore crucial for the successful implementation of open innovation. In the next section, we are going to analyse how gamification might help to remove these barriers.

Open innovation and gamification

Gamification has recently been getting attention from innovation scholars. Gamification can be understood as the introduction of game elements in non-game contexts (Deterding et al., 2011). It can be used as a tool to drive engagement in the innovation process (Patricio, 2017) since it increases the creativity and motivation of the player (Patricio, 2017; Plennert, 2017). Numerous studies have pointed out the advantages of the use of gamification on innovation (Kavaliova et al., 2016; Patricio, 2017; Plennert, 2017; Procopie et al., 2015; Robra-Bissantz and Lattemann, 2017; Scheiner et al., 2017).

Nowadays, innovation does not only happen on the inner level of a firm, rather the innovation process involves external stakeholders, such as customers or suppliers. Open innovation implies the inbound and outbound of knowledge flows to internalize or commercialize innovations (Chesbrough et al. 2006). The interaction between different agents is an opportunity for the generation of new ideas (Enkel, 2010) and new product development (Bahemia and Squire, 2010), but partners need to openly communicate and trust each other. On this basis, open innovation can be enriched with game mechanisms (Witt, 2017). However, the use of gamification to foster and effectively implement open innovation are still an understudied topic.

The few studies dealing with open innovation and gamification are related to the involvement of stakeholders in crowdsourcing activities. For example, Kavaliova et al. (2016) explained how game elements provide motivation for consumers to participate in innovation processes and new product development of an apparel store. Similarly, Kauppinen et al. (2016) introduced a design game to involve the community in open innovation processes so as to develop digital services with open data technologies understandable for consumers. Plennert (2017) proposed a serious

game as a market research method that helps to understand the purchase decision process of a car. He argued that, compared to traditional market research methods, the game elements provide insights that support honest and realistic answers on the buying process.

Morschheuser et al., (2016) conducted a literature review on crowdsourcing and gamification, showing how the number of papers on both research streams has been rapidly growing independently, but there is still a need for more joint analyses of both topics. Their study investigates how different gamification methods increase the motivation and participation in four types of crowdsourcing activities –crowdsolving, crowdcreation, crowdrating, and crowprocessing-. The positive effects of gamification on all crowdsourcing activities, such as engagement, quality of output, a decrease in the tendency to cheat, positive psychological effects, and fun, that have been underlined in literature, lead the authors to conclude that there is a positive impact of gamification on crowdsourcing related to motivation. However, they could not conclude that gamification leads to an increase in participation in such activities. In line with the latter conclusion, Dalpiaz et al. (2017) also argued the difficulty of engaging a large number of stakeholders when opening participation to all stakeholders through gamification to improve the quality of requirements engineering.

Regarding the motivation of gamification, it worths to note the difference between intrinsic and extrinsic motivation. Intrinsic motivation refers to the natural human propensity to learn and assimilate; while extrinsic motivation can either reflect external control or true self-regulation (Ryan and Deci, 2000). In terms of innovation, intrinsic motivation could be understood as the basis needs of a person, such as self-esteem and social respect; while extrinsic motivation would be linked to the individual role in the innovation process (Robra-Bissantz and Lattemann, 2017). Both types of motivation should be present for the success of open innovation (Kavaliova et al., 2016), but intrinsic motivation might be at stake when gamification methods are applied. The game elements, such as rewards, punishments or regulations might lead to the shift in the nature of motivation from intrinsic to extrinsic motivation since those elements corrupt the nature of participation (Meske et al., 2017; Robra-Bissantz and Lattemann, 2017), leading to a short-term motivation (Dalpiaz et al., 2017).

Furthermore, applying gamification on the open innovation process involves other managerial challenges that could leverage the advantages of open processes, but also pose some difficulties. In particular, the gamification method should be design for the specific purposes of the innovation process and work environment, as well as being adapted to the diversity of players needs (Dalpiaz et al., 2017; Morschheuser et al., 2016). Additionally, it involves some technical and organizational costs (Dalpiaz et al., 2017), requiring a change in mind in the organizations culture. As such, trust and loyalty between partners players become a central element for the success of gamified open innovation processes (Robra-Bissantz and Lattemann, 2017).

How can gamification foster Open Innovation?

