

The effects of a gamified human resource management system on job satisfaction and engagement

Questa è la versione sottoposta a revisione paritaria (postprint) della seguente opera:

Original

The effects of a gamified human resource management system on job satisfaction and engagement / Silic, M., Marzi, G., Caputo, A., Bal, P.M.. - In: HUMAN RESOURCE MANAGEMENT JOURNAL. - ISSN 0954-5395. - 30:2(2020), pp. 260-277. [10.1111/1748-8583.12272]

Availability:

This version is available at: 20.500.11771/21952

Publisher:

Published

DOI:10.1111/1748-8583.12272

Terms of use:

This publication is made accessible in accordance with the terms for deposit in the institutional repository, as defined by the IMT School for Advanced Studies Lucca's Open Access Policy. (https://library.imtlucca.it/sites/default/files/regolamento-policy-open-access-imtlib_0.pdf).

Si prega di consultare le pagine informative dell'editore relative alle politiche di autoarchiviazione.

(Article begins on next page)

THE EFFECTS OF A GAMIFIED HUMAN RESOURCE MANAGEMENT SYSTEM ON JOB SATISFACTION AND ENGAGEMENT

MARIO SILIC

University of St. Gallen - Institute of Information Management
mario.silic@unisg.ch

GIACOMO MARZI

Lincoln International Business School - University of Lincoln
gmarzi@lincoln.ac.uk

ANDREA CAPUTO

Lincoln International Business School - University of Lincoln
acaputo@lincoln.ac.uk

MATTHIJS BAL

Lincoln International Business School - University of Lincoln
mabal@lincoln.ac.uk

Published in Human Resource Management Journal

Full Text (DOI): <https://dx.doi.org/10.1111/1748-8583.12272>

Abstract

The pressures associated with the speed of competition, including the digitalization of workspaces, are increasing the need for modern organizations to drive employee satisfaction and engagement. Integrating gamification into the workplace has been identified as a possible strategy to promote employee participation, engagement, and loyalty. Gamification is defined as the application of game design elements in a non-game context, which, in this case, is the workplace. This article presents a 12-month longitudinal study designed to investigate the role of gamification in fostering job satisfaction and engagement. The findings from a sample of 398 employees, including both treatment and control groups from a large multinational company that introduced a gamified human resource management (HRM) system, revealed the effects of certain gamification experiential outcomes related to driving employee satisfaction and engagement at work. Overall, our study highlights the possibilities of employing gamified HRM systems to influence employee attitudes and behavior at work.

Keywords: HRM system; gamification; job satisfaction; job engagement; workplace gamification; flow

Introduction

Nearly 40% of the Global Fortune 1000 organizations have implemented gamification in their workplaces (Cherrie, 2018; Rivera, 2013). This makes gamification one of the most prominent modern trends in the management of organizations (Gruman & Saks, 2011; Strobel, Tumasjan, Spoerle, & Welp, 2017). Gamification involves the use of game design elements in non-gaming contexts (Hamari, 2017). Gamification is defined as the application of game design elements in the workplace environment, which takes advantage of the interactivity created by modern digital technologies and the principles of entertainment. It represents a tool capable of conveying various messages and encouraging people to reach specific personal or organizational goals (Cardador et al., 2017). At the center of this approach are the user and their active involvement in the task, the system, or the activity that is central to the game. Typical objectives achieved through gamification include the improvement of customer service, the consolidation of brand loyalty, and the improvement of student, employee, and partner performance (Hamari et al., 2014; Harman et al., 2014). Several companies (e.g., Cisco, Deloitte, and IKEA) have also included gamification in their human resources (HR) processes, including recruitment, training, and HRM systems, in an effort to achieve similar positive effects (Chamorro-Premuzic, 2015; Cherrie, 2018). However, despite the increasing use of gamification, management research on the subject of gamification in human resource management (HRM) is still lacking.

In the HRM realm, gamification consists of integrating gaming features and behavior-motivating techniques (e.g., points, leaderboard, challenges) into the HRM system to develop everyday tasks and processes that are perceived by users as game-like experiences (Cardador et al., 2017). For example, giving recognition badges to employees may promote higher levels of engagement among users (Hamari, 2017). Gamification is not effective per se, but rather the specific game design elements influence the user's psychological state and motivation (Sailer, Hense, Mayr, & Mandl, 2017). The effects of gamification in organizations ultimately depend on whether employees are motivated to use it, and whether gamification enhances their positive attitudes regarding their work. If employees experience more satisfaction and engagement in their work as a result of gamification, it will also be more likely to benefit organizations (Schaufeli & Bakker, 2004).

