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Departamento de Economia, Gestão, Engenharia Industrial e Turismo

Rui Miguel Beja Sardo de Sousa Patrício

Desbloquear a forma como as empresas estão aplicando gamificação ao longo do ciclo de vida inovação

Unlocking the Way Firms are Applying Gamification throughout the Innovation Life Cycle

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Tese apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Doutor em Marketing e Estratégia, realizada sob a orientação científica do Doutor António Carrrizo Moreira, Professor Associado do Departamento de Economia, Gestão, Engenharia Industrial e Turismo da Universidade de Aveiro e do Doutor Francesco Zurlo, Professor Catedrático da Escola de Design do Politécnico de Milão.

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palavras-chave

gamificação, gestão de inovação, processo de inovação, design thinking.

resumo

Esta tese complementa uma linha de investigação emergente na área da gamificação da inovação, explorando como é que a gamificação (utilização de elementos de jogos em contextos não lúdicos) pode apoiar a gestão da fase inicial do processo de inovação, que é mais complexa, confusa e obscura e desta forma ajudar as empresas a inovar. Os principais objetivos desta tese são em primeiro lugar conceptualizar a utilização da gamificação na fase inicial do processo de inovação, em segundo lugar investigar através de estudos empíricos como é que o processo de inovação pode ser melhorado através desta abordagem e em terceiro lugar explorar de que forma é que a gamificação pode apoiar e melhorar o design thinking. Isto porque esta tese defende que a gamificação pode contribuir para melhorar a gestão da fase inicial do processo de inovação, complementando as práticas de design thinking. Como o valor potencial do design thinking está por vezes sobreavaliado entre académicos e gestores, é fundamental reconhecer os seus principais obstáculos e discutir melhor as maneiras de ultrapassar as dificuldades de gestão da inovação, tais como a natureza das atividades pouco estruturadas e não previstas e a necessidade de maior coordenação e alinhamento das equipas. Dado o caráter exploratório dos objetivos e a necessidade de se chegar a um melhor conhecimento das ligações entre a gamificação e a fase inicial do processo de inovação, esta tese segue uma abordagem qualitativa. Os resultados mostram que a gamificação promove o envolvimento das equipas no processo de inovação, melhorando aspetos como o espírito de equipa, diálogo e consenso, partilha de experiência de forma mais criativa, definição de objetivos, coordenação de atividades, desenvolvimento de conceitos e, de uma forma geral, toda a gestão da fase inicial deste processo. Finalmente, esta tese também sugere que a gamificação complementa e melhora as práticas de design thinking aumentando o envolvimento das pessoas e proporcionando uma abordagem mais estruturada do processo de inovação.

keywords

gamification, innovation management, innovation process, design thinking.

abstract

This thesis complements an emergent body of literature on gamification of innovation by exploring how gamification, i.e. the use of game elements in non-gaming contexts, can support the management of the complex, messy and unclear Early Stage of Innovation Process (ESoIP), and therefore help firms to drive innovation forward. Thus, the goal of this thesis is threefold: Firstly to conceptualize gamification approaches to the early stage of innovation; secondly to examine by empirical research studies how the ESoIP can be supported by gamification approaches and thirdly to explore the way gamification approaches support and enhance design thinking. In fact, this thesis argues that gamification can contribute to improving the management of firms' ESoIP by complementing design thinking practices. Since the potential value of design thinking is sometimes overhyped among academics and practitioners it is fundamental to acknowledge its main obstacles and discuss better ways to overcome the difficulties of managing the ESoIP, such the unpredictable and unstructured nature of activities and the need for more coordination and alignment of teams. Given the explorative type of goals and the need to achieve a deeper understanding of the linkages between gamification and the ESoIP, the thesis follows a qualitative research approach. Findings show that gamification approaches encourage the involvement and engagement of teams in the innovation process, improving aspects like team spirit, dialogue and consensus building, creative experience sharing, goals setting, coordination of activities and concept development as well as the overall management of the ESoIP. Finally, it also suggests that gamification complements and enhances design thinking practices by making people more engaged and delivering a more structured approach to the ESoIP.

Table of contents

List of Tables

List of Figures

List of Abbreviations

BM	Board Members
ESoIP	Early Stage of Innovation Process
FEI	Front End of Innovation
GEH	Game Elements and Hierarchy
IM	Innovation Manager
MDE	Mechanics, Dynamics, and Emotions
PM	Project Manager
SDT	Self-Determination Theory
TL	Team Leaders
TM	Team Members

1. Introduction

1.1 Motivation

Due to the increasing worldwide competition, innovation has become an imperative for many firms. The huge pressure to create new and breakthrough solutions for existing and emerging market needs emphasizes the complexity of this process that requires two simultaneously components: novelty, i.e. creation of new product, service, process, technology or business model; and market use, i.e. acceptance by markets, governments and society (Chiva, Ghauri, & Alegre, 2014; Lal, 2015; Pla-Barber & Alegre, 2007; Yu & Si, 2012; Zucchella & Siano, 2014).

If innovation is considered a strategic issue of the firm and a key success factor to create a sustainable advantage in the marketplace, it must be managed like any other key business processes (Denham & Kaberon, 2012; Hamel, 2006). Yet, the biggest difficulty when approaching innovation as a business process is the distinctive nature of its early stage. Actually, during this stage, the innovation process is non-sequential and messy with systematic back and forward movements, which makes it very hard to manage and deliver positive outcomes (Hoholm & Araujo, 2011; Humble & Jones, 1989).

The early stage of innovation, also known as front-end of innovation (FEI), includes activities such as opportunity analysis and identification, idea generation and selection and concept development (Koen et al., 2001), which influences significantly the outcomes of innovation (Khurana & Rosenthal, 1998; Riel, Neumann, & Tichkiewitch, 2013; Wowak, Craighead, Ketchen, & Hult, 2016). The early stage starts with ideation that includes insights discovery, idea generation, idea selection and development, and ends with the decision, positive or negative, to develop a new product/service (Kurkkio, Frishammar, & Lichtenthaler, 2011; Riel et al., 2013; Wowak et al., 2016).

It has been found that only a small percentage of potential new products and services succeeded in the marketplace and the early stage of innovation is influencing the outcomes of the whole innovation process and its success rate (Riel, Neumann, & Tichkiewitch, 2013; Wowak, Craighead, Ketchen, & Hult, 2016). Creative and engaging approaches are therefore essential for better managing the front-end of innovation, particularly the

innovative process of turning ideas into products and services and supporting the underlying decision-making process (Eling, Griffin, & Langerak, 2014; Zimmerling, Hoflinger, Sandner, & Welpe, 2016).

The main challenges of managing innovation during this early stage are summarized in table 1-1.

Table 1-1 Challenges of managing the early stage of innovation

Topic	Type of difficulty	Authors
Volatility	The activities are more unpredictable and unstructured than those performed at the new product development in a stage-gate process.	(Cooper, 2014; Koen et al., 2001)
Informality	There are informal relationships between stakeholders with a high degree of complexity and uncertainty, tacit knowledge-intensive conflicting organizational pressures and permanent discovery of what customers hope to accomplish.	(Christensen, Hall, Dillon, & Duncan, 2016; Ende, Frederiksen, & Prencipe, 2014; Florén & Frishammar, 2012; Zimmerling, Hoflinger, Sandner, & Welpe, 2016)
Coordination and alignment	There is a broad range of activities, such as identifying customer needs and demands and performing an economic analysis of the concepts that require greater coordination of functions.	(Ulrich & Eppinger, 2012)
	There is the need for goal setting, coordination, alignment and motivation.	(Birkinshaw & Mol, 2006; Hamel, 2006; Vaccaro, Jansen, Van Den Bosch, & Volberda, 2012)
	There are changes in how managers set goals, make decisions, coordinate activities, and other more social tasks such as motivating, building alignment, and nurturing relationships	(Birkinshaw & Mol, 2006; Hamel, 2006; Vaccaro et al., 2012)
Knowledge building	The processes are much more dependent on external knowledge sources and higher levels of collaboration among diverse teams.	(Ollila & Elmquist, 2011)
	The processes are highly resource-consuming and often painful, making more challenging managing multiple actors that are more difficult to engage, coordinate and support in their knowledge creation.	(Huxham & Vangen, 2004; Ollila & Yström, 2016)

Based on the important challenges identified, the scope of this thesis is not the entire innovation life cycle but its early stage, which takes place prior to the new product development and commercialization and deeply influences innovation outcomes (Khurana & Rosenthal, 1998; Koen, Bertels, & Kleinschmidt, 2014).

The object of analysis chosen for the empirical research studies conducted under this thesis is a team of mature firms in terms of innovation, here called design driven firms. For this purpose, the indicator of innovation maturity is the adoption of design thinking approaches to innovation and not necessarily the demonstration of a formal innovation process. This type of innovation teams consists of groups of corporate individuals from different backgrounds, e.g. marketing, R&D, product development, among others, addressing challenges of the early stage of innovation with support of design thinking methods and tools.

This choice of design driven firms was made because of the applicability of design thinking approaches in supporting innovation, particularly as a problem solving tool in more complex, uncertain or difficult problems that requires a good combination of both flexibility and structure (Chasanidou, Gasparini, & Lee, 2015; Lee & Benza, 2015; Liedtka, 2015; Seidel & Fixson, 2013; Shpakova, Dorfler, & Macbryde, 2016; Tidd, 2001).

1.2 Literature review

The purpose of this section is to highlight the most important areas and introduce new topics not already covered by the research studies conducted during this thesis (chapters 2-5) related with innovation, design thinking and gamification. Thus, the aim is not to be exhaustive in terms of the literature review as it is already embraced afterward.

The innovation literature is a fragmented body that is a consequence of the ambiguity of the term innovation, making extremely hard to streamline firms' innovation processes, particularly from its early stage (Adams, Bessant, & Phelps, 2006). Thus, the theoretical framework that supports this thesis is grounded on the theory of design and innovation, particularly design thinking approaches to innovation.

Design thinking approach is more suitable to tackle the challenges of the early stage of innovation, bringing together a creative and analytic set of tools and techniques that promote collaboration and engagement (Brown, 2008; Lee & Benza, 2015; Liedtka, 2015).

Over the time, the focus of design has shifted progressively from traditional tangible objects, product-oriented design processes, toward ways of thinking and doing that support the design of solutions to intangible offerings and complex problems concerning to systems and organizational culture (Beaudry, 2009; Boland, Collopy, Lyytinen, & Yoo, 2002; Deserti & Rizzo, 2014; Manzini, 2016; West & Wind, 2007; Zurlo & Cautela, 2014). Both academia and industry have recognized the importance of the design, as it goes beyond products and services and puts design much closer to the center of the organization (Beaudry, 2009; Chen & Venkatesh, 2013; Gruber, de Leon, George, & Thompson, 2015; Kolko, 2015; Rauth, Carlgren, & Elmquist, 2014).

Design has evolved from the creation of a designed artifact – such as a new product, service, system, or technology – to its current attention toward processes, systems, services, business models, and strategy (Beaudry, 2009; Meyer, 2015). Actually, design principles are being increasingly applied in various organizational settings and management contexts that require a powerful set of methods and tools for creative problem solving and innovation (Beaudry, 2009; Chen & Venkatesh, 2013; Meyer, 2015; Rauth et al., 2014). Furthermore, it has definitively moved further away from designing tangible products up to ways of thinking and doing that support the design of solutions aimed at getting people to engage and adopt innovative new ideas and experiences, such as looking at corporate strategy through the lens of design (Beaudry, 2009; Brown & Martin, 2015; Manzini, 2016; Zurlo & Cautela, 2014).

The term “design” can now be applied to tackle organizational designs in which organizations are seen as products of design and designers are increasingly being asked to contribute to the (re)design of organizations (Beaudry, 2009; Buchanan, 2008).

The lens provided by design are also being applied to other areas within the management domain (Gruber et al., 2015). If in some cases design is still treated as referring to a finished product and not to a management practice, a growing number of managers are developing a new form of thinking, leadership style and attitude towards design in order to remain competitive in the marketplace (Buchanan, 2008; Boland, Collopy, Lyytinen, & Yoo, 2002). This new design attitude of firms with impact on management practices is compared with the traditional management perspective in table 1-2.

Table 1-2 Comparison between traditional and design-driven management

Perspective	Strategic Approach	Culture	Leadership
Traditional Management	Planning – the goal is to control uncertainty	Focus on goals and organizational routines	Top-down methods and processes
Design-driven Management	Thinking – the goal is to provide new ways of thinking and prototyping	Diffusion of meaning and purpose	High engagement with bottom-up design processes

This design-driven perspective can also be understood as an influence of "cultura del progetto" from the Italian design tradition since the context in which a new project is conceived and developed can influence the very culture from which they grew (Manzini, 2016). A similar view is held by Deserti & Rizzo (2014) when they argue the word "progetto" implies something broader than simply the form-giving within design, including not only the output of the design and to its realization but also the conception and negotiation of the products with clients.

This perspective must ensure that products meet users' needs and expectations by iteratively studying and actively involving users throughout the design life cycle and therefore designers should focus not just on the needs but also on the culture of the end-user (Moalosi, Popovic, & Hickling-Hudson, 2010; Deserti & Rizzo, 2014). Likewise, leadership style shapes the culture of the firm by introducing bottom-up design processes, rather than planned and top-down new methods and processes (Deserti & Rizzo, 2014).

Also in contrast to traditional management perspective, design-driven is an iterative process that generates innovation mainly by using a trial-and-error approach, where new concepts give shape to ideas through the development of prototypes and only subsequently a convergent way of thinking based on the fulfillment of product requirements is adopted (Boland et al., 2002; Deserti & Rizzo, 2014). Design principles embrace knowledge, processes, skills, values, visions, and quality criteria delivered by designers during the interaction with a variety of actors and cultures and so design can be used for solving complex problems and develop innovative solutions that meet explicit or latent needs by iteratively studying and actively involving users (Deserti & Rizzo, 2014; Manzini, 2016; Moalosi, Popovic, & Hickling-Hudson, 2010).

Due to a greater adoption of design thinking approaches to innovation by scholars and managers, design is definitively influencing the agenda of firms. Rather than the exclusive coordination of the design function with other parts of the organization, design thinking can shape a design-driven corporate culture (thoughts and beliefs) that shift mindsets, trigger new behaviors, promote experimentation, integrate thinking, reflection and change attitudes toward collaboration, failure, learning, and resolution of ambiguous problems (Beaudry, 2009; Chen & Venkatesh, 2013).

Besides still very connected to the creative problem solving approach, design thinking can also be understood and adopted in three other typologies, e.g. sprint execution, creative confidence and innovation of meaning. The creative problem solving and the sprint execution address the solution domain, whereas the last two mainly tackle the people and direction domains (Dell'Era, Cautela, Magistretti, Verganti, & Zurlo, 2018).

Design thinking has, therefore, the potential to unleash people's full creative energies and address the counterproductive biases of human beings, e.g. fear of mistakes, by emphasizing engagement, dialogue, and learning (Liedtka, 2018). Therefore, design-driven firms, i.e. firms that use design thinking approaches to innovation, are involved in the development of a responsive, flexible and people-centered organizational culture and approaches to innovation, which emphasizes the following distinctive principles:

- Adoption of systematic and holistic approaches – Supports an integrated vision that explores constraints in creative ways and encompasses all the stakeholders needed for the project over a more traditional vision more oriented to achieve efficiency through functional subdivision of the tasks. This functional approach reduces the chances of creating breakthroughs or facing unexpected changes since managers tend to rely on pre-existing knowledge and resources and on separate functions in the process of developing new products (Deserti & Rizzo, 2014). For achieving breakthroughs it is required to promote integrative thinking that relies on both analytical processes and exploitation of novel solutions that go beyond and dramatically improve on existing alternatives Brown (2008).
- Identification of emerging needs – The innovation is taken as an intuitive recognition of and response to a need supported by the generation of fresh insights

without the filters and dogmas bound to established procedures and ways of doing (Deserti & Rizzo, 2014).

- Promotion of collaboration – The increasing complexity of products, services, and experiences leads to interdisciplinary approaches with people having significant experience in more than one discipline (Brown, 2008).
- Perception of failure – This new approach to innovation doesn't encourage failure, but assumes failure as part of the process and free employees to take risks without losing face or having any fear of organizational punishment (Brown, 2008; Deserti & Rizzo, 2014). It goes against traditional management practices that typically use the expression "failure is not an option". And it promotes the notion of failure as learning through prototyping, accepting modifications – even radical ones, and does not limit managers in the way they deal with change and innovation neither forces them to adopt conservative solutions that maintain the status quo (Deserti & Rizzo, 2014).
- Adoption of "people first" and "user experience" approaches – Observing the world in detail allows to build more empathy with users (e.g. colleagues, clients, end users, and customers) and to imagine solutions that are inherently desirable and meet explicit or latent needs (Brown, 2008; Kolko, 2015). To support this effort, organizations are using emotional language, words that concern desires, aspirations, engagement, and experience (Kolko, 2015).
- Conception of prototypes – Digital, physical models, or diagrammatic prototypes of new ideas, new products, and new services that are used to examine complex problems such as how a customer experiences a service and explore potential solutions (Brown & Martin, 2015; Kolko, 2015). Typically the goal is to approach users with a very low-resolution prototype to get early feedback and repeat this process in short cycles until users are delighted with the products. It is way to communicate ideas and reflect an open-minded culture that supports values exploration and experimentation. Iterative rapid-cycle prototyping is one of the key drivers of design-driven firms since it allows predict users' reactions to the final product soon after the market launch and also provides the funding and organizational commitment to bring the new artifact to market, overcoming the fear of the unknown (Brown & Martin, 2015).

Despite the advantages and wider acceptance of design thinking approach among managers and scholars, some authors argue that the practices of integrating design into innovation are facing significant obstacles – e.g. lack of structure and contextualization; disconnection between thinking and doing; excessive top-down change management approach; perception of a simplified view of design; need for legitimacy and engagement; use of multidisciplinary, self-organized, and non-hierarchical teams (Beaudry, 2009; Deserti & Rizzo, 2014; Kupp, Anderson, & Reckhenrich, 2017; Meyer, 2015; Rauth et al., 2014) – which turns the Early Stage of Innovation Process (ESoIP) more difficult to manage.

On top of that, there is a growing demand for collaborative innovation practices to support the interaction and interchange of ideas between multiple actors in a knowledge-building environment (Baldwin & von Hippel, 2011), such as co-creation of new solutions, which brings more complexity to the innovation process. Co-creation is the practice of developing new solutions, e.g. products, services, processes, organizational designs, and business models through a more participative process with engaged company stakeholders involved in a collective creativity environment (Galvagno & Dalli, 2014; Grönroos & Voima, 2013; Ind & Coates, 2013; Prahalad & Ramaswamy, 2004; Sanders & Stappers, 2008).

Gamification, i.e. the process of making activities more game-like, in non-game contexts, to encourage users' motivation and engagement in a particular task (Deterding, Dixon, Khaled, & Nacke, 2011), holds the potential to support design driven firms' innovation processes, particularly at its early stage, by contributing to overcome some of the obstacles of design thinking identified in the literature.

On a firm-level, gamification can also be applied to many different business functions including marketing and sales, human capital and customer service, involving participants within a firm, e.g. to improve employee engagement or outside it, e.g. to co-develop products with customers (Piligrimiene, Dovaliene, & Virvilaite, 2015; Robson, Plangger, Kietzmann, Mccarthy, & Pitt, 2014; Ruhi, 2015). By providing gamified experiences, such as fun and a feeling of mastery, firms are making desired behaviors more engaging, not only in complex environments but also in contexts that have normally boring but critical activities (Harwood & Garry, 2015; Koivisto & Hamari, 2014; Roth, Schneckenberg, & Tsai, 2015).

Research studies are covering a wide range of areas such as education and training, human capital, hospitality, healthcare, entertainment, marketing and sales (Borges, Durelli, Macedo, & Isotani, 2014; Dicheva, Dichev, Agre, & Angelova, 2015; Hamari, Koivisto, & Sarsa, 2014; Mora, Riera, & Arnedo-Moreno, 2015; Raftopoulos, Walz, & Greuter, 2015; Seaborn & Fels, 2014). While considerable progress has been made in these areas, the link between gamification and innovation has not been extensively considered.

Previous studies have shown that integrating gamification in innovation is a promising research avenue, particularly during ideation (Agogué, Levillain, & Hooge, 2015), continuous innovation (Hyypiä & Parjanen, 2015), and workshop sessions (Schulz, Geithner, Woelfel, & Krzywinski, 2015). Yet, these studies suggest that there is the need to research and further validate the actual value of gamification in relation to innovation, considering, in particular, its mechanics (rules) and participants' motivation (Brandt, Messeter, & Binder, 2008; Kavaliova, Virjee, Maehle, Kleppe, & Nisar, 2016).

Although thoroughly researched in many dimensions and contexts, gamification is still a recent concept and should not be confused with others, such as play, traditional games or even reward systems and loyalty programs that merely persuade people to perform actions in order to earn points (Ruhi, 2015). Furthermore, gamification is much more than a technical process of applying game elements and tools (Harwood & Garry, 2015).

The selection of game elements like rewards and level of competition depends on what really motivates and keeps people engaged (Dale, 2014; Galetta, 2013). Therefore, in order to design of a fun, challenging and engaging experience, the focus of the firm is placed on understanding the users and not so much on tools and mechanics of gamification (Dale, 2014). For this reason, gamification approaches need to involve the application of psychological, social, behavioral, cognitive science theories and user centered design perspective (Norman & Draper, 1986; Schoech, Boyas, Black, & Elias-Lambert, 2013).

Human motivation has been commonly and popularly addressed from two sources, external and internal. Self-determination theory (SDT), one of the most widely employed theories, postulates that behavior may be extrinsically or intrinsically motivated (Hamari & Koivisto, 2015; Mekler, Brühlmann, Tuch, & Opwis, 2015; Robson et al., 2015). Self-determination theory (SDT) differentiates two forms of motivation: extrinsic and intrinsic motivation.

Extrinsic motivation refers to motivations arising from an external source, such as being motivated to perform a task in order to receive financial compensation for it (Hamari & Koivisto, 2015). And it is defined as doing something due to an extrinsic reward in the form of money or verbal feedback, e.g., praise (Mekler et al., 2015).

Intrinsic motivation refers to motivations arising from an internal source, i.e. self-purposeful behavior and being internally motivated, without external forces affecting the will to act (Hamari & Koivisto, 2015). It means the pursuit of an activity, simply because it is inherently interesting or enjoyable (Mekler et al., 2015).

Comprehensive gamification frameworks like the Mechanics, Dynamics, and Emotions (MDE) (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015) and the Game Elements and Hierarchy (GEH) (Werbach & Hunter, 2015) are needed to enable a consistent and efficient use of game designed elements in corporate processes and design inspiring experiences for the users. For instance, the MDE framework includes the three following principles that should be interconnected for creating fruitful gamification experiences: mechanics, dynamics and emotions. Gamification designers determine these mechanics, like the rules and goals, progress through the game, rewards and interactions, before the gamified experience begins. The dynamics define how players ratify the mechanics. They are the player behaviors (e.g., cheating, bluffing, bragging) that emerge when the mechanics are executed during the gamified experience. Emotions are the affective states evoked during the experience, i.e., how players feel toward the gamified experience – excitement or disappointment at losing or sadness at not achieving a reward.

When efficiently used gamification supports innovation, particularly in user engagement and co-design of tailored product-service systems by providing an open, collaborative, challenging and innovation driven environment (Patricio, Moreira, & Zurlo, 2017).

Benefits of this gamification goes beyond hedonic elements, such as customer and employee engagement (Kumar & Raghavendran, 2015; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016). Gamification also provides utilitarian benefits for the firm by increasing productivity among employees (Hamari & Koivisto, 2015), improving customer loyalty (Lucassen & Jansen, 2014) and accelerating the product development process (Agogué et al., 2015).

In conclusion, the following research gaps were identified:

- Although design thinking is definitively influencing the agenda of firms, the practices of integrating design into innovation are facing significant obstacles, which turns the ESoIP more difficult to manage.
- Gamification holds the potential to complement and support design approaches to innovation but the linkage between gamification and ESoIP has not been empirically researched. Despite the growing body of literature on gamification, there was a lack of empirical research examining the use of gamification approaches on firms' innovation processes, particularly at its early stage (Patrício, Moreira, & Zurlo, 2018).
- There is still confusion in relation to the meaning of gamification and other game approaches. The differences between gamification and other similar and overlapping game approaches, e.g. serious games, and playful design, are unclear, which prevents researchers and practitioners to fully understand the application domains and impacts of gamification approaches to innovation and to the ESoIP.

1.3 Objectives and structure

This thesis aims to unlock the way firms are applying gamification approaches to support the ESoIP by addressing the above mentioned research gaps with different research studies. The primary goal is to set out a conceptual framework, i.e. a conceptualization of gamification approaches to ESoIP, and attempt to examine it in the field. Therefore, this thesis seeks to contribute to the body of knowledge by answering the main research question: How can the ESoIP be supported and improved by gamification approaches?

The research question was identified in the literature and reflects a problem with a substantial degree of uncertainty that can be addressed by this thesis. In this context, it has three distinctive objectives:

- Objective 1 (O1): To provide a comprehensive and organized picture of the use of gamification approaches to the ESoIP, illustrating its main application domains and outcomes.
- Objective 2 (O2): To empirically examine the deployment of gamification approaches to ESoIP.

- Objective 3 (O3): To explore the way gamification approaches support and enhance design thinking practices.

The research objectives are addressed by research questions (RQs) that are linked to a collection of studies developed during this thesis, already published (studies I and II) or submitted to scientific journals (studies III and IV).

Study I (see chapter 2) is completely exploratory, systematizing different cases of gamification applied to the innovation space. Study II (see chapter 3) is the backbone of the thesis and provides the conceptualization of gamification in the context of the early stage of innovation, delivering a comprehensive contribution to the theory. The other two studies are empirical researches that seek to examine this conceptualization in the field. In fact, these studies apply the conceptualization of gamification approaches to innovation to real business scenarios of diverse innovation teams composed by representatives from the same firm (study III - see chapter 4) and representatives from different stakeholders, i.e. multi-actors in a collaborative innovation setting (study IV - see chapter 5).

Figure 1-1 shows the thesis structure, based on different type of studies. The collection of studies combines a set of four independent manuscripts focused on the research objectives, which in some cases display some minor overlaps in terms of the innovation and gamification literature review.

In order to examine the use of gamification approaches on firms' innovation processes, a gamified method and tool called ideaChef® was chosen to be applied during empirical research studies III and IV. This gamified method and tool is appropriate for this research and fully complies with the requirements of a recognized gamification framework, called "Game Elements and Hierarchy" (GEH) (Werbach & Hunter, 2015) (see section 1.6 for more information about ideaChef®).

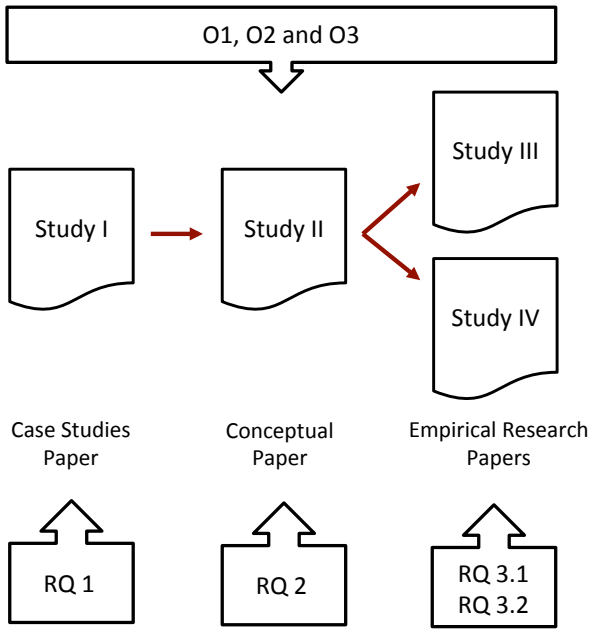

Figure 1-1 Thesis Structure

Study I is linked to the following research question (RQ1): How can gamification approaches, and ideaChef® in particular, help teams get committed and engaged in corporate innovation and entrepreneurship practices? The purpose of developing this study was to gather initial insights on how the chosen gamification approach for empirical studies, i.e. ideaChef®, supported innovation practices and delivered the desired outcomes.

The second research question, (RQ2), was linked to the Study II: How can the relationship between gamification and the ESoIP be described? The goal of this theoretical study was to conceptualize the linkages between gamification and innovation along with its main outcomes.

The other two empirical studies tackled the opportunity for further research identified in Study II and were linked to the following research question: How can gamification support the ESoIP? More specifically, these studies empirically studied the way design driven firms were applying the chosen gamification approach (ideaChef®) in different innovation contexts. One study used teams composed by employees of same firm (Study III) and the other teams composed by representatives from different stakeholders (Study IV).

Study III, using innovation teams composed by employees of the same firm, is linked to a more specific research question derived from the above mentioned, (RQ3.1): How can gamification approaches support the idea development phase of the early stage of innovation? The purpose was not only to investigate the outcomes of gamification approaches to idea development but also to examine how gamification complements and enhances design thinking approaches to the ESoIP.

Finally, the other empirical study (Study IV), using innovation teams composed by representatives from different stakeholders, was focused on the co-creation of new solutions and is linked to the following research question (RQ3.2): How can gamification approaches support the co-creation of new solutions in a collaborative innovation context?

The method adopted for this thesis, moving from a high-level view to a more particular study in concrete business scenarios (as seen in figure 1), provides an effective and efficient way to explore the relationship between gamification and innovation process and identifies new approaches to overcome the difficulties of managing the early stage of innovation.

1.4 Research paradigms

A paradigm is a general perspective of the world, i.e. a way of breaking down the complexity of the real world that serves for defining how knowledge is extracted from this world, and how one is to think, write, and talk about this knowledge; defining the types of questions to be asked and the methodologies to be used in answering; deciding what is published and what is not published; structuring the world of the academic worker and providing its meaning and its significance (Dills & Romiszowski, 1997; Patton, 1990).

Given its importance for research, key concepts should be clarified and discussed. Table 1-3 provides a relevant systematization and comparison of the existing scientific paradigms in relation to its dimensions (Sobh & Perry, 2006).

A paradigm includes three dimensions, ontology, epistemology and methodology. Ontology deals with the question of what is real (that is the “reality”) and the epistemology is the relationship between that reality and the researcher, which studies the process by which knowledge is obtained and validated (Patton, 1990; Sobh & Perry, 2006).