Open innovation processes can take advantage of game tools to overcome the cultural barriers that emerge when firms open their boundaries. When analysing the definition of open innovation, it is worth noting that open innovation intends to create a knowledge exchange relationship between different agents. As a premise, open innovation requires communication between a broad range of stakeholders, but cultural barriers might emerge on those relationships. On that point is where gamification can perform as a facilitator of the open

innovation process. Gamification is a way to organise collaboration, and it can be understood as a comprehensive approach that encompasses a purposively managed interaction between different stakeholders for common goals (Roth et al., 2015). Specifically, gamification can be used as a tool or mechanism that eases knowledge exchange. Gamification might create an environment where players are free, creative and motivated (Patricio, 2017), laying the basis for knowledge sharing, bringing down any barrier between players and, engaging all players in the open innovation process.

Each cultural barrier has its own peculiarities since each individual and/or organization feels threaten by different causes. Similarly, the way in which the gamification tool has a bearing on that cultural barrier might also be different. In other words, the underlying forces that thrive on combating each cultural barrier perform in a specific way. Our purpose is to explain how the features of gamification help to overcome the three main cultural barriers –structural inertia, NIH syndrome and, NSH syndrome- on open innovation processes. Table 1 summarizes the triggers of gamification to overcome the shortcomings of each cultural barrier.

Table 1. Triggers of gamification to overcome the cultural barriers of open innovation

Cultural barrier	Shortcoming	Gamification triggers
Structural inertia	Realizing about the changes of the environment	Crowd participation and willingness to contribute
	Evaluation of the information	Learning and 'unlearning'
		Divergent thinking
	Organizational change	Divergent thinking
		Taking action in the same direction
NIH	Inward looking	Communication and group reflection
	Lack of trust	Engagement
	Not recognition of external value	Risk-taking, creativity
		Fun and curiosity
NSH	No value of internal technologies	Creativity
	Protective attitude based on long term orientation	Motivation (intrinsic and extrinsic)

Source: Own elaboration

Structural inertia

Structural inertia is a cultural barrier that happens on an organizational level. Hannan and Freeman (1984) underlined three factors that define the existence of structural inertia in an organization: 1) the temporal pattern of changes in key environments; 2) the speed of learning mechanisms and; 3) the responsiveness of the structure to designed changes. Analysing these three factors implies to take into consideration not only the organization, but also the environment in which the firm operates. Thus, the pace of change of an organization should be compared to the pace of change of the environment. An organization will suffer from structural inertia *when the speed of reorganization is much lower than the rate at which environmental conditions change* (Hannan and Freeman, 1984: 151).

The adaption to the external environment is especially relevant in the open innovation process. Open innovation processes entail an organizational change that involves a process of experimenting and learning that requires flexibility, agility and adaptability (Aquilani et al., 2017). If these changes do not meet the pace of change of the environment, the organization will

suffer from structural inertia. Innovation managers should find the ways for dealing with the different factors of structural inertia.

First, the temporal pattern of changes in environment cannot be controlled by the organization, but organizations should always keep an eye on the changing environment. The discovery, evaluation and exploitation of an opportunity is essential to gain a competitive advantage (Shane and Venkataraman, 2000). Thus, organizations need to set informants in different areas and places that quickly report the changes on the environment. For organizations with limited economic and human resources it might be a challenge, but they can take advantage of the collaboration of the crowd. On this basis, gamification methods shaped as crowdsourcing activities could contribute to gather information about the environment in terms of customers' interests and needs. In this line, literature has argued that gamification could trigger the crowd participation and willingness to contribute on the innovation processes of the firms (Kavaliova et al., 2016; Plennert, 2017; Procopie et al., 2015), although it has not been evidenced its effective impact (Morschheuser et al., 2016). Organizations should devise a game tool that hooks the crowd to provide information about the environment. For example, organizations could use opinion mining tools, such as surveys, lead users concepts or crowd voting to identify the changes in customers' interests (Robra-Bissantz and Lattemann, 2017). Afterwards, this information should be cleared and screened by the organization. Although that process would imply some costs for the organization, it might create a competitive advantage for the organization since it would provide the access to strategic assets through the direct absorption of potential customers' needs and want (Kauppinen et al., 2016; Robra-Bissantz and Lattemann, 2017; Scheiner et al., 2017).

Second, the speed of learning mechanisms is the most fruitful area for applying gamification. Realizing about the need of change, processing and evaluating information on key environments will require from some capabilities and skills that can be obtained from gaming. Literature agrees that gaming leads to successful learning as it is developed in a context of embeddedness and motivation (Procopie et al., 2015; Robra-Bissantz and Lattemann, 2017; Rughiniş and Rughiniş, 2017; Siemon and Eckardt, 2017), but it also eases a process of 'unlearning', which means a change in routines and behaviours since players face new situations that require experimentation (Robra-Bissantz and Lattemann, 2017). In fact, open innovation processes will require both, the interiorization of new concepts, but also the willingness to change. Learning may come from direct experience or from the experience of others (Levitt and March, 1988). Gamification with collaborators allows organizations to retrieve lessons from both ways. Thus, gamification leads to professional development from the work of others, as well as it is considered an internal inspirational trigger (Kavaliova et al., 2016). In addition, gaming provides divergent thinking as players interact in a new ecosystem without any limitation and forgetting all routines (Robra-Bissantz and Lattemann, 2017). As a result, organizations involve in an open innovation process are ready to change when gamifying the process.