The impact of gamification of HR practices on job satisfaction and engagement can be explained by flow theory (Csikszentmihalyi, 2000). Flow theory predicts that employees can reach flow by experiencing immersion, absorption, enjoyment, intrinsic motivation, and interest when performing a task or activity. Flow is the mental state of operation in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity. (Ghani & Deshpande, 1994). It has been suggested that flow is key to employee engagement at work (Shuck, 2011), and it is also associated with job performance (Bakker, 2008). Flow at work arises under conditions with clear goals, where feedback is provided, and there is a sense of control combined with challenging tasks (Csikszentmihalyi, 2004). In line with flow theory, our study focused on four ways through which gamification impacts employees' perceptions of their HRM system. More specifically, gamification is beneficial when people enjoy it, feel recognized through it, find it useful, and are motivated to use it, which will increase job satisfaction and engagement (Csikszentmihalyi, 2000).

Accordingly, the present study investigates the use of gamification in HRM using a longitudinal study to investigate the effects of gamification antecedents (i.e., enjoyment, recognition, usefulness, and motivation) on job satisfaction and job engagement in the HRM system. A total of six hypotheses were developed for this study, which focused on employee perceptions of different factors associated with a gamified HRM system and their relationship

to job satisfaction and engagement. Our results revealed that recognition, motivation, usefulness, and enjoyment of HRM gamification enhanced job satisfaction and engagement.

Theoretical Background

This study focuses on investigating the longitudinal role and impact of a gamified HRM system in the workplace where gamification is defined as the application of game design elements in the workplace environment, and specifically within the HRM system (Shuck, 2011). More specifically, in this study, gamification was integrated into the company's HRM system using existing HRM procedures and practices that included new elements of engagement, such as sharing stories, which is a typical element stemming from the game world (Cardador et al., 2017). Gamification of HRM practices includes the introduction of game-like elements into the core activities that underpin HR practices such as knowledge sharing (e.g., sharing employees' stories and best practices). Gamification of HR practices, including recruitment and training, is accomplished by motivating employees to engage in games designed around these core processes. These games entail competition among employees to share their expertise and knowledge with each other, and employees can be rewarded through virtual badges, leadership boards, and a 'hall of fame' (Cardador et al., 2017). These gamified elements promote friendly competition among colleagues, the active sharing of knowledge, and the recognition of others for their achievements.

Gamification can be employed to leverage employee motivation through a series of *achievements, badges, a hall of fame, and leaderboards* (leaderboard and hall of fame are the terms that show employee's ranking compared to others based on certain criteria that can be points, a ranking, or number of acquired badges), which stimulate the enjoyment and the challenges in their everyday working lives with the ultimate goal of increasing employee satisfaction and engagement (Burguillo, 2010). From a practical perspective, this means that both colleagues and supervisors can reward employees for their work on a digital platform. Moreover, employees can earn digital badges through their work and interactions with others and can compete for a spot on the digital 'hall of fame' and 'leaderboard'. These game-like elements are part of the HR-system because they are designed to spur employee motivation, performance, and reward management. These are considered to be core elements of an HR-system in an organization, as their primary aim is to drive motivation and performance.

The use and potential benefits of gamification can be explained by flow theory (Csikszentmihalyi, 1996). Flow theory suggests that a person may reach a state of flow, characterized by the complete immersion in the moment when fully engaged in performing an activity (Csikszentmihalyi, 1996). Flow can be experienced in many different contexts. Musicians can reach flow while playing music, and athletes might experience it while performing at the limits of their physical capacity. Similarly, employees can reach flow by experiencing immersion or absorption, motivation, and enjoyment of the task they perform (Ghani & Deshpande, 1994; Shuck, 2011). Therefore, we hypothesized that the introduction of gamification in the HRM system may impact job satisfaction and engagement through motivation, usefulness, recognition, and enjoyment.

The existing research on gamification has shown its positive effects in several fields, such as education (Hanus & Fox, 2015), human-computer interaction (Sailer et al., 2017), healthcare (Cugelman, 2013), and the reduction of domestic energy use (Johnson, Horton, Mulcahy, & Foth, 2017). Indeed, several studies have reported that gamified elements can create engagement and flow among individuals, which indicates that flow theory provides theoretical support of the use of gamification principles in the organizational context (Hamari, 2017; Hamari et al., 2014). Studies on flow at work have shown that employees may experience flow during longer workdays or workweeks (Bakker, 2008). Thus, we assert that the application of gamification in the workplace may induce a continuous and sustained state of

flow. Employees not only experience flow in specific gamified tasks, but through enjoyment, recognition, and usefulness, they will continue to experience flow when transitioning from one task to another in an effective gamified HRM system. The HRM system examined in this study included elements that promote employee participation, collaboration, and recognition by gamifying HRM tasks (e.g., procedures and processes) to leverage employee motivation and job satisfaction and engagement. The objective of using gamification in the workplace is to go beyond the induction of a momentarily flow state, which is consistent with the long-term HRM goals. Instead, it focuses on a continuous, long-lasting “game”, which benefits both the employee and ultimately the wider environment (Shuck, 2011). Thus, gamification tries to foster enjoyment in everyday tasks by relying on a person’s psychological need for satisfaction (Seaborn & Fels, 2015), where the players are rewarded with short-term and long-term achievements, which are publicly shared within the organization (Hamari, 2017; Hamari et al., 2016). Gamification can be employed to address a variety of personal needs, such as the need to be competent, which includes feelings of efficiency and success (Rigby & Ryan, 2011; Vansteenkiste & Ryan, 2013). Moreover, gamification also fulfills the need for autonomy in the form of psychological freedom and volition when performing a particular task (Vansteenkiste, Niemiec, & Soenens, 2010) and the need for social interaction, such as feelings of belonging to a group of significant others (Deci & Vansteenkiste, 2004).

