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How gamification influences employees to be more productive: a meta-analysis

Beatriz Almeida Gil

Dissertation presented as partial requirement for obtaining the Master's degree in Information Management

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HOW GAMIFICATION INFLUENCES EMPLOYEES TO BE MORE PRODUCTIVE: A META-ANALYSIS

by

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Dissertation presented as partial requirement for obtaining the Master's degree in Information Management, with a specialization in Information Systems and Technologies Management.

Advisor: Prof. Mijail Naranjo-Zolotov, PhD

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To my family, especially my parents, for always supporting my decisions.

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It was not an easy path, but all the support I received helped me to believe I was capable of accomplishing this achievement.

ABSTRACT

In an increasingly competitive environment, companies are seeking to find competitive advantages, through new ways of working. Gamification has showed some proofs that can have an impact in performance in enterprise information systems context. Especially after a pandemic context and during a global crisis, finding motivation and engagement, when people find themselves apart from each other, can be a true challenge.

The purpose of this work is to analyse the gamification impact on employees' performance and productivity, relating employees' motivation and engagement with the gamification implementation in enterprises.

A meta-analysis was performed from previous quantitative studies connected to gamification implementation in enterprises. A total of 20 articles from the last 7 years were used as input for the meta-analysis. Strong constructs were found: behavioural intention, engagement, gamification consent, intrinsic motivation, enjoyment, performance. A motivated and satisfied employee is more productive in the workplace, therefore the research carried out provides a model that supports its main purpose: gamification influences employees' engagement and performance.

KEYWORDS

Gamification; Enterprise; Productivity; Performance; Motivation; Meta-Analysis.

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LIST OF ABBREVIATIONS AND ACRONYMS

DSR	Design Science Research
GA	Gamification Analytics
EIS	Enterprise Information Systems
SDT	Self-Determination Theory

1. INTRODUCTION

1.1. BACKGROUND AND PROBLEM IDENTIFICATION

In today's competitive world, companies are constantly challenging each other, not only with improvements in their products and services, but also in new ways of working. In order to survive this rival environment and satisfy their stakeholders' needs, every company is seeking to gain competitive advantages.

In our time, the use of new technologies appears to be an inevitability to thrive. One new tool that has brought the attention of contemporary enterprises in the last few years is gamification. Gamification is an umbrella term, covering the application of information and communication technologies as an organizational capability, that uses game design elements to engage, motivate and persuade employees, customers and partners to develop productive behaviours, in non-gaming systems (Fathian et al., 2020).

Gamification allows to improve user experience and user engagement, since it exploits the link between games and intrinsic motivation (Swacha, 2016). Typically, work and play do not get together, but game elements used in an enterprise system can make work more appealing.

A serious issue of todays' enterprises is the lack of motivation among employees. According to Gallup worldwide poll results, employee engagement is currently at 21% (State of the Global Workplace Report - Gallup, 2022). The sharp impact of low engagement translates to low performance, poor retention and less profitability. With gamification, engagement can have a chance to thrive again, as performing repetitive tasks or monotonous activities can attain a new enjoyable aspect, rising engagement, improving employees's attitude towards work and consequently increase their productivity (Swacha, 2016).

But how can gamification be applied in Enterprise Information Systems (EIS)? The aim of gamification is to affect how these business processes are experienced. Since people use technology, the proper use of technology depends on how it interacts with humans (Fathian et al., 2020).

Some studies have found the importance of gamification application in EIS. An experiment conducted in 2016, to understand the behavioural impact of gamification in distributed Agile teams, has concluded that gamification encourages teams to deliver their software as soon as possible, showing an increase of about 4% in one of the early pilots, when comparing with the sprint velocity of pre-gamification (Sharma et al., 2016).

However, measuring this engagement is an important capability that is missing today. The key is, not only to apply gamification, but know how to deal with it in real-time for better achievements.

Managers are frequently tasked with increasing employees' engagement levels. Since gamification can increase engagement, it seems to be too promising for enterprises to ignore in a world of limited opportunities for gaining competitive advantages, moreover after a global pandemic situation and during a global crisis, where people find themselves apart from each other, losing motivation and engagement even more.

1.2. STUDY OBJECTIVES

Gamification in enterprise context is a relatively recent area, thus this study main objective is to understand how motivation, engagement and performance increase with the use of gamification in enterprises, discovering the answer to the main research question: how gamification influences employees to be productive, and understanding the real impact of this tool.

Other objectives expected to be accomplished are:

- Identify gamification elements: dynamics, mechanics and components;
- Understand the concept and use of gamification in enterprise context;
- Identify the relationship between gamification implementation and employees' behaviour/performance;
- Identify and analyze the most relevant variables for a successful gamification implementation;
- Propose the "best" model to explain how to influence employees' productivity with gamification.

2. LITERATURE REVIEW

In order to discover what others have done and realize what still needs to be done, this chapter aims to describe the state of the art regarding gamification adoption in enterprise context. To do so, it will be divided into subchapters, covering the background of the topic, stressing relevant concepts as motivation, engagement and productivity, and introducing the main factors to consider when applying gamification solutions – providing the starting point for the model to implement.

2.1. GAMIFICATION CONCEPT

Gamification is a concept based on information and communication technologies, that uses game design elements to engage, motivate and persuade employees, customers and partners to develop productive behaviours, in non-gaming systems (Fathian et al., 2020). It is an umbrella term, as it is covering a broad range of game-based solutions to solve needs and achieve effective goals. Gamification allows to improve user experience and user engagement, since it exploits the link between games and intrinsic motivation (Swacha, 2016). Typically, work and play do not get together, but game elements used in an enterprise system can make work more appealing.

"Gameification" was the first similar term used, in 2008, by Bret Terril (Terril, 2008), but it was in 2010 that it started gaining recognition from academia and industry. Since then, it has been used in different domains like social networks, marketing, health and education, but it sure has attracted the attention of enterprises in the last few years, being seen as a trending area of research.

Nevertheless, it has been estimated that most gamification efforts will fail, despite the promising results it is showing, due to poor understanding of how gamification should be designed and implemented (Morschheuser et al., 2017). And as it was emphasized by Huotari et al. (2017), there is still a gap in gamification conceptual understanding. Since gamification is a multi-disciplinary concept, it requires a holistic view and agreement on its domains. So, to help filling this gap and representing gamification set of concepts and their relationships, this study is reinforced by an ontology.

According to Bouzidi et al. (2019), the mains concepts that form this umbrella term are Core Gamification, Psychology, Organization, Ethics, User, Evaluation and Risk.

2.1.1. Core Gamification

It all starts with the game concept, as it was defined as “a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome” (Salen et al., 2003). Since gamification covers game-based solutions, game-inspired elements are applied in a gamification application domain, such as education, health or business, and their design follows a gamification design approach. With the support of gamification design elements, gamification systems are produced (Bouzidi et al., 2019).

These gamification design elements are the core of gamification research, and according to the Gamification Elements Pyramid (Werbach & Hunter, 2012), there are three layers to consider in gamification design elements: dynamics (the big picture of gamified systems); mechanics (basic processes that drive action and generate engagement); and components (specific instantiations of mechanics and dynamics) (Figure 1).

Dynamics can be seen as constraints, emotions, narrative, progression and relationships, while mechanics work as challenges, turns, competition, cooperation, achievements. Components are the elements borrowed from games, like points, badges, rewards, avatars, achievements, levels, leaderboards, countdown and feedback, leading users to engage while doing IT-mediated tasks, increasing their motivation and performance (Bouzidi et al., 2019).

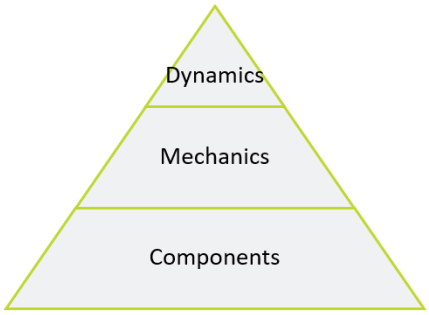

Figure 1: Gamification Elements Pyramid

Adapted from Werbach & Hunter (2012)

Some of the most common elements used in a gamified experience are Points (to reward the users), Leaderboards (to compare players together), and Levels (to indicate players status).

