INNOVATION AND GAMIFICATION:
A VIEW ON THE SCIENTIFIC LITERATURE EVOLUTION

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Abstract

The success of the innovation process depends largely on the scientific progress registered in this field, the techniques used to simplify it and the involvement of a large number of people from the organization in achieving it. Gamification can be one of the modern tools, useful in transforming the innovation process in something more attractive to the current generation by adapting it to this generation's technological preferences. The paper aims to analyse the evolution of the scientific literature on innovation and gamification and perform a comparison between the two areas. This analysis used publications in the last six decades and outlined the main contributions of literature in developing these concepts. An exponential increase in the number of articles published on innovation was observed, as well as in the case of articles on gamification where much of the increase has been achieved since the 90s. In these conditions, an important development of the two areas analysed is expected. Moreover, exploiting specific elements of the gamification process would contribute to the increase of the effects of innovation.

Keywords
innovation, gamification, literature review.

JEL Classification
O30, M10.

Introduction

The importance of innovation and the increasing attention companies pay to it is demonstrated by the mission and strategy of many companies that want to maintain their position in the consumers' preferences and to be competitive on the market. As desirable the results of this process are (new or improved products, services or processes) it is however difficult to find appropriate optimal ways for an organization to perform this process optimally and involve as many of the employees as possible. Currently, innovation is not just a duty of the R&D department and the success of this process depends very much on the organization's ability to involve the majority of its members to contribute to the development of new products or services. With the technologic development and the

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evolution of the Internet the present generation of consumers has formed certain skills and habits regarding the devices, programs and websites frequently used and their expectations and way of thinking has changed with them. For example, the use of smartphones, and especially those operating systems such as Android or iOS, accustomed the users to simpler, friendlier and more playful ways of thinking and interacting. Assuming tasks or responsibilities, including in an organization, can thus prove much easier and pleasant if elements specific to familiar devices and programs are assigned to them. In this respect the knowledge and adoption of elements specific to gamification becomes imperative for improving an organization's performance, including in the field of innovation. To achieve this goal, a proper development of scientific literature and research in gamification is needed, with a focus on the contribution of gamification in improving the performance of innovation activities.

In this respect, the paper mainly aims to create an overall picture of the evolution of the literature on innovation, gamification and the two addressed together.

Literature Review

Innovation has always been the drive for progress. The current socio-economic context has made technology and innovative products increasingly present in consumers' lives. Innovation is perceived to be a permanent element generating competitiveness and economic development (Schumpetere, 1934). So far it has been demonstrated that, for organizations, innovation is a desired but difficult to manage outcome. As stated by Peschl and Fundneider (2012) in their study, innovation and creation cannot be achieved mechanically, certain elements being required to stimulate these processes by creating a framework / context to generate the cognitive processes. In this sense, gamification could be an alternative for creating such a framework.

Gamification can be defined as the use of game elements and game design techniques in non-game contexts. Some of the characteristic elements of a game are: avatar, rewards, challenges, points, badges, leader board. Apart from their main use, that of being 'fun', games are highly engaging, they motivate and retain users within the environment. This is one of the reasons for which gamification has become an emerging business practice, with top companies, such as Microsoft, Nike, Dell, Siemens, Deloitte, eBay etc. applying it.

The concept has had such an increase in popularity for the past years that the global market for gamification is expected to reach to $2.8 billion in 2016 from only $242 million in 2012 according to market analysis firm M2 Research (McCormick, 2013).

While some of the first experiments to implement the idea of 'games' and 'fun' as a way of selling products go as far back as 1912, when Cracker Jack had the idea of introducing a toy in every box of popcorn, the business concept of 'gamification' is quite new. The 1st time the term 'gamification' has been used was in 2003, when Conundra, a UK consultancy agency tried to sell hardware products through the use of a gaming scenario. The attempt had little success. In 2007, Bunchball was launched, as the 1st platform to offer gamification services to companies; it was also 1st to use leader boards, points and in-game mechanics in the applications developed. In 2011, Oxford dictionary officially recognizes the term 'gamification'.

Although it is still a new domain, most researches show that games can facilitate obtaining interdisciplinary knowledge in areas such as psychology, design, strategy or technology.

Various utilities have been developed for gamification in domains such as: education (for training, simulating dangerous situations - e.g: an army battle field), economics (stimulating and retaining consumers), health and wellness, civil awareness etc.