Gamified elements encourage people to engage in work-related activities for intrinsic reasons rather than some extrinsic reward (Seaborn & Fels, 2015). Competition triggered by leaderboards shared across the organization have been employed to harness social pressure to increase engagement (Burguillo, 2010), and consequently, to promote participation (Kahn, 1990). While performing the gamified job tasks, an employee could be psychologically connected, present, and fully immersed in the job task, which can result from their desire to improve job satisfaction (Rich, Lepine, & Crawford, 2010).

Hypotheses development

We propose that gamifying workplace processes could increase employee job satisfaction and engagement through four main factors, including enjoyment, recognition, usefulness of gaming, and gaming motivation (see Figure 1). In this study, we investigated how these factors relate to greater satisfaction or engagement at work, and introduce possible mediating mechanisms through which they relate to the outcomes.

== Insert Figure 1 about here ==

Job satisfaction has been defined as “a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experience” (Locke, 1976, p. 1300), while employee engagement has been defined as “harnessing their full selves in active, complete work role performances by driving personal energy into physical, cognitive, and emotional labors” (Rich et al., 2010, p.619). For the purposes of this study, the enjoyment of gaming is defined as the degree to which people enjoy using a gamified service or system, and this refers to the individual experience of pleasure and happiness in using the gamified HRM system (Deci & Ryan, 2000). If an employee’s participation in the gamified HRM system is an enjoyable and playful experience, it will likely translate into a joyful and satisfactory work experience (Korhonen, Montola, & Arrasvuori, 2009), which provides the nexus between enjoying the game and enjoying work (Mollick & Rothbard, 2014). Therefore, we assert that if an employee enjoys the gamified HRM system and finds it pleasant, exciting, or interesting, it is likely that it enhances job satisfaction. Therefore, H1 can be simply stated in the following manner:

H1: An employee’s perceived enjoyment of a gamified HRM system is positively associated with job satisfaction.

Recognition refers to the feedback received from the community, which results from types of social engagement that can take the form of online engagement or achievement. Recognition can be simply described as the direct feedback received through an HRM system (e.g., accolades for a job-related task), and it is created through the behaviors that employees observe. Recognition often creates reciprocal behavior (Cialdini & Goldstein, 2004), whereby an employee may either receive or provide feedback, which results in creating more value and benefits for the entire HRM system as more collaboration and social interactions are created. Receiving recognition from peers or supervisors fosters an employee's willingness to recognize others in a reciprocal way when using a service, implying that receiving recognition creates reciprocal behavior (Hamari & Koivisto, 2013).

A reciprocal benefit represents the perceived social usefulness of the service, where the individual expects mutual benefits to be created through their contribution to the community (Hsu & Lin, 2008; Lin, 2008; Preece, 2001). In the workplace context, an employee who is engaged in the gamified process would expect to receive and reciprocate positive benefits from their contribution. This effect is associated with the need to be competent, which can manifest as feelings of efficiency and success while employees are interacting with a newly-introduced gamified environment (Rigby & Ryan, 2011; Vansteenkiste & Ryan, 2013) and the need for social relatedness, which can include feelings of belonging to a group of significant others and receiving recognition from the group (Deci & Vansteenkiste, 2004). People are expected to recognize others if they also perceive recognition as something valuable that brings them benefits. For example, a "like" of a comment they posted on the gamified HRM system can function as a form of recognition. Subsequently, the employee is more likely to recognize others, thus leading to mutual benefits for all employees (Deci & Vansteenkiste, 2004). Therefore, H2 can be simply stated in the following manner:

H2: An employee's perception of the recognition they receive in a gamified HRM system is positively associated with reciprocal benefits.

When engaged in their work, employees express their full selves by devoting physical, cognitive, and emotional energy to their work performance (Kahn, 1990). Such engagement has been found to be fulfilling, improve their health, and positively affect their work (Sonnentag, 2003) because engaged employees tend to demonstrate a stronger commitment to their organization, which can translate to a decrease in turnover rates (Schaufeli & Bakker, 2004). Engagement is likely to be affected by reciprocal benefits, and in a gamified system, a reciprocal benefit for the employee and others will result, which enhances the state of flow when playing. Because the gamification experience delivers benefits for both employees and colleagues, the employee is more likely to be engaged at work.