But all these game design elements incorporated in a target system must match the intended purpose of that same system. To be effective, gamification design elements must be consistent with the target task, match users’ characteristics, the desired interactions, the recurrence of the systems,

and fit with the system technologies (Liu et al., 2017). Mainly, these principles state that gamification design elements must match the system purpose and users' characteristics, relating in this way the mechanics and dynamics with the emotions of the player – the MDE framework of gamification principles (Figure 2).

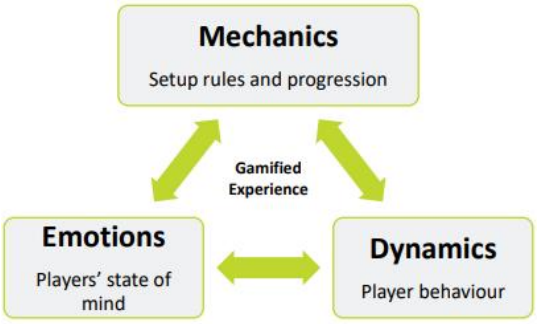

Figure 2: MDE framework of gamification principles

Adapted from (El-Telbany & Elragal, 2017)

2.1.2. Psychology

Gamification psychological theory identifies gamification outcomes, that can be psychological or behavioural. A theory of gamefulness, by Landers (2018), claims that a gameful experience leads to an individual psychological impact. When "players" perceive that externally created goals are non-trivial and can be feasible, and decide they are worth their effort, then they are voluntarily motivated to pursue those goals, under behavioural rules. The more voluntary the engagement, the greater the success of the experience. Gameful systems lead to gameful experiences, that impact psychological characteristics and lead to behavioural changes, which dictate the effectiveness of gamified systems (Landers et al., 2018). These behavioural changes, as behavioural outcomes, concern to user engagement, user performance, user change resistance and user motivation. And since motivation is one of the main goals of using gamification systems, these have many rationales from several psychological theories. The one that affects it the most is Self-determination theory (SDT), that defines the three main psychological needs of the user to be intrinsically motivated. Contrary to extrinsic motivation (that uses external factors, as money, to influence users), Intrinsic motivation intends to motivate users by the task itself without any external incentives to satisfy psychological needs, and these needs are described as autonomy, competence and social relatedness (Bouzidi et al., 2019).

In accordance with Deci & Ryan (2009), people are more likely to become engaged in an activity when they feel hedonic value while performing it; and if that activity involves a form of technology, it will be enjoyable, so people tend to use it even more extensively than others (Nah et al., 2011).

In Boudizi theory (2019), outcomes can be considered by three stages: identification, integration and introjection. While identification means user needs triggers to perform tasks, even if it is without a penalty, integration is when user executes tasks for his personal goals. When the user completes tasks for his self-esteem and to be socially accepted, it is called introjection (Bouzidi et al., 2019).

2.1.3. Organization

Organization structure is a key element to consider while thinking of gamifying a process. Not only the way the organization is structured, but also its objectives and organizational elements, as processes, activities and tasks, need to be taken into account to consider a gamification strategy – a strategy that needs to comply with the foreseen organizational impact (Bouzidi et al., 2019). Another important aspect is to have a strong understanding of what is the organizational culture. Gamification should be aligned with it, although it can also be used to promote change and even adjust organizational culture in some way (Isdiyanto, 2016).

2.1.4. Ethics

As gamification is still not well regulated, there is a gap for ethics to be unaccomplished. Ethical issues that occur from gamification can be character, bias, work intimidation, manipulation, pressure, lack of group cohesion, harm, exploitation and user privacy (Bouzidi et al., 2019). To overcome these matters, gamification regulation process must be clearly specified through a code. It is where ethicists have their biggest role, to establish rules to protect the user and set up agreements, which must be also aligned with the organization management strategy, preserving quality assurance (Algashami et al., 2019).

2.1.5. User

Gamification designers, researchers and ethicists provide gamification solutions in a user centric system. Users are the essence of the design of gamification, for that reason, user characteristics, user profile and user type are key elements to be considered, all linked, to create a gamification service

with the best possible feedback (Bouzidi et al., 2019). However, users are not necessarily gamers and might consequently not be conscious of their game preferences. To measure their ideal design elements by mapping users' personality is not an easy task, but it will lead to personalized gamified systems (Tondello et al., 2016).

2.1.6. Evaluation

Despite everything that needs to be considered to create the best gamified system, nothing will be worth it if an evaluation of its effectiveness is not made. It is crucial to access if a model is adequate to its domain application. And to perform an evaluation, it is not required to wait until the gamification begins: viability is the primary evaluation, that takes place before gamification. Nevertheless, it is after the gamification implementation that results appear. Assessors can perform a heuristic evaluation through the application of guidelines, but the most accurate form of evaluating a gamification system is using analytic tools, through metrics (Bouzidi et al., 2019).

2.1.7. Risk

Finally, to make a decision about applying gamification to a system, there are potential risks that need to be considered. Gamification implementation risks can be split into three categories: ethics related risks, performance and productivity related risks, and well—being related risks (Algashami et al., 2019). According to a systematic literature review performed by Thiebes (2014), gamification risks are mainly "addiction, cheating, declining effect, off task behaviour, task quality, undesired competition and user change resistance". Some strategies that should help mitigate some of these risks, as identified by participants of a study conducted by Algashami et al. (2019), are common ground rules, getting everyone involved, getting rewards for helping others, recognition of individual efforts, and using transparency strategy and self-assessment.

Every single one of these gamification related concepts, represented in Figure 3, influences the design of a gamification solution.