Table 1-3 Four Scientific Paradigms

	Paradigms of Science			
Dimensions	**Positivism**	**Constructivism**	**Critical theory**	**Realism**
Ontology	Reality is real and apprehensible	Multiple local and specific "constructed" realities	"Virtual" reality shaped by social, economic, ethnic, political, cultural, and gender values, crystallised over time	Reality is "real" but only imperfectly and probabilistically apprehensible and so triangulation from many sources is required to try to know it
Epistemology	Findings true – researcher is objective by viewing reality through a "one-way mirror"	Created findings – researcher is a "passionate participant" within the world being investigated	Value mediated findings – researcher is a "transformative intellectual" who changes the social world within which participants live	Findings probably true – researcher is value-aware and needs to triangulate any perceptions he or she is collecting
Common methodologies	Mostly concerns with a testing of theory. Thus mainly quantitative methods such as: survey, experiments, and verification of hypotheses	In-depth unstructured interviews, participant observation, action research, and grounded theory research	Action research and participant observation	Mainly qualitative methods such as case studies and convergent interviews

Source: Sobh & Perry (2006)

The methodology is the technique used by the researcher to discover that "reality", questioning "how do we know the world, or gain knowledge of it?" and integrates quite well the characteristics of the four different paradigms of science (positivism, realism, constructivism and critical theory) when addressing the question of knowledge creation: how can the findings of one research project be generalized to other situations?

These paradigms provide different research perspectives. In positivism, knowledge is statistically generalized to a population by statistical analysis of observations about an easily accessible reality. On the other hand, the aim of realism paradigm is to generalize to theoretical propositions and not to populations (Sobh & Perry, 2006). For the other two paradigms, constructivism and critical theory, "reality" is perception and so generalization

of one research finding of someone's perceptions to another person's "theory" about reality cannot be done.

Actually, under these paradigms, findings are related to individual views of the world and create a world of multiple constructed realities, and such views cannot be usefully compared with those of other individuals (Sobh & Perry, 2006). The meaning of experiences and events are constructed by individuals, and therefore people construct the realities in which they participate, which means that their interpretation of the studied phenomenon is itself a construction (Charmaz, 2006).

According to the research goal, this thesis is focused on knowledge creation within the constructivism and critical theory, which argue that the world is "constructed" by people and that these constructions should be the driving forces of research. "A core element of these two paradigms is that each person's constructed reality is so powerful and influence on their behavior that any external reality is relatively unimportant and, moreover, there is no way of comparing the multiple constructed realities of different people" (Sobh & Perry, 2006, p.1198).

Understanding these fundamentals, make it possible to establish a bridge with the research approach adopted by this thesis, much more process based or means oriented that helps the researcher understand the phenomena and comprehend why certain characteristics or effects occur, or do not occur, by using both quantitative and qualitative methodologies (Meredith, 1998; Sobh & Perry, 2006). In fact, sometimes both types are appropriate even though the two methods may produce contradictory findings about the same phenomena, as "it is likely that quantitative methods and qualitative methods will eventually answer questions that do not easily come together to provide a single, well-integrated picture of the situation" (Patton, 1990, pp. 464-5).

1.5 Methodological approach

The purpose of this section is to systematize and integrate the approaches used by the research studies conducted during this thesis (chapters 2-5). The particularities of the approaches used are presented in each of the studies conducted.

The thesis follows a qualitative research perspective, influenced by Yin's (2013) contribution to the theory. Given the explorative approach goal of the thesis and the need

to achieve a deeper understanding of the linkages between gamification and the ESoIP, a qualitative research was carried out. This type of methodology was adopted since there is a need to observe a phenomenon in depth, exploring the meaning firms are giving it and so understanding it from the perspective of participants. It is an appropriate approach due to the nature of the research gaps identified in the literature and the overall lack of theoretical knowledge in this respect (Eisenhardt, 1989; Yin, 2009).

The methodology for addressing the RQ1 (How can gamification approaches, and ideaChef® in particular, help teams get committed and engaged in innovation practices?) was based on the analysis of already existing case studies of ideaChef® deployment in the corporate innovation and entrepreneurial space (Study I). These cases were selected from a large range of real case deployments that provided rich insights about the deployment of ideaChef® method and tool.

For addressing RQ2 (How can the relationship between gamification and early stage of innovation be described?), research was not limited to ideaChef® but extended to other appropriate gamification methods and tools that were used to address concrete early stage of innovation challenges. Study II made a cross-comparison of published case studies of firms where gamification was used to address innovation challenges, e.g. use of gamification elements and tools that support the generation of ideas for developing new product concepts or entering new markets. To achieve this goal, a systematic mapping of relevant practices in the context of gamification approaches to early stage of innovation was developed, using a cross-comparison of representative case studies.

In order to investigate how gamification can support the early stage of the innovation process, case study research method was applied in studies III and IV. The relevance and alignment of this method with research objectives and questions (RQ3.1 and RQ3.2) is very high since empirical research is used to examine one phenomenon within its actual context in order to create managerially important knowledge (Yin, 2009).

These empirical research studies involve both single and multiple cases. The choice of the single case study is coherent with the research goal (studies III and IV) that seeks to understand a phenomenon with a possibly uncertain process (Yin, 2009). It was adopted since it offered an interesting opportunity for unusual research access and depth of observation to a complex phenomenon (Barratt, Thomas, & Li, 2011; Voss, Tsikriktsis, &

Frohlich, 2002). Multiple case studies were used to address one of the research questions of study III. For this particular situation, it was considered more appropriate to use a multiple case studies approach in order to acquire better insights from a diversify data set, i.e. firms with different levels of maturity in design thinking. Multiple case studies allow creating more robust and testable theory since it often emphasizes complementary aspects of a phenomenon (Eisenhardt, 1989). Table 1-4 provides a synthesis of the inductive methodological approach for studies III and IV.

Table 1-4 Synthesis of the methodological approach used for the empirical studies

Dimensions	**Empirical Studies**
Type of study	Exploratory case studies.
Unit of analysis	Innovation teams from design driven firms
Type of sample	The sample was selected because of the special characteristics of certain groups within the research area. In fact, the level of expertise in design thinking approaches to innovation determined the key selection criteria of the case study firms (studies III and IV).
Type of data	Primary data: views, perceptions and actions of innovation team members (studies III and IV), innovation and project managers (studies III and IV) and board members (study III) as well as the level of satisfaction of the team members regarding several aspects of the gamification experience (study III). Secondary data: internal project reports and documents of case study firms (study III) and European project Co-Create (study IV).
Data collection	Primary data collection applied different methods. Qualitative data have been collected through field written notes, observation of workshops and meetings, audio taped and fully transcribed interviews. For the quantitative data, surveys were conducted based on prior research (study III). Secondary data collection has been collected from internal and external secondary sources and took into consideration the case study firm's strategic and innovation plans (study III) and Co-Create project (study IV).
Data analysis	Data analysis was inductive and followed a thematic coding process that helped to determine correspondences and differences across the sample. Core themes emerged from empirical evidence of repeated patterns across each individual piece of data collected (studies III and IV).

Several procedures were conducted to ensure the research reliability and validity. The primary and secondary dual approach allowed the triangulation of data that supported the study findings validated the data collection through multiple sources of evidence and optimized the internal validity and reliability of the study (Patton, 1990; Yin, 2009; Zomerdijk & Voss, 2009). Being an exploratory study and aiming to qualitatively understand the phenomenon it was possible to adjust the direction of the research study

throughout the entire process of collection and analysis (Strauss & Corbin, 1998).

Multiple cases augmented external validity by the increased capacity of generalizing the conclusions from the study and helped guard against observer bias (Voss, Tsikriktsis, & Frohlich, 2002). Moreover, the use of interview and survey protocols for collecting data that can be repeated with the same results in another study also contributed to increasing the reliability of the study.

It is important to acknowledge that the researcher was involved in the conduction of the empirical case studies, contributing as a workshop facilitator. Like in the action research method, the researcher is involved in the development of the theory. As opposed to a positivistic view, action method embraces the notion that knowledge is socially constructed and the development of theory encompasses not only the observation but also the involvement of researchers, even arguing that without practice it is not theory but speculation that is created (Gudiksen, 2015; Roos, Victor, & Statler, 2004). But in contrast with the action research method, the researcher was not involved as a workshop participant either in any data production activity in collaboration with participants.

Nevertheless, this circumstance influenced the way data was interpreted and thus participants of case study firms were asked to give feedback immediately after the sessions about their experiences, demonstrating their appreciation of the process, and to review the results (Hyypiä & Parjanen, 2015; Schulz et al., 2015). Therefore data analysis has been complemented with project documentation, written notes taken during interviews and meetings, video and audio recordings, and still pictures from the interventions (Gudiksen, 2015; Schulz et al., 2015; van Amstel & Garde, 2016).

1.6 Overview of ideaChef® method and tool

ideaChef® was the gamified method and tool employed for the empirical studies. It is a board game that uses a cooking metaphor to enable teams to develop ideas further and then turn it into projects. It encourages an entrepreneurial spirit in a more open, transparent and innovative thinking atmosphere. In order to assist teams to bring ideas into reality, team members are asked a number of thought-provoking questions to be discussed around different building blocks that structure an idea (e.g. menu, ingredients and main course). ideaChef® challenges people's thinking and puts a structure on it to move an idea from

concept into an actual project. Moreover, it builds actionable consensus regarding the best direction to take (Patricio, 2017).

ideaChef® level of compliance with the "Game Elements and Hierarchy" gamification framework (Werbach and Hunter 2015) is described in table 1-5.

Table 1-5 ideaChef® level of compliance with the "Game Elements and Hierarchy" gamification framework

Game Elements Framework	**Game Elements of ideaChef®**
Dynamics	Rules that require users to answer different type of questions within defined time windows as well as choices and tradeoffs like buy a card or expertise; Range of emotions that seek to invoke recognition, happiness, creativity among others; Narrative that reports a coherent experience related with the concrete challenge/problem; Different challenges like the power cards as the user progresses in the game; Players depend on one another for achieving contributions for all the blocks and designing the recipe.
Mechanics	A set of questions that require some effort to solve like time, knowledge and creativity; Elements of randomness by using the dice; Group and individual competition; Cooperation everyone must work together to achieve the best "recipe"; Feedback about how players are performing very two minutes; Transactions where players can trade with each other directly like paying for expertise; Rewards for players that complete the individual board with contribution for all categories; Teams can play up to six rounds.
Components	Points that show players performance and progression; Achievements of objectives (give contributions) that result in one player winning; Aspects of the game (power cards) available only when players achieve one or two regular rounds; Group of 3 up to 6 players that work together for a common goal i.e. designing the best recipe for solving the challenge/problem; Visual displays of teams progression i.e. number of rounds; Quests that are defined ahead of time for players i.e. provide contributions for all the categories.

Having a high level of compliance with this comprehensive and widely accepted gamification framework, ideaChef® was considered a good method and tool to support this intervention and achieve the desired goals.

In this particular intervention, the goal of ideaChef® game was to find a common solution ("recipe") for the challenge/problem, based on the most ranked individual contributions from the players. Since the purpose was to enhance collaboration, no individual competition element among the team members was promoted and no individual points were counted after the play session.

ideaChef® is played in teams (four up to six members) and prompts questions on key issues to address, it can assist in developing new products and services, re-designing internal processes or even working with clients to improve product and service offering. It basically allows for non-digital gamification and structure development all in one. As an added bonus, it encourages a team to work together in an informal fun yet structured fashion and consensus about an idea and approach that will create a winning solution, called "recipe". It can be used in one team or with multiple teams around the same or different ideas, always addressing a concrete challenge/problem.

The ideaChef® method comprised three phases: a), setting up of the game (done remotely one week before the workshops); b) playing the game; and c) reporting (conducted during the gamification workshop sessions). During the setup phase, the challenge/problem was outlined and submitted to the teams. Soon after, team members generated high potential ideas on an individual basis for addressing the particular challenges/problems and anonymously selected which of them to play. This task was done remotely with the support of templates and conducted by the firm's project manager.

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2. A gamified approach for engaging teams in corporate innovation & entrepreneurship

Abstract

The study explains the link between gamification and innovation and describes the use of a particular gamified method and tool, which helps teams get committed and engaged in idea development. The goal is to provide valuable insights on how gamification can accelerate innovation. Data was collected from innovation consultants and IT/Software companies' team members that used this gamification approach to address innovation challenges as well as from an entrepreneurship class from University that also used this particular gamification approach to support an idea competition program. The study provides insights and discusses the major impacts of gamification from the perspective of innovation consultants, corporate teams as well as from young entrepreneurs. It suggests that the application of this gamified method and tool enhances the quality of the idea that is developed to address an outlined innovation challenge. It was also found that team members/participants as a result of this process subsequently developed important innovation and entrepreneurship capabilities. Despite the growing body of literature on gamification, there is a lack of empirical research that examines the use of gamification tools on companies' innovation and entrepreneurship initiatives. This study contributes to clarify the contribution of gamified methods and tools towards the success of corporate innovation and entrepreneurship programs by describing the use of a particular gamified approach. Researchers will gain insights into the effects of gamification approaches and a better understanding of the integration requirements with other related research areas. Practitioners will understand how this new method and tool can be implemented in order to drive innovation and entrepreneurship forward.

Keywords: Gamification, Innovation, Entrepreneurship.

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2.1 Introduction

Getting the entire organization committed to innovation is one of the biggest challenges in the context of corporate innovation and entrepreneurship. Managing the entire innovation life cycle requires and a strong commitment from all levels of the firm. Besides having engaged employees in entrepreneurial behaviors, coordination is needed at the senior, middle, first levels of management and team level (Kuratko, Covin, & Hornsby, 2014).

It compels the creation of a culture that supports innovative behaviors and capabilities such as creativity, collaboration, experimentation, risk-taking behavior, questioning the status quo, a can-do attitude as well as a desire for personal growth and development. This often requires underlying assumptions to be challenged, and the creation of new methods and tools that bring such values and norms to life through visible and tangible symbols and actions. New innovation methods and tools are required to help challenge underlying assumptions and influence desirable behaviors among teams.

Gamification can be defined by the use of game designed elements in non-gaming contexts (Deterding, Dixon, Khaled, & Nacke, 2011) or non-leisure situations to encourage users' motivation, enjoyment and engagement, particularly in difficult and complex tasks. Gamificiation benefits goes beyond hedonic elements, such as customer and employee engagement (Kumar & Raghavendran, 2015; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016). It also provides utilitarian benefits for the firm by increasing productivity among employees (Hamari & Koivisto, 2015), improving customer loyalty (Lucassen & Jansen, 2014) and accelerating the product development process (Agogué, Levillain, & Hooge, 2015).

Gamification is a growing and an inevitable trend for industries and organizations that wish to gain a competitive edge. It is a new topic of research that includes many areas of investigation, from economics to sociology, with different approaches, research questions, methods and results. In March 2014, the Institute of Electrical and Electronics Engineers (IEEE) speculated that "*85% of the tasks in our daily lives will include game elements by 2020*" (Settles, 2014).

Gamification is an excellent method and tool to drive employee participation and engagement in innovation processes since it taps into human desire and its natural

attraction for gaming. By providing enjoyable experiences gamification takes employee engagement to a new milestone. A gamified method and tool can influence "good" employee behavior in the workplace. It triggers people's curiosity about innovation, keeps people intrinsically motivated to continuously engage, enhances internal collaboration, promotes greater fun and commitment among employees, increases motivation to learn and grow, provides insights for future areas of product/service applications, increases the willingness to take risks, educates on how to accept failure, promotes openness to new ideas and technologies, among many other behaviors.

Gartner mentions there are warnings that about 80% of current gamified applications fail to meet business objectives, primarily because processes have been inappropriately gamified (Gartner, 2012). In fact, gamification is not an easy and straightforward process since it requires an engaging user experience focused on clear business goals and a balanced mix of rewards and emotions. However, when implemented correctly, gamification can contribute greatly to the shaping of an innovation-supportive culture.

2.2 ideaChef® method and tool

What is it and how does it work?

ideaChef® is a gamifed method and a tool (a board game that uses cooking metaphors) that was designed to enable teams to convert high potential ideas into working concepts or prototypes. ideaChef® supports convergent thinking by helping to narrow a number of potential solutions down to a 'best fit' solution, which provides an engaging and more efficient way of selecting and developing ideas to be pursued further.

This new method and tool has been developed in a very short period of time: between February and June 2015 and it was launched on the market by October 2015. This project was developed with a diverse and international team that applied lean startup principles, involving users since the early stage, prototyping all the components and testing user interface and experience across all the ideation and development stages.

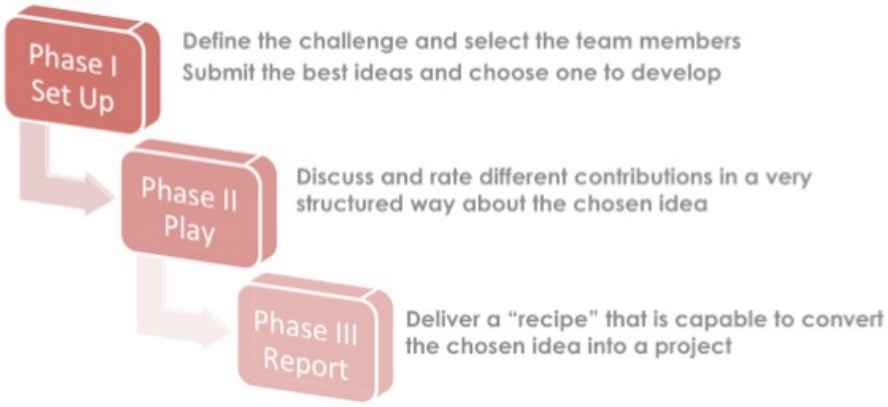

Figure 2-1 ideaChef® project phases

In the setup phase it is up to the project owner to clearly define the challenge and the team, which is going to contribute with ideas to address the challenge (see Figure 2-1). Team members provide their best ideas to address the challenge in an anonymous manner and each member selects one to play.

During the second phase, team members give, discuss and rate different contributions. The highest ranked contributions will be delivered in a structured and visual way (six building blocks dashboard).

Immediately after the play phase a report is written with a 'recipe' that converts the idea into a prototype/working concept. Each player's individual objective in the game is to achieve the highest number of points at the end. During the game, several ways on how points can be earned is explained. Nevertheless, the collective and most important objective of the game is to deliver a structured and coherent proposal in tackling the problem (the 'recipe'), based on the highest ranked contributions.

ideaChef® is designed for up to six players, requiring a minimum of three. It can be played multiple times by the same team playing different ideas, or by multiple teams playing the same idea. It can be used 'on the spot' to address one or several particular challenges. If used consistently, e.g. in a series of workshops over time, it helps to develop entrepreneurial skills and capabilities, reinforce team spirit and shape an innovation-supportive culture.

What does it serve for?

ideaChef® serves to create solutions ('recipes') that address a particular challenge, need or problem related to either internal processes or to the external market.

When tackling the corporate innovation segment, ideaChef® can be applied to: create a new product/service; address a new service weakness; identify new markets; co-create services/products with customers; create more intimate relationships or engage more with customers; develop new applications; select a technology; prioritize features in upcoming product/service releases; drive product/service roadmap decisions; improve marketing campaigns; gain a better understanding of how value can be created; create strategic plans for organizations or business units; leverage direct customer feedback for market research; identify areas for improvement in internal processes; encourage internal collaboration; redesign an internal process; understand teams better; provide support and strengthen teamwork relationships; among others.

ideaChef® also helps entrepreneurs to develop, enrich and test their business ideas. The direct outcome is a visual report that can be used to pitch the ideas. This method and tool can also be applied to manage idea competitions and hackathons as well as to provide start-ups with mentoring and training in entrepreneurship.

2.3 Corporate innovation insights

Playing ideaChef® with professionals from different types of organizations provided valuable insights about its main impacts and potential applications. The following testimonials are particularly relevant to the corporate innovation target audience. Inputs were gathered from the perspectives of innovation consultants and innovation teams at IT/Software companies.

From the perspective of innovation consultants, ideaChef® was perceived as an innovative tool that supports innovation in a more open, creative and enjoyable environment. It was also recognized as a way to enhance team spirit, structure projects and shape an innovation-supportive culture:

- "*ideaChef is a very innovative tool which can be used to generate more powerful ideas, convert these into results and create more cohesive and responsive teams.*

Combined with an experienced game facilitator this simple board game can be an enjoyable and interesting way to get the most out of even the quiet genius-type team members that have so much to offer, but are often overlooked. Having had a small part in its development, I have witnessed firsthand how this easy to play game has even helped transform the team that developed the game itself. Have more fun innovating with ideaChef!" - Consultant, Author and Coach

- "*The game looks pretty interesting and is obviously a nice way to support creative thinking*." - Senior Manager Innovation & Technology
- "*I see ideaChef as an introduction tool to modernizing organizations which need to expand on innovation and creativity giving the company its competitive edge by focusing on developing the company culture with Human Capital as the catalyst*." - Creative Business Professional
- "*Nice idea to add a pinch of gamification to ideation*." - Project Manager Research & Innovation and Design Thinking Lecturer
- "*Rapid entertainment team building to structure a new project. Can be used at a project kick off meeting – allowing immediate surfing of the main topics. Project plan can be the rapid output. It can be used when starting a new project – having pre-formed goals – and stating that is the recipe for successful collaboration across companies – inspired on the well-known maxim "how different people see the problem", the engineers, the marketing team, the consultant. This tool can help to solve this problem since it keeps everyone aligned and speaking the same language*." – Innovation Facilitator and Catalyst

From the perspective of teams at IT/Software companies, ideaChef® is also perceived as a way to stimulate team building and an enjoyable atmosphere. According to one of the users, being challenged to win the game was clearly a motivation. Besides that, the creative problem solving process was very much appreciated for its structure. Further, balanced contributions from all the team members and outcomes (quality of the 'recipe') were also mentioned as key advantages of ideaChef®:

- "*ideaChef breaks the norm and provides an alternative means to work on new ideas through a game. It's fun, engaging and provides a sense of competition. Participants engage fully, unlike a regular workshop or brainstorming session*

where not everybody expresses themselves and it is hard to come up with a conclusion that is representative of the whole group. At the end of the game, ideaChef provides a final report that creates a clear vision representative of the whole group. I highly recommend ideaChef to help create team spirit and build consensus on the best direction to take." - Solution System Manager in an IT company

- "*The most important thing I take from this experience is the opportunity to discuss in a focused manner a real organization problem. So far, it was the most interesting brainstorming experience I was able to participate in. Since we begin with the expectation of 'playing' a game, the discussion flows very easily and in a fun atmosphere, which adds wings to the suggested idea. In the end I had the sensation that a lot of barriers were torn down, and although no direct solution came from the discussion, it was the necessary first step in order to make decisions through problem solving*." - Software Engineer of an IT/Software company
- "*I played the game with my team and it was a great experience. It was fun and we managed to get good results in the end. I now have 3 ideas that are part of my 'to do' implementation list*." - CEO of an IT/Software company
- "*It was a good experience and the output of the session was very positive! It is indeed a good way to improve brainstorming and to get everyone involved. From the HR perspective, I think it can also be used as a team-building tool. Overall, I think we all had a great time playing ideaChef, at least I did*." - Head of Human Resources in an IT/Software company
- "*A week ago, a friend shared ideaChef with me... First, I thought it would be an evolution of Business Model Canvas, but then I realized that it's not! It's more interesting and exciting, due to its gamification flavor on top of recognized methods! ideaChef integrates Service Design Concepts with Problem Solving Techniques and Business Innovation. In times of entrepreneurship, this is a perfect tool to take into account*." - R&D Manager of an IT/Software company
- "*Playing ideaChef is very motivating! From the moment of choosing an idea to when we see in a structured form the different ideas that were presented through to the final point when we summarized the main conclusions of the game, the mood was always extremely positive. The 4 hours we spent playing passed in a hurry!*

> *The discussion and voting moment is very interesting, because everyone receives everyone else's feedback and has a clear feeling of their reactions. It is also motivating to be challenged to win the game, but in the end there is a fantastic feeling that all have contributed to the generating of a solution*." - CEO of an IT/Software company.

2.4 Entrepreneurship case study

The project

This case study provides valuable insights on the use and impact of ideaChef®, particularly relevant to the entrepreneurship target audience.

A University professor used ideaChef® in an extra-curricular entrepreneurship activity in the 3rd year Project Management and Business Planning course unit of the degree in Communication Studies. In her own words "*this option allows for the development of a project not only in a specific and specialized context within the class but also in an inter-disciplinary context which promotes contact with other students, places and scientific fields*."

Recognizing that these inter-disciplinary teams (comprised of students from different faculties/academic backgrounds) were at different stages in the development of their respective projects, ideaChef® seemed to this professor a flexible enough tool to be able to support and strengthen both the initial ideas evaluation and the decision making as to which option to choose, contributing to the much needed team building.

This professor came into contact with the ideaChef® method and tool during the closing session of the Global Entrepreneurship Week (an idea competition). ideaChef® was the method and tool chosen to help student teams enrich the business ideas with which they would be competing in Global Entrepreneurship Week and it was used during a class in the presence of qualified ideaChef® facilitators.

The results

The ideaChef® session was very productive and enjoyable, leaving participants with a sense of accomplishment by the support given to the projects of the student teams. According to the professor, "*without stifling creativity, ideaChef® proved to be a guiding*

and optimising tool of the available resources and of the results achieved; it leveraged analytical capabilities as well as the establishment of ties and commitment amongst team members".

In terms of skills, attitudes and opportunities for learning, the professor classifies ideaChef® as "*a dynamic interactive pedagogical tool" which she recommended to other departments of the University and of the Technological Scientific System because "it supports the development of ways of thinking, of doing, of learning and innovating as a group which will resonate in decisive moments of the professional/scientific future of the students involved*".

The feedback

According to the following testimonials given by team members/students, using ideaChef® was very enriching and useful for their business projects. Most of them mentioned the enriching experience of developing their ideas in a creative, fun and playful way. Regarding the contribution of ideaChef®, users highlighted the value provided by multiple viewpoints and different angles of analysis.

Feedback on the experience of using ideaChef®:

- Student 1: "*The sharing and discussion of ideas for the construction and development of a business project through addressing serious and realistic issues in a fun and playful way was very enriching*."
- Student 2: "*The use of ideaChef® was extremely motivating, entertaining and a stimulus of creative thought on the part of each participant. Besides being a 'light' board game, it also encourages the exchange of ideas between participants and calls for a permanent reflection of all the aspects encompassed in the development of a project*."
- Student 3: "*I liked it a lot. I loved the concept! I believe that the best way to reflect upon more series issues is to do it in a creative and fun manner*."
- Student 4: "*Using the ideaChef® tool was very pleasant. It was interesting to realize that even when you already have a business idea it is always possible to improve and complement it. Likewise, it was interesting to witness that there are other angles of analysis and that the contributions by other players permits the*

emergence of other viewpoints. It is enriching, even from the standpoint of the unblocking or the bypassing of constraints or weaknesses that the initial idea may have."

Feedback on the contribution of ideaChef® towards their business project:

- Student 1: "*It was very useful for the work group to understand the opinion of someone who had no knowledge of our project and, in that way, be able to improve it as well as perceive it from different angles*."
- Student 2: "*ideaChef® contributed in a big way to our business project. Not only did it help us develop parts that had not yet been developed, but it also made us think in a more creative and proactive manner regarding those parts that had already been planned. In this way, it helped us develop our project in a more firm and complete manner*."
- Student 3: "*It helped us to reflect on issues that we had not previously thought about*."
- Student 4: "*ideaChef® is an excellent tool for analysing the various elements that comprise a business idea - allowing them to interconnect and become more coherent and consistent. In this aspect, ideaChef® permitted a more global view of the idea, the identification of alternate approaches, other perspectives and the completion of some stages. I consider the game template to be well constructed. It is dynamic, motivating and forces you to think holistically about the business idea. The dynamic interaction with the other players is also interesting because, besides the competitive element, it has a complementary component and adds to teamwork*."

Users also provided very interesting suggestions for the development of ideaChef®, such as making the game more accessible, that it should be presented to all the faculty of the University and targeted at university students, student associations and young entrepreneurs.

2.5 Findings and discussion

ideaChef@ key impacts

Initially, when this method and tool was designed, the main expected impacts were basically in terms of the output i.e. the solution (or recipe) that is created and can successfully address the challenge.

With time other impacts were identified in terms of its innovation and entrepreneurship capabilities and these were subsequently developed by the team members as a result of this process.

ideaChef® key impacts can be summarized as follows:

- Address challenges in a more structured manner: helping to easily reach a common conclusion, getting everyone on the same page and taking action in the same direction.
- Enhance, enrich and develop ideas: encouraging contributions from all players, in a more balanced manner and gaining valuable insights even from the more reserved team members.
- Create actionable 'recipes': generating results that have been developed by all participants and agreeing on the actions to implement from the ‘recipe’.
- Develop critical entrepreneurial and innovation capabilities: promoting debate and accepting opposing viewpoints, taking risks, or cautiously questioning assumptions, explaining things in a different way and collaborating in a more open and engaged manner.

ideaChef® builds actionable consensus regarding the best direction to take, which was one of the main impacts identified by the corporate innovation target audience. Corporate innovation managers also benefit from having a method and tool that develops and strengthens the capabilities of team members in an inspiring, more open and collaborative environment.

When it comes to new product/service development, one of the key impacts is on time to market. ideaChef® reduces the time to get good ideas to market by effectively converting ideas into prototypes/working concepts.

When tackling the entrepreneurship market, the main impacts for this target audience are related to idea enhancement (ideaChef® helps entrepreneurs to structure their ideas and provides the input for shaping the available ideas and decision on which actions to implement – like the students of the University who used ideaChef® to develop their business ideas) and training (ideaChef® helps to develop innovation capabilities and an entrepreneurial mindset).

Besides recognizing the many advantages of ideaChef® for both corporate innovation and entrepreneurship target audience it still has some limitations.

Limitations

- ideaChef®, like many other game approaches, is not yet broadly accepted in the corporate world and it will take a long time for it to become a mainstream tool.
- Its large scale use is limited since it is a physical tool.
- The ideaChef® brand is not as strong and as recognized as many other methods and tools even when it is not competing in the same phases of the innovation cycle (e.g. lego® serious play®).
- Still unknown to most of the target customers and users.
- Value proposition is somehow difficult to explain since it requires using it in order to understand its value and the type of possible applications.
- Requires detailed communication and demonstration and, in some cases, the presence of a facilitator.

Pros

- More (transparent, open, collaborative and fun) engaged approach than all the other available methods and tools.
- Addresses a concrete and important need: provides an effective and engaging way to convert ideas into projects.
- Provides a wide-range of new uses (marketing and communication, human capital, project management). And, additional applications are being identified based on user requirements and lessons learned.
- Cost-efficient since it can be played on-site with a team of just six players and takes only half a day to play.

- The adaptation of an old technology (board game) to 21st century key organizational challenges provides the physical interaction that is sometimes missing among teams.

2.6 Conclusion

This study contributes to clarifying the contribution of gamified methods and tools towards the success of corporate innovation and entrepreneurship programs by describing the use of ideaChef®. Based on this experience, it makes a lot of sense to gamify corporate innovation and entrepreneurship processes and that is probably why gamification approaches are becoming more widespread among many innovation teams.