Saks (2006) showed a positive relationship between reciprocal benefits and job satisfaction and engagement, whereby employees who continue to be engaged and satisfied do so as a reaction to a continuation of favorable reciprocal exchanges that occur in the work environment. This can ultimately result in an increase in employee job engagement, resulting from the recognition received in the gamified HRM system (Rich et al., 2010).

Overall, we suggest that reciprocal benefits play an important role in leveraging job satisfaction and engagement due to the reciprocal exchange mechanisms, which are supported by the gamified system, where employees are focused on receiving recognition while also recognizing others. For example, if an employee takes a positive action (e.g., posting a positive comment), and it receives a positive response (e.g., "likes" from others), the employee's job satisfaction will increase because the employee may perceive that their efforts are paying off. Examples of the reciprocal benefits can be the tokens exchanged among users in a gamified HRM system. Accordingly, H3 can be simply stated in the following manner:

H3a: An employee's perception of a reciprocal benefit in the gamified HRM system is positively associated with job satisfaction.

H3b: An employee's perception of a reciprocal benefit in the gamified HRM system is positively associated with job engagement.

The usefulness of gaming represents the degree of belief in performance improvement due to using a gamified system (Davis, 1989; Venkatesh, 2000; Venkatesh & Davis, 2000). Performance expectancy is related to improving the employee's productivity and effectiveness in job-related tasks. Previous studies established a link between usefulness and performance expectancy (Venkatesh, Morris, Davis, & Davis, 2003). If employees perceive that the gamified system is useful to them in their work, they will be likely to also perceive their performance to improve as a result of the implemented system. A gamified system's usefulness is primarily driven through the communication, familiarity, and acknowledgment of the company's internal procedures and processes. For example, the gamified system can facilitate more effective communication through the social exchanges among employees, which are associated with the design of the game element (see Figure 2). Hence, due to improved communication and usefulness, it is possible for employees to conduct their work in a more efficient and motivated manner, thus improving their performance. In the workplace context, we further expected to see a positive impact on job engagement if the gamified HRM system is easy to use and useful. Hence, if gamification is useful and helps employees improve their productivity, it should lead to an increase in their effectiveness and overall motivation. Consequently, job engagement should be positively impacted by performance expectancy. Accordingly, H4 can be simply stated in the following manner:

H4: An employee's perceived usefulness of the gamified HRM system is positively associated with performance expectancy.

H5: An employee's perceived performance expectancy is positively associated with job engagement.

== Insert Figure 2 about here ==

Motivation is the level of an individual's motivational experience when engaged in an activity (Vallerand, 1997), where motivation refers to the stimulus required for an employee to take part in the gamified HR system. Previous studies have established a positive relationship between motivation and job engagement (de Lange, Van Yperen, Van der Heijden, & Bal, 2010; Parker, Jimmieson, & Amiot, 2010), and self-determined motivation leads to positive outcomes (Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011). Accordingly, we assert that when employees are highly motivated to use the gamified HRM system, it contributes to higher levels of job engagement due to the positive effects of the motivational factors that improved the employee's psychological state (Hanus & Fox, 2015). Therefore, H6 can be simply stated in the following manner:

H6: An employee's perceived motivation in the gamified HRM system is positively associated with job engagement.

Methods

Research design

This study involved a large US-based multinational company (~10,000 employees) engaged in the financial services sector that has implemented the gamified BRAVO HRM system (name modified), which provides gamification elements that are designed to drive community engagement. Bravo is an HRM network which enabled the company to promote peer recognition, improving engagement with other colleagues, and receive public recognition

for productivity. Prior to BRAVO's implementation, the company used a very similar HRM system (i.e., CompanyLife) but without gamification elements. In contrast to the previous system, the BRAVO system enables employees to play an ongoing game while working, and it provides similar incentives and enjoyment as if employees were playing a quest-style board game. As shown in Figure 2, using challenges, leaderboards, recognition, and awards, BRAVO incorporates the entire company's HRM system, including (1) talent acquisition and management (e.g., onboarding process for new hires and referral processes); (2) knowledge sharing (e.g., sharing employees stories and best practices); (3) mandatory HR training (e.g., earning recognition/badges when completing a training); and (4) team/group collaboration (e.g., sending/receiving feedback on completed tasks; congratulating employees for their work anniversary).

BRAVO provides an opportunity for any employee to participate in the community (a group of people using an internal HRM system) by either creating content (e.g., a new project, blog, idea, contest) or contributing to existing content through recognition of their peers by voting, giving points, reading, and providing comments on content. Overall, the BRAVO system enabled the company to easily share best practices and success stories, promote and familiarize employees with existing and new procedures and policies, while also allowing employees to interact with each other by sending and receiving recognition that was available to all users. Figure 2 shows screenshots from the actual gamified HR system implemented in the organization.