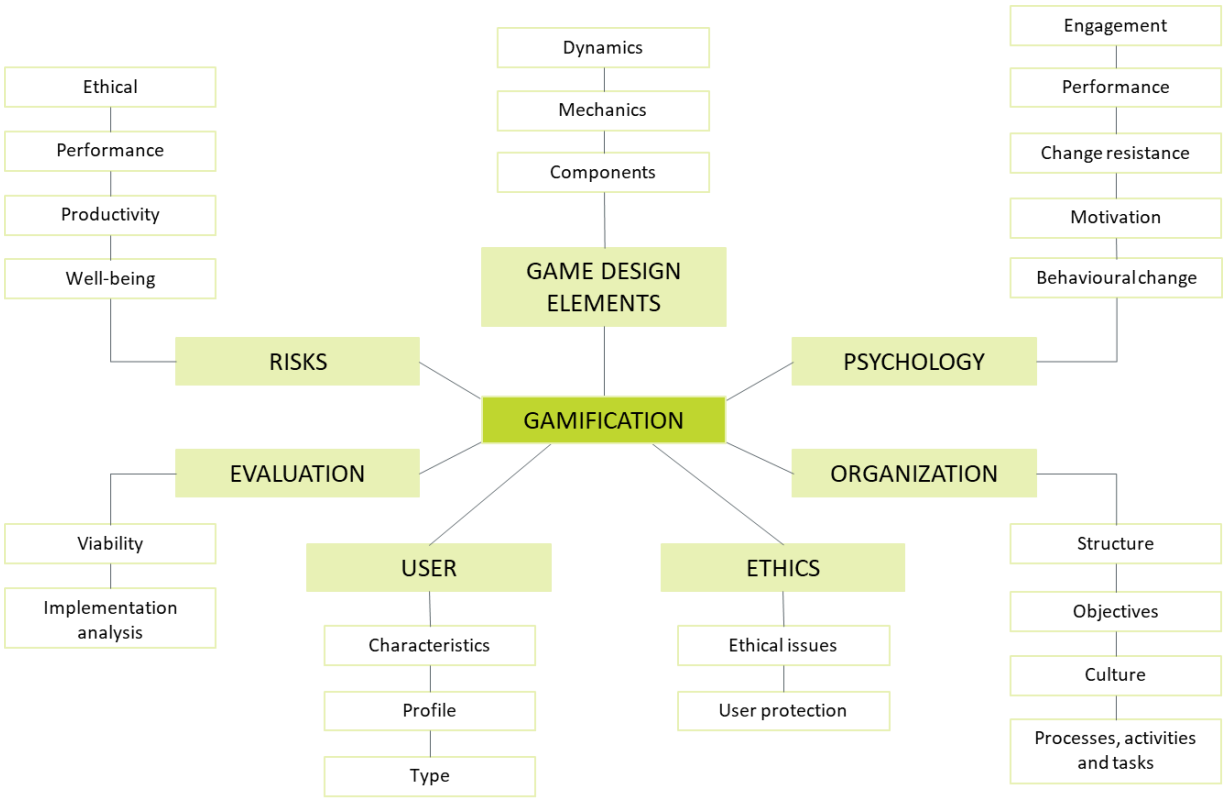

Figure 3: Representation of Gamification Ontology

And having defined all the concepts that influence the design of a gamification solution, then according to Landers' theory (2018), the design of a gamified system should work backwards, starting from the end of the model. First, the intended outcomes need to be defined. Then, it is necessary to understand which individual behavioural changes will lead to the desired results. And finally, identify what type and intensity of gameful experiences facilitate that behavioural changes. Having these set, a new gamified system can be built to reach the target (Landers et al., 2018).

2.2. GAMIFICATION IN ENTERPRISE CONTEXT

Companies today strive to survive in a competitive world and satisfy their stakeholders needs. To succeed in such environment, taking advantage of new technologies is a requirement. However, the most valuable assets for organizations are still human resources, because non-tangible resources, as people, are more likely to present continuous competitive advantages to companies than tangible resources, as it is more challenging to emulate them (Lado et al. 1994). And no feat can be achieved if people are not committed with enterprises, for that reason, having motivated and engaged

employees is the starting point to reach success – as motivation is considered the most productive influence behind employees' performance (Deci et al., 2009).

A serious issue of todays' enterprises is the lack of motivation among employees, specially after a pandemic scenario. According to Gallup worldwide poll results, employee engagement is currently at 21% (State of the Global Workplace Report – Gallup, 2022). The sharp impact of low engagement translates to low performance, poor retention and less profitability, as Gallup estimates that it costs the global economy US$7.8 trillion and represents 11% of GDP globally, according to an analysis of 112,312 business units in 96 countries.

So here comes the major question: why to gamify an enterprise system? Because, in general, gamification outcomes seem to match organizational goals: increase motivation, effectiveness and productivity of employees, to reach higher results. With gamification, engagement can have a chance to thrive again, as performing repetitive tasks or monotonous activities can attain a new enjoyable aspect, rising engagement, improving employees' attitude towards work and consequently increase their productivity (Swacha, 2016).

But how can gamification be applied in enterprise context? The aim of gamification is to affect how business processes are experienced. Since people use technology, the proper use of technology depends on how it interacts with humans (Fathian et al., 2020). And because where there are humans, there are feelings: adding emotions to the gamified experience makes people a substantial resource to consider. Gamification should be personalized, taking into account that each employee has different abilities, characteristics and motivations, which can lead to different responses (Rozi et al., 2019). Guaranteeing users are fully engaged in gamification requires the understanding of what motivates them and how different game elements address employees' needs (Codish et al., 2014).

Having set that user performance is a gamification outcome, and being gamification still an emerging trend, researchers are interested in demonstrating its effectiveness. In this way, there have been some studies to evidence that employees' productivity can increase when applying gamification to their tasks.

In 2016, experiments in agile projects were conducted to understand the behavioural impact of gamification on distributed teams. Project members, when allocated in different locations, may lose perspective of how they are performing, when compared to their counterparts. Gamification techniques shown to enhance situational awareness and incentivize software team members to deliver their user stories as soon as possible within respective sprint. There was an increase of about 4% in sprint velocity, when comparing with pre-gamification sprints (Sharma et al., 2016).

In another experiment, in 2014, gamification was used as a tool for detecting and removing bugs early in software development. This tool calculated points by counting removed warnings regarding each developer and respective team. The points gave feedback and urge developers to compete with each other. The results revealed there were about 150% warnings removed, in comparison with the case where they did not use the gamified tool (Arai et al., 2014).

Also, there is an expanding number of successful start-ups focused on adding a gamified layer to a core activity (e.g. Codecademy, a service that helps to teach users how to code uses game-like elements), or who assist more traditional companies in gamifying their existing services (e.g. Badgeville) (Hamari et al., 2014).

But despite these studies only shown a certain domain, there are many daily enterprise activities where gamification elements can be applied, such as training, project management, customer support, data-entry and others (Prakash & Rao, 2015).

Enterprise gamification is growing at an impressive rate, while researchers find its benefits and how it can be implemented. Understanding its role in enterprise context is not only to accept that game elements in business application are encouraging and motivating employees to perform their tasks in a pleasant way, but also to recognize gamification can work as a bridge between older employees and the new generation, the digital natives. According to Sam-Epelle (2022), a value-oriented approach would help to understand enterprise gamification acceptance, especially in today's workforce that is mostly dominated by millennials. Also, generation Z, entering marketplace, has different communication habits, is more familiar with what a gamified system can lookalike, and has high expectations from what can get from there (Swacha, 2016).

Gamification seems to be too promising for enterprises to ignore in a world of limited opportunities for gaining competitive advantages, moreover after a global pandemic situation, where people found themselves apart from each other, losing motivation and engagement even more. Since gamification aims to defeat all these factors, it appears to be an innovative approach with much potential.

Gamification can bring new ways of improving not only work performance, but as well work attitude, social relations and on-boarding and training processes (Swacha, 2016). The main ideia with gamification in workplace is for employees to receive rewards such as points, badges and prizes when they reach milestones (Sam-Epelle et al., 2022). Some of the suggested gamification-related practices are in the following table (Table 1):

	Practice	Expected Benefit	Relevant Component
Performance	Differentiate rewards for completing various tasks	Users are directed to the most important tasks at a given moment	Fixed action rewards, virtual good
	Mark very hard tasks	Users can prepare better for a bigger challenge	Boss fights
	Visualize relative employees' performance	Users are motivated to rise over others	Leaderboards
	Visualize the distance to the goal	Users are motivated to finish the current task	Progression bar
	Visualize the time left	Users are motivated to hasten their work	Countdown
Attitude	Provide a chance of surprise	The monotony of repetitive tasks is shunned	Easter eggs, random rewards, mischief
	Define penalties for failing to complete a task	Users appreciate what they have attained and could lose	Points, protection, progress loss
	Remind users the importance of their role	Users are aware if the value of their contribution	Elitism, humanity hero
Social relations	Let users reward each other	Users feel their effort is recognized and their social relations are improved	Social treasure, virtual good
	Let users help each other	Knowledge is transferred	Thank-you economy
On-boarding and training	Appoint more difficult tasks to users as they make progress	Users do not get bored or frustrated with tasks thar are too easy of too hard for them	Milestone unlock, learning curve
	Guide users in their steps	Users know what to do to progress	Step-by-step tutorial, choice reception
	Make users improve their weak sides before they can move on	Users' skill development is more balanced	Moats

Table 1: Gamification practices to apply in Enterprise context

Adapted from Swacha (2016)

2.2.1. Enterprise Gamification Adoption

One factor to consider in applying gamification in an enterprise is gamification competence, which is detailed as the enterprise's capacity for developing gamification, including gamification investments, the quality of infrastructure to implement gamification and human conditions for adoption (Fathian

et al., 2020). Once more, relating to the MDE framework, that connects mechanics, dynamics and emotions (Figure 4).