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3. Gamification Approaches to the Early Stage of Innovation

Abstract

Despite the growing adoption and acceptance of gamification approaches among firms, the relationship between gamification and early stage of innovation is confusing and deserves further attention in order to produce added-value exploratory knowledge. This study puts forward the idea that gamification approaches can support the early stage of innovation by making a cross-comparison of published case studies of firms where gamification was used to address innovation challenges, e.g. use of gamification elements and tools that support the generation of ideas for developing new product concepts or entering new markets. In order to understand and clarify the relationship between gamification and early stage of innovation, the study proposes an analytical framework that provides a consistent and organized picture of the use of gamification approaches for innovation purposes. Research findings provide a conceptualization of gamification in the context of early stage of innovation and demonstrate significant outcomes of these types of approaches with regard to the various forms of engagement, team spirit, consensus building, knowledge transfer, creative thinking, and productivity.

Keywords: Gamification, Innovation Management, Early Stage of Innovation.

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3.1 Introduction

The early stage of innovation, also known as front-end of innovation, precedes the new product development and commercialization stages of the innovation process and includes activities such as opportunity analysis and identification, idea generation and selection and concept development (Koen et al., 2001). This stage influences significantly the outcomes of innovation, and therefore, any improvement may have a positive impact on the success rate of new products and services (Khurana & Rosenthal, 1998; Riel, Neumann, & Tichkiewitch, 2013; Wowak, Craighead, Ketchen, & Hult, 2016). Due to its importance for the success of the innovation process, there is a significant body of literature on the challenges facing the early stage, particularly the one that explores new ways to overcome the shortage of high-potential ideas entering the execution process (Koen et al., 2001). One of the strongest arguments from this research stream is that creative and engaging approaches, both structured and flexible, are essential for a better management of the front-end of innovation activities, particularly the ones related to the process of turning ideas into products and services and supporting the underlying decision-making process (Eling, Griffin, & Langerak, 2014; Zimmerling, Hoflinger, Sandner, & Welpe, 2016).

Gamification approaches use game-based elements in non-game contexts to encourage users to perform desired behaviors (Deterding, Dixon, Khaled, & Nacke, 2011) and to develop possible solutions that overcome the encountered difficulties when managing the early stage of innovation through making these activities more structured, engaging and game-like. In fact, it has been noticed that many organizations are becoming increasingly receptive to incorporating games into day-to-day processes. They are consciously experimenting with different forms of game-like approaches which promote creative thinking and permit getting the work done in relation to traditional processes (Butler, Olaison, Sliwa, Sørensen, & Spoelstra, 2011; Sorensen & Spoelstra, 2012).

This research complements the emergent body of literature on design games in product and change management, Lego Serious Play in strategy and serious games in management education (Roth, Schneckenberg, & Tsai, 2015). This line of research has shown that integrating gamification into innovation is a promising research avenue, particularly in ideation (Agogué, Levillain, & Hooge, 2015; Kavaliova, Virjee, Maehle, Kleppe, & Nisar, 2016), continuous innovation (Hyypiä & Parjanen, 2015) and serious play (Schulz,

Geithner, Woelfel, & Krzywinski, 2015). These studies suggest that there is a need to research and further validate the actual value of gamification in relation to innovation, considering, in particular, its mechanics (rules) and participants' motivation (Brandt, Messeter, & Binder, 2008; Kavaliova et al., 2016).

In spite of previous studies that have empirically substantiated the advantages of using game elements during the early stage of innovation, it is still hard to find a well-defined link between the gamification concept and innovation challenges, and this is amplified by the lack of a clear definition in relation to similar and somewhat overlapping concepts like serious games, playful design and design games. This circumstance prevents researchers and practitioners from fully understanding the application domains and the impact of gamification approaches on innovation, particularly in its early stage.

This study aims to provide a consistent and organized picture of the use of gamification for innovation purposes. More specifically, its main goals are: 1- to conceptualize gamification approach to innovation by extracting from general game/play approaches what is specifically targeted at business motivations; 2- to illustrate how gamification can contribute to supporting challenges and complex tasks that firms need to perform throughout the early stage of innovation; and 3- to display different outcomes that are generated by gamification when addressing early stage of innovation challenges.

The methodology used to achieve these goals was based on a systematic mapping of relevant practices in the context of gamification approaches to innovation, grounded on inductive theory using a cross-comparison of representative case studies. The basic procedure for data collection comprised a comprehensive search of the academic literature and a review of published case studies retrieved from databases that matched the search criteria.

This study emphasizes its main results in three distinct categories. First, it provides a conceptualization of the use of gamification in the context of innovation, underlining the key characteristics of the early stage of innovation that can be better managed by gamification approaches. Second, it provides a new analytical framework, adapted from Hoshin Kanri Matrix X that can be used to identify patterns and gaps linked to gamification approaches to innovation. This framework was developed so that cases can be read in a structured and coherent manner, synthesizing the nature of findings and making

the connections between each of the building blocks of gamification approaches to innovation more visible. It provides structure, transparency, trustworthiness and a more reliable cross-comparison of several cases in a story-telling manner that can also be applied to further studies, particularly to the research of other complex business applications of gamification. Third, it presents a set of research propositions derived from the conceptualization of gamification in the context of innovation, which open up opportunities for further research and advances in this emergent field of knowledge.

3.2 Literature review

3.2.1 Early Stage of Innovation Challenges

In fast-changing competitive environments, a growing number of firms are facing increased pressure to innovate. Designing new and breakthrough solution portfolios for existing and emerging market needs is a very complex process that often requires two components, simultaneously: novelty, i.e. new product, service, process, technology or business model; and market use, i.e. acceptance by markets, governments and society (Chiva, Ghauri, & Alegre, 2014; Lal, 2015; Pla-Barber & Alegre, 2007; Yu & Si, 2012; Zucchella & Siano, 2014).

This study focuses on the early stage of the innovation process that takes place prior to the new product development and commercialization stages (Koen, Bertels, & Kleinschmidt, 2014). Its relevance comes from the fact that the ability to overcome the complexity and to positively influence innovation outcomes is highest at the early stage of the innovation process (Khurana & Rosenthal, 1998).

It starts with ideation that includes insights discovery (data collection on users' emergent needs and clarification of deep insights), idea generation, idea selection and development, and ends with the decision, positive or negative, to develop a new product/service (Kurkkio, Frishammar, & Lichtenthaler, 2011; Riel et al., 2013; Wowak et al., 2016).

Early stage activities are more unpredictable and unstructured than those performed at the new product development in a stage-gate process (Cooper, 2014; Koen et al., 2001). Actually, the front end of innovation and particularly ideation, which is the fuzziest element of this early stage of innovation, is typically characterized by informal

relationships between stakeholders, a high degree of complexity and uncertainty, tacit knowledge-intensive conflicting organizational pressures and permanent discovery of what customers hope to accomplish (Christensen, Hall, Dillon, & Duncan, 2016; Ende, Frederiksen, & Prencipe, 2014; Florén & Frishammar, 2012; Zimmerling et al., 2016). Moreover, is characterized by a broad range of activities, such as identifying customer needs and demands, and performing an economic analysis of the concepts that require greater coordination of functions (Ulrich & Eppinger, 2012).

While considerable research has been done in the area of early stage of innovation, the link between this particular stage of the innovation process and gamification has not been extensively considered.

3.2.2 Gamification Approaches

Gamification can be defined as the use of game designed elements in non-gaming contexts to encourage users' motivation, enjoyment and engagement, particularly when performing a difficult and complex task or when trying to achieve a set goal (Deterding et al., 2011; Galetta, 2013; Harwood & Garry, 2015; Piligrimiene, Dovaliene, & Virvilaite, 2015; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015).

On a business-level, gamification can be applied to many different business functions including marketing and sales, human capital and customer service, with different impacts inside and outside the firm's boundaries (Piligrimiene et al., 2015; Robson, Plangger, Kietzmann, Mccarthy, & Pitt, 2014; Ruhi, 2015).

Effective gamification approaches attempt to encourage users' engagement, amusement, and enjoyment towards various activities. This can lead users to experience very diverse behaviors (Baumeister, Vohs, Nathan, & Zhang, 2007; Watson & Spence, 2009) and emotions, both positive (e.g. excitement, amazement, surprise or triumph) and negative (e.g. disappointment or fear). All this leads to the creation of users' enjoyment and motivation as well as a fun atmosphere (Robson et al., 2015).

Gamification can motivate people to change their behaviors and achieve the desired states when it taps into key motivational drivers of human behavior through a balanced mix of reinforcements that can be both extrinsic (i.e. prizes, money, status or fame, points and

badges, trophies, fear of failure or punishment, penalties and even progress bars) and intrinsic (i.e. sense of fun and enjoyment, belonging to a group, mastery, purpose in the work carried out, learning from an activity, personal achievement or more responsibility, autonomy and power) (Dale, 2014; Hamari & Koivisto, 2015; Robson et al., 2015; Smith & Popa, 2015). These motivators can be achieved by embedding gaming mechanics – inspired by human desires and needs – into traditional work activities thereby turning routine tasks into a game (Conaway & Garay, 2014; Galetta, 2013).

Gamification is a recent concept and should not be confused with others, such as play, traditional games or even reward systems and loyalty programs that merely persuade people to perform actions in order to earn points (Ruhi, 2015). Games introduce an explicit or implicit set of rules and an element of extrinsic motivation or work in a playful context that is free, different from real life and usually characterized by satisfaction, enjoyment, fun, and other hedonic aspects (Holbrook, Chestnut, Oliva, & Greenleaf, 1984; Kultima, Niemelä, Paavilainen, & Saarenpää, 2008). Therefore, games are a subcategory of play. While play refers to a good mix of fun and voluntary actions, games must conform to an explicit or implicit set of rules for objectives to be achieved (Roth et al., 2015).

Conceptually, gamification relates to traditional games, typically associated with a well-defined set of rules and regulations aimed at the achievement of objectives and competitive elements, and not so much to play or playfulness, i.e. a large variety of voluntary actions that are the result of intrinsic motivation (Koivisto & Hamari, 2014; Ruhi, 2015). Gamification is different from traditional games as these are typically focused on an entertainment value, while the former is focused on a business value and is used to advance goals outside of the game (Koivisto & Hamari, 2014; Ruhi, 2015).

Deterding et al. (2011) developed a framework that differentiates between play, games and gamification. It compares gamification with other related approaches i.e. serious games, playful design and toys/pure play via two dimensions: playing/gaming and parts/whole. The play/game dimension has already been discussed, in particular, with regard to the set of rules and goals that distinguishes these two concepts. The parts/whole dimension differentiates gamification from serious games.

Serious games can be defined as video or computer-based games for one or multiple players designed, from square one, for non-recreational or non-entertainment environments

(e.g. in areas as diverse as education, health, engineering, and military) that have a learning objective and allow for the simulation of real-world situations without incurring in eventual costs and risks (Agogué et al., 2015; Borges, Durelli, Macedo, & Isotani, 2014; Deterding et al., 2011; Meijer, 2015; Simões, Redondo, & Vilas, 2013). Gamification refers to the use of parts of game design elements rather than whole elements, like full-fledged games used in serious games. Thus, gamification uses parts of game elements in the work environment with the purpose of changing or inducing behaviors, e.g. to engage employees in a certain task and not for simulation or educational purposes.

Table 3-1 provides a conceptualization of game/play approaches based on three distinctive dimensions, i.e. adding motivation to the game elements and game environment dimensions. The pure play and the gamification concepts are clearly outlined in relation to these dimensions. However, this conceptualization shows that there is a need for further clarification regarding playful design and serious games concepts because some confusion between these concepts and gamification still exists. As mentioned in the introduction, one the goals of this study is to bridge the research gap between gamification and playful design/serious games.

Table 3-1 Conceptualization of Game/Play Approaches

		Dimensions						
		Environment		Game Elements		Motivation		
		Enjoyment/Fun	Rules System	Parts	Whole/Full-Fledget	Entertainment	Business	Learning/Simulation
Game/Play Approaches	Pure Play/Toys	Yes	No	No	Yes	Yes	No	No
	Playful Design	Yes	No, but may have	Yes	No	No	Yes	No
	Serious Games	Yes	Yes	No	Yes	No	No, but may have	Yes
	Gamification	Yes	Yes	Yes	No	No	Yes	No

In fact, the differences between gamification and serious games are getting blurred in relation to the motivation dimension, which is expressed by the growing number of serious games, not only for training and education, but also for business processes like innovation (Groh, 2012). Serious games combine a simulation of reality and a role-playing activity that induce an immersive experience in which participants take actions that may adequately support, not only learning, but also business processes (Agogué et al., 2015).

Furthermore, the distinction between gamification and playful design is still unclear when assessing the rule system/environment dimension. In fact, game elements with clear rules and procedures have been used in non-game contexts by design games (a type of playful design game) for a long time (Gudiksen, 2015). Typically, design games involve a diverse

group of stakeholders, not only designers and potential users but also additional players that collaborate and contribute to explore and present design options (Brandt et al., 2008). A design game uses game tools and techniques that allow stakeholders to collectively conduct a design assignment in a playful, collaborative and participative manner and to do so in an engaging environment, thereby producing outcomes that may affect them far beyond the game (Kauppinen, Luojus, & Lahti, 2016; van Amstel & Garde, 2016).

Finally, the gamification concept should not be confused with video games and limited to digital technology alone. Although many examples of gamification are based on digital tools (such as IT systems, web-based and mobile-based applications, as well as virtual environment, e.g. Virtual Reality/Augmented Reality), it can also include non-digital tools, such as board games, card decks and Lego bricks (Deterding et al., 2011).

3.2.3 Gamification Elements and Outcomes

Designing inspiring and meaningful gamification experiences for users is not easy and requires the support of comprehensive frameworks. Werbach & Hunter (2015) developed a framework called "Game Elements and Hierarchy" (GEH) characterized by three core elements: dynamics, which provide motivations (e.g. narrative, progression and social interaction); mechanics, which provide basic procedures that drive player involvement and engagement (e.g. challenges, competition, cooperation, rewards and turns); and components, which are the concrete evidence of mechanics and dynamics (e.g. achievements, avatars, badges, gifting, leaderboards, points and virtual goods).

The benefits of implementing a comprehensive gamification framework encompass important hedonic outcomes, such as engagement, enjoyment and playfulness, fun and learning experiences (Cardador, Northcraft, & Whicker, 2016; Gatautis, Vitkauskaite, Gadeikiene, & Piligrimiene, 2016; Hamari & Koivisto, 2015; Harwood & Garry, 2015; Holbrook et al., 1984). Regardless of the value of engagement and motivation, gamification is much more than just a set of entertaining exercises and teamwork activities with no targets and organized outputs (Agogué et al., 2015; Dale, 2014; Kalinauskas, 2014). In fact, the benefits of gamification go beyond the hedonic elements as they also include utilitarian and social benefits. The utilitarian benefits encompass increased productivity among employees (Hamari & Koivisto, 2015), cognitive, functional, creative

problem-solving, time to action, usefulness and ease of use (Gatautis et al., 2016; Hamari & Koivisto, 2015; Harwood & Garry, 2015; Stock, Oliveira, & Von Hippe, 2015), improved customer loyalty (Lucassen & Jansen, 2014) and accelerated product development processes (Agogué et al., 2015). The social benefits encompass people's reactions during interactive situations, recognition, social influence and self-esteem (Hamari & Koivisto, 2015; Harwood & Garry, 2015).

3.3 Methodology

3.3.1 Research Design

The research methodology was grounded on an inductive approach using a cross-comparison of published case studies, which supports the goal of getting insights from firms where gamification was used to foster the innovation process. The roadmap for building theories from case study research (Eisenhardt, 1989) was used to devise a theory on gamification approaches to innovation. The first step consisted in collecting data on relevant studies of gamification approaches to innovation, i.e. cases of firms where gamification was used to foster the innovation process. Then, a systematic mapping was carried out for similar themes. Only when all relevant published case studies were capture was it possible to establish comprehensive categories and shape hypotheses developed on how gamification can be applied to drive the innovation process forward (Eisenhardt, 1989). This procedure was structured into three phases. First, a comprehensive analysis of the academic literature was carried out in the context of gamification approaches to innovation. Second, the publications identified during the research were reviewed. Third, the data was classified, cross-compared and analyzed.

- Phase 1 – Search of academic literature: The inclusion criteria used in the search of academic literature was built on exploratory studies that illustrate gamification approaches across the phases of the early stage of innovation (discovery, idea generation, idea development and the decision to develop a new product/service). The search covered publications from selected electronic databases published and indexed until April 2017. The search of keywords/terms included synonyms or similar meanings of "gamification approach to innovation".

Of the 553 articles identified and screened, only 119 were considered to be potentially suitable for retrieval. Most of the articles were discarded from this analysis based on the following exclusion criteria: a) publications completely out of the scope of gamification approach to innovation, i.e. those that discuss "serious games," "video games" or "playful tools" in innovation-related areas or that discuss gamification approaches in areas other than innovation (e.g. training and education, human capital, marketing and advertising or operations); b) publications that show a potential gamification approach to innovation, but do not provide enough information on the findings; c) publications not written in English; d) incomplete or duplicate publications (when retrieved from different databases).

- Phase 2 – Screening of publications: After reading the abstracts of the 119 publications retrieved, 60 publications were considered to be potentially suitable for a more detailed analysis, which included reading the full text. Although these publications investigated the use of games in innovation contexts, many of them did not meet the inclusion criteria. In fact, only 15 of the 60 publications provided exploratory studies, delivering relevant information on how gamification can be used across the phases of early stage innovation. The publications that were selected provided in-depth knowledge on the research objective and served as the theoretical foundation for mapping the different gamification approaches to innovation applied throughout the early stage of innovation.
- Phase 3 – Classification and analysis: Some of the 15 publications provided more than one exploratory study of gamification approaches to innovation, but not all of them met the inclusion criteria. In fact, of the 15 publications selected, 17 case studies and one survey were considered. These studies, hereafter called cases, are referenced as: (1) Brandt et al. (2008); (2) Hyypia & Parjanen (2015); (3) Schulz et al. (2015); (4) Scheiner (2015); (5) Kavaliova (2016); (6) Zimmerling (2016); (7) Agogué et al. (2015); (8) Brandt et al. (2008); (9) Gudiksen (2015); (10) Roos et al (2004); (11) Vaghn et al. (2016); (12) Grienitz & Schmidt (2012); (13) van Amstel & Garde (2016); (14) Kauppinen et al. (2016); (15) Schulz et al. (2015); (16) Patricio (2017); (17) Meijer (2015); and (18) Vagn et al. (2016). A cross-comparison was carried out, highlighting the similarities and the differences found between these 18 cases.

The comparative case studies analysis was particularly useful for identifying and breaking down the building blocks of gamification approaches to innovation as well as for explaining how the combination of these factors influence the success of an intervention, i.e. how better gamification approaches can address concrete innovation contexts (Goodrick, 2014).

3.3.2 Concept Outline of Gamification Approaches to Innovation

An analytical framework, based on the Hoshin Kanri Matrix X, was developed in order to read the data extracted from full text readings in a structured and coherent manner so as to make this cross-comparison possible (see Figure 3-1). Due largely to this method, it was possible to get a clear picture of all 18 cases, identify patterns and gaps, and understand the value of gamification approaches to innovation.

The Gamification and Design Approaches Analytical Framework (see Figure 3-1), based on the Hoshin Kanri Matrix X method, made it possible to link each of the four building blocks of gamification approaches to innovation that emerged from the analysis: 1- innovation challenges; 2- game elements; 3- tools; and 4- outcomes.

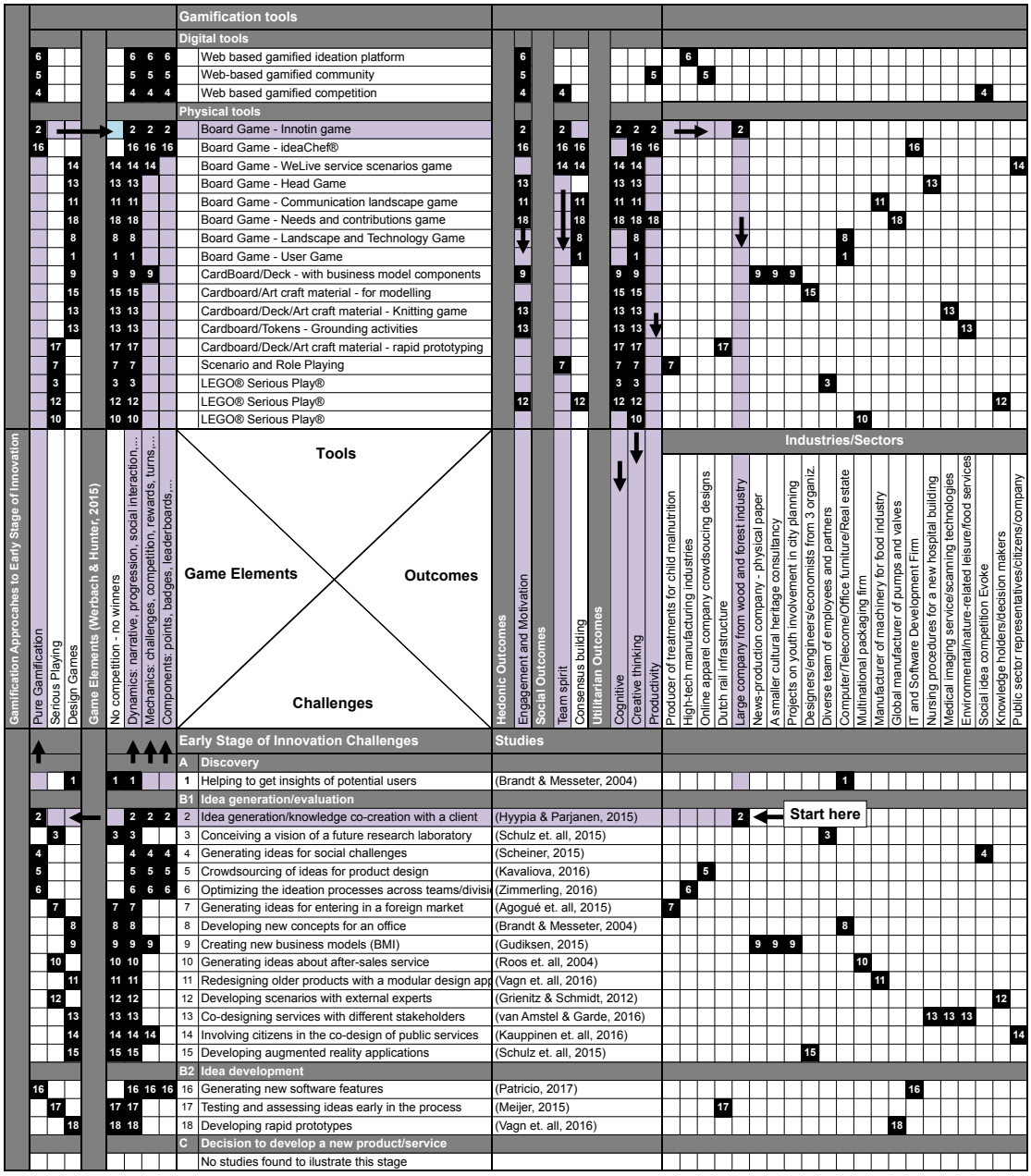

Figure 3-1 Gamification Approaches to Early Stage of Innovation Analytical Framework

This framework can be interpreted by taking the example of case 2. A large firm from the wood and forestry industry was challenged to generate ideas and co-create knowledge with a customer (1- challenge building block). This challenge was addressed by a gamification approach with game elements, i.e. dynamics, mechanics and components (2- elements building block) using a board game called Innotin (3- tools building block). In this particular case, gamification delivered several outcomes (4- outcomes building block) linked to engagement and motivation, team spirit, cognitive/knowledge building, creative thinking and productivity, which contributed to the generation of ideas.

The typology of gamification approaches to innovation that results from the use of this analytical framework goes beyond that which is described in the literature (see Table 3-1) and includes Gamification along with the following new concepts: Design Games and Serious Playing approaches (see Table 3-2).

Table 3-2 Conceptualization of Gamification Approaches to Early Stage of Innovation

		Dimensions						
		Environment		Game Elements		Motivation		
		Enjoyment/Fun	Rules System	Parts	Whole/Full-Fledget	Entertainment	Business	Learning/Simulation
Gamification Approaches to Innovation	Design Games	Yes	Yes	Yes	No	No	Yes	No
	Serious Playing	Yes	Yes	Yes	No	No	Yes	No
	Gamification	Yes	Yes	Yes	No	No	Yes	No

Design Games is an extension of Playful Design incorporating implicit or explicit rule systems. Serious Playing is an extension of Serious Games focusing on business value rather than education. This new conceptualization clarifies what is under the radar of gamification approaches to innovation and leaves little room for ambiguity in relation to the differences between gamification and playful design and serious games concepts. Design Games and Serious Playing do the same as Gamification does with regards to the dimensions used in conceptualizing game/play approaches. The main differences between them are highlighted throughout the cross-comparison between the cases (see section 3.4).

Thus, the proposed definition of gamification approaches to innovation has a broader scope and includes not only "gamification" but also "design games" and "serious playing" approaches which are implemented through digital (e.g. computer software, web-based and mobile apps) and/or non-digital tools (e.g. board games, card decks, art craft materials and Lego bricks). Yet, it excludes full-fledged games, entire playful systems with no game structure or game systems that force users to step out completely from the innovation practice (e.g. pure simulations or even video games).

This framework not only synthesizes the nature of the findings but also describes the connections between each of the building blocks of gamification approaches to innovation. All the innovation challenges were grouped around the following phases of the early stage of innovation as shown in Figure 1: (A) discovery; (B1) idea generation/evaluation; (B2) idea development; and (C) decision to develop a new product/service. Most of the innovation challenges illustrated by the cases were related to (B1) and (B2). No challenges were considered to fit into phase (C). The only challenge that fits into (A) concerns

obtaining insights from users (case 1). The challenges that fit into phase (B1) are grouped as cases 2-15. Although further information is necessary (e.g. the nature of the project plans) in order to fully justify this selection, the challenges that were considered to fit into phase (B2) are grouped as cases 16-18.

Different game elements, which, to some extent, incorporate evidence of game dynamics (e.g. narrative and progression), mechanics (e.g. competition, cooperation and rewards), and components (e.g. badges, leaderboards and points) of the game elements and hierarchy framework (Werbach & Hunter, 2015) were identified and assessed for each type of approach and tools. While gamification approaches to innovation have the same profile regarding the game/play dimensions (see Table 2), the same kind of game elements was not found in all of them. Certain game elements are commonly used in some approaches yet in others they are more distinctive, as illustrated in the next section. Game elements can be described in relation to the typology of gamification approaches for design and innovation (gamification, serious playing and design games) and tools (web-based platforms, board games, cardboard/deck/art craft material, scenario/role playing and LEGO® Serious Play®).

The types of gamification outcomes observed in the cross-comparison of cases fit into the generic groups that were found in the literature review. The typical outcomes generated by gamification approaches to innovation are: 1- hedonic, which encompass motivation and engagement; 2- social, which encompass team spirit and consensus building; and 3- utilitarian, which encompass cognitive, creative thinking and productivity. In each specific case, all or some of these outcomes are integrated, depending on the type of game elements and tools used to address the innovation challenge.

Consequently, gamification approaches to the early stage of innovation can be defined as gamification, design games or serious playing approaches, incorporating game elements (dynamics, mechanics, and components) and explicit goals which are used across the phases of discovery, idea generation/evaluation, idea development and decision to develop a new product/service. Therefore, from an innovation perspective, gamification definition is extended to design games and serious playing approaches, which provide further support to address complex innovation tasks and creativity requirements of this particular process.

3.4 Findings and discussion

3.4.1 Game elements and tools for innovation

3.4.1.1 Gamification approaches

This type of approach can be found in cases 2, 4, 5 and 6 – phase of generation and evaluation of ideas (B1) – and in case 16 – phase of development of ideas (B2):

- Generating ideas and co-creating knowledge with a customer – A firm wanted to explore the innovation potential of its network of customers and distribution channels. The knowledge co-creation project with the customer generated an idea for a potential environmentally friendly packaging solution (case 2).
- Generating ideas for social challenges – This case concerned an idea competition for addressing urgent social challenges, such as food security, power shift, water crisis, the future of money, empowering women and urban resilience (case 4).
- Crowdsourcing of ideas for product design – The submission of designs by external contributors through an open online call allowed the firm to innovate in line with the demands of its consumers (case 5).
- Optimizing the ideation processes across teams/divisions – At a time when outcomes are acknowledged to be highly uncertain, the goal was to build on non-monetary motivational stimuli within the firm's boundaries (case 6).
- Testing new software features – The process of involving a cross-functional team in the development of new features led to a complete rethinking of the software application roadmap (case 16).

In all these cases (2, 4, 5, 6 and 16) there is some evidence of dynamics, mechanics and components. In comparison with the other gamification approaches, gamification is the only one that promotes a competitive game environment with individual and/or team winners.

Dynamics – These high-level design patterns are typically exhibited in gamification approaches and tools through game rules and constraints (cases 2, 4, 5, 6 and 16). Game dynamics raise significant emotions in the form of recognition, happiness, excitement, competitiveness and motivation capable of generating ideas in a fun and constructive

environment (cases 2, 4, 5 and 16). Reporting a coherent experience with a narrative is not the key driver in gamification approaches since, only in one case (case 4) was the background information story communicated in a multifaceted way (e.g. short stories, blog entries and a comic strip).

Mechanics – Game mechanics are what drive player involvement and engagement. The most visible mechanics in gamification approaches are challenges, competition and feedback. Most of the cases are characterized by questions that require some effort to reach solutions (time, skill and creativity), such as design submissions, the completion of idea building blocks, or social challenges (cases 2, 4, 5 and 16).

Components – Key components of gamification approaches involve points (cases 2, 4, 5, 6 and 16), achievements (cases 5, 6 and 16) and badges (cases 4 and 6). Points are a game component typically given for a specific performance (e.g. reaching a new level in missions or quests) that results in an increase in intrinsic motivation when goals are realistic and challenging (cases 4 and 6). Point-based scoring introduces excitement and competitiveness since, in order to achieve defined game objectives, a player must win or increase the status.

Gamification digital tools, such as IT and web-based applications, can be created specifically to fully support an innovation process, e.g. an ideation platform (case 6). Or, they may be created just to add features and game elements to existing platforms, which is the case in the crowdsourcing web-based apparel store (case 5) and the social idea competition (case 4). The other type of gamification tool is offered by board games (games that are played on a table) which can be used to support the generation of ideas – as in the case of Innotin (case 2) – and to test and develop ideas with ideaChef® (case 16). The latter supports convergent thinking by narrowing a number of potential solutions down to a ‘best fit’ solution. This provides an engaging and more efficient way of selecting and developing ideas to be further pursued (Patricio, 2017).