Third, regarding the responsiveness of the structure to the designed change, gamification methods perform indirectly. Organizations have already defined their organizational routines and procedures for decision taking, and that formal processes are not nearly flexible or adaptable (Christensen and Overdorf, 2000; Henderson and Clark, 1990). However, innovations are more likely to happen in contexts not affected by the rigidity of that routines (Criscuolo et al., 2012). Although gamification does not lead to a direct change on procedures, the divergent thinking and 'unlearning' effects (Robra-Bissantz and Lattemann, 2017) pose the need for a change in the bureaucratic system. That structural change should be only taken when affecting a

key core business advantages as it has been evidenced that organizational change in response to environmental change is not always beneficial (Ganco and Agarwal, 2009). Furthermore, those changes should be carried out in a thorough tightly controlled way since it would otherwise destroy the sustain core values and capabilities of the organization (Christensen and Overdorf, 2000; Henderson and Clark, 1990). Gamification helps to address that change in a structured way since it helps to reach a common conclusion and take action in the same direction (Patricio, 2017).

Not-Invented-Here syndrome

The NIH syndrome is one of the major obstacles to inbound open innovation as it rejects the integration of external knowledge in the innovation process of the firm (Chesbrough and Crowther, 2006). This syndrome frequently happens on an individual level. Even if an organization starts a collaborative relationship with third parties, employees that suffer from that syndrome will tend to reject any external idea. Given its importance, some researchers have analysed the causes of the syndrome and have proposed mechanisms to overcome it (e.g. Chesbrough and Crowther, 2006; Mortara et al., 2010). Diverse approaches are required to contrast the NIH syndrome (Mortara et al., 2010). We propose that one tool to leverage those approaches is gamification.

Following the definition of open innovation, knowledge flows are the object of exchange. Knowledge flows are driven by communication flows (Hong et al., 2011). Chesbrough and Crowther (2006) argued the role of communication to overcome the NIH syndrome. They explained that employees should contrast why internal efforts are insufficient to meet firms' objectives, which will lead to an open innovation culture. The communication process becomes an instrument to overcome behaviour constraints and helps to be apparent the emergence of an open organizational culture (Hong et al., 2011). Gamification helps to leverage the communication processes in organizations. Gamification tools, such as points, badges and leaderboards have proven the increase in communication as well as in collaboration activities (Meske et al., 2017; Procopie et al., 2015). Players are immerse on the innovation process, reaching the called 'flow state' (Plennert, 2017; Witt, 2017), which triggers interactions between players and facilitates group reflection (Roth et al., 2015). Those interactions will be more emotional than rational, flourishing a realistic point of view of the dilemma (Plennert, 2017). Players might realize about a win-win situation when opening the firm boundaries.

Trust becomes a key concept when analysing the NIH syndrome in open innovation processes, and gamification might help to create bond relationships between players. The NIH syndrome arises with a lack of trust on collaborators (Veugelers and Cassiman, 1999) since all external knowledge is not accepted from the start. Literature has largely recognized the role of trust as an effective mechanisms to improve the collaborative outcome (Brockman et al., 2018; Häusler et al., 1994; Nafi et al., 2015; Perry et al., 2004; Zaheer et al., 1998). In an open innovation context, two types of trust can be defined: interpersonal trust, which refers to an individual level as the trust between an individual on another firm individual; and interorganizational trust, which can be understood in an organizational level as the trust placed on the members of another organization by members of the focal organization (Zaheer et al., 1998). Both of them are related to each other, but interorganizational trust has been evidenced to reduce negotiation costs and conflict (Zaheer et al., 1998) and improve relational governance among partners, overcoming information barriers, opportunistic behaviour, and binding together transacting parties (Brockman et al., 2018). The role of gamification in such processes is to create a scenario where trust can emerge. Between the advantages of gamification, it has been argued

that gamification keeps players intrinsically motivated to continuously engage in fulfilling a goal, enhances collaboration, and promote commitment (Patricio, 2017; Procopie et al., 2015; Witt, 2017). All those actions generate relationships between players that will subsequently enhance the trust between individuals and organizations.