From an enterprise point of view, there are several directions of using gamification: external (marketing, sales, customer engagement), internal (HR, productivity enhancement, crowdsourcing) and behaviour change (health & wellness, sustainability, personal finance). According to specialists in this domain, 50% of organizations that manage innovation processes will gamify those processes by 2015 (Gartner, as cited by Hamari et al, 2014). One can find in the scientific literature examples of innovation contests or open innovation challenges as a form of gamification, meant to encourage consumers to develop new products or services or to respond to the challenges of innovation launched by companies (Armisen and Majchrzak, 2015).

Social network platforms have gained more and more popularity in recent years; Facebook alone has exceeded 1.3 billion in the 3rd quarter of 2014, creating an opportunity for companies to adapt to this new environment and develop innovative ways to use it to their advantage. (Statista, 2015)

Research Questions

This study is based on the following questions: *What is the evolution of the interest for research topics such as innovation, gamification? How many articles address the link between gamification and innovation, and what is their evolution in time? What are the main catalysts that helped develop the concept of gamification? What are the main advantages / disadvantages of using gamification?*

Research Methodology

Fulfilling the purpose of this paper requires an analysis on the evolution of the interest in the concepts of innovation and gamification in literature. Moreover, an overall view in needed of the usefulness of using elements specific to gamification in the innovation process, from the perspective of researchers who have addressed these issues to date. The database used to identify the number of papers published on the topic is Web of Science (by Thomson Reuters). To identify articles in the topic area "innovation" the following search formula was used: TOPIC: (innovation OR research and development OR new product development OR new service development OR business model innovation OR business process improvement OR design OR invention). In the case of topic area "gamification", the each formula used was: TOPIC: (gamification). The intersection of the two topics (papers written on both the topic of "innovation" and "gamification") resulted from the following formula: TOPIC: (innovation OR research and development OR new product development OR new service development OR business model innovation OR business process improvement OR design OR invention) AND TOPIC: (gamification). Papers published in 1955 - 2014 were taken into account, using a decennial division of the time interval (1955 - 1964, 1965 - 1970 etc.), with the last interval available being 2005 - 2014. The analysis took into account only scientific papers on these topics, which have been accepted for publication in journals indexed by Web of Science.

Quantitative analysis

The results recorded in the searches have shown an increasing interest of researchers on topics related to innovation and an emerging stage of development of the topic area of gamification. The evolution of research for gamification has grown in the last 5 years, with the development of the IT&C industry and the increasing number of computer and Internet users. The intersection of the two topic areas, innovation and gamification, is still at an early stage of development having recorded a total of 132 papers so far, representing a share of 43% of the papers written on gamification.

a. the evolution of the literature on innovation

Number of papers published by researchers on innovation, indexed by Thomson Reuters increased exponentially in the last six decades. Early in the nineteenth century, Schumpeter defined the term innovation and development makes a significant contribution to the literature by publishing the work entitled "Theory of Economic Development" in 1934 and the subsequent work "Business Cycles" in 1939. As seen in Figure 1, there has been a growing interest for innovation during the mid-twentieth century, as more than three thousand papers have been published on this topic between 1955 and 1964. Following this period, the number of papers published in each decade increases up to 8 times compared to the previous period, reaching 6 million papers on the topic of innovation, in the last decade. During this period, along with the quantitative increase in the research in the field of innovation, a qualitative growth of the understanding and development of the concept of innovation has been recorded, with important contributions made by authors such as Peter Drucker and Michael Porter (1985-1990), have assigned an important utility to innovation in the entrepreneurial endeavour. These concepts were the basis of future developments. In the early 21st century, we note Henry Chesbrough's important contributions, the theory of open innovation (2003, 2006) - an improvement method for the outcomes of this process through collaboration and a better recovery of internal and external sources of innovation, and later, the development of the concept of business model innovation (2010) as a new and complex form of innovation.