3.4.1.2 Serious playing approaches

This type of approach can be found in cases 3, 7, 10 and 12 – phase of generation and evaluation of ideas (B1) – and in case 17 – phase of development of ideas (B2):

- Conceiving the vision of a future research laboratory – It described the generation of ideas regarding the future vision of a research laboratory that emerged from the various groups of participants, including user groups (case 3).
- Generating ideas for entering a foreign market – In this case, the goal was to stimulate the generation of ideas from a perspective other than that traditionally held by the firm, using a role-play setting and the discussion of different scenarios (case 7).
- Generating ideas on after-sales service – In this case, the firm generated new insights and perspectives on a potentially serious challenge to their after-sales technical service business (case 10).
- Developing scenarios with external experts – The goal was to enhance imagination and creativity for the generation of future scenarios with external experts, and achieve a common understanding of these scenarios and opportunities for action (case 12).
- Testing and assessing ideas early on in the process – The firm supported the rapid systems development (prototyping) by testing hypotheses on differences and improvements (case 17).

Game mechanics and components are generally absent from these serious playing approaches. For instance, no challenges or competition mechanics were found in all these serious playing approaches. Actually, one of the distinctive characteristics of serious playing is role of the narrative in game dynamics.

Two serious game approaches – the ProRail low-tech games (case 17) and an ideation game (case 7) – were considered in this category since they are much closer to the concept of serious playing. In contrast to typical serious games, these two approaches are not rich data computer games focused on a learning process, but rather on the innovation process itself. In both cases, the generation of ideas is based entirely on a full game approach that takes the participant out of the innovation process. The richness of the collaborative experience reported by participants and the use of tools, such as scenario and role-playing and cardboard/art craft materials, puts the game narrative very much in line with the LEGO® Serious Play® approach.

These two approaches still comply with other characteristics of serious games, such as the testing of underlying assumptions, concepts and prototypes in an environment that simulates the real world and the role-playing game dynamics. In all of these, the narrative is very much influenced by the simulation of a concrete challenge/scenario in which participants play their own roles or create fictitious profiles in order to gain insights and stimulate the generation of ideas (cases 7 and 17).

Serious playing tools share some of the characteristics of serious games but they differ in the approach since they do not force users to completely step out of the process. Even in simulation-based cases, like the ProRail low-tech games, which represent system components (e.g., trains, passengers, infrastructures, and timetables), they supported rapid systems development (prototyping) but in a context of concrete work process (case 17). In a very similar situation, a serious play tool was used to support ideation in a small and medium-size enterprise (SME). This provided participants with specific profiles and a description of a challenging but realistic context with the aim of developing innovative proposals (case 7). In these situations, scenario/role playing and analogic materials were used (such as a pen and an object, sponges and wooden sticks) to support the generation of ideas. The other application of serious playing, i.e. LEGO® Serious Play®, was used fundamentally to generate new insights concerning concepts and scenarios (cases 3, 10 and 12).

3.4.1.3 Design games approaches

This type of approach can be found in cases 1 – phase of discovery (A); in cases 8, 9, 11, 13, 14, 15 – phase of generation and evaluation of ideas (B1); and in case 18 – phase of development of ideas (B2):

- Understanding users' experience and getting inspiration concerning their problems – In a project carried out by a computer manufacturer, a telecom provider, an office furniture firm and a real estate company, game materials based on ethnographic video-recordings helped the participants get insights into the specific real-life world of potential users (case 1).
- Developing new concepts for an office – The setup of collaborative concept design activities with multiple stakeholders enhanced their ability to express and negotiate ideas (case 8).

- Creating new business models (Business Model Innovation) – It described how to foster new business models by re-examining and challenging their underlying assumptions (case 9).
- Redesigning older products with a modular design approach – Another example of cross-functional generation of concepts in a firm with very ad-hoc and customer driven R&D processes that wanted to adopt a more collaborative and structured approach in order to work proactively on issues and on the development of new products (case 11).
- Co-designing services with different stakeholders – The objective was to co-design three services: medical imaging diagnosis, hospital care, and environmental education/leisure, with a diverse group of stakeholders (customers and the people who deliver the services) who play an active role in the ideation and creation of shared products (case 13).
- Involving citizens in the co-design of public services – By providing a creative and challenging process, it gave citizens the power and motivation to express their needs and wishes for new types of public services which they would like to benefit from use in the future (case 14).
- Developing augmented reality applications – It enabled the creative development of new product concepts of augmented reality technologies that went beyond existing views (case 15).
- Developing rapid prototypes – Based on the ideas submitted to a specific challenge, teams delivered several product prototypes (case 18).

A strong narrative with an appealing story characterizes all design games and is a common aspect among the serious playing approaches. In fact, the narrative is the common ground for approaches and tools based on cardboard/deck/art craft material. In all these cases, social interaction is typically based on role-playing and on the illustration of stories created by participants (cases 9, 13 and 15). Participants' involvement in role-playing and in generating their own personas enables a structured group discussion on the key activities and a physical representation of the people, products, and environments involved in the workday context.

Design games based on cardboard/deck/art craft material are an "easy to use" approach, which facilitates the generation of concrete and more self-explanatory ideas. Nevertheless, it has some limitations. First, it requires drawing craft skills in order to be able to express thoughts in a visual manner. Second, non-material aspects, such as software, are difficult to express (case 15). The meaning and the explanatory power of cardboard/deck/art craft material is more concrete and focused on a task, albeit supported by the storytelling process. This allows for the leveling out of all contributions and making sure that everyone's opinion is understood.

In contrast to cardboard/deck/art craft material, board games rely on rules and constraints that are combined with emotions and convincing narratives (cases 1, 8, 11, 13, 14 and 16). Elements of game boards such as playing or persona cards, guidelines for collaboration and processes are used to support the brainstorming of ideas for a concrete challenge or problem.

As with serious playing, design games approaches are generally used to facilitate workshop sessions and other group activities. The tools used in design game approaches are typically custom-made/tailored board games (games that are played on a table although sometimes using elements different from the ones used by gamification tools) or cardboard/deck/art craft material.

3.4.2 Gamification Approach to Innovation Outcomes

Hedonic outcomes

It is possible to observe outcomes of gamification in the form of fun, enjoyment, motivation and engagement, particularly in the case of gamification approaches that provide feedback, challenges and competition mechanics. Virtual awards, such as game points, contribute towards higher motivation and engagement when giving immediate feedback, not only for the completion of a task, but also for the quality of contributions. Higher motivation and engagement can also be reached by employing gamification elements such as status, addiction, self-development and inspiration, as well as social character elements, like the feeling of being needed or of belonging to a community and the strengthening of relationships with other participants in the generation of ideas (cases 4 and 5). The accomplishment of a task should be sufficiently challenging (e.g. confront

business assumptions) to involve and motivate participants in both idea generation and development (cases 4, 9, 11, 16 and 18).

The feeling of involvement is higher when participants are inspired by a specific innovation challenge and positive stress linked to the achievement of a difficult goal, i.e. the hard fun of playing the game (cases 4, 5, 11 and 18). Also, the feeling of involvement and motivation is higher when participants are inspired by competition which leads to a higher creative performance in idea generation.

Social outcomes

Social outcomes of gamification are observed in the form of team spirit and consensus building. These outcomes are produced by the use of physical tools, in particular board games. The reduced social distance between participants encouraged interaction amongst them. Trust and loyalty towards the team are key elements that express the sense of team spirit provided by gamification approaches (cases 2, 4, 7, 14 and 16).

The establishment of strong ties and commitment amongst team members has the power to convert ideas into successful projects or prototypes and ultimately contributes towards the shaping of an innovation-supportive culture. Building actionable consensus regarding the best direction to take is one of the most important social outcomes of gamification approaches (cases 1, 8, 11, 12, 14, 16 and 18).

Gamification simplifies the complexity of work and decisions by facilitating a common understanding of ideas. It also helps to reach a common conclusion, getting everyone on the same page and carrying out actions in the same direction (case 16). By obtaining consensus on the chosen ideas, participants gain increased ownership of the solutions and an incentive to contribute towards continuous innovation (cases 11, 12 and 18).

Utilitarian outcomes

Utilitarian outcomes of gamification are observed in the form of creative thinking, cognitive outcomes and productivity. All gamification approaches based on physical tools enhance creative thinking in many different ways (cases 1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18), as they spur participants to bring hidden insights to the surface (case 10). Creating a space for inspiration improves the participants' ability to contribute

creatively and generates original ideas and prototypes with concrete results in terms of innovation potential. Challenging participants' creativity does not have a temporary effect because it provides the environment for a permanent discussion and expression of latent thoughts (case 14) in other settings and future time frames.

Physical tools make ideas more tangible, supporting experimentation and joint visionary thinking (cases 1 and 8) while expanding the range of possibilities for new ideas, options, problems and solutions (case 13). This can be accomplished by a diverse team of participants provided with the necessary know-how and background to develop ideas beyond existing concepts and products (cases 3 and 15). Case 10 concluded that game approaches support more creative thinking than do other competitive approaches, such as executive education programs and retreats.

Cognitive outcomes of gamification are observed in the form of knowledge building. These outcomes – related to the acquisition, understanding and organization of knowledge – are more explicit with reference to the gamification of physical tools (cases 2, 3, 7, 9, 11, 12, 13, 14, 15, 16, 17 and 18). Gamification approaches can facilitate the transfer of explicit knowledge to others in a collaborative manner.

Participants from diverse backgrounds and varying degrees of professional expertise exchange knowledge, insights and competencies in order to reach commonly-held added value concepts. The build-up of an open, playful and creative environment allows participants to think, share, listen to others and incorporate new knowledge into their own model (cases 3 and 15).

Gamification approaches play an effective role in managing the knowledge exchange process across different phases. It supports the identification of knowledge gaps, new actors with whom to interact and collaborate, as well as information flow between key innovation stakeholders. The fact that participants dive into different concepts without knowing in advance the final results, removes relevant knowledge yet it discloses relevance in irrelevant knowledge (cases 7, 11 and 18). Besides fostering knowledge transfer, gamification supports new ways of thinking and learning while playing.

Productivity outcomes are not too visible and widespread among the different gamification approaches. Nevertheless, it is possible to find some evidence of productivity gains and

accelerated time to market (cases 2, 5, 16 and 18). The increased number and quality of contributions is a good indicator of productivity gains generated by game approaches. When participants are more focused on the most relevant activities they perform better with fewer resources, i.e. time and people.

In conclusion, managing the early stage of innovation with gamification approaches helps firms increase their chances of success by addressing their challenges better. The observed outcomes of gamification approaches illustrate how the key characteristics of the early stage of innovation can be enhanced (see table 3-3).

Table 3-3 Conceptualization of Gamification Approaches to Innovation

		Outcomes		
		Hedonic	Social	Utilitarian
Characteristics of the early stage of innovation	Informal relationships between stakeholders	Engagement and motivation	Team spirit	
	High degree of complexity and uncertainty			Creative thinking
	Tacit knowledge-intensive conflicting organizational pressures		Consensus building	Cognitive
	Permanent discovery of what customers hope to accomplish			Creative thinking

Having participants more motivated and engaged in innovation, strengthens their relationships with other stakeholders and creates a strong sense of belonging in their team and community. Complexity and uncertainty cannot be eradicated but it can be mitigated by a creative problem-solving mindset. The transfer of more explicit knowledge to others, in a more collaborative and open environment, overcomes the limitations of tacit knowledge mechanisms and conflict is managed with consensus building that fundamentally encourages interaction and reduces the social distance between participants. And finally, creative thinking improves the participants' ability to find unmet customer needs.

3.4.3 Propositions development

Based on the discussion of the findings, the following set of propositions on how gamification can be used throughout the early stage of innovation is outlined:

Relationship between the challenges and the phases of the early stage of innovation

Most of the innovation challenges fit into the generation and evaluation of ideas (cases 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15) and the development of ideas (cases 16, 17 and 18).

- Proposition #1 – Gamification approaches to innovation, in general, are mostly used for idea generation and development.

Relationship between challenges and gamification tools

Each of the three innovation challenges that fit into the idea development phase uses a different type of gamification approach to innovation, namely gamification (case 16), serious playing (case 17) and design games (case 18), which are supported by physical tools alone, i.e. cardboard/deck/art craft material and board games.

- Proposition #2 – Challenges related to the idea development phase of the early stage of innovation are always addressed by physical tools no matter the type of gamification approach used by the firm.

Relationship between game approaches and game elements

Both serious playing and the design games approaches are characterized by no competition elements and strong game dynamics, essentially narratives. With the exception of two design games approaches (cases 9 and 14), none of them use any game mechanics or components.

- Proposition #3 – Serious playing and design games approaches rely fundamentally on game dynamics to generate and develop ideas.

No matter the type of tools or phases of the early stage of innovation, gamification (cases 2, 4, 5, 6 and 16) is the only gamification approach to innovation that uses competition features along with a combination of the three game elements categories, i.e. dynamics, mechanics and components at the same time.

- Proposition #4 – Gamification approach is the most complete game approach regarding the use of game dynamics, mechanics, components and competition features.

Relationship between gamification approaches, tools and outcomes

Gamification is the only approach where it is possible to observe hedonic outcomes in the form of motivation and engagement, using either digital tools (cases 4, 5 and 6) or board games (cases 2 and 16). Gamification approaches include game mechanics and components that contribute very much towards engaging and motivating participants.

- Proposition #5 – Motivation and engagement outcomes are observed particularly in gamification approaches.

Social outcomes, such as team spirit and consensus building, are mostly observed in gamification approaches to innovation that use physical tools (cases 1, 2, 7, 8, 11, 12, 14, 16 and 18), in particular board games (cases 1, 2, 8, 11, 14, 16 and 18).

- Proposition #6 – Gamification approaches to innovation that use board games can lead to more social outcomes in the form of team spirit and consensus building.

As for consensus building, cognitive and creative thinking outcomes can be observed only in gamification approaches to innovation supported by physical tools (cases 1, 2, 3, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17 and 18). Creative thinking is observed in all gamification approaches to innovation supported by physical tools.

- Proposition #7 – Gamification approaches to innovation that use physical tools with strong game dynamics can lead to more utilitarian outcomes in the form of creative thinking and cognitive/knowledge building.

Both digital and analogic tools are used to facilitate gamification approaches. In contrast, the other two approaches, serious playing and design games, are completely analogic. Serious playing uses LEGO® Serious Play®, scenario/role playing and cardboard/art craft material. Design games employ a combination of cardboard/deck and art craft material as well as board games.

- Proposition #8 – Analogic gamification tools are more suited to serious playing and design games approaches to innovation.

3.5 Conclusion

This study provides a structured and coherent manner of analyzing the use of gamification throughout the early stage of innovation by making a cross-comparison of firms' case

studies where gamification was used to address concrete innovation challenges and these firms had benefited from this new approach. Gamification Approaches to Innovation Analytical Framework provides a rich data visualization of these cases, which facilitates the generation of several insights on how gamification elements and tools can be used to address concrete challenges and enhance the early stage of innovation.

This explorative study argues that gamification can support firms in becoming better at performing complex innovation tasks and at managing challenges hindering the early stage of innovation by providing a more creative, engaging, structured and flexible approach. In fact, it was observed that gamification approaches to innovation create a space for inspiration, improve creativity and the generation of high potential ideas. Having participants that are more involved and motivated by game dynamics with clear challenges and rules provides a more structured and timely process, which increases engagement within the early stage of innovation. Furthermore, the open and collaborative environment provided by gamification also allows for greater flexibility on the part of participants to think, listen and share ideas.

Moreover, this study illustrates that beyond the 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.

The connections between the characteristics of the early stage of innovation and their outcomes for innovation, based on a sample of 15 published articles, encourage researchers to proceed with further studies on how firms can apply gamification successfully throughout the early stage of innovation.

In order to validate and enhance the findings of this conceptualization, two main avenues for further research are suggested. The first avenue is based on the propositions derived from the conceptualization of gamification approaches to innovation. Empirical findings of the selected cases support a set of propositions that can be considered starting points for further studies. When looking at the use of gamification approaches throughout a firm's early stage of innovation, the vast majority fitted into the idea generation and development phases. Therefore, further research is necessary in order to assess the impact of gamification on discovery as well as on other phases where existing knowledge is scarce.

Findings also suggest the need for further research on the use of gamification tools, which could improve the robustness of the research propositions. And, it would be very stimulating to address, for instance, an innovation challenge with a mixed approach of digital and physical tools.

The second avenue concerns the analytical framework that was developed for this study. Although it was originally designed for studying gamification approaches to innovation it might be applicable to other environments. Potential areas of application are exploratory studies where researchers need to make a cross-comparison of relevant published cases so as to understand the contributions of gamification approaches to other business processes.

Besides the above-mentioned theoretical contribution, this article also has implications for practitioners, especially innovation managers and other professionals engaged in the innovation process. A better understanding of the contributions of various gamification approaches to innovation can provide valuable insights for innovation strategy decision-making process. Moreover, it can even contribute towards mitigating some of the inherent risks of subsequent stages, i.e. new product/service development and commercialization.

This study offers valuable exploratory insights regarding gamification approaches to innovation. However, this concept is clearly focused on firms and businesses, excluding situations where gamification may not have a business goal, or goals related to video games and pure play environments. Nevertheless, the relevance of the results drawn from the limited number of published studies can be considered representative of gamification approaches to innovation. Future research could examine other types of approaches that firms might implement in order to foster innovation.

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4. Gamifying the Early Stage of Innovation: A Contribution to Design Thinking

Abstract

The goal of this study is to investigate the relationship between gamification, i.e. the use of game elements in non-gaming contexts, and the early stage of innovation process (ESoIP), in the context of design thinking approach to innovation. Design thinking is conceptually appropriate to support innovative, complex and uncertain business environments but its practices have demonstrated some problems of dealing with the difficult tasks of managing the ESoIP, such as goal setting, coordination of activities, alignment, and motivation of employees. This study argues that gamification can contribute to improve the ESoIP by complementing and enhancing design thinking practices. In order to address the research goal, two research studies based on case study research method were conducted through the deployment of a gamified method and tool (ideaChef®) and a combination of different instruments: workshops, surveys, and interviews. Research questions have been investigated through the deployment of a gamified method and tool (ideaChef®) in a sample of design-driven firms, i.e. the ones that use design thinking methods and tools to manage the ESoIP. The results show that the chosen gamification approach generated positive outcomes in the ESoIP, substantially improving aspects of employee's engagement, team spirit, and consensus building as well as the management of early stage of innovation in a more structured and timely manner. Moreover, it confirms that gamification complements and enhances design thinking practices by making the ESoIP more organized and people more engaged. The originality of this study is the use of gamification to support and manage the ESoIP. Besides providing implications for the body of knowledge in the areas of design thinking approaches to innovation and workspace gamification, its results are particularly important to innovation, R&D, and new product/service development managers interested in using gamification to support the ideation and concept development of new solutions.

Keywords: Gamification, Innovation Management, Early Stage of Innovation, Innovation Process, Design Thinking.

Part of this study is submitted to a JCR indexed scientific journal; Authors: Patrício, R., Moreira, A. C., & Zurlo, F.

4.1 Introduction

Developing sound processes that support corporate innovation is crucial to tackle the challenges of the fast-changing business environment and to create a sustainable advantage in the marketplace (Denham & Kaberon, 2012; Hamel, 2006). While most firms have already some approaches for process-improvement innovation, more developed and holistic innovation processes – that engage employees in entrepreneurial and innovative behaviors, support radical technological improvement, foster cross-functional collaboration and knowledge sharing, promote risk-taking and creative activities – are required to drive corporate innovation forward (Denham & Kaberon, 2012; Jassawalla & Sashittal, 2002; Kuratko, Covin, & Hornsby, 2014; Kurkkio, Frishammar, & Lichtenthaler, 2011; Verganti, 2011).

Both process-improvement innovation and design thinking perspectives provide valuable approaches for engendering innovation processes. The former is usually characterized by a more linear manner, e.g. stage gate, focused on incremental innovation (Cooper, 2014; Hesmer, Hribernik, Baalsrud Hauge, & Thoben, 2007; Kurkkio et al., 2011), while the latter is more appropriate to address the early stage of innovation, characterized by a complex and uncertain internal and external environment that influence both the magnitude and the nature of innovation (Shpakova, Dorfler, & Macbryde, 2016; Tidd, 2001).

Design thinking has attracted the interest of both academics and practitioners because of the applicability of design methods in supporting the early stage of innovation. Moreover, it has been recognized for its effectiveness in promoting innovation and solving more complex problems in many industries by combining empathy for the context of a problem, creativity in the generation of insights, and rationality in analyzing different solutions (Chasanidou, Gasparini, & Lee, 2015; Lee & Benza, 2015; Liedtka, 2015; Seidel & Fixson, 2013; Shpakova et al., 2016).

Although the greater adoption of design thinking as a corporate approach to innovation, managing the early stage of innovation is still very difficult. In fact, this stage is often associate to an iterative, uncertain, and non-sequential innovation process, embracing very tough tasks such as goal setting, coordination, alignment and motivation of employees (Birkinshaw & Mol, 2006; Hamel, 2006; Vaccaro, Jansen, Van Den Bosch, & Volberda, 2012).

No matter its wider acceptance among managers and scholars, design thinking approach is reaching mid-life and some authors are arguing that the practices of integrating design into innovation are facing significant problems - e.g. lack of structure and contextualization; disconnection between thinking and doing; excessive top-down change management approach; perception of a simplified view of design; need for legitimacy and engagement; use of multidisciplinary, self-organized, and non-hierarchical teams (Beaudry, 2009; Deserti & Rizzo, 2014; Kupp, Anderson, & Reckhenrich, 2017; Meyer, 2015; Rauth, Carlgren, & Elmquist, 2014) - which the ESoIP.

It means that managing the ESoIP is a difficult job even for design-driven firms, i.e. the ones that use design thinking methods and tools to manage the innovation process, demonstrating a design-driven innovation orientation (Simoni, Cautela, & Zurlo, 2014; Verganti, 2009).

Gamification holds the potential to support firms' processes by improving the system perspective, i.e. structure and goal setting and social perspective, i.e. user involvement and motivation components, both critical to create and maintain firms' sustainable advantage in the marketplace (Denham & Kaberon, 2012; Hamel, 2006). Therefore, gamification is proposed to complement and enhance design thinking practices in overcoming the difficulties of managing the ESoIP.

Gamification can be defined as the use of game designed elements in non-gaming situations to encourage users' motivation, enjoyment and engagement, particularly in performing a difficult and complex task or achieving a certain goal (Deterding, Dixon, Khaled, & Nacke, 2011; Galetta, 2013; Harwood & Garry, 2015; Piligrimiene, Dovaliene, & Virvilaite, 2015; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015). It can deeply engage and motivate users to change their behaviors and achieve the desired states through a balanced mix of extrinsic and intrinsic reinforcements (Dale, 2014; Hamari & Koivisto, 2015; Robson et al., 2015; Smith & Popa, 2015).

Although an emergent body of literature on game/play approaches to innovation, e.g. serious games and playful design in the wider contexts of creativity, design and innovation (Agogué, Levillain, & Hooge, 2015; Kavaliova, Virjee, Maehle, Kleppe, & Nisar, 2016; Roth, Schneckenberg, & Tsai, 2015; Schulz, Geithner, Woelfel, & Krzywinski, 2015),

there is a lack of empirical research that examines the use of gamification approaches on firms' ESoIP and its main outcomes.

The examination of the relation between gamification and ESoIP merits pursuit. Gamification has the power to provide firms a better approach to improve and manage the ESoIP, which turns it relevant in terms of theoretical motivation as well as in a managerial perspective. Hence, the main goal of the study is to investigate the relationship between gamification and the ESoIP. Research objectives are twofold: firstly, to understand how gamification contributes to improve the ESoIP; secondly, to examine how gamification complements and enhances design thinking practices.

In order to understand what is the role gamification plays in improving the ESoIP and how it can complement and enhance design thinking practices, two research studies based on case study research method were conducted through the deployment of a gamified method and tool (ideaChef®) and a combination of different instruments: workshops, surveys and interviews. The first study examined how gamification approaches, and ideaChef® in particular, can contribute to improve the ESoIP, using a single case study. The second study examined how gamification complement and enhance design thinking approach to ESoIP, using three case studies of design-driven firms.

This study makes important contributions to both theory and practice. First, it offers valuable insights into explaining the outcomes of gamification and its implications to the management of ESoIP and how it complements and enhances design thinking practices. Second, it provides important managerial contributions on how, why, and when gamification can improve the ESoIP. Firms can use gamification to involve more effectively all relevant stakeholders, make work tasks more enjoyable, boost teams motivation, and increase engagement with the ESoIP.

4.2 Literature review

Design Thinking Approach to Innovation

Design thinking is a promising approach to innovation because of the applicability of design methods for solving more complex problems and its ability to build multi-disciplinary teams with high levels of collaboration and support an iterative process capable of discovering needs, framing key insights, rapidly prototyping and testing

potential solutions (Chasanidou, Gasparini, and Lee, 2015). At the same time, provides a broader alignment of values between employees, the organization and its customers, as well as a more thoughtful and human-centered approach to innovation since it places human needs right at the forefront of the innovation activities (Gruber et al., 2015; Kolko, 2015).

Design thinking is focused on a holistic view that addresses the entire innovation process with a strong focus on the early stage of the innovation, which includes idea generation, idea selection and idea development (Brown, 2008). These approaches are being increasingly applied in various organizational settings and industrial contexts that require a powerful set of methods and tools for creative problem solving and intangible challenges, such as getting people to engage in innovation activities (Beaudry, 2009; Brown & Martin, 2015; Chen & Venkatesh, 2013; Meyer, 2015; Rauth et al., 2014).

The stages of design thinking approach to the innovation process can be summarized as follows (Benson & Dresdow, 2015; Brown, 2008; Brown & Martin, 2015; Liedtka, 2015; Scherer, Kloeckner, Ribeiro, Pezzotta, & Pirola, 2016): 1. Discovery – Data gathering on users' needs or discovery and interpretation of deep insights. It is the circumstance (a problem, an opportunity, or both) that motivates the search for solutions, expanded through observation, empathy, and immersion in the users' context, which includes: dialogue; telling stories related to the issue for which a solution is needed; questions asked; stakeholders' observations; identification of constraints; using visuals to showcase stories and thinking. 2. Ideation – Idea generation and transformation. It is the process of ideation, i.e. to generate, develop and test ideas, identifying patterns and creating solutions, including: continued observation of stakeholders and their potential engagement in the possible outcomes of the search; use of visuals to communicate ideas; prototypes; re-envision and iteration; nonlinear relationships among the factors that make up ideas; empathy and creation of value. 3. Implementation – Testing or getting the idea in use. It is the path that leads to the market, including communication and visuals used to show the value of the idea and delivering the value created. Innovation projects loop back through these three spaces – particularly the first two – more than once, as ideas are refined and new directions taken (Gruber et al., 2015).

Design thinking practices involve a highly collaborative and iterative process capable of discovering needs, framing key insights, and then rapidly prototyping and testing potential products, services, processes, organizational designs, and business models, which are designed to enable a truly compelling experience for users (Gruber et al., 2015).

Design-driven firms are involved in the development of a responsive, flexible and people-centered organizational culture and approaches to innovation, which emphasize the following distinctive principles: creativity and identification of emerging needs; adoption of systematic and holistic approaches; fostering of involvement and collaboration; perception of failure; adoption of people first and user experience approaches; conception of prototypes (Brown, 2008; Deserti & Rizzo, 2014; Kolko, 2015).

Design thinking is thus an approach to innovation that brings together a creative and analytic set of tools and techniques and introduces innovation skills, such as: thinking, i.e., customer focused thinking and problem solving; telling, i.e., getting others on board and storytelling, and doing, i.e., learning through experimentation (Lee & Benza, 2015; Liedtka, 2015). It should be focused on finding and constructing new and viable solutions rather than just by explaining problems and generating ideas (L. Meyer, 2015). In fact, real innovation booster, that could radically change processes and transform people in organizations, only occurs in environments characterized by a design-driven perspective (Deserti & Rizzo, 2014).

Obstacles of Design Thinking

Despite the value of design thinking approach to innovation, it is possible to find a gap in the literature between the above-mentioned theory and the practice of integrating design into innovation. Design thinking is nearing its 50th birthday (McKinsey, 2018) and some warning signs for a possible midlife crisis are being found for some time ago in the literature. The practices of integrating design into innovation are facing significant obstacles that can be illustrated as follows:

- Lack of structure and contextualization: Design thinking is sometimes used ad hoc, with a disconnected set of methods and tools in the field of idea generation, taken out of a strategic context and introduced as one-off workshop engagements (Beaudry, 2009; Deserti & Rizzo, 2014; Meyer, 2015).

- Disconnection between thinking and doing: The aim of design thinking processes is to stimulate creativity for the envisioning of new solutions. Yet the ideation (thinking) and the development (doing) processes are sometimes separated, which is quite negative in terms of managing the entire innovation life cycle (Deserti & Rizzo, 2014).
- Excessive top-down change management approach: Design thinking drives a top-down change management approach that principally affects the management rather than the entire organization. This leads only top-level managers to be committed in applying this approach (Deserti & Rizzo, 2014).
- Perception of a simplified view of design: Design thinking may be perceived as a very limited sticky notes approach, which can be reduced to a few-days workshop sessions that everyone can do and follow (Rauth et al., 2014).
- Need for legitimacy and engagement: Design thinking introduces ambiguity, uncertainty, and abstract vision into the innovation equation by challenging prevailing structures and practices (Kupp et al., 2017). The misfit between disruptive design thinking approaches and the dominant organizational culture requires the creation of greater engagement and internal legitimacy among both managers and employees (Rauth et al., 2014).
- Use of multidisciplinary, self-organized, and non-hierarchical teams: Instead of simply asking for new products and services, firms are asking more strategic thinking and organizational change processes, which require a new type of multidisciplinary teams with different backgrounds and expertise that are managed in a non-hierarchical way and go against the conventional team management (Beaudry, 2009; Brown, 2008; Kupp et al., 2017; Zurlo & Cautela, 2014).

Thus a new and more engaging approach is needed to overcome the above-mentioned obstacles and improve the design approach to innovation. It can either be achieved by creating new processes to sustain design thinking within the organization i.e. meshing design thinking with organizational culture, convincing through experience, creating physical spaces, training and advertising material, and creating ambassador networks (Rauth et al., 2014) or by changing more radically the design approach to innovation i.e. transforming the way people do their work and engage with the processes, strengthening

their competencies and attitudes toward collaboration and focusing more on finding solutions than explaining problems (Beaudry, 2009; Deserti & Rizzo, 2014; Meyer, 2015).

Gamification fundamentals

The term gamification was created in 2002 by Nick Pelling (Dale, 2014; Galetta, 2013; Mora, Riera, & Arnedo-Moreno, 2015; Müller, Reise, & Seliger, 2015; Oravec, 2015; Shpakova et al., 2016) but only evolved and got widespread interest by 2011 with the most common definition in the literature i.e. the use of game-based elements in non-game contexts to encourage users to perform desired behaviors (Deterding et al., 2011). The main goal of gamification is to encourage engagement, enjoyment and user motivations toward certain tasks and achieve predetermined business purposes, based on foundational psychological theories, including self-determination theory and intrinsic and extrinsic motivation (Hamari & Koivisto, 2015; Roth et al., 2015; Seaborn & Fels, 2014).