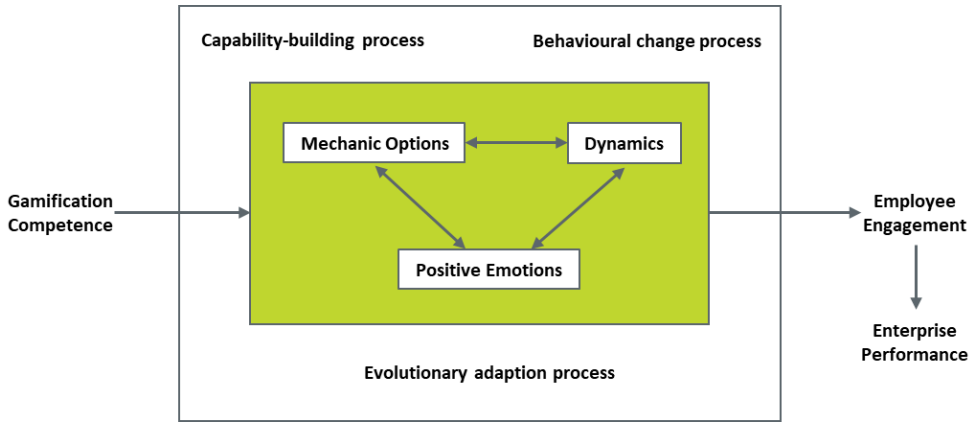

Figure 4: The nomological network model of relationships between gamification competence and enterprise performance

Adapted from Fathian et al. (2020)

In this competence, organization plays an important role, as previously stated. The choice related to how an activity should be gamified depends on the organization structure, its long and short term objectives and the foreseen organizational impact. Organization elements are the processes running in the organization, and gamification can be applied to them at three different levels, according to Neeli (2012): superficial level (gamification mechanics are independent from the activity), integrated level (mechanics are integrated in the activity to perform), and deepest level (when the activity design is based on the gamification mechanics). This application expresses how much gamification relates to organizational activities to perform (Bouzidi et al., 2019).

Another important role is played by human resources value to organizational performance, which is emphasized by gamification, leveraging employees' engagement. Employee engagement is a key factor in increasing organizational productivity, and that is why organizations should rise with ideas for engaging their users by analysing how people get motivated by games (Fathian et al., 2020). The presence of hedonic elements has been working as a means of engaging users and increasing system acceptance – SDT, as introduced before (Figure 5).

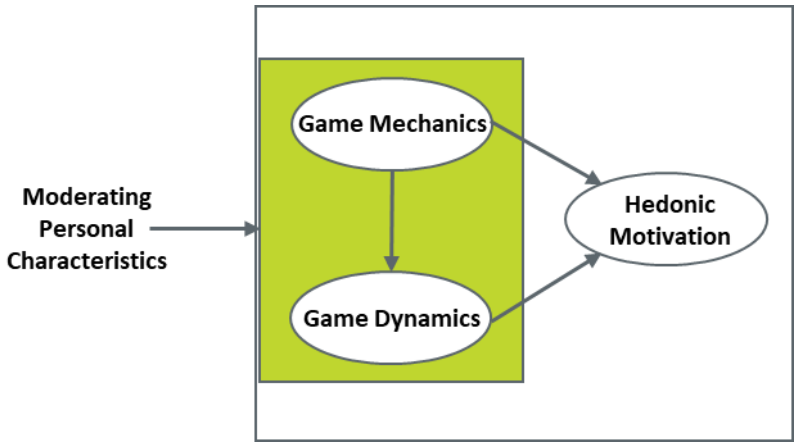

Figure 5: Moderation Effects

Adapted from Codish et al. (2014)

Gamification aids employee engagement through emotions. Emotions present an important character in any technology-in-practice, leading to its adoption in enterprises, so positive emotions can significantly enhance engagement in the workplace. Emotions are a factor to consider in creating interactive structures between employees and gamification technology (Fathian et al., 2020). Emotions are definitely one of the keystones connecting gamification and productivity. The greater the employees' positive emotions emerged from gamification, the better the gamification competence will be. At first, proper gamification mechanics are implemented at a specific cost. With the successful realization of gamification, these mechanics get higher levels of options at a lower cost. So positive emotions moderate employees' engagement, which by its turn improve mechanics and dynamics, having an impact on enterprise's gamification competence (Fathian et al., 2020).

The real challenge is to delineate a strategy to apply a gamified experience, matching organization and individuals' characteristics, in order to increase engagement and productivity. Usually gamification failures are linked to poor alignment between organization competence and players involved in the gamified experience. Having into consideration user characteristics allows to adopt gamification tools in a more suitable way, leading to better results. User characteristics are their cultural background, previous experiences, skills, objectives, needs and preferences (Bouzidi et al., 2019). Having this set, the second step is to describe the users as players, according to their positioning regarding orientation (to self or to others) and competitiveness (low or high)**.** From this, four different types of players rise: strivers (play in order to engage in personal development), slayers (play in order to be better than others), scholars (play in order to learn about the game), and socialites (play in order to network, collaborate or bond) (Robson et al., 2016) (Figure 6).

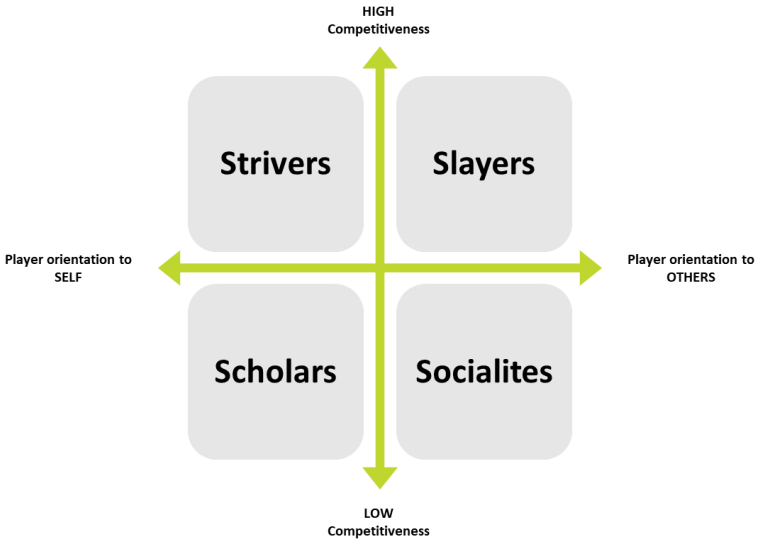

Figure 6: Typology of players in gamified experiences

Adapted from Robson et al. (2016)

It is a challenge to know each user's characteristics, however it is critical. Realizing where employees place themselves as users in a gamified experience is a requirement for the enterprise when applying gamification, as it has a fine line between being a positive tool to motivate employees and being a source of workplace pressure (Aziz et al., 2017).

Game elements such as points, badges and rewards, used as immediate forms of feedback, are expected to increase playfulness. But the fun and engagement generated from these mechanics can be different based on the dynamic that is being programmed. In a given scenario, a person with a specific personality (such as an extrovert) may find mechanics, like leaderboards, playful; but other people may find it stressful. There are people who do not like competition, so game mechanics have to be adapted (Codish et al., 2014). Risk of addiction and user change resistance may also be taken into account.

However, gamification usually works as a single strategy, with one approach fitting every purpose. This comprehends a challenge since, as we've seen, every employee has different abilities, characteristics, motivations, leading to different responses to the approach (Rozi et al., 2019). Employees with different characteristics, the same platform content, and static gamification elements do not increase the expected motivation.

To overcome this impasse, gamification must be adapted to the characteristics of the users – Adaptive Gamification. Having a personalized gamification ensures that users are fully engaged,

having game elements ajusted to their needs (Codish et al., 2014), which affects employees' productivity and enterprise performance. But adaptive gamification raises several questions, such as which game elements to use, what are the relationships between mechanics and dynamics to apply, how do personality and demographics impact individual optimization and can individuals within a system have different rules applied to them without creating a sense of unfairness. Without adaptive systems, organizations may experience overall increase in a target objective, but at the hidden cost of certain individuals who might be disengaged which is undesired for organizations.