Going beyond the NIH syndrome and implementing an open innovation process requires the development of an ambidextrous mentality that combines internal and external knowledge sources (Chesbrough, 2003, 2006b; Pontiskoski and Asakawa, 2009). Managers should integrate and align their internal and external strategies. Only when employees realize about the need of combining internal and external knowledge, will they commit to an open innovation approach and adopt the firm culture (Chesbrough and Crowther, 2006). The adoption of that open culture can be reached through some practices, such as the offer for fun and the provision of a space for creativity, the building of trust and altruism feelings, or the enhance of brand affinity and fame (Bughin et al., 2008). Gamification has a place on the achievement of such practices and it should help to remove all the cultural barriers that block the exploration and exploitation of external opportunities. For example, gamification is said to trigger players' curiosity, promote fun, provide insights for future areas for product development, increase the willingness to take risks, and promote the openness to new ideas and technologies (Kavaliova et al., 2016; Patricio, 2017). It means that incorporating gamification methods in the implementation of an open innovation process enables the beating of the NIH syndrome. Challenging players to look at their ideas from different perspectives while imaging opportunities and threats supports the understanding of the new innovation process (Mosleh and Leue-Bensch, 2017). It is expected that, through these processes, employees recognize external ideas and creativity and reinforce the motivation for co-creation as gamification can be understood as a process of design thinking in a context of creativity and shared understanding of innovation challenges (Roth et al., 2015).

Not-Sold-Here syndrome

The NSH syndrome might represent a cultural barrier for outbound open innovation processes since it avoids the commercialization of internal technologies (Chesbrough, 2003). On the one hand, organizations might think that the technology that has not being used by them is of no value for any other firm (Aquilani et al., 2017; Chesbrough, 2003). The firm perceives that if the developer of the technology, which knows the process and has invested on it, cannot capture value from that technology, it is going to be nearly impossible that another firm, disconnected to the innovation process, can get value from it. On the other hand, organizations have a protective attitude (Chesbrough, 2006a) that is reinforced when the firm has a long term orientation (Savitskaya et al., 2010). It means that organizations will keep the internal technology over time, in case that technology could be once incorporated to the innovation process of the firm. Besides, keeping the technology maintains organizations in a 'comfort zone' since they do not feel threated by other companies making better use of the focal firm technology. Gamification might have a positive impact to overcome those downsides.

First, there are numerous cases where technologies that were thought to be valueless for one firm were sold to another firm and succeeded, especially in the pharmaceutical sector (Chesbrough and Chen, 2013). However, it is difficult to convince the focal firm about the possibilities of that technology when getting to market. On this aspect is where gamification might exert its influence. The lack of use of a technology could be overcome through creativity. One of the main advantages of gamification is that it triggers the creativity of the player (Patricio, 2017; Plennert, 2017; Robra-Bissantz and Lattemann, 2017; Roth et al., 2015), so

players will generate new ideas from a given technology. Announcing the technology and devising a game for the search of a joint use of a technology could be a good strategy to capture value from a technology that the firm had already considered waste. Nevertheless, the implementation of a gamified outbound innovation process is still an understudied area.

Second, the protective attitude from the long term orientation could be counteracted through the introduction of games elements. Rewards and points are seen as the main objective, so players are motivated to reach them in a short time spam (Dalpiaz et al., 2017; Meske et al., 2017). It would help the organization to not only be focused on the long term but also on the short term. Employees would get an extrinsic motivation in the outbound innovation process. However, when implementing gamified outbound innovation processes, organizations should endeavour to also engage employees on the innovation process through an intrinsic motivation since the intrinsic motivation is actually the driving force of the success of gamification methods (Dalpiaz et al., 2017; Meske et al., 2017; Robra-Bissantz and Lattemann, 2017). Despite the importance of extrinsic motivation, intrinsic factors are crucial for maintaining players' engagement (Kavaliova et al., 2016). Both, extrinsic and intrinsic motivation, are needed to face off the NSH syndrome as organizations that implement outbound open innovation should consider the employees involved in the process and the incentives (West et al., 2006).

Conclusion

The main objective of this research was to propose how gamification can be an useful tool to overcome the cultural barriers that the implementation of open innovation poses to companies. Open innovation is framed on the knowledge exchange relations between different agents and it implies the blurring of the organizations frontiers. However, effective knowledge sharing present some limitations that come from both individuals and organization (Hong et al., 2011). Cultural barriers have become one of the main challenges when implementing open innovation strategies. Given the importance of an efficient and managed open innovation implementation, there is a need for the application of new methods that draw effective and practical conclusions (Oumlil and Juiz, 2016). In this paper, we have proposed the application of game tools on the open innovation process to overcome those cultural barriers.