Most of the research studies and contributions to the literature on gamification have been particularly focused on education and learning (Attali & Arieli-Attali, 2015; Awwal, Alom, & Care, 2005; Borges, Durelli, Macedo, & Isotani, 2014; Herro, 2015; Kingsley & Grabner-Hagen, 2015; Müller et al., 2015; Simões, Redondo, & Vilas, 2013; Varonis & Varonis, 2015), health (Koivisto & Hamari, 2014; McKeown, Krause, Shergill, Siu, & Sweet, 2016), marketing and consumer behaviour (Harwood & Garry, 2015; Lucassen & Jansen, 2014; Robson, Plangger, Kietzmann, Mccarthy, & Pitt, 2014; Rodrigues, Costa, & Oliveira, 2016; Salcu & Acatrinei, 2013; Schoech, Boyas, Black, & Elias-Lambert, 2013; Sigala, 2015), as well as on social behaviours (Asquer, 2013; Ferrara, 2013; Schoech, Boyas, Black, & Elias-Lambert, 2013).

A few studies have revealed that the relation between gamification and innovation is a promising avenue for future research (Roth et al., 2015). Some of these studies investigated the way game approaches can support ideation (Agogué et al., 2015), explored different purposes of using gamification during continuous innovation (Hyypiä & Parjanen, 2015) and examined how workshop sessions based on game approaches can be integrated and connected to a whole innovation process (Schulz et al., 2015). Others reinforced the need to create a more robust argument on the experimental value of games mechanics and participants' motivation in gamification (Brandt, Messeter, & Binder, 2008; Kavaliova et al., 2016; Scheiner, 2015). Despite the growing body of literature exploring

this relationship, there is a lack of empirical research in real business settings that examines the use of gamification approaches on firms' innovation processes.

Gamification approaches are able to drive employee and team's participation and engagement in the process by influencing desirable behaviors, providing enjoyable experiences and taping into human desire and its natural attraction for gaming (Piligrimiene et al., 2015). But gamification is not a simple and straightforward process and game elements per se do not automatically create a better engagement with participants (Hyypiä & Parjanen, 2015). No matter the significant investments on technology, consulting and related marketing activities, some of the gamification initiatives will eventually fail to meet business objectives, mainly because of the lack of understanding of what gamification is and how it works (Harwood & Garry, 2015; Robson et al., 2015).

The selection of game elements like rewards and level of competition depends on what really motivates and keeps people engaged (Dale, 2014; Galetta, 2013). Therefore, in order to design of a fun, challenging and engaging experience, the focus of the firm is placed on understanding the users and not so much on tools and mechanics of gamification (Dale, 2014). For this reason, gamification approaches need to involve the application of psychological, social, behavioral, cognitive science theories and user centred design perspective (Norman & Draper, 1986; Schoech et al., 2013).

Principles of user centred design are complemented with human motivators in order to guarantee a truly player centred experience i.e. the right ingredients for making a game experience work for the participant (Kumar & Herger, 2014). Achieving this balanced experience is essential since under this perspective engagement can only be achieved when the user is completely immersed in a challenging and interesting task and falls into a flow state, which can be defined as a feeling of happiness and inspiration associated with playing a game that prevents the user from getting bored (Galetta, 2013; Kavaliova et al., 2016; Kumar & Herger, 2014; Ruhi, 2015).

Comprehensive gamification frameworks are needed to enable a consistent and efficient use of game designed elements in corporate processes and design inspiring experiences for the users. The game elements and hierarchy framework (Werbach & Hunter, 2015) highlights the game elements that can be used by gamification approaches to create

meaningful user experiences: (i) dynamics, like narrative, progression or social interaction; (ii) mechanics, like challenges, competition, cooperation, rewards, turns; and (iii) components like achievements, avatars, badges, gifting, leaderboards, points and virtual goods.

Workplace gamification

Gamification approaches are becoming more accepted in corporate environments and raised awareness of the advantages of using game elements and mechanisms for problem solving in the work setting (Skarzauskiene & Kalinauskas, 2014; Smith & Popa, 2015). By providing gameful experiences and elements similar to game play, firms are providing users a more enjoyable and gratifying experience, as well as a greater engagement in what they are doing, even in contexts that normally have more routine or boring experiences (Harwood & Garry, 2015; Koivisto & Hamari, 2014; Roth et al., 2015).

The purpose of gamification is not to create full-fledged games for firms but to apply game elements towards existing business processes. Fun and games are, nonetheless, still taboo in many corporations personified by senior generations and considered a form of diversion from work tasks (Jorge & Sutton, 2017; Reeves & Wittenburg, 2015). Top management sometimes view work and play as opposites, where fun is automatically associated with waste of time and lack of productivity or efficiency (Dale, 2014; Smith & Popa, 2015).

Despite some limitations and biases in regard to the inclusion of game elements in critical business processes, many firms are consciously experimenting different forms of game approaches such as team-building exercises, simulation games and puzzle-solving activities, which under certain circumstances release unexploited creative thinking and gets the work done better than traditional processes can (Butler, Olaison, Sliwa, Sørensen, & Spoelstra, 2011; Sorensen & Spoelstra, 2012). Although work and play appear to involve an exclusive mutual relationship in which work means productive and goal-oriented behaviors and play means unproductive behaviors, a lot of benefits emerge from this blended approach (Roos, Victor, & Statler, 2004).

Outcomes of gamification encompass hedonic elements, such as engagement, enjoyment and playfulness, fun and learning experiences (Cardador, Northcraft, & Whicker, 2016; Gatautis, Vitkauskaite, Gadeikiene, & Piligrimiene, 2016; Hamari & Koivisto, 2015;

Harwood & Garry, 2015; Holbrook, Chestnut, Oliva, & Greenleaf, 1984). The advent of a gaming culture has raised awareness of the advantages of using game elements and mechanics for problem solving in the work setting at all ages and job descriptions of the workforce (Skarzauskiene & Kalinauskas, 2014; Smith & Popa, 2015).

Besides having engaged employees in innovation behaviors, coordination is needed at senior, middle and team level management to ensure a comprehensive game-like innovation process. Relationship between middle and senior managers plays an important and complementary role, since middle managers have the ability to provide resources and support innovation practices and first level managers the competence to experiment innovation projects (Kuratko et al., 2014). The originality of gamification in relation to other games in a corporate environment is that it extends the use of games to white collar tasks, engaging knowledge workers and middle managers in problem solving (Mollick & Rothbard, 2014; Zichermann & Cunningham, 2011).

Regardless of the hedonic value of making all employees engaged in innovation, gamification is much more than just a set of entertaining exercises and teamwork activities with no targets and organized outputs (Agogué et al., 2015; Dale, 2014; Kalinauskas, 2014). Actually, the outcomes of gamification go beyond the hedonic elements as they also include utilitarian and social outcomes.

Utilitarian outcomes encompass increased productivity among employees (Hamari & Koivisto, 2015), cognitive, functional, creative problem-solving, time to action, usefulness and ease of use (Gatautis et al., 2016; Hamari & Koivisto, 2015; Harwood & Garry, 2015; Stock, Oliveira, & Von Hippe, 2015), and accelerated new product development processes (Agogué et al., 2015). Emphasizing the importance of the cognitive dimension, one of the engines of innovation is the creation of effective and focused teams supported by strong team leadership and communities that guarantee the transfer of tacit knowledge both within the organization and externally (Koen, Bertels, & Kleinschmidt, 2014). Social outcomes encompass people's reactions during interactive situations, recognition, social influence and self-esteem (Hamari & Koivisto, 2015; Harwood & Garry, 2015).

4.3 Methodology

4.3.1 Theoretical purpose and case selection

In order to clarify the role of gamification on the improvement of the ESoIP and enhancement of design thinking practices, two research questions (RQ) are worth investigating in the context of design-driven firms:

RQ 1 – How does gamification contribute to improve the ESoIP?

RQ 2 – How can gamification complement and enhance design thinking approaches to ESoIP?

These research questions were the starting point in the investigation process, which allowed articulating the whole research design and provided rich insight into the specific context of gamification approaches to ESoIP (Creswell, 2007).

The case research study was the method employed to address the two research questions. This method is usually adopted by researchers to understand complex issues where the variables are still unknown and thus is critical to gain a qualitative in-depth understanding of the underlying reasons and motivations of the phenomenon within real-life contexts (Charmaz, 2006; Goffin, Ahlström, Bianchi, & Richtner, 2018; Kindström, Kowalkowski, & Sandberg, 2013; Meredith, 1998; Strauss & Corbin, 1998; Yin, 2009). Considering the exploratory nature of this research, the case research study method is appropriate to close the gaps identified in the literature and practice of this particular and focused phenomenon, i.e. the lack of research about the use of gamification approaches on firms' innovation processes.

Case research study method can involve both single and multiple cases (Yin, 1984; Eisenhardt, 1989). In order to address the first research question, the single case study approach was adopted since it offered an interesting opportunity for unusual research access and depth of observation to a complex phenomenon (Barratt, Thomas, & Li, 2011; Voss, Tsikriktsis, & Frohlich, 2002). Regarding the second research question it was considered more appropriate to address it using a multiple case studies approach in order to acquire better insights from a diversify data set, i.e. firms with different levels of maturity in design thinking. Actually multiple case studies allows to create more robust and testable

theory since different cases often emphasize complementary aspects of a phenomenon (Eisenhardt, 1989).

The advantage of the single case study is the greater depth of examination, which is the disadvantage of multiple case studies with less depth per case and more resource needed (Voss, 2002).

Theoretical sampling was used to select all case study firms involved in these two research studies, i.e. using single case and multiple cases. These firms were chosen carefully because it exhibited contextually rich data on the management of innovation processes, supporting empirical research in real-world settings (Meredith, 1998; Eisenhardt, 1989; Yin, 2009). The selection of the first study with a single case study firm has matched the following criteria: (i) Firm that is using design thinking approaches to manage the innovation process, i.e. design-driven firms; (ii) Firm that have already generated ideas for concrete business challenges with a diverse work team; and finally c) Firm that can mobilize teams to participate innovation workshops and follow up interviews. A selected case firm 1 participated in the first study as well as in the second study with two other firms.

For the second study, two other firms were selected. The selection of this non-probabilistic sample took in consideration the above-mentioned dimensions used to select firm 1 along with their level of expertise in design thinking approaches, i.e. proficiency in methods and tools like brainstorming, personas and customer journey maps, which typically engage people with diverse backgrounds in convergent and divergent thinking workshop sessions (Chasanidou et al., 2015) – see table 4-1.

Table 4-1 Sample selection for the two empirical research studies

Dimensions	**Case Study Firm 1**	**Case Study Firm 2**	**Case Study Firm 3**
Expertise in design thinking	Yes, beginner	Yes, proficient	Yes, expert
Generation of ideas	Yes	Yes	Yes
Mobilization of teams	Yes	Yes	Yes

Due to complexity of the linkages between gamification and innovation process, is appropriate to limit the number of case studies, aiming for more depth rather than breadth

and theoretical replication rather than literal replication (Yin, 2009). The three case study firms matched outlined criteria dimensions but exhibited different levels of experience in design thinking methods and tools, which allows identifying differences and similarities – see table 4-2.

Table 4-2 Studies and sample profile

Studies/Firms	**Case Study Firm 1**	**Case Study Firm 2**	**Case Study Firm 3**
Research Study 1	Yes	No	No
Research Study 2	Yes	Yes	Yes
Type of firms	Business unit of a corporation operating in the business & facility services segment with a €770 million in sales revenues and 31.000 people in 27 firms/business units.	European subsidiary of one of the top 5 pharmaceutical companies in the world with sales revenues of around USD 48 billion, present in more than 155 countries and with a workforce of nearly 120.000 people.	European subsidiary of one of the top 3 software companies in the world with sales revenues of around USD 87 billion and with a workforce of more than 124.000 people worldwide.
Type of challenge(s)	Customer Loyalty (CL); Valorization of the Offer (VO); New Service Development (NSD); Corporate Image (CI) and Business Processes (BP).	Culture & People (C&P), Science in Innovation (SiI) and Innovation beyond Science (IbS).	Internal Service Design (ISD).
Type of team(s)	5 Multidisciplinary teams composed by 23 participants, including team leaders and members, from operations, marketing and sales, finance and IT.	3 Multidisciplinary teams composed by 21 participants, including people with different backgrounds and levels in the hierarchy of the organization i.e. top and line managers.	1 Multidisciplinary team composed by 5 participants, including people that usually delivers design-thinking methods and tools to address concrete challenges of external customers.
Type of experience	Most of the participants involved in this project never participated in any type of innovation workshops and both the tools and methods were completely new for them.	Most of the participants were familiar with design thinking methods and tools and already participated in brainstorming and innovation workshops.	The team functions as an internal consultancy team of the firm that supports the premium customers in the process of generating ideas and drafting project plans for large digital transformation projects.

Typically, these firms involve multidisciplinary teams thinking about particular business challenges, generating, selecting and then developing ideas that would meet the business challenges that have been set by the top managers. So they all go from idea generation and group brainstorming to idea development, throughout one or few innovation workshops, which enable them to convert the chosen ideas into project plans that subsequently could be implemented. During these innovation workshops, teams apply a set of design thinking methods and tools, such as personas, journey maps and visioning techniques, to enable the generation and orchestration of ideas that covers the entire ideation process.

For the specific purpose of this research, all these firms that participated in both research studies wanted to strengthen the idea development phase of ideation with support of a gamified method and tool (ideaChef®).

4.3.2 First study design and data collection

The first study examined how gamification approaches, and ideaChef® in particular, supported innovation process. The Case Study Firm 1 recently acquired a new business unit (in the area of health and safety in the workplace) and appointed a new board of directors to run this business that outlined five strategic challenges for future projects. The innovation manager (IM), who is responsible for leading and implementing innovation initiatives and processes among the corporate business units, helped this new unit to frame and address its priorities and challenges. Soon after the generation of ideas, using design thinking methods and tools, like customer journeys and visioning technics, the IM decided to use a gamified approach for idea development in order to achieve more robust project plans for implementation and increase engagement of key stakeholders with corporate challenges and projects.

The case study team, composed of 23 knowledge workers and middle managers, including team leaders (TL) and team members (TM), has been selected based on their interest in participating as well as on the different hierarchies (middle managers and their direct staff) and backgrounds (from operations, marketing and sales, finance and IT). No matter their positions and responsibilities, most of the participants involved in this case study never participated in any type of ideation workshops. Moreover, both the design thinking tools and methods were new for them.

This single case study was focused on the idea development stage of a current strategic and innovation project of the selected firm. The board of directors and the IM outlined five strategic challenges for the project: a) customer loyalty (CL); b) value-added offer (VO); c) new solution (product service system) development (NSD); d) corporate image (CI); and e) business processes (BP). For each challenge, an interdisciplinary team of four to five members, including the team leader, was designated. Each team generated several ideas with design thinking methods and tools and chose one to develop. The study took place over a four-month period by conducting workshops, surveys and semi-structured interviews with top management i.e. challenge owners, the IM, team leaders and members (see Figure 4-1).

Figure 4-1 Case Study Design

The setup meeting (phase 1) conducted with the challenge owners (the CEO and two other members of the board), the IM and the five team leaders (one for each of the five teams) served to confirm user needs and chosen ideas.

Besides providing assistance to phase 1, the researcher also participated actively in the idea development (phase 2), running both workshops (the first with 5 teams and the second just with NSD team) as facilitator and collecting data from surveys and interviews.

During the idea development phase, each team developed its chosen idea and drafted a solution with the support of ideaChef® method and tool. This intervention has been conducted during the first gamification workshop in which the five teams made a presentation of the proposed solutions and received feedback from the challenge owners. The gamification workshop session lasted three to four hours with the following agenda and duration: a) Setup and alignment – 30 minutes; b) Developing the chosen idea – 120 minutes; c) Preparing the report with a draft solution that allows designing a project plan for the chosen idea – 60 minutes; and d) Pitch – 30 minutes.

A second gamification workshop with the same agenda has been conducted to fine-tune the solutions of the NSD team. Allowing iteration, at least two rounds, with a quick reflection or discussion before the second round paves the ground to a continued learning process and feedback loop that will reduce risk and improve success rates in the innovation process (Bogers & Sproedt, 2012; Liedtka, 2015). During this workshop, it was possible to turn the draft into more robust solution, by incorporating additional feedback from the board members, new inputs, and lessons learned from the first workshop. Gamification workshops were designed, planned and facilitated by the researcher, which contributed to a deeper understanding of the phenomenon and validation of the data obtained from the surveys and interviews (Zomerdijk & Voss, 2009).

During the last phase (phase 3), board members, the IM and team leaders reviewed and improved on the project plans based on the draft solutions (from the second workshop for the NSD team and the first workshop for all the other teams).

Data collection included multiple sources (Yin, 2009), i.e. individual and team-level semi-structured interviews, surveys, observations (site visits, workshops and meetings) and internal documents such as previous strategic plans, following a comprehensive research procedure. Immediately after the first gamification workshop, participants were asked to provide information about their experiences and appreciation of the process using different instruments (Table 4-3).

At the end of the first workshop session, team-level interviews (Appendix A) that lasted between 20 minutes and 30 minutes were conducted with each team (TL and TM) and the board members (BM). Moreover, an evaluation survey (Appendix B) was undertaken involving all (23) participants, in order to facilitate the interpretation of the gamification

workshop, crosscheck data from the interviews and get further insights about the phenomenon. Items have been assessed on a scale ranging from "very poor (1)" to "excellent (5)".

Table 4-3 Data Collection

Activities	**Instrument**	**Role of participants**
1st Gamification Workshop 5 teams	Team-level interview	1 interview with the CEO and two other board members (BM) 5 interviews with each team (including TL and TM)
	Evaluation Survey	23 responses from all TL and TM
2nd Gamification Workshop 1 team (NSD)	Debriefing survey	5 responses from the NSD TL and TM
	Individual-level interview	1 interview with the NSD TL
Final meeting	Individual-level interview	1 interview with the IM 2 interviews with VO TL and CI TL

After the second workshop (phase 2), a debriefing survey (see Appendix C) was undertaken with the NSD team leader and members, followed by a semi-structured individual interview with the NSD team leader (Regional Commercial Director). Data gathering was concluded with semi-structured individual interviews conducted after the final meeting (phase 3) with the IM (Group innovation manager) and two other team leaders: VO (Commercial manager) and CI (Operational division coordinator).

In order to reinforce the methodological approach, a pilot study was conducted before this first study to revise research protocol, namely survey and interview guides. In fact, some of the interview questions and items of the survey used to assess the level of satisfaction of the participants regarding several aspects of the gamification experience (see all appendices) were based on the results of a prior study conducted at an university with master's students who addressed concrete early stage of innovation firms challenges with a gamification method and tool (ideaChef®).

Data collection process included different sources of information in an attempt to triangulate findings. It was driven by transparency, providing clarity about the entire data and including research instruments, such as survey items and interview questions in

appendices, which makes possible replicate data collection from the information provided in the study.

All individual-level interviews with team leaders (see Appendix D) and IM/PM (see Appendix E) incorporated a grid that has been created based on the research goals and questions that increased the reliability of the findings and conclusions. The aim was to check for the potential impacts of the gamification approach on the work activities, and also to trace back the actions observed during the workshop sessions. In order to facilitate the emergence of new insights and prevent leading questions, the interview process allowed respondents to address other topics and has been enriched with a different set of open questions that had not been initially included in the grid (Agogué et al., 2015). Furthermore, the research questions that have been investigated were not addressed directly in order to prevent leading questions and influence interviewees (Zomerdijk & Voss, 2009). Each interview has been voice recorded for further analysis and data transcription validated by the interviewees.

4.3.3 Second study design and data collection

The second research study examined how gamification complemented and enhanced design thinking approach to ESoIP, using multiple cases of design-driven firms. In order to get richer insights on this issue it was necessary to collect data from firms with different levels of expertise in design thinking. The main goal was to understand if less and more mature firms, i.e. experienced in design thinking methods and tools, would have or not the same views.

All case study firms conducted a similar one half-day gamification workshop in which teams developed further a chosen idea and drafted a more concrete solution to address the challenge outlined by the challenge owner. Throughout the workshop participants answered questions related to the chosen idea, discussed and scored each other contributions. At the end of the workshop, all contributions were assembled in a structured manner and the team drafted a report of the proposed solution (“recipe”) for the challenge. The aim of the report was to support the strategic project’s decision-making process in terms of implementing the “recipe” that emerged from the gamification experience.

In order to provide research consistency, the measurement of results was based on the same activities and instruments for all case study firms (see Table 4-4). In order to learn as much as possible from participant's experiences, two semi-structured individual interviews were conducted for each case study firm, one with a team member/leader and another with the innovation or project manager. The only exception was the case study firm 3 that included all members. Since they involved just one team, it was possible to collect rich inputs as well in a group interview.

Table 4-4 Data collection

Instruments	**Case Study Firm 1**	**Case Study Firm 2**	**Case Study Firm 3**
Gamification workshops	1 workshop	1 workshop	1 workshop
Semi-structured interviews	1 interview with NSD team member/leader 1 interview with project/innovation manager	1 interview with IbS team member/leader 1 interview with project manager	1 group interview with ISD team members 1 interview with project manager

Despite developing first the single case study and then with the other case study firms, the type of data collected for this second research study was from the same origin (see interview questions in Appendices D and E). Data collected from the first study took in consideration the same goals and themes that were defined for the comparative analysis.

The interview guide already used for the first study reflected the research goals and the specific research question addressed by this second study. Some questions were broader with the intention to open new perspectives and identify new insights. Others were more focused on the differences between gamification and design thinking approaches as well as on the implications of gamification approaches to innovation. In order to ensure the quality of research measurement, the data collected and the way it was treated followed the same protocol for each of the case study firms. Finally is important to emphasize that this second research study followed the same data collection procedure, including transparency that was above described for the first research study.

4.3.4 Data analysis procedure for both cases

The analytical procedure used to integrate all the data from the interviews, surveys and workshops observations from both research studies was inductive and followed a thematic coding process that helped to determine correspondences and differences across the entire data as well as to shape and describe the core themes that emerged from empirical evidence of repeated patterns across each individual piece of data collected (Braun & Clarke, 2006).

These themes have been shaped based on the data elements i.e. answers, behaviors and conclusions perceived by participants throughout the study. Using visual representations of data in a mind map helped to sort the different codes into themes. However, determining what aspect of the data each theme captures was not a straightforward process. Data have been coded with specific questions in mind and different codes have been combined to form a core theme. During this process, some candidates for core themes collapsed into each other or broke down into separate themes. Lastly, it was necessary to identify the essence of each theme story in relation to the research propositions in order to avoid too much overlap between themes (Braun & Clarke, 2006).

Throughout the entire process of collection and analysis, it was possible to adjust the direction of the research study that ended only when no new categories or relevant topics emerged (Strauss & Corbin, 1998). This analysis has been complemented with project documentation, written notes taken during interviews and meetings, and picture observations from the workshops, which helped document results (Gudiksen, 2015; Schulz et al., 2015; van Amstel & Garde, 2016). In order to assign significance, coherence and meaning to the data collected, precise transcriptions of recorded interviews have been made, which provided an excellent way to of becoming more familiar with the data (Braun & Clarke, 2006). Therefore, the way data was collected, integrated and analyzed as well as results were obtained, contributed to higher transparency and rigor of the study (Eisenhardt, 1989).

On a qualitative study, there is no process of measurement of quantified results since the data format is mainly words, pictures, audio and video. What is critical in this type of research is to gain a qualitative understanding of the underlying reasons and motivations of the phenomenon to be investigated (Yin, 2009). Nevertheless, some measures were taken

to ensure validity and reliability during the research process. Triangulation has been addressed to extend and validate the data collection by using multiple information sources of evidence like relevant internal documentation and reports from the firm, not just to obtain further insights but also to look for additional corroborating or contradicting evidence from data collection and findings (Kindström et al., 2013; Yin, 2009). Besides data from interviews and surveys, all gamification workshop sessions have been documented with photographs and video recordings, thereby providing valuable observations of the work in progress. A few minutes of recording from each workshop session have been selected to observe the critical dialogues between participants and the interactions with the game dynamics, and, at the same time, to cross check the data collected from the surveys and interviews (Gudiksen, 2015).

Finally, by doing the crosscheck of facts and impressions and developing a comprehensive process of coding data, reliability of the findings and results of the research study was also ensured. Likewise, incorporating an interview protocol and organizing all of the collected transcripts makes the research method replicable (Kindström et al., 2013).

4.4 Findings and discussion - Study One

4.4.1 Hedonic outcomes

Involvement, playfulness and novelty emerged from data as the core themes that illustrate hedonic outcomes and explain employee engagement throughout the innovation process and idea development in particular (see table 4-5).

Table 4-5 Identification and evaluation of data sources per core themes – hedonic outcomes

Activities	**Core themes**		
	Involvement	Playfulness	Novelty
1st Workshop Team-level interview Evaluation survey items	 VO, CI, NSD, BM 3, 4, 5, 9, 15, 16	 CI, BP 6	 VO, NSD, CL, CI Not inquired
2nd Workshop Debriefing survey Individual-level interview	 NSD NSD TL	 Not inquired NSD TL	 Not inquired NSD TL
Final meeting Individual-level interview	 IM, VO TL, CI TL	 IM	 IM

Involvement means to take part or become involved in the project. This core theme is illustrated by several quotations from group and individual interviews grouped in sub-themes (Table 4-6) and supported by survey results (Appendix B).

Safeguarding a balanced contribution increased significantly to involvement of all participants. Providing the same space and time to contribute ensures no one imposes his/her views and dominates the conversation. Feedback is also key since the essence of the gamified method and tool is to promote a positive feedback loop among participants. The incentive to keep up with this game experience and maintain the involvement is high, which is illustrated by the fact that, after the second gamification workshop, all NSD team members expressed their interest and availability to participate in the future implementation of the project.

Table 4-6 Quotes from interviews – involvement core theme

Core theme	Representative quotes
Involvement	The other groups spontaneously gave us ideas during coffee breaks and we were adding value to our presentations. It is interesting to evaluate each member of the group anonymously. All contribute and build on top of others to come up with a better idea in the end. There was no one who had not made a contribution that in the final result is not visible. It ensures that they all have the same influence. It gets everybody involved because by playing a board game each person has to participate. Everyone has the same space and the same time to contribute. Creating space for everyone's participation is very important in order to allow the participation of all. Everyone participated but no one felt compelled to participate. I definitely see benefits as regards engagement and get people involved and participating. I am very satisfied with the results so far in terms of the engagement and motivation factors that gamification provides. I felt from my colleagues a sense of commitment; it turned out to involve people 100%. Regarding the questions and the organization of the board itself, I thought it was very well conceived. It made perfect sense. There was some duplication of the question topics, but even this induces the result.

Moreover, the following testimonial from the board members demonstrates how the search for further involvement supports their organizational goals as well as important design thinking principles, e.g., people first, involvement and collaboration: "*The involvement generated by the project is in line with the cultural change we intended to implement in order to give greater relevance to the participation of everyone, as well as to create commitment with the defined objectives*."

Playfulness can be explained as the pleasure of using something that is fun. People are getting tired of the current high-pressure work environment that affects them negatively and are looking for approaches that make them feel more relaxed. Playfulness has been mentioned quite often during the workshop sessions and group and individual interviews (Table 4-7). As mentioned by one of the participants, "games can be used to engage people in day-to-day activities that usually require extrinsic incentives."

Table 4-7 Quotes from interviews – playfulness core theme

Core theme	**Representative quotes**
Playfulness	Gamification is more and more the future because we have an intensive rhythm at work. It is a fun way to do serious things before we know it. It is a quite different way of approaching a challenge and a fun way to find solutions. The fact of being a game provides a more relaxed way. Very interesting method, through a game that is something interactive and more dynamic. There are several little things to do that people that are on the job are able to identify on their day-to-day but usually don't have any incentive.

Novelty has not been one of the topics asked in any of the interview guides or surveys, but it emerged spontaneously as a core theme during the interviews (Table 4-8). Novelty can be expressed as the enthusiasm and surprise of using a new and different approach. For most of participants, it was the first time that they were involved in ideation activities. Regardless of age, gender or background, none of them had been expecting to interact with a game-like approach. The IM is on record as stating, "*To innovate is to surprise and I think people have been surprised by the nature of the whole process*."

Table 4-8 Quotes from interviews – novelty core theme

Core theme	Representative quotes
Newness	I think (the approach) has surprised and engaged the people that were involved in the teams in a way that they didn't expect. ideaChef is an innovative tool. I think it's a very valid, different approach. We were not used to gamification, it was completely new for everyone. It was the first time I did a workshop on gamification, the tools were very simple to use. It is a very unique approach and original because we are thinking outside the box but to come up with a concrete idea at the end.

4.4.2 Utilitarian outcomes

Themes that best describe utilitarian outcomes are: structured process; timely process; time to action; and creative thinking. Structured process and timely process fit into the cognitive category and are directly related to the acquisition, understanding and organization of knowledge (Table 4-9).

Table 4-9 Identification and evaluation of data sources per core themes – utilitarian outcomes

Activities	Core themes			
	Structured process	Timely process	Time to action	Creative thinking
1st Workshop Team-level interview Evaluation survey items	CI, BP, NSD, BM 12, 13, 14, 17	BP, NSD 2	No data 20, 21	BP, CI, NSD 18, 19
2nd Workshop Debriefing survey Individual-level interview	Not inquired NSD TL	Not inquired NSD TL	Not inquired NSD TL	Not inquired NSD TL
Final meeting Individual-level interview	IM, VO TL, CI TL	IM, VO TL, CI TL	IM	IM

Structured process received several comments during group and individual interviews, particularly in relation to the focus on relevant activities and the knowledge required to structure an idea (Table 4-10).

Data elements suggest this structured process helped participants to align ideas about their particular challenge and project. As mentioned by the NSD team leader, "*it allows us to*

quickly align a set of ideas that are on the table." The IM also strengthened this argument when he stated, "it provides an easy structure for a group to start working together and thinking in a structured methodological fashion about the idea." Teams began to share knowledge about the corporate challenges and projects in a more explicit and structured manner. The following reference made by board members about the method endorses the value of having employees aligned with the goals: "*the method that has been used contributed significantly to the achievement of desired behaviors*." To accomplish this, participants had to learn how to "*think differently and create a new structure based on a way of thinking with rules, instead of in a messy manner*" as mentioned by the NSD team leader.

Table 4-10 Quotes from interviews – structured process core theme

Core theme	Representative quotes
Structured process	What they gave us were instruments so we could have a methodology and a tool to present the final results. It is very well thought out and helped significantly to create an idea of what we wanted for our project. The methodology helped the process unfold and things flow naturally with logic. I liked the way they taught us to think in group. What they gave us were instruments so we could have a methodology and a tool to present the final results. It contributes not only to let people express their ideas but also to other members of the group supporting those ideas and improving them with other contributions. The process itself and the way it is assembled is very well thought and aligned in terms of a sequence, it is very interesting. We managed to structure our idea in the various aspects, customers, and ingredients. I thought it was well structured and worked perfectly to align ideas. We ended up with a healthy way to get rid of the individual ideas we brought and promote those that the group had considered to have more potential. We were able to generate ideas a little bit differently and to structure them. Without this type of process we would not reach this set of ideas and this result. The important is the focus, which helps to arrive at something more tangible than the initial idea No vague things but process driven activities that we know when the game is going to end then it make things more structured, when working with boundaries you have to be objective. It was important to help us to structure the project, the very idea of the project, that is, to have a clear driver, what we want and what the solution is and which are the processes that we should use.