However, to apply gamification techniques in enterprise context is not ideally a static process. It should be a dynamic approach, considering the outcomes, performing evaluations. But applying gamification analytics (GA) is a capability that is missing today. Gamification implementation should be able to perform online GA and be able to act based on this data and modify the implementation in a timely manner if needed (Codish et al., 2014). The key is, not only to apply gamification, but know how to deal with it in real-time for better achievements. There are some studies that emphasized the difficulty of maintaining user engagement as the effects of game elements are frequently brief. That is why many users cease their engagement with the gamified IS few months after their first use. For this reason, to understand what makes users to continue to use gamified IS is critical (Suh et al., 2017).

Despite the trend of the topic, there is still a lack of coherent understanding on what kind of studies have been conducted, with which methods, what kind of results they yield, and under which circumstances. Understanding whether gamification is effective is also a pertinent practical issue (Hamari et al., 2014).

"The successful implementation of gamification in EIS is a matter of primary importance, as a failed attempt will bring costs in morale and productivity, notwithstanding the cost of the implementation itself" (Swacha, 2016).

Despite knowing that many gamification contexts have not been sufficiently explored yet, and having identified risks in applying gamification to an enterprise context, it is already viable to believe in gamification potential to motivate users, consequently leading to their higher productivity.

From this, the objective is to understand how gamification is influencing employees' productivity in enterprises, building the connection between employees' motivation, gamification elements and its appropriate implementation.

3. METHODOLOGY

This dissertation follows a Design Science Research (DSR) methodology to perform insightful research in the area of enterprise information systems. This research aims to investigate phenomena that emerges when technological and social systems interact, and thereby build an artifact to create problem-solving knowledge (Hevner, 2010).

To understand how gamification influences employees' performance and productivity in enterprises, this study will conduct a conceptual-analytical approach, with theory building (Nunamaker et al., 1990), gathering well-known theories and studies as a base to understand the current state of the art (systematic literature review) and then perform a meta-analysis.

A meta-analysis is defined as a statistical analysis that combines and summarizes the results for a specific outcome, extracted from multiple similar empirical studies (Hu et al., 2019). This meta-analysis will allow to identify patterns and sources of disagreement among those study results.

The performed meta-analysis consists in three different steps:

1. Chose criteria for selection of studies
2. Data collection
3. Merging of variables

Having meta-data results prepared to analyse, from the research activity, DSR methodology will support the study to produce an artifact – in this case, a model. A model is a set of propositions or statements expressing relationships among abstractions and representations (March et al., 1995). The intent is to build a model to express the relationship between gamification application in enterprises and employees' productivity.

3.1. CRITERIA FOR SELECTION OF STUDIES

The first step for meta-analysis is to select what studies to include. The criteria start with research, as certain keywords need to be defined for research queries. For this study, the research query used was:

TS=((gamification) AND (enterprise OR firm OR company OR industry) AND (model* OR evaluation OR assessment OR regression OR pls))

The objective was to find papers with experiments regarding gamification application in enterprise context.

From the first query resulted 324 papers.

The second step was to screen and filter primary studies, removing duplicates and out of context articles, selecting only the studies written in English, that conduct experiments, utilize quantitative methods, have relevant variables and report enough statistical data to apply meta-analytic techniques, such as regression coefficients and sample sizes.

The following PRISMA flowchart (Figure 7) represents the process from the first query results to the final set of studies that fill the selected inclusion criteria.

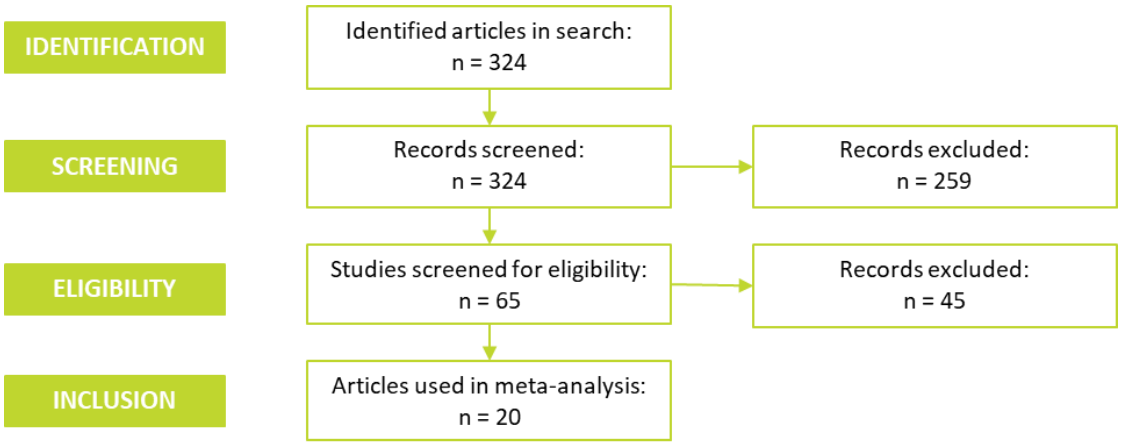

Figure 7: PRISMA flowchart

3.2. Data Collection

A data extraction was performed from 20 studies, where were found structural models – the estimation of path and regression coefficients, indicating the strength of relationships between variables (dependent and independent). It defends how well data supports hypothesized models: how variables affect each other in gamification contexts.

The next table (Table 2) lists the applied 20 studies, informing the study that was made, research method, sample size and main findings, as well as study number (#).