Sample and Data Collection

Data were collected over one year during three different time periods: six months (T1), nine months (T2), and one-year (T3) after implementation of the new system. Given that the only difference between the CompanyLife system and the BRAVO HRM system were associated with the gamification elements, we distinguished between the treatment group (BRAVO) and the control group (CompanyLife). Participants were randomly allocated to each group by the HR department. Four divisions representing four countries (UK, USA, Australia and the UAE) were chosen by the top management to pilot the BRAVO system and participate in the study. A survey was administered through the internal survey system in English, which is the official working language of the company.

For the treatment group, 490 employees were invited, 290 responded to the survey (59% response rate), and 20 questionnaires were removed because they were incomplete, improperly completed (e.g., responding to all items with the same answer), or completed too quickly. The treatment group included 270 participants, and 232 employees were invited to participate in the control group, 141 responded to the survey (61% response rate), and 13 questionnaires were removed due to inconsistencies, resulting in a final sample of 128 participants. Selection bias was tested and did not reveal any significant differences in the groups. Demographics characteristics of our sample are shown in Table 1.

== Place Table 1 here ==

Measurements

All measurements employed a self-reported 7-point Likert scale for items that were pre-tested with 20 students enrolled in an IT university course. Minor changes were made to some items to include reference to the BRAVO system.

Enjoyment of gaming ($\alpha = .92$) was measured with a 4-item scale (e.g., "I find the experience of BRAVO system use enjoyable") adapted from Davis (1989). *Recognition* ($\alpha = .88$) was measured with a 3-item scale (e.g., "I like it when my peers notice my BRAVO recognitions") adapted from Hernandez, Montaner, Sese, and Urquizu (2011). *Usefulness of*

Gaming ($\alpha = .93$) was measured with a 5-item scale (e.g., “I find BRAVO system useful”) adapted from Venkatesh and Davis (2000). *Motivation in Gaming* was measured with the Situational Motivation Scale (SIMS) from Guay, Vallerand, and Blanchard (2000), 16-items scale consisted of asking respondents why they were engaged in the HR system activity (e.g., “Because I think that this activity is interesting”).

Reciprocal benefit ($\alpha = .95$) was measured with a 4-item scale (e.g., “I find that participating in the BRAVO system can be mutually helpful”) adapted from Koivisto and Hamari (2014). *Performance expectancy* ($\alpha = .96$) was measured with a 5-item scale (e.g., “Being recognized through BRAVO system would enhance my effectiveness on the job”) adapted from Venkatesh et al. (2003).

Job satisfaction ($\alpha = .89$) was measured with a 4-item scale (e.g., “Bravo system increases my present job satisfaction”) adapted from Judge, Bono, and Locke (2000). *Job Engagement* ($\alpha = .91$) was measured with an 8-item (e.g., “I exert my full effort to my job”) scale adapted from Rich et al. (2010).

Analysis

Since our constructs are reflective, and the model contains first and second-order constructs, partial least squares (PLS) methodology was selected (Lowry & Gaskin, 2014) to test our research model with SmartPLS 3.2.8 software (Ringle, Wende, & Will, 2005). We started with the hypothesized model (Figure 1) and tested a range of alternative models to assess whether the hypothesized model fit the data better than a range of conceptual alternative models. We found that the hypothesized model had the best fit among the variables used in the study. We analyzed the data at three different periods of time (T1, T2, T3) for both the treatment group and the control groups. To analyze the cross-lagged data, the process described in Maxwell and Cole (2007) was followed.

To test the risk of common method bias, we followed recommendations of Podsakoff, MacKenzie, Lee, and Podsakoff (2003). The Harman’s single factor test resulted in the largest factor, accounting for 31% of the variance. Moreover, as Pearson’s correlations were above the 0.9 level among the formative constructs, we examined the correlation matrix as suggested by Lowry and Gaskin (2014). Since none of the correlations reached 0.9, we concluded that the likelihood of common method bias was relatively low.

Confirmatory Factor Analysis

First, confirmatory factor analysis (CFA) was conducted to test for the convergent and divergent validity of each variable at each wave. The results from the data taken at wave T3 are presented in Tables 2 and 3. The measurement quality was evaluated by inspecting the content validity, construct validity, and reliability (Straub, Boudreau, & Gefen, 2004). For the reflective constructs, their validity and reliability were evaluated, and for convergent validity, the t-values of the outer model loadings were examined. All items loaded significantly on the factors (except for items WE4 and JS4, which were removed from further analysis), and the model showed a strong convergent validity. Following the recommendation of Fornell and Larcker (1981), it was necessary to determine whether the average variance extracted (AVE) values were 0.5 or higher. Regarding the reliability of measurement items, Cronbach’s α and composite reliability scores were found to be higher than 0.6 (Fornell & Larcker, 1981). Our results (Table 2) revealed a high degree of convergent validity and composite reliability as all thresholds were met (Straub et al., 2004).

Next, we examined the construct validity of our second-order construct using CFA with maximum likelihood estimation. Results indicated an acceptable model fit (RMSEA = 0.05, SRMR = 0.07, CFI = 0.91, TLI = 0.91). To establish the discriminant validity, the cross-

loadings were evaluated to make sure that an item displayed a higher loading on the construct than any other construct. The results (Table 2) indicated that the test was successful.