The timely process theme is the second key cognitive outcome that emerged from data (Table 4-11).

Rules and time constraints are related to the time frame in which to perform certain game activities, i.e. if an activity is occurring at a suitable time. Even though not that well ranked, this type of constraints is critical to ensure a timely process, and has been recognized by interview quotations. The CI team leader mentioned that "*time management is very important because we sometimes tend to deviate from the central points and start arguing over how many angels can dance on the head of a pin*." Nevertheless, there are conflicting perspectives about the amount of time that is needed to perform a core game activity, i.e. reply to a particular question. The NSD team leader felt that the time to complete this activity (2 minutes) had been a bit short. But for the CI team manager, it had been perfect, giving everyone enough time to address the question.

Table 4-11 Quotes from interviews – timely process core theme

Core theme	**Representative quotes**
Timely process	Time limit is good and is important to use it, 2 minutes per person for feedback, is a good aspect as well. The fact that each moment is timed is important because the idea may not be fully developed but is already registered, then the ideas could be developed with more time. It is necessary to pay attention to the time limits so as not to run away from what was scheduled. At a given moment in time we had the pressure to move faster. We reach the end of the day with lots of ideas written down and completely exhausted, which is a sign that we have been very concentrated and without dispersion. It had been a huge intellectual effort from the point of view of thinking with limited time. At first the mechanics created some distress because I felt limited by the question of time.

The time to action theme emerged from data when trying to assess the productivity outcomes of gamification (Table 4-12). Besides ensuring well-timed activities, as discussed in the timely process theme, in order to increase productivity it is fundamental that the overall ideation process be accelerated.

Time to action is a key driver of productivity, but it has been observed that productivity also has linkages with other core themes like structured and timely process. In fact, the level of satisfaction with focus on relevant activities, which is one of the items of structured process (Table 10), surpassed the time to convert ideas into projects in both cases. Time to action issues have not been cited in any of the group team interviews and were only mentioned by the NSD team leader and by the IM. The nature of the project and the background of the NSD team leader may explain why he paid particular attention to the time to convert ideas into projects. As he mentioned, "*I have been involved in other innovation projects using traditional methods of thinking and creating, and they are not comparable to this approach. Gamification shortened deadlines in relation to the normal projects*."

Table 4-12 Quotes from interviews – time to action core theme

Core theme	Representative quotes
Time to action	We were forced to move fast in time. If not, may be we would still be discussing what idea would be taken forward. Reaching consensus on what idea to follow and how to structure the idea would have been much more time-consuming. If it was not the game, I think the whole process until getting to the implementation part would be much more time consuming. It has never been so fast getting to projects almost ready to be implemented. Without gamification, the process would take much more time. Games by their nature have an end either after a certain amount of time or when a particular objective is reached, so by providing that kind of structure gamification can help to speed up the whole process. If the game itself has engaged a lot of people then we can speed up the whole process by speeding up the game.

The level of satisfaction with creative thinking items and quotations from the interviews support the idea that thinking about an idea in a deep manner or simply rethinking a particular view of reality leads to greater insights about the issues (Table 4-13). As mentioned by the IM, "Gamification encourages the team to ask certain questions that they might otherwise not ask. It forces the team to look at all aspects of the idea and to think about it in a 360 degrees perspective" Creative thinking has been particularly well ranked by the NSD team and by the IM, since the nature of innovation is very much related to this perspective.

Table 4-13 Quotes from interviews – creative thinking core theme

Core theme	Representative quotes
Creative thinking	By using these questions cards, it helps to think deeply about all aspects of the characteristics of the particular idea. As playing the game people get surprised by a question that comes up because they hadn't gotten the answer before, they hadn't thought about that particular aspect of the idea or they are having trouble relating that question to the idea that they are evaluating. The type of questions is within the same topics, which forces us to draw a second letter and obliges us to rethink what we have in the first response. We always want to think on our own way. But when we are having this game constrains, it brings results more quickly since my reasoning has to be more objective. It was a great intellectual effort from the point of view of thinking differently all the questions. We thought that thinking outside the box was just having a different idea from another angle, but that's not enough. It forces groups to think about aspects of the idea that were not considered otherwise, which is important before start thinking about the solution. It will make people think deeply and to answer particular questions rather then just answering questions that they had already the answers to.

4.4.3 Social outcomes

Team spirit and consensus building are the core themes that illustrate social outcomes (Table 4-14). Items linked to these themes received the highest scores in the survey (Appendix B) and very supportive comments from the interviewees.

Table 4-14 Identification and evaluation of data sources per core themes – social outcomes

Activities	Core themes	
	Team spirit	Consensus building
1st Workshop Team-level interview Evaluation survey items	 BP 7, 8	 NSD 10, 11
2nd Workshop Debriefing survey Individual-level interview	 Not inquired NSD TL	 Not inquired NSD TL
Final meeting Individual-level interview	 IM, VO TL	 IM

As observed by the IM, "*the gamified method and tool allowed everybody to participate and accelerated the whole team building process*." Gamification contributed to strengthen relationships, increase team spirit and promote a better work environment (Table 4-15).

Table 4-15 Quotes from interviews – team spirit core theme

Core theme	Representative quotes
Team spirit	We have all pulled in the same direction and with the same group spirit. I think is good for team building and put people work together, helps to build team spirit. Definitively at team level is beneficial. I think it was easy to work as a team, I do not know if was also because of the common background we already had about the challenge. The atmosphere created by the game was fantastic. I felt from my colleagues a sense of commitment in relation to the project.

Items related to consensus building were ranked second highest in the survey (Appendix B), highlighting the importance of social outcomes generated by gamification. The scores of the survey also support quotes arising from the interviews (Table 4-16). One of the NSD team members recognized, "*one thing is to think alone, group thinking is another, but the most important thing is to reach consensus*."

Table 4-16 Quotes from interviews – consensus building core theme

Core theme	Representative quotes
Consensus building	From what I observed it could also lead to conflict resolution, people get together, discuss their opinions and get to conclusion and consensus. Whoever works in a group has to adjust, we do not own the truth and must realize that there is another way. It should be mandatory for aligning people. We realized that we had to leave aside some more personal questions and work for our company. The understanding of the company issues becomes deeper and it clarifies where we want to go. It was not exactly the idea we had but once there is a general consensus we have to go through there.

4.5 Findings and discussion - Study Two

4.5.1 Key issues

It is always hard to compare the advantages and disadvantages of a new approach in relation to traditional and well-known methods and tools. In the particular case of gamification approaches to innovation it is even harder due to the lack of empirical knowledge that is coming from the corporate world.

Findings from this second study illustrate the main driving forces of gamification in relation to other methods and tools used in design thinking, i.e. organized and engaged process, both characterized by different core themes. It was observed that sometimes there is a coincidence in some of the themes with the findings from the first study, yet these two are the most representative driving forces of gamification when compared with other methods and tools that support the ESoIP.

For the all the forces/core themes, as well as for other examination, representative quotes from each of the case study firms are exhibited, providing important insights into the way gamification can add value to existing design thinking methods and tools and practices used by these firms to support the ESoIP. Similarities and differences are highlighted regarding the different levels of expertise in design thinking. Most of the data collected for these forces/core themes provides the same views no matter the experience of the firm.

The analysis is complemented with a systematization of the restraining forces and limitations of gamification approaches in relation to other methods and tools used in design thinking and a discussion about the best fit of gamification with the different phases of the early stage of innovation. Finally it is provided some examples of other gamification applications in the corporate environment.

4.5.2 Organized process

Result-focused and structured emerged from data as the core themes that explain the way gamification process was organized. By providing such impact on existing projects and initiatives of the firm, gamification overcomes the difficulties related to the lack of structure and contextualization that sometimes characterized other design thinking methods

and tools. Structured process approach complement the "thinking" element of design thinking, making it more "doing" oriented. Moreover, the focus on the goal provides the context that is required to engage people with the process.

4.5.2.1 Result-focused core theme

Context: Representative quotes provided by case study firms.

Finding: The goals of the project were also achieved but in a faster, focused, playful and creative way.

Quotes and comments:

Quotes from Case Study Firm 1:

- *"People can be creative but do not disperse in the objective which allows us to be much more concentrated"*
- *In other creative processes in idea generation that is not always the case, sometimes is a bit "vague and could be a lack of objectivity"*

Quotes from Case Study Firm 2:

- *"The same goal was achieved, which was to have ideas but somehow end up with something more concrete, with a more concrete plan. We got out of there with a more concrete idea"*
- *"It was a different way to reach the same goals and maybe even with more interesting ideas"*
- *"We came up with interesting ideas and some initiatives that could then be debated by the whole group"*

Quotes from Case Study Firm 3:

- *"It was teamwork and focused on the same subject"*
- *"For better or worse it comes always to a result"*
- *"The same goal was achieved in a faster and playful way"*
- *"With our current method we could not control the time and it could take 3 sessions to get to what we have here"*

- *"In relation to the methodology that we have been adopting, both allow us to reach the same goals but in different ways. I would say that gamification may be faster and more fun"*

No dispersion of efforts and more clarity about the goals and process to follow is what distinguish the gamification approach from the traditional design thinking practices.

4.5.2.2 Structured core theme

Context: Representative quotes provided by case study firms.

Finding: The main benefit of this approach as compared with design thinking approaches that these firms are using is the ability to collaboratively develop a more structured and well-rounded description of the idea, supporting better decision making process in terms of allocating more resources to the development and commercialization of the idea.

Quotes and comments:

Quotes from Case Study Firm 1:

- *"A positive aspect is that it helps to develop the idea and finds the weaker and strong points of the idea and well-rounded description of the idea"*
- *"By traditional methods, we would still be brainstorming. We would still be in an initial phase, where we would not yet have come up with the idea. Neither communicating the idea to the board"*
- *"The way the process is set has forced us to evolve much more quickly. And even the issue of having brainstorming with us and not with everyone. Traditionally we had to be in the room all day brainstorming with the others. Now I decided what were my contributions/ideas and the rest of the team do the same thing and we can progress faster. This differentiation, paradigm shift, has resulted in its full"*

Quotes from Case Study Firm 2:

- *"We got out of there with a more structured idea. With the development of the idea we realized how we could implement the idea, who could help us, who our stakeholders were and how we could do it"*

- *"It gave us a very comprehensive perspective of what we need to do to implement the idea. With the mapping of what would we have to do, what resources would be involved, what would we have to change, etc, we understood that it would be a very ambitious project, which we could not implement immediately"*
- *"With gamification we are creating stimuli to people that are not obvious, because when I am in brainstorming, which is the methodology that we mostly use in the area of innovation, I share with the others my experience, knowledge and ideas, but I am not really being stimulated or put myself out of my comfort area to develop a common idea"*
- *"As gamification, brainstorming can also be multidisciplinary and have several people contributing but the main focus is on individual ideas. Gamification enables building upon each other's ideas, which is the improvement of the idea and I think this has more value in relation to the methodology of brainstorming that we use"*

Quotes from Case Study Firm 3:

- *"The fact of using a cooking metaphor, which is being fashionable, and a mundane, routine, allows establishing interesting associations and finding the meaning of each question faster than in our method, in each moment of the drawing. Therefore is faster in closing the gap between the explanation of what is intended and its understanding"*
- *"It has a language and method more accessible to a greater number of people. Our current method requires participants to master the tools to achieve something"*

The other important finding is that gamification can enrich brainstorming by enabling people to build upon each other's ideas and collectively improve ideas that were generated individually. Also, the simplicity of the approach and the use of cuisine metaphor turned the process easier to engage with.

4.5.3 Engaged process

Participated and relaxed process emerged from data as the core themes that explain why people were engaged in the gamification activity. By encouraging balanced and voluntary contributions, providing a common language and simple-to-use tools to share knowledge and making the tasks more interesting, gamification also reduces the obstacles of design

thinking practices related to an excessive top-down change management approach and the difficulties of promoting and involving self-organized and multidisciplinary teams.

4.5.3.1 Participated core theme

Context: Representative quotes provided by case study firms.

Finding: Having ALL the people contributing to the idea development increased their engagement with the project because they felt they were having a personal touch of their own on the final idea.

Quotes and comments:

Quotes from Case Study Firm 1:

- *"I definitely see benefits as regards engagement and get people involved and participated, and I think the board followed every step of the way. It is something we should learn for the future"*

Quotes from Case Study Firm 2:

- *"Each person added or deconstructed this idea until the time we came to a more concrete thing fuelled by a creative flow that gave us some final ideas"*
- *"It is something that is built involving several people around a board game and they all contribute to create a better idea in the end"*
- *"This process of getting the contribution of all the people, has greatly enriched this project"*
- *"In the end it turns out to have more value what is built together and what people feel there is a bit of yours, compared to the traditional method in which the idea of a person is somehow imposed, in a good way, to all others"*
- *"I think that we can get more quality in the end than when it's a one-person idea"*
- *"Therefore it is always a rich process because it will also seek other ideas that we would not have if it were in front of a computer or just with a pen and study, so I think it stimulates creativity, cooperation between people and interaction and engagement"*

Quotes from Case Study Firm 3:

- *"Team building in the involvement of people in creating an idea"*

In comparison with the traditional process, gamification provides more buy in of the idea since all people are encouraged and have the same opportunity to contribute.

4.5.3.2 Relaxed core theme

Context: Representative quotes provided by case study firms.

Finding: Providing a playful environment to people reduces the day-to-day pressure and increases the motivation to adopt a new method.

Quotes and comments:

Quotes from Case Study Firm 1:

- No relevant quotes

Quotes from Case Study Firm 2:

- *"Traditional methodologies were maybe a little more boring and not guarantying the engagement that the game provides"*
- *"Through a relatively informal moment we were able to cook some interesting ideas"*
- *"We can have the involvement and engagement of people through a more playful and competitive vehicle where we can interact with the other colleagues"*
- *"I think it went well; it was a workshop that was fun and that did not cost to do it, by introducing a game approach people did not feel the pressure of the normal workshop, and it was a more fun thing to do"*

Quotes from Case Study Firm 3:

- *"It seems to me that more fun is very interesting. The gamification approach has a more playful meaning than what we have done so far"*
- *"It is a more fun and relaxed way of doing things"*

Engagement is also influenced by the way people are interacting each other.

4.5.4 Fit with the early stage of innovation

Gamification approach is very suitable for innovation in general and specifically for idea development, the phase of the ESoIP that was gamified. It can support idea generation and brainstorming as well as idea implementation, but also be used to test the characteristics of personas. A close fit was also identified with the co-creation of new solutions with inputs from third parties like partners and customers. Besides supporting further developments of a possible solution, an in-depth analysis of the characteristics of a new solution can be made with support of gamification approaches.

Context: Representative quotes provided by case study firms.

Finding: There is a close fit between gamification approach and the ESoIP.

Quotes and comments:

Quotes from Case Study Firm 1:

- *"I think is good, more suited for new product development or improving products and services because you think about the recipe and it is easier to relate to product or service and use this analogy of the recipe when you got a product or service, a cake that you are making is a new product or service"*
- *"It could be suited to idea generation as well besides idea development and I would like to see it applied in idea implementation. I think we can use gamification at different points of the innovation life cycle. We tried at development phase but we can use at idea generation and implementation phases"*
- *"For idea generation we can use it in two different contexts, in an idea generation workshop having activities that are games to get people involved and get them actively participating in the idea generation activity, which is often difficult to get everybody contributing the same way. So if we can have a kind of game focused on idea generation it could be good to get everybody involved"*
- *"Idea implementation is something I would like to think about how we can maintain people engaged to implement the ideas using some elements of gamification that is something I would like to explore"*
- *"Another way we can use it is something I have seen done in other companies into a certain point is regarding people, giving people incentives to contribute with*

their ideas. If you reward people within a kind of game concept based on their contribution to a particular challenge that can encourage a lot of people to participate more"

- *"Gamification is more suited for complex challenges with a concrete output e.g. develop a new product/service"*
- *"Based on the conclusions I come to from watching different teams, the more concrete the challenge, easier to play the game"*

Quotes from Case Study Firm 2:

- *"I think the fit with innovation is obvious. I think the whole process would benefit from gamification approaches but I think more in the brainstorming and implementation phases"*
- *"We have had already multidisciplinary contributions from different areas and departments. But now it only enriches if we can still add other opinions and contributions from possible partners and deep down from possible targets to where this project will impact. I think this is the spirit of co-creation"*

Quotes from Case Study Firm 3:

- *"Design Thinking is a method of approaching a project, which results in specifications from the point of view of the solution, which are the persons of the organization for which the solution is to be created. In my view the gamification may have a close fit with the design of the features that can match the needs or problems and the descriptions of personas. That is, specification of the characteristics of the technological solution"*
- *"Co-creation of an idea together with other is also possible"*
- *"This is a methodology to be used when the project is already defined, that is when there has already been an overview of a digital transformation of the client and when it has already going into a project. And you have to detail this project"*
- *"Language helps in understanding the meaning of the question. Actually I'm associating the gamified method to a phase after the creation of the personas. In fact, personas are the most complex to build, not the personas themselves but the*

dimensions that will create these personas, and this is the process of thinking that had not been thought so far"

- *"Therefore, in addition to perceiving what is going to create a persona, if this characteristic is interesting for overcoming the problems or achieving the goals"*
- *"Only apply gamification after the project was in the process of having to design a conceptual architecture. It can be in the discovery of a solution as in finding the characteristics of the solution. This is what we did (in the workshop) in identifying needs. Perhaps in this construction of the specifications there is space for this method, in what we call the "deep dive" of the solution"*

Despite the close fit with the ESoIP demonstrated by relevant quotes from all case study firms, there are still some remarks regarding idea development. The need to have an already existing idea/output chosen from previous phase of idea generation is a strong requirement for gamification, which can be considered as a limitation in cases where setup was not properly done and teams did not address a concrete challenge or identify an idea that holds potential to be further developed.

4.5.5 Restraining forces

In order to support decision-making, the following two main disadvantages and limitations of gamificiation approaches in relation to other methods and tools used in design thinking, were identified: duration of the entire gamification approach to innovation and the playful approach.

4.5.5.1 Duration of gamification approach

Context: Representative quotes provided by case study firm 1.

Finding: Apparently, there is some contradiction with other views considering that same goals were achieved in a faster way because of the more organized gamification process. Yet, the discussion is about different time frames. For smaller projects, conducted during a month with just one workshop, gamification approach can be considered a timely process.

Quotes and comments:

- *"The gamification whole process took longer than we usually take but got more traction from people. What we usually do is basically get people thinking about a particular challenge, generate ideas and by the end of a full day workshop have a rough outline of a project that they we would like to implement that would meet the challenges that has been set. And then we move to different phase where we already thinking on how to implement this, which is very close to a project plan. So we go through individual idea generation, group brainstorming, and idea development in a day"*
- *"With this new process we took more time, we had more interactions, emails back and forward, voting between workshops. We get people think and reflect on the different stages. However I believe that the outputs are better because of this. So it did not make shorter, make it longer but it worth so far"*

Because case study firm 1 conducted a longer study with several workshops and meetings (see Figure 1), their views about the duration of the whole process were particularly relevant for this study.

4.5.5.2 Playful approach

Context: Representative quotes provided by case study firms.

Finding: Not explicitly, some people are questioning themselves about the advantages and disadvantages of having a more playful approach to critical processes. Most probably, a significant number of people in the corporate world still disbelieve in the potential of gamification to improve business processes. The difficulty to embrace change and adopt gamification is more difficult in cases where playful approaches were already introduced in firms not to gamify processes but to simply provide a more fun environment to employees.

Quotes and comments:

Quotes from Case Study Firm 1:

- No relevant quotes

Quotes from Case Study Firm 2:

- *"People who are more skeptic may think it is not serious and do not pay attention"*

Quotes from Case Study Firm 3:

- *"It has a more playful approach, which is interesting but always depends on the profile of who will participate in the workshop"*
- *"In order to be able to fit in Design Thinking sessions I think we have to adopt the methodology taking into account the players with whom we are going to interact and run the project"*
- *"The fun/game aspect does match with some people, but with others not. I think it has to be always like this"*

As mentioned by firm 2, it is very interesting to realize that the second key limitation of gamificiation approach, the playful approach, was at the same time considered an important driving force. This view was reinforced with others from firm 3.

4.5.6 Potential applications

In order to understand the potential of gamification approaches, it is important to realize how far it can go in regard to other applications in the corporate world. The capability to scale up is a good indicator of its ability to integrate with other business processes and increase the probability of longer-term success. Ideas and suggestions provided by case study firms can be summarized as follows:

Context: Representative quotes provided by case study firms.

Finding: Business processes like human resources, sales and training as well as brainstorming and process improvement are targets of gamification approaches.

Quotes and comments:

Quotes from Case Study Firm 1:

- *"There are little things that people are requested to do on their day-to-day but usually don't have any incentive. And perhaps games could be used to engage people in those kinds of activities"*

- *"I would also be interested in gamification, at a very operational level in our business, so people that are working day-to-day for clients on the job and have particular ideas on how to improve on the processes that are focused on continues improvements. And how can we use gamification to get people more involved in continues improvements. E.g. when you are able to identify things that can be improved, such as reduce waste, improve efficiency and customer satisfaction"*
- *"Gamification can be applied to many other areas e.g. human resource management. Also in team management and in the sales process, because the sale has stage gates phases and people tend to overtake phases. It would be very important for people not to deregulate in the process.*
- *I think it should even be mandatory in universities"*

Quotes from Case Study Firm 2:

- *"We have 2 initiatives going on, one is for simplification purposes and people are gaining points when more simplification suggestions are being made and the other is a gamification of training and product knowledge"*
- *"Process simplification - If we look at processes of simplification and optimization, I think I can also be interesting to apply"*
- *"Training - Also applying gamification for culture change and for training and development"*

Quotes from Case Study Firm 3:

- *"Team building in any situation where is needed the involvement of people"*

These observations confirm some of the possible applications of gamification identified in the literature, namely day to day more repetitive and routine tasks and process improvement or simplification. Team building can be considered a killer application, with a lot of potential in any situation that requires the involvement of diverse teams in a shorter period of time.

4.6 Conclusion

This study illustrates the types of outcomes design driven firms can accomplish when deploying gamification approaches across the ESoIP as well as the driving restraining

forces of gamification in relation to other methods and tools used in design thinking practices.

The fact that the case study firms are already using design thinking approaches to innovation and adopting distinctive principles such as people-centered orientation, creativity and collaboration, make it more able to leverage gamification approaches with positive impact on the ESoIP performance.

Learning from participants' experiences supports the idea that gamification approaches generate hedonic as well as utilitarian and social outcomes of different magnitude and nature. These outcomes were observed with the deployment of a scientific and market-validated gamified method and tool (ideaChef®) that fully complies with the requirements of a recognized gamification framework, i.e. "Game Elements and Hierarchy" (GEH) (Werbach & Hunter, 2015).

The findings suggest all employees are eager to adopt new and more engaging approaches that create a more open and playful environment in which to participate and collaborate throughout the ESoIP. Gamification approach fully involves all employees by creating an open, fun and playful atmosphere appropriate for collaboration and continuous participation in innovation process initiatives. The range of outcomes go beyond employee engagement and include others, such as structure and timely process and creative thinking as well as social outcomes, namely, team spirit and consensus building.

Gamification supports some of the complex tasks employees need to perform throughout the ESoIP, namely, trigger employees to innovation, share knowledge, develop a positive feedback loop, build consensus, drive the desired behaviors, structure ideas and draft possible solutions to challenges/problems. This type of approach helps to overcome major difficulties of managing the innovation process, like setting of goals, coordination of activities, alignment of the organization and motivation of employees.

Gamification complements and enhances design thinking practices by making the ESoIP more organized in terms of structure and focus on goals and people more engaged through a more participated and engaged environment. Yet some strong disadvantages in relation to other methods and tools used in design thinking remain, particularly the suspicion in

relation to the potential of gamification to improve business processes that still exist in many corporate decision-makers.

If not discussing its real limitations, it would not be possible to suggest gamification as an approach that can complement and enhance design thinking practices. Gamification is a game changer approach because it challenges the way firms are usually managed and how power is distributed among the key stakeholders. For many reasons, it has been observed in these gamification empirical case studies that, power is shifting from the middle management to the team-level. For instance, game elements give equal opportunities to everyone to participate no matter the decision of the manager or project leader.

Teams are usually managed within a structure composed by a project manager and other team members with very concrete tasks and responsibilities, which contrast with gamification that truly empowers self-management teams. Also knowledge is build and transferred normally from a top down approach where the experts (owners of the knowledge) turn explicit their knowledge to others by training or doing on the job activities. It contrasts with gamification that promotes a bottom up team collaborative approach where knowledge is generated by a collaborative effort of a diverse team that gives the opportunity to everyone to share their views. On top of that, organization structure is usually hierarchical and non-democratic. Again, it contrasts with gamification that encourages peer assessment, anonymous feedback and consensus building. Finally, and as already identified, organizations are not a fun or even relaxed place to be and work. No matter the advantages of more relaxed environments for people, there will always be some bias from the management in not treating work and game as opposites.

This type of constraints is still difficult to overcome by a large number of firms, which means that despite the growing number of firms adopting gamification approaches, every project with deeper implications in the business processes and day to day work tasks will always have a lot of resistance from people that will lose more power, status and control over the others.

In terms of applications of gamification in the workspace, it has been confirmed a very good fit with the characteristics and requirements of ESoIP. Besides that it shows potential applications in other business processes like sales and training and teambuilding activities.

This study provides important implications for both theory and practice. First, it supports and expands the view of previous studies that integrating gamification in innovation is a promising research avenue. This case study provides important contributions to innovation management theory, particularly to the way firms can successfully manage the innovation process. In fact, by providing a more creative, structured and engaging approach, gamification can help firms overcome the main difficulties and challenges of managing the innovation process in systemic and social perspectives. The latter is related to goal setting and coordination of tasks, while the former is much more about consensus building, involvement and motivation. This is also particularly relevant for managers that wish to successfully apply gamification in order to accelerate systematic innovation practices and successfully launches new services or products in the marketplace by improving employee engagement with innovation processes.

Second, it demonstrates that gamification approaches to ESoIP are perceived as very much focused on the processes and business goals, which emphasizes the management of innovation processes in a system perspective. Actually, gamification approach to ESoIP is clearly more process-driven than other related approaches, e.g. design games and serious playing. Despite its ability to equally generate significant social outcomes, like team spirit and consensus building, gamification can be considered a creative engineering approach that contrasts with the other, less structured approaches more focused on thinking than on doing.

Although efforts were employed to ensure the quality of the findings, there have been some constraints and limitations when planning and conducting the interviews.

First, it would have been important to facilitate and support more closely the five teams during the first two workshops. Most of the participants did not have any experience in this type of sessions and revealed some difficulties in contributing. Therefore, having more facilitators would have helped to get everyone on board sooner and more easily. Second, the participants' time constraints which the researcher had to face during the course of the whole process, have been the main difficulties affecting data collection — a consequence of having inputs from users, not in a laboratory, but in a real work environment. Nevertheless, this practical dimension of the case study provides the validation that is necessary to produce a high quality theory about the way firms are applying gamification

approaches to ESoIP. Third, single cases do not provide so many opportunities for creating more robust and testable theory as multiple cases research.

In terms of research directions and areas for further study, an important opportunity for future studies relates to the deployment of gamification approaches throughout the other phases of the innovation process. It makes sense to investigate how gamification approaches can be applied, not only to other phases of the ESoIP like idea generation, but also to the subsequent stages, i.e. new product development and commercialization. Findings also lead to potential research in other areas of innovation like the co-creation of value with customers by using gamification to facilitate the incorporation of their inputs in the concept design of new products and services.

Further research could also explore existing results in other contexts and business sectors. It would be interesting to study gamification approaches to early stage of innovation in industrial firms with organizational silos that separate different types of employees or even in closed-minded organizational cultures where games and play are still considered a form of diversion from work tasks. Finally, studying how gamification can complement other methods and tools being used by design-driven firms to improve the innovation process may be very promising in terms of future research.

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Appendices

Appendix A - Team-level interview questions

Team-level interview questions for each of the five teams (TL and TM)	**Team-level interview questions for the CEO and board members (BM)**
1. Did you enjoy today's gamification workshop? Why? 2. What is you opinion about ideaChef game elements and process? 3. How would you qualify the value and dynamic of the project as a whole?	1. How would you qualify this project as a whole (meetings, assignments and workshops)? 2. Did the recipes/solutions presented by the team make sense to you? Did you relate to known projects within the firm or in other fields? 3. Are you planning to support the implementation of the solutions presented by the teams? All or just some of the solutions?

Appendix B – Evaluation survey items and results

Please rate from 1 (very poor) to 5 (excellent) the following items:
How satisfied were you with the ____?

Game elements	
1. game materials & design	4,2
2. rules and time constraints	3,7
	4,0
Participation and Motivation	
3. feedback received from other participants	4,1
4. question cards	3,8
5. group competition	3,8
6. play mode	4,3
	4,0
Team spirit	
7. relationships between team members	4,7
8. game environment/atmosphere	4,5
9. balanced contributions of all team members	4,1
	4,4
Consensus building	
10. dialogue between team members	4,3
11. common understanding of issues	4,1
	4,2
Knowledge bulding and sharing	
12. knowledge exchange	4,4
13. diverse background of the team members	4,1
14. value of individual contributions	3,9
15. anonymous feedback	4,0
16. report and pitch of the solution (recipe)	4,1
17. individual overall learning	4,3
	4,1
Creative thinking	
18. expression of your latent thoughts	3,9
19. expanding of opportunities	4,2
	4,0
Productivity	
20. focus on relevant activities	4,1
21. time to convert ideas into projects	3,9
	4,0
Aligmment	
22. fit with idea/concept development phase	**4,3**
Number of respondants	23

Appendix C – Debriefing survey questions for NSD team leader and members

Survey questions
1. How do you evaluate the level of improvement of the proposed solution after conducting this second workshop? 2. How do you assess the support of the workshop facilitator? Did it improve in relation to the first workshop? 3. What are your expectations regarding the implementation of your proposed solution? Are you interested in being part of the implementation team?

Appendix D – Individual-level interview questions for team leaders

Semi-structured interview questions
1. What is you opinion about ideaChef game elements and process? 2. To what extent do you consider that ideaChef contributed to a higher engagement of team members with innovation process? 3. To what extent do you consider that ideaChef contributed to speed up the innovation process? 4. What do you think of the atmosphere generated by the gamification approach? 5. Did you face frustration or openness in sharing views and opinions? 6. How can you describe the process of knowledge transfer among the team members? 7. What do you think of the insights produced by the team members? Did you encounter any surprises? 8. What did you learn in the workshop? Did you learn anything new? 9. Did the recipe/solution produced by the team make sense to you? 10. What are your overall comments about the gamification workshop?