#	Reference	Title	Research method	Sample Size	Main findings
1	Benitez et al., 2022	Impact of mobile technology-enabled HR gamification on employee performance: An empirical investigation	Questionnaires to employees from 134 firms in several industries using gamified HR systems	728	HR gamification initiatives make employees feel happy and satisfied with their jobs, increasing employees' effort, interest, curiosity, enthusiasm and concentration on their job
2	Kim, 2021	How a company's gamification strategy influences corporate learning: A study based on gamified MSLP (Mobile social learning platform)	A survey to sales, service, and admin staff employees working in automotive retailers	293	Utilizing custom-made gamification strategies, organizations can maximize their effectiveness
3	Prasad et al., 2021	Gamification for Employee Engagement: An Empirical Study With E-Commerce Industry	Research instrument (5-point Likert-type scale) provided to employees who participated in the study prior to gamification	160	Significance relationship between intrinsic motivation and behavioural change/employee engagement in gamified environments, but not with extrinsic motivation
4	Pereira et al., 2021	The art of gamifying digital gig workers: a theoretical assessment on evaluating engagement and motivation	Questionnaires to employees of firms using gig workers to complete their tasks	523	Swift trust theory and psychological contract theory offer empirical insights into how companies engage their digital gig workforces through gamification
5	Mullins et al., 2021	Enterprise systems knowledge, beliefs, and attitude: A model of informed technology acceptance	Questionnaires to participants in 12 workshops from 3 different organizations in a gamified ERP training	258	A gamified ERP training is more effective than average organizational training
6	Riatmaja et al., 2021	The Effect of Using Game Dynamics Towards Employee Work Engagement: An Empirical Study in Indonesia	Questionnaires to employees of a startup Limited Liability Company	226	When employees are inherently motivated at work, by the game dynamics application, they perform their duties effectively and efficiently
7	Nivedhitha et al., 2020	Gamification inducing creative ideation: a parallel mediation model	Survey to employees working in an IT organisation	508	Game dynamics as collaboration, network exposure and time pressure positively influence creative ideation
8	Höllig et al., 2020	Individualizing gamified systems: The role of trait competitiveness and leaderboard design	Two experimental vignette studies, through a team-based vs. player-based leaderboard	E1: 213; E2: 426	Personal development competitiveness is significantly positively related to perceptions of enjoyment, as well as indirectly related to the intention to use a competitive gamified system
9	Bhattacharya et al., 2020	Engaging the Head, Heart and Hand of the Millennial Workforce	Study 1: Questionnaire made to millennial employees in the IT sector Study 2: interviews to managers in IT sector	S1: 306; S2: 18	For millennials, gamification is the most significant positive indicator of employee engagement; for IT sector employees, gamification is not perceived as an organizational employee engagement strategy
10	Xi et al, 2019	Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction	Survey to Xiaomi and Huawei online gamified communities	824	Interactions with all gamification features and achievement-related features were positively associated with autonomy need satisfaction
11	Hassan et al, 2019	How motivational feedback increases user's benefits and continued use: A study on gamification, quantified-self and social networking	Online survey to users of a tracking system that incorporates features of gamification, QS and social networking	167	Experience of affective feedback is facilitated by the perceived prominence of gamification and is positively associated with intentions to continue the use of a motivational IS
12	Kwak et al., 2018	Cross-Level Moderation of Team Cohesion in Individuals' Utilitarian and Hedonic Information Processing: Evidence in the Context of Team-Based Gamified Training	Laboratory experiment in an integrated business process team setting using ERPsim	232	Team-based gamification elements and team cohesion play important roles in human information processing in the context of team-based gamified training
13	Putz et al., 2018	Gamified Workshops as Drivers for Attitudinal and Behavioral Shifts toward Sustainable Business Practices: The Role of Enjoyment, Curiosity and External Regulation	Questionnaires to Supply Chain Management professionals as participants of gamified workshops	261	Enjoyment and curiosity contribute to a positive change in attitudes and subsequently in behavioural intentions, as adopting sustainable business practices
14	Mulcahy et al., 2018	Designing gamified transformative and social marketing services An investigation of serious m-games	Online surveys to young adults about game elements and their outcomes	497	Hedonic and transformative game design elements have influence upon key outcomes, namely satisfaction, knowledge, and behavioural intentions
15	Suh et al., 2017	Gamification in the Workplace: The Central Role of the Aesthetic Experience	Survey of employees of a global consulting company that applied gamification ideas in an IS	178	Users are prone to discontinue the use of the IS as the novelty of game elements diminishes over time. Applying Aesthetic Experience helps understanding how a gamified IS successfully engages users and keeps them using the system
16	Suh et al., 2017	How gamification of an enterprise collaboration system increases knowledge contribution: an affordance approach	Survey to users of a gamified Enterprise Collaboration System	166	Designing three gamification affordances (rewardability, competition and visibility of achievement) for users to feel increased hedonic value is key to the success of gamification in the workplace
17	Liu et al., 2017	Gamification's impact on manufacturing: Enhancing job motivation, satisfaction and operational performance with smartphone-based gamified job design	Laboratory method integrated in a field experiment (experimental group and control group)	60	Gamified job design can enhance job motivation, job satisfaction, and operational performance, and consent to gamification can positively influence job motivation
18	Yang et al., 2017	Examining the impact of gamification on intention of engagement and brand attitude in the marketing context	Questionnaires to participants of a mocked gamification marketing activity	320	Perceived usefulness positively influences people's intention of engagement in a gamified process, although perceived ease of use is not significantly related to the intention of engagement
19	Mekler et al., 2017	Towards understanding the effects of individual gamification elements on intrinsic motivation and performance	Online experiment with four conditions to isolate the effect of game elements on intrinsic motivation	273	Points, levels and leaderboards functioned as extrinsic incentives, effective only for promoting performance quantity
20	Wagner et al., 2016	Enhancing User Engagement through Gamification	Survey method to collect empirical data from users of a gamified IS	164	Gamification improves users' engagement when game dynamics successfully satisfy their psychological needs and influences employees' performance

Table 2: Studies used for meta-analysis

The following table (Table 3) states, for each study (#), the relationships between variables, transmitting how the independent variables affect the dependent variables – a positive or negative correlation. For this, it is presented a standard regression coefficient (β) for each relationship, and its significance.

#	Independent variable	Dependent variable	β	Significance
1	usage of mobile technology	HR gamification initiatives	0.260	Significant
	HR gamification initiatives	job satisfaction	0.145	Not significant
	job satisfaction	employee engagement	0.673	Significant
	job satisfaction	job performance	0.241	Significant
	employee engagement	job performance	0.291	Significant
2	challenge	continuous usage intention	0.277	Significant
	relationship	continuous usage intention	0.235	Significant
	usability	continuous usage intention	0.228	Significant
3	behavioural change component of gamification	employee engagement	0.948	Significant
	intrinsic motivation	employee engagement	0.134	Significant
	extrinsic motivation	employee engagement	- 0.025	Not significant
4	psychological contract	swift trust	0.54	Significant
	relational contract	swift trust	0.52	Significant
	swift trust	task performance	0.46	Significant
	task performance	engagement	0.73	Significant
	gameful experience	task performance	0.03	Not significant
	gameful experience	engagement	0.62	Significant
5	system self-efficacy	perceived ease of use	0.2	Significant
	perceived ease of use	perceived usefulness	0.44	Significant
	perceived usefulness	attitude	0.35	Significant
	attitude	intention	0.55	Significant
6	game dynamics	intrinsic motivation	0.669	Significant
	intrinsic motivation	enjoyment	0.811	Significant
	enjoyment	work engagement	0.315	Significant
7	collaboration (game dynamics)	transcendent experience (user experience)	0.3966	Significant
	network exposure (game dynamics)	transcendent experience (user experience)	0.224	Significant
	time pressure (game dynamics)	transcendent experience (user experience)	0.2323	Significant
	collaboration (game dynamics)	intellectual experience (user experience)	0.0919	Not significant
	network exposure (game dynamics)	intellectual experience (user experience)	0.2413	Significant
	time pressure (game dynamics)	intellectual experience (user experience)	0.5302	Significant
	collaboration (game dynamics)	creative ideation	0.232	Significant
	network exposure (game dynamics)	creative ideation	0.232	Significant
	time pressure (game dynamics)	creative ideation	0.2741	Significant
8	personal development competitiveness on team-based leaderboard	enjoyment	0.659	Significant
	personal development competitiveness on team-based leaderboard	usage intention	0.040	Not significant
	personal development competitiveness on player-based leaderboard	enjoyment	0.659	Significant

#	Independent variable	Dependent variable	β	Significance
	personal development competitiveness on player-based leaderboard	usage intention	0.033	Not significant
9	gamification	employee engagement	0.132	Significant
10	immersion (gamification feature)	autonomy (intrinsic need satisfaction)	0.236	Significant
	achievement (gamification feature)	autonomy (intrinsic need satisfaction)	0.314	Significant
	social (gamification feature)	autonomy (intrinsic need satisfaction)	0.179	Significant
	achievement (gamification feature)	competence (intrinsic need satisfaction)	0.349	Significant
	social (gamification feature)	competence (intrinsic need satisfaction)	0.234	Significant
	achievement (gamification feature)	relatedness (intrinsic need satisfaction)	0.216	Significant
	social (gamification feature)	relatedness (intrinsic need satisfaction)	0.393	Significant
	immersion (gamification feature)	competence (intrinsic need satisfaction)	0.042	Not significant
	immersion (gamification feature)	relatedness (intrinsic need satisfaction)	-0.012	Not significant
11	gamification	affective feedback	0.254	Significant
	gamification	social feedback	-0.072	Not significant
	gamification	informational feedback	0.088	Not significant
12	rank performance	team cohesion	- 0.39	Significant
	perceived quality	team cohesion	0.14	Significant
	perceived enjoyment	team cohesion	- 0.12	Not significant
13	curiosity	enjoyment	0.66	Significant
	enjoyment	attitude	0.29	Significant
	curiosity	attitude	0.39	Significant
	attitude	behavioural intention	0.73	Significant
14	challenge	satisfaction	0.46	Significant
	challenge	knowledge	0.11	Not significant
	behaviour monitoring	satisfaction	0.20	Significant
	behaviour monitoring	knowledge	0.37	Significant
	virtual training	satisfaction	0.22	Significant
	virtual training	knowledge	0.35	Significant
	satisfaction	behavioural intentions	0.37	Significant
	knowledge	behavioural intentions	0.08	Not significant
15	status affordance	flow experience	0.557	Significant
	competition affordance	flow experience	0.159	Not significant
	status affordance	aesthetic flow	0.338	Significant
	competition affordance	aesthetic flow	0.570	Significant
	rewards affordance	aesthetic flow	0.326	Significant
	rewards affordance	flow experience	0.252	Significant
	self-expression affordance	flow experience	- 0.046	Not significant
	self-expression affordance	aesthetic flow	- 0.066	Not significant
	aesthetic experience	continuance intention to use a gamified IS	0.086	Not significant
	flow experience	continuance intention to use a gamified IS	0.349	Significant
16	rewardability	perceived hedonic value	0.182	Not significant
	competition	perceived hedonic value	0.379	Significant
	visibility of achievement	perceived hedonic value	0.296	Significant