This paper contribute to literature in several ways. First, we contribute to advance on the scarce literature on gamification on open innovation. The use of gamification is increasing on popularity in companies, but little research has analysed its efficacy on innovation processes. Open innovation requires the participation and engagement of external sources as well as the recombination of internal and external knowledge. In this paper we explain how gamification is a tool that facilitates open innovation processes by promoting communication, creativity, motivation, engagement, and fostering teamwork. Gamification is an underexplored tool that can be used for the innovation process. It might be a promising and fruitful solution for existing problems on openness of innovation.

Second, we propose a theoretical framework to overcome open innovation cultural barriers. Understanding the cultural barriers of open innovation is important to explain the success factors of open innovation practices. However, few researchers have explained the causes and solutions to open innovation barriers. Our work is innovative in identifying the obstacles of open innovation and proposing gamification tools to overcome such obstacles. In particular, we have analysed three cultural barriers –structural inertia, NIH syndrome, and NSH syndrome-,

describing their shortcomings; and we have argued how gamification triggers can help to overcome those barriers. Hence, the three factors of structural inertia –realizing, evaluation, and organizational change- can be overcome through the participation of the crowd, learning and 'unlearning' from collaborators, and dealing a change in the same direction. The inward looking, lack of external trust and not acknowledgment of the value of external knowledge that provoke the NIH syndrome could be brought down through the curiosity, enjoyment, risk-taking, and engagement that gamification provides. And the shortcomings of the NSH syndrome, such as the no exploitation of dismissed technologies and the protective long term attitude, can be beaten through the creativity and motivation that the gamification methods trigger. The presented study therefore offers a starting point for developing an appropriate approach regarding how gamification can face open innovation cultural barriers.

Along with the theoretical contributions, this study provides a basis for managers. First, open innovation is nowadays a reality. Any firm can think about a closed innovation process, rather organizations should combine internal and external knowledge. External stakeholders need to feel actively involved in decision making processes, and organizations have to adapt their innovation process to engage external actors. Gamification becomes a tool for external participation and engagement in the innovation process. We recommend managers to introduce gamification methods into their organizations to involve a large quantity of actors while creating an environment for creativity and innovation. Indeed, it has been encouraged in educational programs for qualified entrepreneurs to follow a gamification approach, conjugating creativity, innovation and entrepreneurship (Leitão, 2018). Second, the gamification method should be designed for the specific type of open innovation practice. It requires time and development efforts, becoming a risky activity. Although there are several challenges when implementing game elements on the open innovation process, the positive effects seem to overweight the drawbacks of gamification, becoming a useful tool for open innovation processes. Third, an efficient open innovation management is crucial to get a competitive advantage. Hence, understanding the cultural barriers to open innovation and accomplishing mechanisms to overcome them is vital for innovation success. Cultural barriers impede the adoption of an open culture in the organization. Managers should pay more attention to mechanisms that overcome those barriers. This is a first step to engage in an open innovation culture. In particular, introducing game elements in the innovation process is an effective tool to overcome those barriers.

Limitations and future research lines

The main limitation of this paper is the lack of empirical validation of the proposed framework. The next step would be to validate this framework through multiple case studies by implementing a gamification approach on organizations with cultural barriers. The idea is to develop a game that helps to overcome each cultural barrier, and analyse the efficiency of gamification on open innovation processes. Future research could also develop a more comprehensive framework of the organisational barriers and synthetize how gamification can help to overcome them. In this paper we have focused on three main cultural barriers, but managerial and others barriers could impede the open innovation process. Gamification could be also applied to overcome those barriers. In addition, we recognize the need to compare the effects of gamification on different open innovation practices and encourage further research in this direction. Gamification of crowdsourcing activities has been the most studied area, explaining the inbound open innovation process. Although there is still a long way to advance

on this stream, the literature on gamification of outbound open innovation processes is almost inexistent. We therefore encourage future works to focus on outbound open innovation.

Finally, we have analysed gamification as a tool to facilitate the open innovation process that helps to remove cultural barriers. However, gamification could be considered not only as a tool, but as an element of the business innovation model. Indeed, literature has argued that once gamification is introduced, it should not be discontinued (Kavaliova et al., 2016). Future research could analyse how firms align gamification and their innovation strategy.

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Acknowledgments

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Co-funded by the Erasmus+ Programme of the European Union