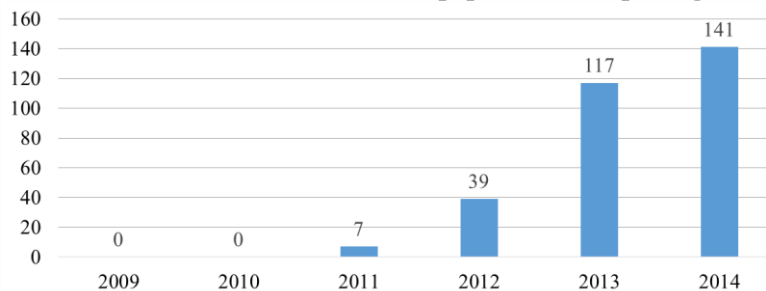**Figure no. 1. Evolution of the number of papers on innovation**
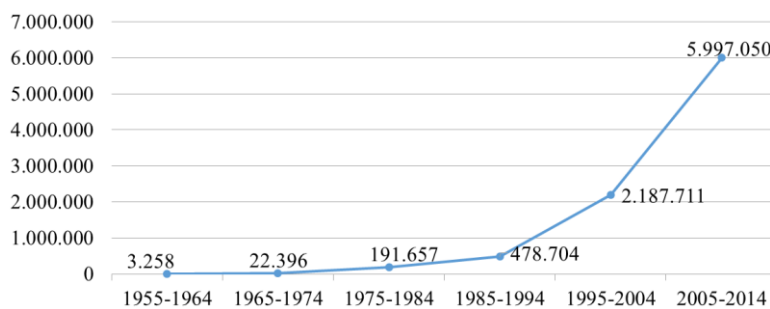
Source: Own representation based on data provided by Web of Science (2015), available at http://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mod e=GeneralSearch&SID=Z1FDGPNjMfxqC1rOYZh&preferencesSaved=

b. the evolution of the literature on gamification

Compared to the evolution of literature on innovation, the topic of gamification is a much more recent one, in the early stages of its development. It is obvious that the development of this field is closely linked to the evolution of the Internet and electronic components (PCs, laptops, smart phones, etc.) and it is important to note the spectacular increase of the number of papers published on the subject: 20 times more papers in 2014 as compared to 2011, when the first papers on gamification appeared (Figure 2a). The number of papers published in the last 4 years encourages us to believe that the evolution of the literature on gamification as well, will record an important increase, however smaller than the extent of the research in the field of innovation. An element contributing to this hypothesis is the fact that gamification is a study subject in itself (Seaborne and Fels, 2015, p.27). There are still

major thresholds to overcome in order to discover the true potential of the gamification phenomenon. This will happen once the disparity between theory and practice in the field of gamification will be overcome and by providing representative analyses confirming the important contribution of this field to the overall performance of subjects in terms of motivation and involvement.

Figure no. 2a. Evolution of the number of papers on the topic of gamification

Source: Own representation based on data provided by Web of Science (2015), available at http://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mod e=GeneralSearch&SID=Z1FDGPNjMfxqC1rOYZh&preferencesSaved=

We also note the upward trend recorded, similar to the evolution of scientific literature, in general searches by users, as registered by the Google search engine - as shown in Figure 2b.

**Figure no. 2b. Evolution of Google searches for the term "gamification" (global level)**

Sursa: Google Trends - gamification, http://www.google.com/trends/explore #q=gamification&date=1%2F2004%20136m&cmpt=q&tz=

c. the evolution of the literature on both gamification and innovation

With the understanding of the important contribution and the positive effects of gamification on people's motivation and involvement, as an adaptation to the technological skills of the new generations, it is important to study the extent to which this can help improve the innovation performance of organizations. In this respect an increase can also be observed in the number of papers simultaneously addressing the two topics, innovation & gamification, from 3 papers in 2011 to 54 papers in 2014. Although in an early stage of development, the potential of this topic area, created at the intersection of gamification and innovation, plays an important role in developing the concepts of open innovation and co-creation, which will mark the coming decades.

All these factors justify the undertaking of a research regarding how the innovation process could be adapted by including specific gamification elements that will improve the performance of this process by corresponding using the skills and answering the demands of generations Y and Z.

Figure no. 3. Evolution of the number of papers on innovation and gamification
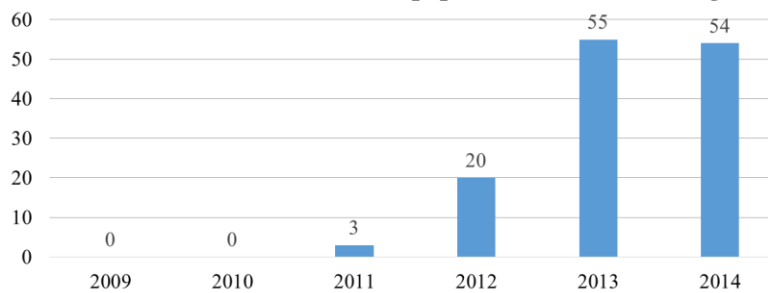
Source: Own representation based on data provided by Web of Science (2015), available at http://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mod e=GeneralSearch&SID=Z1FDGPNjMfxqC1rOYZh&preferencesSaved=

Although in recent years the number of papers published on gamification has registered a steady growth, it is important to underline that there are still diverging views on the positive or negative effects of this process. In our view, the success of the results achieved through gamification depend on the psychological capacity and skills of those involved in the "game of innovation".