The square root of AVE was calculated for each construct and compared to the correlations of other constructs. According to Chin (1998), this value should be higher than the values of the other constructs. As shown in Table 3, the results indicated that the discriminant validity was established.

Finally, multicollinearity issues were considered. A variance inflation factor (VIF) score provides a measure of the increases in the variance of the estimated beta coefficients and its impacts due to collinearity. The calculated VIFs were all below the recommended value of 10 (Hair, Anderson, Babin, & Black, 2010), which indicated multicollinearity was not an issue for this study.

== Place Table 2 here ==

== Place Table 3 here ==

Results

Results for Theoretical Model Testing

Our model results are presented in Figure 3. The model exhibited an R^2 value of 0.31 for job engagement, 0.66 for job satisfaction, 0.48 for the reciprocal benefit, and 0.50 for performance expectancy.

=== Insert Figure 3 about here ===

The perceived enjoyment of the gamified HRM system was predicted to be positively associated with job satisfaction, and the relationship with job satisfaction was found to be significant at T3 ($b=.46$, $p<0.001$) and across all time points (see Table 4).

=== Insert Table 4 about here ===

The results at T3 indicated a positive relationship between enjoyment of gaming and job satisfaction, supporting H1 ($b=.46$, $p<0.001$). H2 was also supported, as recognition is positively related to reciprocal benefits at T1, T2, and T3 (T3: $b=.69$, $p<0.001$). The relationship between reciprocal benefits and job satisfaction was found to be significant for all three time periods (for T3: $b=.42$, $p<0.001$), supporting H3a. The relationship between reciprocal benefits and job engagement was also found to be significant, which supported H3b (for T3: $b=.42$, $p<0.001$).

H4 predicted that the usefulness of gaming would have a positive relationship with performance expectancy. Across all three measured periods, the result was statistically significant ($b=.71$, $p<0.001$ at T3), which supported H4. H5 predicted that performance expectancy would be positively associated with job engagement, which was supported ($b=.17$, $p<0.01$ at T3). Finally, H6 predicted that motivation would be positively associated with job engagement, which was supported ($b=.14$, $p<0.001$ at T3). We also tested for indirect effects of recognition through reciprocal benefits ($b=.241$, $p<0.001$), usefulness through performance expectancy ($b=.185$, $p<0.001$) and usefulness to job engagement through performance expectancy ($b=.121$, $p<0.001$), and we found statistically significant specific indirect effects in all three cases. Hence, reciprocal benefits and performance expectancy were found to mediate the relationships between the gaming experiences and the outcomes in our study.

Therefore, we concluded that all six hypotheses were supported and statistically significant across T1, T2, and T3, confirming the positive impact of gamification in both the short and long term.

=== Insert Table 5 about here ===

Table 5 shows the results from the control group, highlighting how the control group was affected by different dimensions in a non-gamified system. Notably, the treatment group received a higher impact from the gamified system in such a way that all indicators were indicative of stronger statistical power. For example, R^2 for job engagement was 0.31 for the treatment group vs. 0.09 for the control group, R^2 for job satisfaction was 0.66 for the treatment group vs. 0.11 for the control group. Finally, the results from the cross-lagged analysis (Table 6) revealed that all the relationships were statistically significant and increased over time. The control variables (age, gender, and experience) had no significant effect on any of the dependent variables.

== Insert Table 6 about here ==

Discussion

Despite the recent increase in research interest to advance understanding of the dynamics and the impact of gamification in the workplace (Harman et al., 2014), empirical evidence regarding the motivational dimensions that support user's willingness to play at work is still in the early stages (Hamari et al., 2014; Sailer et al., 2017). In this study, we aimed to develop an understanding of how gamification can influence job satisfaction and engagement in the workplace context when the HRM system is gamified. Overall, we found that reciprocal benefits, usefulness of gaming, motivation for gaming, recognition, and enjoyment of gaming are important triggers that foster job satisfaction and engagement that can be better leveraged in the organizational HRM system by introducing gamification elements, which should lead to a more pleasant, interesting, and enjoying workplace environment.

Theoretical Contributions

The importance of the effect of gamification experiential outcomes (reciprocal benefit, recognition, enjoyment, usefulness, extrinsic motivation) on employee attitudes were empirically validated, including job satisfaction and job engagement. This is particularly important, as we found a positive link between the effects of gamification and the work environment. Our findings provide new theoretical insights into the theory of engagement, as the relationship between being motivated and job engagement takes on a new dimension by gamifying one's personal resources. As Oprescu, Jones, and Katsikitis (2014) noted, the "game-like" experience is something that organizations are looking for to transform work-related processes, with the ultimate goal of achieving higher job satisfaction. This seems to be especially true when the person received some type of reciprocal benefit from their participation in the gamified HRM system processes.