Appendix E – Individual-level interview questions for IM/PM

Semi-structured interviews questions
1. What is your opinion about gamification and ideaChef method and tool in particular? 2. How do you perceive the feedback provided by participants after the workshop? 3. How satisfied are you with the way gamification was applied to innovation process? 4. How do you see gamification approach in relation to the design thinking methodologies and tools that you use? 5. Do you think gamification is well suited for other phases of the innovation process? 6. Do you find any other application of gamification in the workplace?

5. Co-Creation of New Solutions through Gamification: A Collaborative Innovation Practice

Abstract

This study aims to explore the main implications of gamification approaches to collaborative innovation and particularly to co-creation, i.e. interaction and interchange of ideas between users/customers, suppliers and other actors in the development of new solutions. Despite the wider acceptance of gamification approaches to innovation, researchers have not extensively analyzed the link between gamification and co-creation. In order to better understand this complex relationship, empirical case studies with multi-actors participating in a real-life co-creation project have been conducted through the deployment of a gamified method and tool (ideaChef®) and a combination of different instruments, involving speed meetings, workshops and in-depth interviews. Besides advancing the body of knowledge on collaborative innovation practices and conceptualizing the relationship between gamification and co-creation, this study provides several avenues for further research, as well as important implications for managers on how multiple actors can be engaged in such practices through gamification. Moreover, it illustrates how a gamification approach to co-creation has facilitated collaboration between multi-actors with different backgrounds and interests, increased engagement in the process, offered collective creativity experiences, and delivered a clear concept output.

Keywords: Gamification, Co-Creation, Innovation Management, Collaborative Innovation.

Part of this study is submitted to a JCR indexed scientific journal; Authors: Patrício, R., Moreira, A. C., Zurlo, F., & Melazzini, M.

5.1 Introduction

The nature of competitive environment is increasingly demanding collaborative innovation practices in order to support the interaction and interchange of ideas among multi-actors in a knowledge-building environment, such as co-creation of new solutions (Baldwin & von Hippel, 2011). Co-creation is the practice of developing meaningful products, services or systems through a more participative process with engaged company stakeholders involved in a collective creativity environment, which can be described as interaction and interchange of ideas between multiple actors, e.g. users/customers, suppliers and other stakeholders in the development of new solutions, such as products, services, processes, organizational designs and business models (Galvagno & Dalli, 2014; Grönroos & Voima, 2013; Ind & Coates, 2013; Prahalad & Ramaswamy, 2004; Sanders & Stappers, 2008).

By drawing attention to the importance and complexity of co-creation, this study acknowledges that gamification approaches provide a more successful approach to support such collaborative innovation practices. Actually, gamification is the process of making activities more game-like in non-game contexts, to encourage users' motivation and engagement in a particular task (Deterding et al., 2011; Werbach, 2014). These approaches offer a substantial payback in co-creation of new solutions by supporting this practice in an open, engaged and collaborative environment (Ind & Coates, 2013).

This study complements the body of knowledge on collaborative innovation (Agogué, Yström, & Le Masson, 2013; De Silva, Howells, & Meyer, 2018; Ollila & Elmquist, 2011; Ollila & Yström, 2016), co-creation of new solutions (Galvagno & Dalli, 2014; Grönroos & Voima, 2013; Ind & Coates, 2013; Prahalad & Ramaswamy, 2004; Sanders & Stappers, 2008), and gamification of innovation (Roth & Schneckenberg, 2012).

It is an original topic, since there is a lack of empirical research in real organizational settings that explores the use and implications of gamification on co-creation. At the same time, it is very relevant as gamification holds the potential to improve the result of collaborative innovation practices by encouraging the involvement and participation of all key actors in the development of new solutions, i.e. products, services, processes and business models. Moreover, it facilitates the coordination of knowledge between different actors and organization of co-creation, which is particularly relevant in messy and more complex innovation processes.

The purpose is to explore the implications of gamification deployment on co-creation, increasing the understanding associated with this unexplored relationship. Therefore, the key research question behind this study is how can gamification approaches support the co-creation of new solutions in a collaborative innovation context? Research objectives are two-fold: Firstly, to understand how gamification enhances the involvement and participation of multi-actors in the co-creation of new solutions; secondly, to understand how firms manage co-creation practices and grasp its fundamentals.

The main contribution to theory is the conceptualization of gamification in the context of co-creation practices, offering a new research stream particularly relevant for the concept development phase of early stage of innovation. Furthermore, it enriches the body of knowledge on collaborative innovation, contributing to a broader discussion and understanding regarding co-creation fundamentals from the perspective of firms involved in this practice. Besides several avenues for further research that explore potential applications and ways to overcome some of the limitations and difficulties of this new approach, this study provides key implications for managers on how to facilitate and enhance the collaborative development of concepts for new products, services or business models through gamification.

Empirical studies were conducted in a real case scenario of a co-creation project that involved multi-actors, from creative and traditional industries in collaborative innovation practices. In order to achieve a more specific understating of the link between gamification and co-creation and its implications, a case study that involved the customer, the supplier and a team of designers in the concept co-design of a new line of furniture was performed with the support of a gamified method and tool (ideaChef®).

Findings support the idea that gamification enhances user-driven collective creativity, i.e. co-creation of new solutions. Moreover, it demonstrates that gamification provides a more engaging and powerful platform for multi-actors dialogue, mutual understanding, alignment of goals, creative experience sharing and concept development.

5.2 Literature review

Collaborative innovation and value co-creation

The fast changing and more competitive business environment is driving collaborative innovation practices forward. This can be explained by the fact that innovation processes are much more dependent on external knowledge sources and higher levels of collaboration among diverse teams (Ollila & Elmquist, 2011). The dynamic and messy nature of collaborative innovation is highly resource-consuming and often painful, making it more challenging to manage multi-actors that are more difficult to engage, coordinate and support in their knowledge creation (Huxham & Vangen, 2004; Ollila & Yström, 2016).

In order to address this difficult scenario and make collaborative innovation work effectively (Huxham & Vangen, 2004), different forms of managing collaborative innovation have been proposed in the literature. Most of them are focused on ways to engage with external partners, such as innovation intermediaries, open innovation communities, innovation networks, and open innovation arenas (Ollila & Yström, 2016). Innovation intermediaries, who are often called third parties, bridgers, agents or brokers are the ones that provide a supportive role and handle problems related to collaboration among partners during various stages of the innovation process (De Silva et al., 2018; Ollila & Yström, 2016). The involvement of intermediaries in collaborative innovation supports not only collaboration among multi-actors but also knowledge creation by incorporating and transforming the knowledge base of the entire innovation ecosystem (e.g. internal and external) into concrete innovation outputs (De Silva et al., 2018). Innovation intermediaries have been highlighted in relation to other forms of managing collaborative innovation, because of their ability to connect and coordinate knowledge between multi-actors, going beyond the simple brokering and connecting activities and playing a new role as co-creators (M Agogué et al., 2013).

By promoting the interaction and interchange of ideas between multi-actors in a knowledge-building environment, co-creation is therefore a collaborative innovation practice that can be deployed with the support of innovation intermediaries. Co-creation is a growing body of literature on innovation in which firms' users and other relevant stakeholders generate value through interaction in a collective creative environment (Frow,

Nenonen, Payne, & Storbacka, 2015; Galvagno & Dalli, 2014; Grönroos & Voima, 2013; Sanders & Stappers, 2008).

This perspective is driven by companies that want to cooperate with key suppliers and thereby co-create value, meaning that they are no longer on opposite sides, but interacting with each other for the development of new solutions (Galvagno & Dalli, 2014; Prahalad & Ramaswamy, 2004). Co-creation of valuable solutions requires enabling the users to co-create their own unique experience and welcome their inputs for the design of the solution (Gentile, Spiller, & Noci, 2007; Prahalad & Ramaswamy, 2004).

From the perspective of design, co-design is a term used to describe co-creation, and can be considered a specific case of co-creation. Co-design refers to any act of collective creativity, within a diverse team of users/customers and suppliers, with the designers' intermediation, where users' expertise plays a key role in knowledge development, idea generation and idea development (Lee, 2008; Sanders & Stappers, 2008). Co-design takes place in the early stage of innovation, usually characterized by high levels of uncertainty, and encompasses idea generation, idea/concept development, and prototype. Thus, users should be provided with a comprehensive set of tools for ideation and expression in order to ensure close interaction with different stakeholders and provide creative collective experiences, particularly when it is often not known what exactly the deliverable of the co-design process will be (Grönroos & Voima, 2013; Sanders & Stappers, 2008).

No matter all the advantages, co-creation is a very difficult and resource-consuming collaborative process: to unleash its full potential, firms are required to understand its fundamentals and manage such practices quite well. The four principles of co-creation (Ramaswamy & Gouillart, 2010) can be systemized as: 1- Stakeholders only enthusiastically participate in co-creation when it produces value for them; 2- Successful co-creation is focused on providing rewarding experiences for customers, employees, suppliers and other stakeholders; 3- Multiple stakeholders should be able to have a dialogue, i.e. to interact directly with one another; 4- Stakeholders should be able to use platforms, not only IT-based, to interact, share their experiences and develop an understanding of other key players' problems and priorities. Applying these principles guarantees a more positive and productive collaborative environment for the co-creation of

new solutions. Still, it requires firms involved in co-creation practices to master a set of co-creation building blocks proposed by the DART model (Prahalad & Ramaswamy, 2004).

This model suggests the following key building blocks of co-creation: Dialogue; Access; Risk; and Transparency. Dialogue means interactivity and engagement, which implies shared learning and communication between two equal parties; Access means to share information and provide tools to give customers access to data on manufacturing processes, design and fabrication libraries, and quality processes; Risk assessment means to inform consumers about risks they will undergo when participating in co-creation of value, providing not just data but appropriate methodologies for assessing the personal and societal risk associated with products and services. Finally, transparency means that information asymmetry, which benefited companies over customers, is rapidly disappearing. Moreover, as information about products, technologies, prices and costs becomes more accessible, creating new levels of transparency becomes increasingly desirable.

In order to better understand how firms involved in co-creation are managing these collaborative innovation practices, the following research question is proposed: How aware are firms of co-creating fundamentals?

Gamification

Gamification is known as the use of game-based elements in non-game contexts to encourage users' enjoyment and engagement, particularly in performing a difficult and complex tasks (Deterding et al., 2011; Galetta, 2013; Harwood & Garry, 2015; Piligrimiene et al., 2015; Robson et al., 2015). Gamification is a hot topic among researchers and practitioners alike, covering areas such as education and training, human capital, hospitality, healthcare, entertainment, marketing and sales (Borges et al., 2014; Dicheva et al., 2015; Hamari et al., 2014; Mora et al., 2015; Raftopoulos et al., 2015; Seaborn & Fels, 2014). However, only a few studies have explored the relationship between gamification and innovation (Roth et al., 2015).

By providing gamified experiences, such as fun and a feeling of mastery, organizations are making desired behaviors more engaging even in routine tasks and contexts that are normally more boring (Harwood & Garry, 2015; Koivisto & Hamari, 2014; Roth et al.,

2015). Gamification can be applied to many enterprise functions involving participants within a firm, e.g. to improve employee engagement or outside it, e.g. to co-develop products with customers (Piligrimiene et al., 2015; Robson et al., 2015; Ruhi, 2015) and is not restricted to digital approaches like software for computers and smartphones (Deterding, 2015).

The development of successful and meaningful gamification experiences involve the application of design principles in the development of the user experience environment like psychological, social, behavioral, and cognitive science theories and principles from multiple disciplines to ensure the experience provided to users is fun and challenging, which is much more than a simple process of applying points systems, rewards graphics, colors, and animation (Harwood & Garry, 2015; Schoech et al., 2013). Gamification attempts to encourage engagement, enjoyment and user motivations toward various activities, based on foundational psychological theories, including self-determination theory and intrinsic and extrinsic motivation (Hamari & Koivisto, 2015; Seaborn & Fels, 2014). Yet, only a well-designed gamification experience with the right mix of rewards and emotions can induce the desired behavioral changes so that employees repeat the behavioral outcome desired by the organization in a habitual or routine form (Robson et al., 2015).

Regardless of how powerful gamification can be, elements of spontaneity, play, and exploration are often absent from collaborative innovation practices of co-creation, which typically emphasize analytical and not creative thinking approaches (Ind & Coates, 2013). In order to clarify how gamification is able to support co-creation practices, a second research study question is proposed: How does gamification enhance co-creation, i.e. participation, interaction and interchange of ideas among multi-actors in the development of new solutions?

5.3 Methodology

5.3.1 Theoretical purpose and case selection

Case research was the method adopted to understand the unexplored relationship between gamification and collaborative innovation practices of co-creation. This method is appropriate as it facilitates a more comprehensive understanding of such an emergent

phenomenon (Goffin, Ahlström, Bianchi, & Richtner, 2018; Kindström, Kowalkowski, & Sandberg, 2013; Ponelis, 2015; Yin, 2009). An exploratory research about the main implications of gamification approaches to co-creation is therefore needed to close the gap identified in the literature about the absence of gamification approaches in collaborative innovation practices of co-creation (Barratt, Thomas, & Li, 2011; Goffin et al., 2018; Yin, 2009).

In order to acquire a better understanding of how gamification is being used to support co-creation collaborative innovation, two empirical studies were conducted. The first study provided valuable insights about the way firms, in a real case scenario, grasped the fundamentals of co-creation. It additionally served as a pilot study to adjust and improve interview design and guides of the subsequent single case study that applied gamification method and tool to a concrete co-creation case. This case study design served the purpose of this exploratory research, i.e. to gain a qualitative understanding of the underlying reasons and motivations of the phenomenon within a real-life context that have a clear research purpose (Yin, 2009).

The cases were chosen for theoretical reasons, exhibiting extremely rich and appropriate data to help understand the phenomenon (Eisenhardt, 1989; Meredith, 1998; Yin, 2009). Empirical research sample was taken from a concrete Co-Create project co-financed by the European Regional Development Fund of the European Commission. The goal of this project is to support cross-fertilization processes between creative industries and traditional clusters, contributing to test co-design and creative methods applied to entrepreneurs and clusters managers. Therefore, cases from Co-Create project were selected for this exploratory research because of the good match between the goals of firms involved in this project and the promotion of collaborative innovation practices of co-creation – in fact, Co-Create project aimed to promote the cooperation with new methodologies and tools addressed to clusters managers, SMEs and policymakers. For all these reasons, co-Create project provided an appropriate scenario for exploring and understanding how gamification can be used to support co-creation of new solutions.

5.3.2 Data collection

Empirical research studies have been conducted through a combination of different instruments, i.e. speed date meetings, gamification workshops and interviews to address research objectives.

A first study was developed during one of the activities of Co-Create project, called speed date meetings, in which business-to-business meetings were held to connect firms from traditional sectors (customers) and creative industries (suppliers) in the search for opportunities to co-create new solutions. A sample of firms participating in these speed date meetings (see Table 5-1) was selected to assess how far their representatives were aware of the basic frameworks of co-creating practices, particularly regarding the building blocks of interaction and interchange of ideas. Firms from two creative industries and two traditional clusters were chosen to provide more balanced and richer data. The purpose was to gather insights about the way firm's representatives were grasping and mastering the building blocks of co-creation, i.e. dialogue, access, risk, and transparency when co-creating new solutions e.g. products, services, processes, organizational designs, and business models.

Table 5-1 Speed Date Meetings: characterization of the sample

Participant	Role of the Participant(s)	Perspective	Type of industry
#1	Administration Manager	Supplier	Creative Industries (Merchandising)
#2	Head of Design and Head of Marketing	Supplier	Creative Industries (Product design)
#3	Marketing Manager	Customer	Traditional Clusters (Furniture accessories)
#4	Head HR/Finance and Sales & Marketing	Customer	Traditional Clusters (Metalworks)

After the speed date meetings session, individual interviews were conducted with the four participants, i.e. firm's representatives, following a semi-structured procedure, which included a number of questions focused on the participant's experience and not specifically on the above-mentioned building blocks (see appendix 1). The goal was not to influence participants about research statements but to let them spontaneously express their own experiences and expectations about this kickoff phase of co-creation practices.

In order to understand how gamification enhances co-creation, i.e. interaction and interchange of ideas among multi-actors in the concept development of new solutions, a

second study was conducted. The study was based on a concrete case of an opportunity identified during the previous speed date meetings session, involving a diverse team (composed by users/customers, suppliers and designers) in the co-design of a new line of furniture (see Table 5-2). This case was selected because of the research potential it offered to explore the deployment of gamification in such practice.

ideaChef® was the gamified method and tool applied during a workshop session held at the university to enable the co-design of a new furniture line concept. Workshop participants included representatives from a flooring manufacturing firm (the customer of this new concept), a creative studio (potential supplier) and designers (external party, intermediating and providing inputs for the concept design). During the gamification workshop, the team developed further the initial concept proposed by the creative firm to the flooring manufacturer. This concept addressed a brief that was prepared and submitted by the flooring manufacturer, during the first session of Co-Creation project.

Table 5-2 Gamification Workshop Session: characterization of the sample

Participant	Role of the Participant	Perspective	Type of industry
#1	Area Director	Customer	Traditional Clusters (Floor Manufacturing)
#2	Head of Design	Supplier	Creative Industries (Product Design Studio)
#3	Designer	Designer	University
#4	Designer	Designer	

Immediately after the workshop session, a debriefing interview was conducted with all participants to quickly discuss their experience and results (see appendix 2). In-depth interviews were conducted the week after with each of the participants, exploring in more detail their behaviors, concerns, motivations and expectations as well as implications of gamification approach to co-creation (see appendix 3). Research questions were not addressed directly during the interviews in order to prevent leading questions, which might tempt interviewees to confirm the study design to please the researchers or to look good in the study (Zomerdijk & Voss, 2009).

Data collection process followed a clear procedure. Firstly, data was collected from multiple sources, i.e. interviews, speed dating meetings and workshops observations, complemented by internal documents of Co-Create project, which allowed triangulation

(Eisenhardt, 1989; Yin, 2009). Secondly, origin of data gathered as well as debriefing and in-depth interview questions was provided, making it possible to replicate data collection. Finally, data was reviewed and validated by one of fellow researchers not part of the data collection (Goffin et al., 2018).

5.3.3 Gamified approach

ideaChef® was the gamified method and tool chosen for supporting the co-creation workshop session. It is a scientific and market validated approach with a proven track-record in idea development and co-creation that followed the 6D, or six steps to gamification framework (Werbach & Hunter, 2012). ideaChef® was chosen because it enables diverse teams to convert high potential ideas into working concepts or prototypes. ideaChef® serves to create solutions ("recipes") that address a particular challenge, need or problem, related to either internal processes or to the external market, based on an existing idea. It supports convergent thinking by helping to narrow a number of potential solutions down to a "best fit" solution, which provides an engaging and more efficient way of selecting and developing ideas to be prototyped or implemented (Patricio, 2017).

ideaChef® was created to maximize user' motivation and involvement in the early stage of innovation. It uses a combination of game dynamics, mechanics and components, inspired on the 6D framework (Werbach & Hunter, 2015), that was designed for a team of four up to six players and can be played multiple times by the same team playing different ideas, or by multiple teams playing the same idea.

5.3.4 Data analysis

Data gathered from firms that participated in the speed date meetings (see Table 5-1) were grouped into the following four groups: dialogue; access; risk assessment and transparency related to key building blocks of DART model that enable interaction and interchange of ideas between users/customers, suppliers, and designers in the development of new solutions (Prahalad & Ramaswamy, 2004).

Regarding the second study (see Table 5-2), thematic analysis was used for analyzing, organizing, describing and reporting patterns, within data collected (Braun & Clarke,

2006). Data from interviews with gamification workshop participants was grouped into four themes.

An iterative process allowed us to define four complementary themes: firstly, discussing the principles identified in the literature from the perspective of users/customers, suppliers, and designers involved in the collective creative process. Secondly, crosschecking these principles with results of the first study. Thirdly, adjusting to the relevance for the next phases of the early stage of innovation, which are still characterized by high levels of uncertainty and risk; and, finally, defining the final themes.

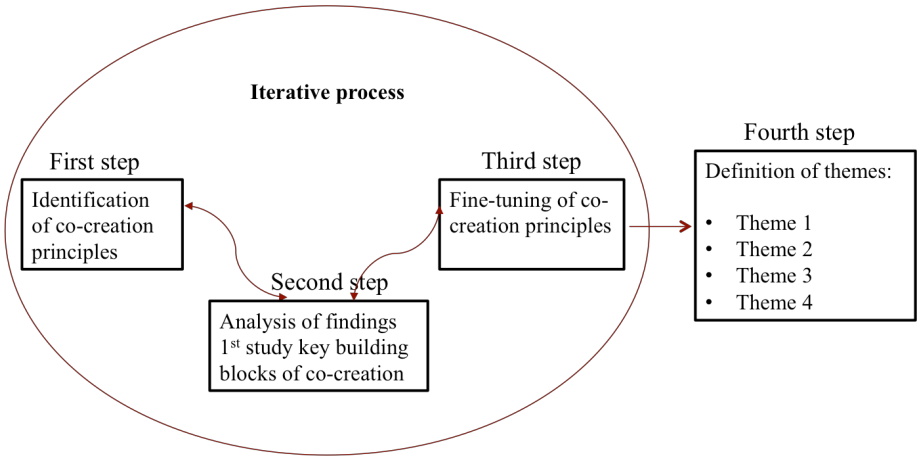

Figure 5-1 Coding diagram

A comparative analysis of the perspectives of the customer, supplier and designer in relation to all these four drivers of co-creation was summarized in the next section of discussion of findings, in which self-explanatory quotes from the interviews were decoded and used to explain particular aspects of the co-design process.

The data collection and analysis process ensured the quality of research. Case research design with two empirical studies enabled the triangulation of findings. In fact, results from the first study provided valuable insights on how to approach co-creation and helped to generate the themes for the second study. Besides that, the clarification of the procedure used to define the themes (see Figure 5-1) facilitates its application in other research settings.

5.4 Findings and discussion

5.4.1 First Study

The main goal of this first study was to provide a better understanding of how firms' representatives were aware of co-creation building blocks, i.e. a) dialogue; b) access; c) risk; and d) transparency.

5.4.1.1 Dialogue

Context: Quotes provided by speed date meetings participants.

Finding: Dialogue building block is easy to grasp in representative quotes from interviews.

Quotes and comments:

The need to share communication was mentioned by both parties, i.e. suppliers (participants 1 and 2) and customers (participants 3 and 4). From the supplier's side, the difficulty to successfully engage with customers is in general quite explicit, either because of lack of communication or knowledge about the core business, a view that is supported by the following quotes:

- *"We sometimes lack expertise in the business of the client (participant 1)"*
- *"We faced some frustration for not having a clear answer from the other part. I could not understand if the person in front of me, representing the firm, really appreciated what we presented and wished to develop it further or just wanted to pick up some ideas (participant 1)"*
- *"We find it easier to communicate with foreign than with Italian firms (participant 2)"*

Yet, it seems that in the concrete case of speed date meetings, interactivity and engagement with the customers was very positive, as mentioned by participant 2:

- *"Most of the briefs were pretty clear and only some slightly blurred, so the dialogue and the communication put us in a good position to develop something further (participant 2)"*
- *"We have received very positive feedback, one firm has basically engaged us and therefore told us that they want to work with us (participant 2)"*

When it comes to the customer perspective, the same difficulties of communication are reflected in the following points of view:

- *"I told you that we produce furniture handles but if I give a brief about what new handles I would like to receive, I will probably receive proposals for different shapes. Yet I am not looking for a new handle shape but to redesign or rethink strategically what is the product for (participant 3)"*
- *"Sometimes there is some frustration when we are talking about specific characteristics of the product and the other part/person cannot fully understand what our problems and needs are (participant 4)"*

As clearly demonstrated, the customer becomes frustrated with the difficulty of the supplier to understand their business and jobs to be done (Christensen et al., 2016).

5.4.1.2 Access

Context: Quotes provided by speed date meetings participants.

Finding: In relation to access, all customers and suppliers demonstrated openness to share information and give access to data on strategy and business processes to the other party.

Quotes and comments: Much more openness was found on the customer's side in relation to this building block as illustrated by the following quotes:

- *"Sharing ideas is something that gives you an added value. Sometimes you are too worried about secrecy and forget that when going to a trade fair you are very exposed to competitors (participant 3)"*
- *"We don't make final products but accessories, so the furniture is the star and our products should respect the furniture. That's the most difficult thing to pass onto designers because if the designer doesn't know this particular market of accessories for furniture she/he is going to look for a solution for products and not for accessories (participant 3)"*
- *"I have been working for more than 20 years in this firm and I am doing things automatically even if I am always trying to be open-minded. That's why having the possibility to stop and watch other companies and be seen by other firms in different ways is quite interesting (participant 3)"*

- *"We don't think we had any issues sharing our vision with the others (participant 4)"*
- *"Maybe this project will make our people understand the importance of being open. Smaller companies do not have internally the resources to find all the solutions so we need to open up a little bit and talk to other experts to find the best solution for our customer (participant 4)"*
- *"We were free to share our business views and we are not too jealous of our value proposition, which is very much linked with the people that work in the firm. It is not sharing some of our power point that could be a problem, we need to be more open and talk with people to find a solution (participant 4)"*

These views towards suppliers reflect the characteristics and size of these customers, typically SMEs, which are forced to engage with innovative suppliers to remain competitive. Furthermore, showing openness to establish partnerships with other firms that could generate more value to customers, as mentioned below:

- *"Our group was making an accessory for a new project and another supplier was doing some other parts in aluminium for the same client. However, we did not network and it would be interesting to speak together (participant 3)"*

One of the suppliers emphasized the openness of customers that participated in the speed date meetings:

- *"We have found very open and friendly companies and honestly curious companies (participant 2)"*

The other supplier was much more focused on supporting the customer and its vision:

- "As a creative firm, our job is to put together different people and ideas, creating something new for our client. This way you don't lose your time and you can be able to realize the dream, the thinking of the client (participant 1)"

5.4.1.3 Risk and Transparency

Context: Quotes provided by speed date meetings participants.

Finding: Dialogue is easy to grasp in representative quotes from interviews

Quotes and comments: Despite clear support for dialogue and access, all firms overlooked risk assessment and transparency, building blocks of co-creation. Regarding risk assessment, one of the suppliers mentioned:

- *"You cannot always be sure of the loyalty of the other part, it is a challenge and a risk, but is part of our activity (participant 1)"*

Yet this is much closer to lack of engagement and not so much about the type of risks customers should be aware of when participating in co-creation of value. Likewise, no evidence was found relating to explicit or implicit comments to information asymmetry protecting the suppliers over the customers, which means that the transparency building block was also unobserved.

Findings from the first study show overall support for dialogue and access building blocks of co-creation. The motivations, expectations and concerns of firm´s representatives from both suppliers and customers, when starting with collaborative innovation practices, are very much focused on dialogue and communication between two equal parties, as well as on information sharing and access to business data that is critical for the concept co-design. Nurturing this collaboration capability enables us to overcome typical difficulties that take pace in co-creation practices. However, it was not possible to find support for risk assessment and transparency building blocks of the DART model. Data collected from co-create project cannot fully support the idea that these firms are aware of and mastering all the building blocks of co-creation.

5.4.2 Second Study

This second study provided important insights on how gamification enhances co-creation of innovative concepts in a collaborative environment. These are structured in four core themes that were defined as a consequence of the fine-tuning of co-creation principles.

5.4.2.1 Diverse team

Firstly, there is strong support from data that gamification enhances co-creation process by facilitating dialogue and communication among team members with different backgrounds and interests (see Table 5-3).

It has been recognized that it is difficult to manage multiple stakeholders with expected conflicting agendas and views. However, as mentioned by the customer, everyone was feeling free to express their inner thoughts even if sometimes going against what others were suggesting. No matter some concerns demonstrated by the one of the designers in relation to expressing some criticism to the initial idea, the customer handled opposite views very well. Therefore, one of the main advantages of gamification was to put these stakeholders together working on a project in a collaborative and friendly environment.

From all perspectives, i.e. customer, supplier, and designer, having an outsider and particularly a designer was clearly appreciated, bringing non-biased views and more breakthrough contributions to the discussion. Designers are typically open to discussing ideas and more able than suppliers to contradict particular views of the customer, which could be a good argument for involving designers in co-creation.

Table 5-3 Diverse team

Perspectives	**Representative quotes**
Customer	It was absolutely nice to work with people outside my organization. Didn't find any constraints. I could speak without any problem and also think that other people were telling what they had in mind. As (the designer) demonstrated a couple of times, providing some criticism to the project. We think we were all in a good mood, discussing things. In a startup, I don't feel any risks of working with externals, you have to go through this process of sharing doubts, ideas, and intentions since you do not have other options. But in some other situations, e.g. when we are not starting something new, I could feel a little bit constrained to be forced to share and receive contributions.
Supplier	I can't see any risks of having people that are not (directly) involved in the process. In fact, introducing an external designer was good and useful because he found some specific things we could not reach. And probably allowed a better understanding of the process. Sometimes we are too concentrated in our fieldwork and it is good to hear different points of view from other people.
Designer #1	I felt comfortable working with a diverse team. For us, designers, it was quite natural but I don't know for other people working in companies. It was a good opportunity to work with the customer in this concept but maybe he was not satisfied by some criticism about his personal views. I was also interesting to see how the other designer that was not involved in anything related to the concept gave a good contribution.
Designer #2	I was external to the project, so a lot of things surprised me but it was not difficult to work with other people.

Another interesting finding was the close fit of co-creation with the particular stage and context of the customer. In fact, this firm was a spinoff of a traditional business that was specifically created to develop this new concept. Under this early stage of the firm, openness and collaboration with externals is not an option but a clear need. This learning can be replicated in other organizational contexts that require inputs for third parties, for instance startup firms during the early stage.

5.4.2.2 Engaging approach

Secondly, there are many good pieces of evidence that gamification enhances co-creation process by providing a more engaging approach (see Table 5-4).

In fact, everyone considered this gamified approach a sort of brainstorming but much more structured and powerful in terms of engagement. There was strong consensus around the two factors that explain higher team engagement with the co-design process: 1- using game elements and 2- providing a clear structure that facilitates open discussion, team alignment, and achievement of concrete results. The important game mechanics, such as the need to stay in time, randomness challenges that introduced elements of surprise and clear rules that ensure everyone stays focused on the process, clearly improved participants engagement in the co-creation session.

Table 5-4 Engaging approach

Perspectives	Representative quotes
Customer	The process is like a brainstorming but still, it gives always a possibility to get back to the main thing we are talking about. This approach contributed to higher engagement because we were playing. Is nice because it keeps the conversation, let's say at a lower level, where everybody is somehow on the same page. And if someone is proposing something stupid then you have to recognize and discuss it. Otherwise, it's another point of view and you have to consider it in a critical manner. I think is a good tool to have.
Supplier	Since the process is structured like a game it probably increases the involvement of people, a large range of people. I think it is a good process to share ideas, is a more structured way to do brainstorming. This way it was easier and clearer to reach some results during the process. In the beginning, it is a bit difficult but during the process you feel more comfortable because you become more confident with the other people and the process. This process provided to the customer a more aligned and structured thinking, and the same for the other participants. We are now thinking about the same problems and points, having now a common vision about the project. This process was very useful when it comes to generating concepts.