#	Independent variable	Dependent variable	β	Significance
	perceived hedonic value	quality of knowledge contribution	0.669	Significant
	perceived hedonic value	quantity of knowledge contribution	0.390	Significant
17	gamification consent	job motivation	0.840	Significant
18	perceived usefulness	intention of engagement	0.148	Significant
	perceived enjoyment	intention of engagement	0.571	Significant
19	condition points	tag quantity	0.327	Significant
	condition levels	tag quantity	0.240	Significant
	condition leaderboard	tag quantity	0.475	Significant
20	enjoyment (intrinsic motivation)	engagement (positive functioning)	0.63	Significant
	competence (needs satisfaction)	enjoyment (intrinsic motivation)	0.18	Significant
	autonomy (needs satisfaction)	enjoyment (intrinsic motivation)	0.35	Significant
	relatedness (needs satisfaction)	enjoyment (intrinsic motivation)	0.50	Significant
	reward (game dynamics)	competence (needs satisfaction)	0.29	Significant
	reward (game dynamics)	autonomy (needs satisfaction)	0.22	Significant
	competition (game dynamics)	competence (needs satisfaction)	0.36	Significant
	competition (game dynamics)	relatedness (needs satisfaction)	0.38	Significant
	self-expression (game dynamics)	autonomy (needs satisfaction)	0.24	Significant

Table 3: Variables Relationships by study

3.3. MERGING OF VARIABLES

Having the previous step completed, the following phase is to identify most relevant variables, merging the ones with same meaning but different definitions. For example, game elements variables, as gameful experience, immersion, network, leaderboard, points, rewards, were merged into “gamification”. This merging process will allow to take conclusions on different studies. Only significant variables were merged, and are presented in Table 4, sorted by Average β.

# Relationship	Independent variable	Dependent variable	Frequency	Average β	∑ Sample size
1	behavioural intention	engagement	1	0.948	160
2	gamification consent	intrinsic motivation	1	0.840	60
3	intrinsic motivation	enjoyment	1	0.811	226
4	performance	engagement	1	0.73	523
5	satisfaction	engagement	1	0.673	728
6	gamification	intrinsic motivation	1	0.669	226
7	perceived hedonic value	performance	1	0.669	166
8	gamification	enjoyment	1	0.659	639
9	enjoyment	engagement	3	0.505	710
10	relatedness	enjoyment	1	0.50	164
11	challenge	satisfaction	1	0.46	497
12	usability	perceived usefulness	1	0.44	258

# Relationship	Independent variable	Dependent variable	Frequency	Average β	∑ Sample size
13	gamification	perceived hedonic value	1	0.379	166
14	gamification	engagement	2	0.376	847
15	satisfaction	behavioural intention	1	0.37	497
16	autonomy	enjoyment	1	0.35	164
17	perceived usefulness	behavioural intention	1	0.35	258
18	gamification	performance	3	0.347	819
19	gamification	competence	3	0.333	1152
20	gamification	relatedness	2	0.298	988
21	engagement	performance	1	0.291	728
22	enjoyment	behavioural intention	1	0.29	261
23	gamification	autonomy	3	0.257	1812
24	satisfaction	performance	1	0.241	728
25	competence	enjoyment	1	0.18	164
26	perceived usefulness	engagement	1	0.148	320
27	intrinsic motivation	engagement	1	0.134	160

Table 4: Merged significant variables

4. RESULTS AND DISCUSSION

4.1. DESCRIPTIVE STATISTICS

Having all 20 studies analysed, 27 relationships were identified between independent and dependent variables. Initially, were found 95 relationships, but 19 of them revealed not be useful, as they were not significant, and other 49 were merged.

Regarding research sample sizes, it is possible to assume the total size as 6,801 individuals, as adding all participants from each study.

Concerning publications' dates, all studies were conducted in the last 7 years, in the following distribution: 1 study from 2022, 5 studies published in 2021, 3 studies in 2020, 2 studies from 2019, 3 studies published in 2018, 5 studies from 2017, and 1 study from 2016.

4.2. META-ANALYSIS

As a meta-analysis extracts results from similar empirical studies (Hu et al., 2019), as a quantitative technique, it allows to compare size effect across relationships between constructs. The metric used in this meta-analysis, to measure those effects, is standardized regression coefficient (β), since the goal is to evaluate the correlation between variables, as positive or negative. The higher the β value, the more significant the relationship is.

Besides the analysis of standardized regression coefficient, each relationship is evaluated by the frequency among studies. A relationship between constructs that is found just once in the sample research is not as strong as one that appears in more studies.

Having this set, the six most frequent relationships were enjoyment on engagement (β: 0.505), gamification on performance (β: 0.347), gamification on competence (β: 0.333), gamification on autonomy (β: 0.257), gamification on engagement (β: 0.376), and gamification on relatedness (β: 0.298).

Nevertheless, these constructs relationships are not presented as the strongest relationships, according to β value. Ten strongest constructs seem to be: behavioural intention on engagement (β: 0.948), gamification consent on intrinsic motivation (β: 0.840), intrinsic motivation on enjoyment (β: 0.811), performance on engagement (β: 0.73), satisfaction on engagement (β: 0.673), gamification on intrinsic motivation (β: 0.669), perceived hedonic value on performance (β: 0.669), gamification on enjoyment (β: 0.659), enjoyment on engagement (β: 0.505), and relatedness on enjoyment (β: 0.5).

4.3. DISCUSSION

After analysing several theoretical and statistical models from the 20 articles reviewed, from the last 7 years, the total amount of 95 relationships between independent and dependent variables allowed to reach a concluding model, suggested from the meta-analysis (Figure 8). From the final 27 relationships, revealed to support the main goal of this study, it is possible to understand how gamification influences employees' performance.

The proposed model, by connecting all significant relationships between identified variables, permits to find the best constructs. Gamification, representing all its dynamics, mechanics and components, affects autonomy (β: 0.257), competence (β: 0.333), relatedness (β: 0.298) and intrinsic motivation (β: 0.669). Intrinsic motivation is also influenced by gamification consent (β: 0.840). By its turn, intrinsic motivation impacts engagement (β: 0.134) and enjoyment (β: 0.811). Other constructs on enjoyment are autonomy (β: 0.35), competence (β: 0.18) and relatedness (β: 0.50).

Usability of the gamified IS affects its perceived usefulness (β: 0.44), as this influences behavioural intention (β: 0.35) and engagement (β: 0.148). Behavioural intention is additionally affected by satisfaction (β: 0.37) and enjoyment (β: 0.29); by its turn, it influences engagement (β: 0.948). One variable affecting satisfaction is challenge (β: 0.46), and satisfaction impacts, besides behavioural intention, engagement (β: 0.673) and performance (β: 0.241). At last, performance is shaped by perceived hedonic value (β: 0.669).

Finally, constructs that connect every other relationships are also connected. Gamification affects enjoyment (β: 0.659), engagement (β: 0.376), perceived hedonic value (β: 0.379) and performance (β: 0.347). Regarding engagement, it is shaped by enjoyment (β: 0.505) and performance (β: 0.73), although it showed to likewise influence performance (β: 0.291).