The expectation to be recognized while also recognizing others appeared to be high. Such reciprocity is especially important since it was found that over time, gamification effects in many other contexts can fade away. For instance, Koivisto and Hamari (2014) found that perceived benefits (perceived enjoyment and usefulness) from gamification declined with service use. Since our study context was different from the Koivisto and Hamari (2014) study (i.e., exercise-tracking and social networking service), and considering that we followed the longitudinal approach for data collection, perceived benefits did not appear to decline over

time. This finding is something that we were expecting to see in a large organization, where a higher number of employees can receive or give each other recognition using a virtual platform. In such a context, it is more likely to make gamification cooperative, adding a layer above the usual work processes (Hamari et al., 2016).

Since our study was primarily focused on recognition and enjoyment dimensions through the gamified HRM system, we demonstrated that reaching flow was not a necessary condition for job engagement. Instead, in the workplace context, our results supported the findings in Bakker (2008), where the flow was expressed through a temporary experience (such as when an employee receives recognition) that is driven by enjoyment and intrinsic work motivation related to the activities that the individual is performing. Recognition and enjoyment of gaming seem to be important dimensions that shape the cognitive and affective factors and their relationship with work motivation. This suggests that feedback in relation to reciprocal benefits plays an important role in fostering satisfaction and engagement.

In summary, organizations are constantly searching for a secret formula to better engage employees and increase their satisfaction to increase productivity and efficiency. Many different initiatives have been employed in the past, such as providing more flexible policies, job crafting, modifying the work design, incorporating diversity into the workforce, and creating a healthy workplace (Berg, Grant, & Johnson, 2010; Grant, 2007; Ramarajan & Reid, 2013). In this study, we found that gamification can also be an important organizational tool that can support employee motivation and engagement.

Implications for Practice

Our research demonstrated that job satisfaction and engagement can be leveraged through the implementation of basic gamification elements, such as feedback. This suggests that organizations may follow the example of gamifying their work processes, thereby making them more attractive and collaborative. Employees want to be recognized and received some type of reciprocal benefit from this novel communication method. They want to be present and seen as valuable parts of the organizational information system. In this context, organizations should strive to leverage HRM systems to propose small enhancements, whereby employees can create added value for themselves through recognition from their peers and colleagues, but also ensuring that employees enjoy the tasks they are performing. By getting “likes” or badges for their activities and achievements, employees express higher levels of job satisfaction and job engagement.

Our study revealed that these small enhancements may also work over the long term because the effects of gamification do not seem to decrease or fade away. However, the question of the employee’s long-term interest in the perceived benefits of using the service is a legitimate one. HRM system designers should take this into consideration to better understand how to tackle the flow challenges and make the information system attractive, useful, and enjoyable over a longer period. Another interesting point to consider is the sample age, which in our case was represented by a relatively young workforce. This worked well in our context, but age could be an important factor to consider when implementing gamification in the HRM system. Indeed, older employees might be reluctant to adopt the new system or may even perceive it as a work distraction or waste of time. By contrast, millennials may adapt faster and benefit more from gamification of the workplace.

Limitations and Future Research

Our research has several limitations but also offers a new direction for future research. First, we did not evaluate the separate effects of various gamification elements because our study focused on a single organization that had gamified its existing HRM system. This could have some influence on the results since other game design elements could have a different

effect on job satisfaction or job engagement. Future research could explore other implementations to improve our understanding of how different game design elements influence workplace factors. A second limitation is that participants were from the same organization, which could potentially decrease the ability to generalize the study results. Future research could expand our findings by incorporating various dimensions that we did not study, including, for example, a cultural dimension because different cultures could have different expectations for workplace satisfaction and engagement (we note that in the UAE sample most of the employees were expatriates). Age and personality differences are other factors that may be worth investigating as some employees do not like public recognition (e.g., the role of extraversion/introversion) or are simply not achievement-oriented. Finally, group dynamics are another potential study subject, which may explain how an individual would perceive interactivity compared to the feedback received and possible negative outcomes from that relationship.

Conclusion

In this study, we investigated the role of gamification in improving job satisfaction and engagement when a gamified HRM system is in place. We found that gamification experiential outcomes have an important effect on employees' satisfaction and engagement at work. Overall, our study highlighted the important role of the gamified HRM system in influencing employee behavior and motivation. We derived several important theoretical and practical implications that can further contribute to a better understanding of the HRM management challenges when it comes to increasing employees' motivation and their level of job satisfaction and engagement.