The following are some arguments for and against the use of gamification.

Arguments for the use of gamification

Games have been successfully used as a means of motivating people into fulfilling certain tasks. The drive to achieve higher statuses within the game, as well as to receive higher benefits can efficiently engage the player in the gaming activity (McCormick, 2015). Games can captivate the subject and focus his attention into accomplishing a goal (Oliveira et. al., 2014). Gamification can be used to improve the quality of peoples' lives. Applications that motivate players to eat healthier, use less energy, or reduce carbon print have had great success. Another positive use for gamification can be to promote social good. Applications that encourage users to donate blood, or reduce the carbon print have been highly appreciated (Werbach, 2015).

Another positive aspect of gamification and the most obvious one is that games are relaxing and fun, aiding people to release stress and feel good. (Murray, 2006).

Gamification has also been efficiently used as a teaching method for students, as well as employees, making learning a more fun and pleasurable activity (Seaborn, 2015).

Nonetheless, in enterprises, games can increase efficiency and productivity and can encourage people to share information within the organization (Werbach, 2015).

Arguments against the use of gamification

One concern about gamification is that the rewards system of gamification can de-motivate, as the intrinsic motivation a person has for fulfilling a task can be replaced by extrinsic motivation, by the rewards system which can make people that are naturally motivated

replace their motivation with a "trade for rewards" approach, which is less efficient on the long term (Seaborn, 2015).

Another aspect that might be considered as a risk for using gamification is that, in an organisation, long term effects of increased competition can be negative, and can lead to decreased trust in co-workers, decreased team cohesion or reduced communication (Werbach, 2015).

Thirdly, gamification relies only on game mechanics, such as points, rewards etc. which can be misleading, thus not driving fundamental, long term changes, just a short term chase after points, research on long term efficiency being limited (Murray, 2006).

Furthermore, there can also be risks such as "exploitation wear" or getting people manipulated into doing things that are not in their benefit. From the users' behalf, the risk of cheating can lead to achieving other results than those desired (Seaborn, 2015).

Nonetheless, another concern targets the legal issues implied. One of them is that regarding privacy, as games sometimes collect sensitive information from players. Also, regulatory concerns exist about unauthorized use of trade marks. If the nature of the reward is monetary or tangible or in case the activity itself is similar to sweepstakes or gambling activities, the lack of specific regulation and the difference in international rules and regulations are other aspects that will most probably need further research (Werbach, 2015).

Conclusions

We conclude that the interest in scientific research in the field of innovation in recent decades has enjoyed great success, increasing exponentially, contributing to both the quantitative and qualitative increase in the knowledge regarding it and the methods of development of this process. The theory of gamification is still at the beginning in terms of its scientific development, having developed especially after 2011. It was interesting to observe a general increase in the interest regarding gamification as demonstrated by global searches conducted through Google. Although the first acknowledgements of the term "gamification" trace their origins no longer than a few years ago, in the recent period, there has been an increase in the number of scientific studies conducted on this subject.

In the last decade there have been approximately 8.8 million papers addressing the topic of innovation, 304 papers studying the phenomenon of gamification, and just 132 papers simultaneously addressing both concepts.

Gamification is a tool that should be taken into account by organizations looking to improve the performance of their innovation process and develop into a dynamic and collaborative environment, specific to open innovation. Moreover, introducing specific gamification elements allows the organization to create a fun and competitive innovation process, to stimulating the creativity and cognitive processes needed for innovation.

Current socio-economic circumstances have made technology increasingly present in peoples' lives and the use of electronic devices, such as tablets, smartphones etc. has become a regular activity. At the same time, public as well as private organisations have been searching for new ways of innovating, of achieving their goals and retaining consumers more efficiently. In this context, gamification, as a new domain, has gained more and more popularity.

Existent literature highlights some positive as well as negative aspects related to the use of gamification in different situations, however since this is considered a new domain, many variables still need to be clarified, and the social and economic implications will probably lead to a necessity for further examination.

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