As referred before, strongest constructs are the ones that appear more often across studies. Remembering these relationships as they were supported: enjoyment on engagement (Riatmaja et al., 2021; Yang et al.,2017; Wagner et al., 2016); gamification on performance (Benitez et al., 2022; Pereira et al., 2021; Mekler et al., 2017); gamification on competence and gamification on autonomy (Xi et al, 2019; Wagner et al., 2016); gamification on engagement (Pereira et al., 2021; Bhattacharya et al., 2020); and gamification on relatedness ((Xi et al, 2019; Wagner et al., 2016).

The presented study introduces gamification as an umbrella term, representing the concept as a gameful experience with all its elements: game dynamics, as time pressure and network exposure, along with game mechanics, as collaboration and competition, as well as game components, like points, leaderboards and rewards. The aimed hypothesis is that gamification influences employees'

performance, and this seems to be supported by the present study. For the proposed model, gamification is appearing to satisfy intrinsic needs, as autonomy, competence and relatedness, beside intrinsic motivation. As gamification leads to intrinsic motivation, that by its turn affects employee enjoyment and engagement, improving performance, the model shows to be statistically significant, supporting the hypothesised question.

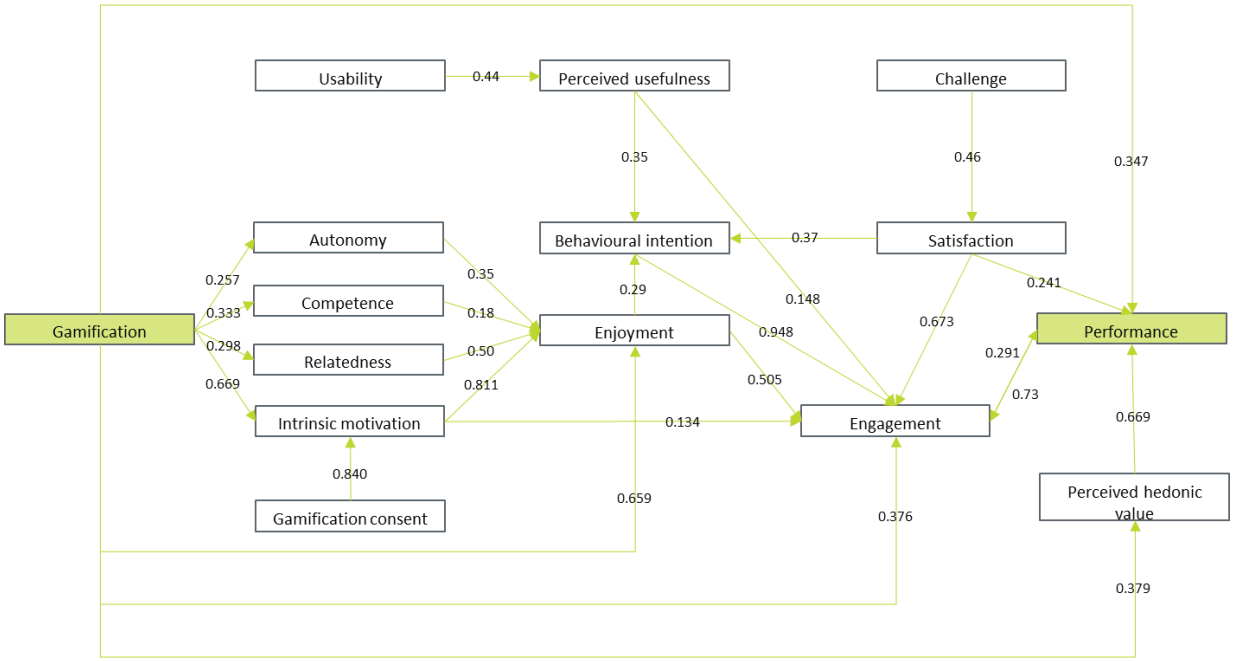

Figure 8: Theoretical model as a result from meta-analysis

(Average β represented by numerical values)

5. IMPLICATIONS

5.1. THEORETICAL IMPLICATIONS

By analysing the significance of relationships between independent and dependent variables, it was possible to obtain a model to explain how gamification application in enterprises influences employees' performance.

Although the most direct path is between gamification, intrinsic motivation, engagement and performance, the findings indicate that these constructs are not necessarily the strongest. These conclusions can be used as a starting point for a more precise model. Evaluate performance of the relationships between presented variables will permit other researchers to recognize patterns and select more adequate constructs to help reinforcing this model, adjusting some variables and relationships between them.

5.2. PRACTICAL IMPLICATIONS

This study discoveries aim to assist enterprises understanding if applying gamification in their workplace, within enterprise information systems, is effective. The meta-analysis allowed to find strong constructs relating to gamification and performance, as intrinsic needs satisfaction, like autonomy, competence and relatedness, intrinsic motivation, enjoyment, engagement and behavioural intention. This suggests that enterprises can start conceptualizing strategies to apply gamification, if their employees are not as engaged as they would want them to be, or if the enterprise results are not as well as they wanted to, due to low employees' productivity. But to apply gamification, as previously learned, some factors need be considered, as the organizational structure, objectives and culture, users characteristics, and enterprise gamification competence. Having these established, gamification design will decide which elements to apply, to better fit in the enterprise context. Gamified information system needs to be usable and usefulness, as well as bringing challenge to increase users' satisfaction. The idea is for employees to raise their enjoyment and engagement while working, since having an employee that enjoys work and is committed to its company, will increase performance and consequently productivity.

5.3. RESEARCH LIMITATIONS AND FUTURE WORK

The first research limitation relates to the sample used in meta-analysis. The 20 articles applied represent a small portion of gamification application studies existing in literature. However, applying

gamification in an enterprise context is a relatively recent subject, then there is not as much data to support the analysis as initially planned. The enterprise context certainly limits the results.

Another important aspect that made it difficult for the analysis was that not all studies evaluated the same relationships between constructs, which reveals a gap in the literature. As well, some studies didn't present the standardized regression coefficient, which led to eliminating those articles from the dataset. Also, the process of merging variables across studies may lead to dubious results, since some concepts are not detailed enough but are assumed to be similar to other notions found in different articles. Moreover, some articles didn't provide enough description of experiments and used tools for gamification application, making it complicated to understand the implementation process.

As for future work, this meta-analysis provides a starting point on gamification research to meet the identified gaps in literature. This research derived a model to demonstrate that gamification application in enterprise information systems generates behavioural changes, as increasing intrinsic motivation, raising enjoyment and engagement, and improving performance. Nevertheless, it is still necessary to apply it, as the model needs empirical evidence.

Additionally, a weight-analysis could be performed to complete what meta-analysis proved to be significant. By applying weight to used variables and relationships among them, it would allow to better evaluate and improve the suggested model.

Finally, as formerly stated and as proved by the model, user performance is a gamification outcome. But there is still the need to show evidence relating the better performance with the higher productivity of the employees. For a better enterprise gamification efficiency, it will be a huge contribution to literature to evaluate not only performance, but also employees' productivity. However, productivity is a difficult construct to measure.

6. CONCLUSIONS

This study conducted a meta-analysis, using as input the relationships between relevant independent and dependent variables, found in theoretical models from 20 articles, published in the last 7 years, from 2016 to 2022. These research findings supported strong constructs among gamification application in enterprise context, showing the 'best' relationships to be behavioural intention on engagement, gamification consent on intrinsic motivation, intrinsic motivation on enjoyment, performance on engagement, satisfaction on engagement, gamification on intrinsic motivation, perceived hedonic value on performance, gamification on enjoyment, enjoyment on engagement, and relatedness on enjoyment. This suggests that enterprises that request to increase their employees' performance and productivity, by raising engagement and enjoyment at work, may apply gamification strategies in information systems, considered to be adequate to organization objectives, structure and culture, and adapting its design to employees' profiles and characteristics as users.

This research aims to be a foundation for future studies, providing a starting point of analysis in gamification application in enterprise context, with the goal to increase employees' engagement and performance. As productivity is challenging to measure, and there is a gap of this evidence in literature, more research is needed to complete the discussed findings.

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