Perspectives	**Representative quotes**
Designer #1	The session was a sort of brainstorming but much more structured that put all people at the same level, so it doesn't matter if you are with someone from a different industry. The game is good for involving people because is not static and is also funny. It is a good thing to mix different ideas because is good for the customer but not only for the customer. I also come back with new knowledge. It obviously increased team spirit among the team. I think the supplier is now closer to the customer. I was also interesting to see how the other designer that was not involved in anything related to the project gave a good contribution.
Designer #2	As explained, this process was not completely linear since along the time we have found different questions from different topics and some were overlapping so the discussion was going back to certain topics and we were understanding which points of the strategy were more valuable to discuss or even the topics where there were more disagreement and the ones that everybody was agreeing. So it was faster to go in the right direction. The rules of the game were easy to follow. The only thing maybe a little bit difficult was sometimes to stay in time. But it was more difficult at the beginning and then it was easier to get on time. And about the things translated at the big board, as the other designer said, you find that everything is linked and is easy to follow the kind of circular process with the six parts of the board. It is easier to speak and be clearer about an idea and also to be more open, i.e. agree or not agree with some points. Actually, it surprised me how some ideas were coming out in a short time, especially with the timing of writing down the answers. This approach contributed to higher engagement of team members. The fact that you have to stay in time. I also loved the fact that you never know what the next question is. I remember the second time I throw the dice and picked up a card again of the same topic and I said no I don't want to answer this topic again but after that, it was nice because I thought about that before. And it was also a little bit of suspense when I was picking a card and was hoping that this time would be easier to answer. These kinds of things are really engaging. The way was built with different categories and specific questions facilitated the exchange of knowledge especially with people with different backgrounds. Because a lot of times, I experienced people speaking about one thing and then thinking about different things, even people with the same background, especially when speaking about non-tangible things. When speaking about a product is easier but for some strategic issues is difficult to talk about the same thing and this kind of game was really powerful to tackle single problems at a time and putting them together. I think that at the beginning was a bit difficult because I did not know the customer and was external to the project. But I think this kind of game, especially when people are starting to tackle more sensitive issues like the things people wanted to discuss more, provides a discussion environment where people are not worried about what they are going to say. At the beginning, I was thinking if the evaluation was really important but at the end, I think it was really important because it was not just evaluating the idea but more about getting consensus about that, so it is easier to understand if everybody was agreeing with that or it was just a personal thought.

According to designers' perspective, this structured process allows customer and supplier to work more closely with each other. Encouraging the participation of all and giving

everyone the same opportunity and time to share views, contributes significantly to knowledge and consensus building as mentioned by all parties.

5.4.2.3 Output

Thirdly, there are also many good pieces of evidence supporting the idea that gamification contributes to enhancing co-creation process by delivering a clear output i.e. a draft report of the concept developed (see Table 5-5).

Table 5-5 Output

Perspectives	Representative quotes
Customer	I am absolutely satisfied with the draft of the concept that we achieved and I still do think that we have to look for a second (ideaChef) session. During this session, we were a little bit forward regarding things what we usually do not consider when we are only focused on the product, like communication to the market. So I think it was really nice and we will have to spend more time on the draft report of the session because we have been through it too quickly.
Supplier	I was satisfied with what we find out at the end. As already said, the game was very useful.
Designer #1	I am very satisfied with the draft report of the session. Particularly satisfied with the end of session, the final process was the main part of the session because I was really surprised with the end result; we have accomplished a lot of things and it is very interesting.
Designer #2	I am satisfied with the draft idea that we reached because I was always a bit skeptical about some kind of games. Also because when started you don't get immediately the outcome and at the same time you are not feeling free. But I felt really free in this game and that´s why I loved it, it was structured but I was feeling free to answer, there were some constraints but if you wanted to say something not linked to the question you could say and still valid to the final outcome. The tool was pretty aligned with the co-creation. The only question was probably the timing. I don't know the real situation about the company and how they can implement what he was thinking at the time he was saying. But the situation they are having is the right one since they are starting the company. Probably the riskiest thing is co-create something together and then not going again forward with it together. Sometimes can also be some misunderstandings about the outcome if there is not a real and clear report. It may happen that when finishing everyone may have the same idea but in some days things can change and you go back to the co-creation.

It was interesting to see participants surprised by getting a draft report of the concept just at the end of a half a day workshop session. The customer revealed this particular approach was useful for providing a clearer picture of the idea and its main market implications. The determination to conduct a second workshop session to improve the results achieved during this session is a good indicator of the value perceived by the customer and all the other parties involved in co-designing the concept.

5.4.2.4 Collective creativity experiences

Fourthly, there are also many good pieces of evidence supporting the idea that gamification enhances co-creation process by providing collective creativity experiences among participants (see Table 5-6).

Table 5-6 Collective creativity experiences

Perspectives	Representative quotes
Customer	I have found some good insights from everybody even from people that we not directly involved in the project like the facilitator and the other designer. Even more, it's a good thing because it worked out.
Supplier	I think it promoted more creative thinking because it was possible to reach some points that individually we can´t understand. Having other people in the process can make it clearer. I did not find any surprises in terms of insights but I think they are much more clear.
Designer #1	For creativity maybe different tools, more material or dynamic like drawing or different can be used, instead of using blackboard seated at the table maybe moving will increase more the creativity. Maybe it was easy (to because more creative) because we were designers and for creative people, it may be simpler.
Designer #2	I think that we get really good insights because I was hearing what the customer was saying when we started the game, and I think after the game the concept become really interesting and different in respect to what the customer was trying to do at the beginning Music was nice to enable creativity. In our group everyone liked that kind of music but finds some images to illustrate the boundaries, however, it may influence too much was the people were thinking.

From the customer and supplier's perspectives, gamification approach facilitated the generation of valuable insights that transformed blurred market issues into visible and clear directions. However, designers have mixed views regarding enhancement of creative thinking. Given the nature of their role and domain of creative approaches, one of the designers felt that other creative tools and methods should be introduced into the co-design process.

Representative quotes from the debriefing interview, gathered immediately after the gamification workshop, reinforces the importance of the second (engagement) and third (output) themes:

- *We liked the gamification approach because is interactive, is a game and not a common tool. It is similar to brainstorming but is more attractive and interesting and more structured. It is always nice to have a structured way, because with*

brainstorming you started with something and sometimes go into the wrong direction, wasting a lot of time because of that. And having something that keeps your mind on the main topic is nice.

- *It is also interesting to see the final results, because I didn't expect that! I was surprised. Because there is a real structure and at the beginning I didn't imagine that. From the first question to this result, it was a big step.*

With such feedback, it becomes easier to understand the need of having a structured process to ensure high engagement of all stakeholders. As mentioned by one of the designers, this gamified approach makes intangible thoughts more tangible.

Findings of this second study support the view that gamification approach enhances user-driven collective creativity, i.e. co-design of new solutions. Despite having valuable inputs from the customer, contributions were very balanced and subject to a peer-review process that encourages good contributions no matter what the role of participants. Moreover, as demonstrated in the case of Co-Create project, applying gamification have resulted in increased collaboration capabilities and improved co-design process with a clear return for all stakeholders.

5.5 Conclusion

The study addresses the research questions, showing how gamification enhances the engagement of different actors in the co-creation of new solutions, as well as how firms are managing the fundamentals of co-creation. Findings demonstrate that gamification plays a key role in supporting the management of collaborative innovation practices by providing a peer-to-peer structured approach that ensures close interaction with different actors, encourages contributions from all participants, supports knowledge creation and provides collective creativity experiences.

Gamification approaches have shown positive impacts, fundamentally when applied to situations where new solutions can only be co-created by a diverse team, i.e. multi-actors with different roles, backgrounds, and knowledge. Multi-actor's engagement comes from the value they are expecting to achieve with this new approach, which is not only perceived as something intangible like motivation but also more concrete in terms of development of work tasks that will eventually end up with a more advanced concept to

prototype or implement. Representative quotes from the interviews are self-explanatory in relation to this unique and rewarding experience, illustrating how gamification provides a more engaging and powerful platform for multi-actors dialogue, mutual understanding, alignment of goals, creative experience sharing and concept development.

The best way to grasp the fundamentals of co-creation is being directly involved in co-creation practices. Fortunately, firms participating in the Co-Create project provided important insights on how they perceived the building blocks of co-creation. The first study shows the importance and relevance of dialogue and access building blocks of co-creation in managing these collaborative innovation practices. Firms' representatives extensively considered interactivity, engagement and information sharing as the key drivers to nurture required collaboration capabilities. The second study confirmed these findings, emphasizing the role of gamification in bringing different people to talk together and share information in an open, structured and creative environment. However, data collected from firms' representatives was unable to illustrate any type of concern in relation to information requirements about potential risks customer may face and the information asymmetry that benefited suppliers over the customers. Likewise, participants from the second study did not demonstrate any particular need to address risk assessment and transparency building blocks of co-creation. Most probably, this situation is due to the lack of information and awareness with regard to issues that can only be perceived at a later stage of innovation or by more mature organizations. It is important to bear in mind that this co-creation practice is focused on the early stage of innovation and not having already a product or service ready to market, which makes it more difficult to foresee risks customers would have to take on or transparency measures to put in place.

The boundaries of this research study were established in advance: it is clearly focused on the application of gamification with reference to businesses, where multi-actors join efforts to develop valuable concepts in a creative environment. Therefore, it excludes situations where gamification approaches may not have a business goal or others related to pure-play environments. Still, there is an important limitation connected to the type of firms involved in these empirical researches. It should be kept in mind that all firms' representatives were very open-minded professionals and enthusiasts of collaborative innovation environments. Even firms' representatives from more traditional sectors were used to work with external

actors and less averse to new approaches. It should be interesting to test whether the gamification approach to co-creation would have the same results in cases of industries that are less open to collaboration and interaction with external actors or less mature in terms of collaborative innovation practices.

Still many other avenues for further research can be investigated. Firstly, to explore in depth the role of designers in co-creation, or co-designing of new-solutions. Being an external party, having designers on board provide a good opportunity to address unusual questions, as well as to introduce bolder ideas and different inputs that are often out of typical customer and supplier discussions. Besides that, it seems that designers can be seen as a new type of innovation intermediaries in the co-creation of new solutions by mediating and triggering the relationship between the customer and supplier and facilitating knowledge creation.

Secondly, to develop a new type of gamification approach to address a particular setting of idea/concept deconstruction. Instead of looking for ways to improve and develop the idea/concept, it could be interesting to test whether the gamification approach to co-creation works for trouble-shooting and identifying hidden problems and limitations of an existing idea/concept. Thirdly, to examine risk and transparency implications of co-creation in the era of digital transformation; particularly how firms are managing these two building blocks of co-creation that are misrepresented in these empirical studies, when almost all critical information about products, technologies, prices and costs are available online and from multiple sources. Fourthly, to clarify the roles and influence of different actors engaged in co-creation collaborative innovation practices, disclosing their behaviors, concerns, motivations and expectations.

In conclusion, this study offers valuable insights on how integration of gamification into co-creation substantially enhances collaborative innovation practices and opens new and relevant avenues for further research. Results demonstrate that the gamification approach supports the engagement of all key actors in co-creation by encouraging continuous dialogue, interaction and learning, which facilitate longer-term relationships and process improvement.

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Appendices

Appendix A - Semi-structured interviews questions for the speed date meetings

Today's session	**Expectation for the next phase of the project**
1. Did you enjoy today's session? Why? 2. How would you qualify the value and dynamic of this creative approach as a whole? 3. What is your opinion about design-driven methods and tools to support co-design of innovative solutions? 4. Did you face frustration or openness in sharing views and opinions during the meetings?	5. What are your expectations regarding your involvement in this project? 6. What do you think of having team members with different experiences and views working together to co-create better solutions?

Appendix B - Debriefing questions for the gamification workshop

Interview questions
1. Did you enjoy today's gamification workshop? Why? 2. What is your opinion about ideaChef game elements and process? 3. How would you qualify the value and dynamic of the whole project, i.e. the speed dating meeting and, the present gamification workshop?

Appendix C - Interviews questions for the gamification workshop

Semi-structured interview questions
1. How can you describe the process of (innovative solutions) co-design among the team members? 2. What do you think of the insights produced by the team members? Did you encounter any surprises? 3. How did you feel working in a team environment with other people outside your organization? 4. Are you aware of the risks of collaborative working? 5. How satisfied are you with the value of the solution (recipe) co-designed by the team? 6. To what extent do you consider that a gamified approach like ideaChef contributes to a higher engagement of team members? 7. To what extent do you consider that a gamified approach like ideaChef contributes to knowledge building and sharing among team members? 8. To what extent do you consider that a gamified approach like ideaChef contributes to enabling creative thinking? 9. To what extent do you consider that a gamified approach like ideaChef contributes to increasing team spirit and consensus building?

6. Conclusions

6.1 Research alignment

The purpose of this section is to illustrate the linkages between objectives, research questions and studies. Table 6-1 shows the different levels of alignment between objectives, research questions and studies, which explains the rationale for the development of these studies and how they contributed to the achievement of the objectives. The first objective 1 (O1: To provide a comprehensive and organized picture of the use of gamification approaches to the ESoIP, illustrating its main application domains and outcomes) was achieved with the contribution of studies II (see chapter 3) and I (see chapter 2). The second objective (O2: To empirically examine the deployment of gamification approaches to ESoIP) was achieved with a strong contribution from studies III (see chapter 4) and IV (see chapter 5). Finally, the third objective (O3: To explore the way gamification approaches support and enhance design thinking practices) had the support from studies III (see chapter 4) and IV (see chapter 5).

Table 6-1 Linkages between objectives, research questions and studies

RQ and Studies	O1	O2	O3
RQ1 - Study I	Strong	Moderate	Moderate
RQ2 - Study II	Very strong	Moderate	Moderate
RQ3.1 - Study III	Moderate	Very strong	Very strong
RQ3.2 - Study IV	Moderate	Very strong	Strong

The first study is linked to the first research question (RQ1: How can gamification approaches, and ideaChef® in particular, help teams get committed and engaged in corporate innovation and entrepreneurship practices?) and is very much in line with the first objective (O1).

The study I served to systematize different cases of ideaChef® deployment and gather valuable insights on how it supported innovation practices and delivered the desired outcomes. In fact, representative quotes were collected on how ideaChef® allows teams to tackle the difficulties identified in the literature regarding the management of the innovation process, particularly during its early stage. These case studies provided a better

understanding of how gamification approaches can be used to support the innovation process and particularly at its early stage.

Findings emphasize the identification of potential advantages and applications of gamification in the innovation management context as well as in the entrepreneurship field. Moreover, it clarifies the main application domains of ideaChef® in the innovation space and emphasized the following key outcomes: structured creative problem solving process and team building.

Besides addressing the first objective, findings of the study I demonstrate a close match between ideaChef® and the research goal of conducting empirical research studies with a gamification method and tool.

In fact, it was observed that the following ideaChef® characteristics and features were appropriate for examining gamification approaches to the EIoIP in the field: i) ideaChef® is focused on the idea development phase of early stage of innovation, enabling a diverse team to develop further and convert an already existing idea into a minimum viable concept or light prototype; ii) ideaChef® is designed for a team of four up to six players that can be integrated with other tools and areas from the creativity and innovation space, e.g. user research and idea generation: iii) depending on the nature of the challenge/problem, ideaChef® can be played multiple times by the same team playing different ideas, or by multiple teams playing the same idea.

Study II is linked to the second research question (RQ2: How can the relationship between gamification and early stage of innovation be described?) and like the study I is very much in line with the first objective (O1).

It essentially provides valuable exploratory insights regarding gamification approaches to innovation, particularly with the "Gamification Approaches to Innovation Analytical Framework" based on the Hoshin Kanri Matrix X method, which allows a better understanding of how gamification can be used to address concrete early stage of innovation challenges.

Besides clarifying the relationship between gamification and the ESoIP, study II also created the opportunity to examine the way firms are applying gamification in different innovation contexts, leading to the design and deployment of the two empirical studies.

The third study is linked to the RQ3.1 (How can gamification approaches support the idea development phase of the early stage of innovation?) and is very much in line with both objectives O2 and O3.

It was perceived that gamification holds the potential to support some of the complex tasks innovation teams need to perform throughout the innovation process and idea development in particular. The deployment of the chosen gamification approach (ideaChef®) in a real business case (see study III) seems to substantially improve aspects of employee's engagement, team spirit, and consensus building as well as the management of idea development in a more structured and timely manner. Besides delivering multiple outcomes, gamification also seems to help to overcome major difficulties of managing the innovation process, like the setting of goals, coordination of activities, alignment of the organization and motivation of employees.

Furthermore addressing the RQ3.1, the study is also linked to O3. Its findings suggest that gamification complements and enhances design thinking practices by making people more engaged and delivering a more structured approach to the ESoIP.

It was interesting to observe that overall findings of study III were very much in line with the insights collected during study II, which suggest that gamification approaches trigger the right people to innovation, encourage knowledge sharing, develop a positive feedback loop, build consensus among team members, drive the desired behaviors, structure ideas and draft possible solutions to challenges/problems.

The fourth study is linked to the RQ3.2 (How can gamification approaches support the co-creation of new solutions in a collaborative innovation context?) and is also very much in line with both objectives O2 and to a lesser extent O3.

The findings of this additional empirical research study (see study III) show that the deployment of the chosen gamification approach appears to encourage the involvement and participation of teams in the innovation process, no matter in this case involving multi-actors on co-creating of new solutions. Gamification seems to enhance this user-driven collective creativity practice and provide a more engaging and powerful platform for multi-actors dialogue, mutual understanding, alignment of goals, creative experience sharing and concept development.

The higher level of complexity associated to this specific business scenario, with innovation teams composed by representatives from different stakeholders, was a good opportunity to explore and understand more deeply the relationship between gamification and the ESoIP. No matter the differences between study III and IV regarding the context and type of innovation team, the outcomes and implications of gamification approaches in both studies were very much focused on the same topics, i.e. the structured process, team spirit and knowledge building.

6.2 Main contributions to the body of knowledge

This thesis clearly addresses the research gaps identified in the literature and provides several contributions to the body of knowledge.

The first contribution is related to the lack of conceptual and empirical research studies analyzing in a structured and coherent manner the use of gamification approaches to the early stage of innovation. It is a very relevant topic since gamification holds the potential to overcome the difficulties and complexity of managing the early stage of innovation and consequently positively influencing the innovation outcomes, e.g. market launch of new products or services.

The second has to do with the difficulty to establish the differences between gamification and other similar and overlapping game approaches, which prevents researchers and practitioners to fully understand the application domains and impacts of gamification approaches to innovation. All the studies provided important contributions to bridge these gaps, in a different degree and nature.

Finally, the third is focused on the gap between the theory and practices of design thinking. Despite the recognition of design thinking as a valuable approach to innovation, its practice needs to be improved to better manage the difficult tasks of the early stage of innovation.

Study II is the theoretical foundation of this thesis, providing a conceptualization of the use of gamification in the context of innovation, which underlines the key characteristics of the early stage of innovation that can be better managed by gamification approaches. In line with this goal, it offers the first known definition of gamification approaches to early stage of innovation, i.e. “gamification, design games or serious playing approaches,

incorporating game elements (dynamics, mechanics, and components) and explicit goals which are used across the phases of early stage of innovation (discovery, idea generation/evaluation, idea development and decision to develop a new product/service)".

Also extremely relevant is the creation of a new method called "Gamification Approaches to Early Stage of Innovation Analytical Framework" that facilitates the generation of several insights and can be used to identify patterns and gaps linked to gamification approaches to the early stage of innovation. This framework makes it possible to read concrete examples of gamification approaches to innovation by linking its four building blocks, i.e. innovation challenges; game elements; tools; and outcomes. Moreover, it can also be used to map, compare and communicate new or already existing gamification approaches to innovation.

While much more relevant from the perspective of practitioners, study I also provides contributions to the body of knowledge by clarifying the contribution of the chosen gamified method and tool (ideaChef®) towards innovation and critically discussing its advantages and disadvantages. This type of input was extremely important for carrying out the two empirical studies (see studies III and IV) with ideaChef®.

The contributions from these empirical studies are much more specific and emphasize the advantages of gamification approaches to innovation. It was observed that a more creative, structured and engaging approach enabled by gamification can help to overcome the main difficulties and challenges of managing the innovation process in relation to goal setting and coordination of tasks as well as to consensus building, involvement and motivation of representatives from the same firm (see study III) and multi-actors from different firms (see study IV).

Study III suggests that gamification approaches to innovation, and particularly to idea development are very much focused on the processes and business goals and thus can be considered a sort of creative engineering approach that contrasts with the other existing approaches, e.g. design games, less structured and more focused on thinking than on doing. This characteristic of gamification approaches to innovation addresses quite well the challenges of managing the messy and unclear early stage of innovation. By delivering advances on the management of early stage of innovation processes it provides implications for design thinking theory and practice, particularly in regard to interventions

in more complex and uncertain business environments characterized by difficulties in goals settings, coordination of activities, and user engagement.

Advances to the body of knowledge on collaborative innovation practices are presented in the study IV that conceptualizes the relationship between gamification and co-creation. This study argues that the integration of gamification into co-creation enhances substantially collaborative innovation practices and also demonstrates that gamification approach supports the engagement of all key actors in co-creation by encouraging continuous dialogue, interaction and learning. Study IV provides important insights into how the building blocks of co-creation are perceived by firms, highlighting the importance of interactivity, engagement and information sharing in managing these collaborative innovation practices.

By making a broader cross-comparison of study findings it is possible to provide other interesting contributions to the body of knowledge, particularly to design thinking theory. Despite some observations in the theory regarding the obstacles and difficulties of design thinking in managing the ESoIP, e.g. lack of structure and contextualization and disconnection between thinking and doing, it seems many academics and practitioners are unlighted by the hope that design thinking would be the holy grail of innovation. More discussion is needed to enhance design thinking practices and make sure that it would be prepared to face the next challenges of the XXI century, such as the engagement of millennials and the transformation of the workplace. While being extremely relevant for management and for society, until so far, no other research study addressing this debate was identified in the theory.

When comparing the results of the conceptual study with the two empirical studies it is possible to recognize the convergence between some of the principles of design thinking and gamification, which is based on good pieces of evidence of overlapping and complementarity, e.g. promotion of collaboration, user engagement and creative thinking. The results of the empirical studies suggest that gamification can improve and enhance design thinking in regard to some aspects, e.g. user engagement and structured process but not so much in relation to others, e.g. creative thinking (mainly during idea generation). In this particular case, it is the creative confidence type of design thinking that can benefit

more from gamification since this interpretation is essentially related to organizational issues and the engagement of all the relevant stakeholders.

Therefore the results support the idea that gamification can enhance design thinking and overcome the weaknesses observed in some practices with new methods and tools, i.e. different from the mainstream tools that everyone is using, e.g. like personas, canvas and journey maps, which restrain novelty and more breakthrough approaches.

Another important result is the possibility to assess the impact of gamification on the implementation of the design thing approach to innovation. In fact, the hedonic, utilitarian and social outcomes framework allow the specification of a set of indicators that firms can use to assess the results of design thinking approach to innovation, which is at the same time one of the most important contributions of gamification to design thinking.

As identified in study II and III, it seems to make sense gamifying the whole innovation process. Besides idea generation, other stages like execution, sometimes called back end of innovation, can benefit from gamification approaches. This opportunity is also very relevant in the context of design thinking, which is not limited to creativity and ideation tasks. Actually, the implementation or execution phase of design thinking is not less critical than all the others. Gamification can thus support the process of testing or getting the idea in the market by encouraging the repetition until the point that is possible to assess the real value of the idea.

A common observation in all the empirical studies is the social dimension of gamification and its huge implications on design thinking. Gamification supports the management of the innovation process by providing a more engaging way to check all the variables of the idea and make it feasible. Yet gamification is also a manner to facilitate conversation among people with different roles and tasks within the organization in a more open and creative environment. Going further with this view, gamification can be perceived not only as a way to support and motivate people but also to transform them within and outside the boundaries of the firm. Taking into consideration all the intrinsic potential and its value added it is not difficult to envision that gamification will be part of design thinking initiatives in the next years.

Another significant contribution of gamification is connected to service design. By establishing some parallel with the design or redesign of services, gamification approaches can also be seen as a specific kind of services with more structure (rules, challenges and time constraints) and a much more engaging (novelty, playfulness and involvement) type of encounters with real people.

6.3 Managerial implications

Study I starts by providing key implications for managers on how to facilitate and enhance the collaborative development of new products, services or business models through gamification. This is particularly relevant for practitioners, especially innovation managers and other professionals engaged in the innovation process that need to understand how this new method and tool can be implemented in order to drive innovation forward.

This view is supported by study II, arguing that a better understanding of gamification approaches to innovation can help firms to manage an increasingly complex, iterative and non-sequential innovation life cycle, support decision-making in the fields of ideation and contribute towards mitigating some of the inherent risks of subsequent stages, i.e. new product/service development and commercialization.

Empirical research studies (see studies III and IV) clearly endorse these implications for practitioners. Study III suggests that gamification approaches to innovation are very relevant to innovation, R&D, and new product/service development managers interested in using gamification to support the early stage of the innovation, which will allow accelerating systematic innovation practices and successfully launching new services or products in the marketplace. Furthermore, it provides important managerial contributions on how, why, and when managers can use gamification to involve more effectively all relevant stakeholders, make work tasks more enjoyable, boost teams motivation, and increase engagement with innovation processes.

Study IV provides managerial implications on how multiple actors with different backgrounds and interests can be engaged in the early stage of the innovation practices, and particularly co-creation of new solutions, through gamification. It emphasizes the role of gamification as a method to increase engagement of all parties in the innovation process

and facilitate the collaborative development of concepts for new products, services or business.

6.4 Limitations of the study and avenues for further research

Research findings open up opportunities for further research and deliver advances on the body of knowledge, which reinforce the theoretical significance of this thesis.

Since suggestions for further research are often related to research limitations and boundaries, it is important to clarify that this thesis is focused on the application of gamification with reference to firms and businesses, excluding situations where gamification may not have a business goal or others related to video games and pure play environments. In fact, future research suggestions that arise out of the research limitations identified in this thesis are linked to gamification approaches to innovation from the perspective of business innovation teams composed of representatives from the same firm (see study III) or representatives from different stakeholders, i.e. multi-actors in a collaborative innovation setting (see study IV).

From the conceptualization of gamification approaches to innovation, study II derives a set of propositions that can be considered starting points for further studies, exploring the relationships between the challenges and the phases of the early stage of innovation, between challenges and gamification tools, between game approaches and game elements and between gamification approaches, tools and outcomes.

Both studies I and study II call the attention for two important research suggestions. The first is linked to the type of tools used to deploy gamification approaches to innovation. Following ideaChef® critical analysis conducted in the study I, additional efforts need to be taken for examining gamification approaches to innovation enabled by a mixed approach of digital and physical tools. The second suggestion concerns exploratory studies of gamification approaches applied to other business processes. The study I suggests a wide-range of corporate areas and new applications uses for gamification approaches, e.g. marketing and communication, human capital, project management.

Another opportunity for future studies relates to the deployment of gamification approaches throughout the other phases of the innovation process. Study III suggests examining how gamification approaches can be applied, not only to other phases of the

early stage of innovation like idea generation but also to the subsequent stages, i.e. new product development and commercialization. Findings of study III also lead to potential research in the co-creation of value with customers by using gamification to facilitate the incorporation of their inputs in the concept design of new products and services. This important and emerging research area was partially explored by an empirical research study of gamification approach to co-creation that have been conducted and presented in study IV.

Study III also suggests further studies of gamification approaches to the early stage of innovation in other contexts where the sample is not composed by design driven firms. It would be relevant to examine other business sectors that are typically less collaborative and mature in terms of innovation. It would also be worth to investigate gamification deployment in firms with organizational silos that separate different types of employees or even in firms with closed-minded organizational cultures where games and play are still considered a form of diversion from work tasks. Yet, the research potential of gamification cannot be limited to a certain type of firms since many different businesses can benefit from this approach. Study III also opens the opportunity to examine how gamification can complement other design thinking methods and tools to improve the innovation process.

Study IV provides a set of avenues for further research that can be investigated from the perspective of design. The idea is to examine in more detail the role of designers in the co-creation of new solutions. Not only as facilitators but also as active participants in co-creation, mediating and triggering the relationship between the customer and supplier and facilitating knowledge creation. Relevant suggestions are also provided in relation to further research about risk and transparency implications of co-creation in the era of digital transformation.

Another potential research related to the gamification support of co-creation activities can be the application of gamification principles to the game-design industry. Particularly by facilitating the collaboration between players and entering in the emergent field of playing through collaboration.

The future of gamification approaches to innovation is very promising. New avenues for further studies should be taken by other researchers to advance the body on theory in this emerging field and support the management of the innovation process.

6.5 Conclusion

This thesis complements an emergent body of literature on gamification of innovation by exploring how gamification, i.e. the use of game elements in non-gaming contexts, can support the management of the complex, messy and unclear Early Stage of Innovation Process (ESoIP), and therefore help firms to drive innovation forward.

Integrating gamification into the early stage of innovation is a high impact topic since any improvement at this stage can serve to mitigate the risks of launching new solutions in the marketplace. Although gamification has been thoroughly researched in many dimensions and contexts, e.g. education and training, advertising and healthcare, the link between gamification and the innovation process, particularly at its early stage has not been empirically researched. An additional breach that prevents researchers and practitioners to fully understand the application domains and impacts of gamification approaches to ESoIP is the confusion that still remains in relation to the meaning of gamification and other similar and overlapping approaches like serious games.

This thesis acknowledges that despite the growing adoption and acceptance of design thinking approach to innovation, it must be improved to better manage the difficult tasks of the early stage of innovation. It also argues that gamification can contribute to improving the management of firms' ESoIP by complementing and enhancing design thinking practices.

Key findings support the view that gamification approaches allow firms to improve the early stage of the innovation by overcoming major difficulties of managing this complex, messy and unclear process. Actually, results from empirical research studies show that gamification approaches encourage the involvement and engagement of teams in the innovation process, improving aspects like team spirit, dialogue and consensus building, creative experience sharing, goals setting, coordination of activities and concept development as well as the overall management of the ESoIP.

Moreover, empirical findings suggest that gamification complements and enhances design thinking practices by making people more engaged and delivering a more structured approach to the ESoIP. Thus, gamification is a new and emergent approach that helps managers to put design thinking into practice.

Besides enriching the theory with new knowledge about the management of the early stage of innovation in the context of design thinking, this research provides key implications for practitioners on how firms can overcome the difficulties of managing this particular stage of innovation, supporting the ideation and concept development of new products, services and business models.