References

- Bakker, A. B. (2008). The work-related flow inventory: Construction and initial validation of the WOLF. *Journal of vocational behavior*, 72(3), 400-414.
- Berg, J. M., Grant, A. M., & Johnson, V. (2010). When callings are calling: Crafting work and leisure in pursuit of unanswered occupational callings. *Organization science*, 21(5), 973-994.
- Burguillo, J. C. (2010). Using game theory and competition-based learning to stimulate student motivation and performance. *Computers & Education*, 55(2), 566-575.
- Cardador, M. T., Northcraft, G. B., & Whicker, J. (2017). A theory of work gamification: Something old, something new, something borrowed, something cool?. *Human Resource Management Review*, 27(2), 353-365.
- Chamorro-Premuzic, T. (2015). 3 Emerging Alternatives to Traditional Hiring Methods. *HBR.org*. Retrieved 17/11, 2018, from <https://hbr.org/2015/06/3-emerging-alternatives-to-traditional-hiring-methods>
- Cherrie, D. (2018). How Leaders Can Utilize Gamification To Level Up Engagement. *Forbes.com Dallas Business Council*. Retrieved 17/11, 2018, from <https://www.forbes.com/sites/forbesdallascouncil/2018/09/26/how-leaders-can-utilize-gamification-to-level-up-engagement>
- Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. *MIS Quarterly*, 22(1), vii-xv.
- Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55(1), 591-621.
- Collmus, A. B., Armstrong, M. B., & Landers, R. N. (2016). Game-thinking within social media to recruit and select job candidates *Social Media in Employee Selection and Recruitment* (pp. 103-124): Springer.
- Csikszentmihalyi, M. (1996). Flow and the psychology of discovery and invention. *New Yprk: Harper Collins*.
- Csikszentmihalyi, M. (2000). *Beyond Boredom and Anxiety*. San Francisco, CA, US: Jossey-Bass.
- Csikszentmihalyi, M. (2004). *Good business: Leadership, flow, and the making of meaning*: Penguin.
- Cugelman, B. (2013). Gamification: what it is and why it matters to digital health behavior change developers. *JMIR Serious Games*, 1(1).
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. doi: 10.2307/249008
- de Lange, A. H., Van Yperen, N. W., Van der Heijden, B. I., & Bal, P. M. (2010). Dominant achievement goals of older workers and their relationship with motivation-related outcomes. *Journal of Vocational Behavior*, 77(1), 118-125.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry*, 11(4), 227-268.
- Deci, E. L., & Vansteenkiste, M. (2004). Self-determination theory and basic need satisfaction: Understanding human development in positive psychology. *Ricerche di psicologia*.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.
- Ghani, J. A., & Deshpande, S. P. (1994). Task characteristics and the experience of optimal flow in human—computer interaction. *The Journal of psychology*, 128(4), 381-391.
- Grant, A. M. (2007). Relational job design and the motivation to make a prosocial difference. *Academy of management review*, 32(2), 393-417.

- Gruman, J. A., & Saks, A. M. (2011). Performance management and employee engagement. *Human Resource Management Review*, 21(2), 123-136.
- Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the assessment of situational intrinsic and extrinsic motivation: The Situational Motivation Scale (SIMS). *Motivation and emotion*, 24(3), 175-213.
- Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). *Multivariate data analysis: A global perspective* (Vol. 7). Upper Saddle River, NJ: Pearson.
- Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, 71, 469-478.
- Hamari, J., & Koivisto, J. (2013). *Social Motivations To Use Gamification: An Empirical Study Of Gamifying Exercise*. Paper presented at the ECIS.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). *Does gamification work?--a literature review of empirical studies on gamification*. Paper presented at the 2014 47th Hawaii International Conference on System Sciences.
- Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54(January), 170-179.
- Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, 80(January), 152-161.
- Harman, K., Koohang, A., & Paliszkievicz, J. (2014). Scholarly interest in gamification: a citation network analysis. *Industrial Management & Data Systems*, 114(9), 1438-1452.
- Hernandez, B., Montaner, T., Sese, F. J., & Urquizu, P. (2011). The role of social motivations in e-learning: How do they affect usage and success of ICT interactive tools? *Computers in Human Behavior*, 27(6), 2224-2232.
- Hsu, C.-L., & Lin, J. C.-C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. *Information & management*, 45(1), 65-74.
- Johnson, D., Horton, E., Mulcahy, R., & Foth, M. (2017). Gamification and serious games within the domain of domestic energy consumption: A systematic review. *Renewable and Sustainable Energy Reviews*, 73, 249-264.
- Judge, T. A., Bono, J. E., & Locke, E. A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of applied psychology*, 85(2), 237.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of management journal*, 33(4), 692-724.
- Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35, 179-188.
- Korhonen, H., Montola, M., & Arrasvuori, J. (2009). *Understanding playful user experience through digital games*. Paper presented at the International Conference on Designing Pleasurable Products and Interfaces.
- Landers, R. N., & Armstrong, M. B. (2017). Enhancing instructional outcomes with gamification: An empirical test of the Technology-Enhanced Training Effectiveness Model. *Computers in Human Behavior*, 71, 499-507.
- Lin, H.-F. (2008). Determinants of successful virtual communities: Contributions from system characteristics and social factors. *Information & Management*, 45(8), 522-527.
- Locke, E. A. (1976). The nature and causes of job satisfaction. *Handbook of industrial and organizational psychology*, 1, 1297-1343.

- Lowry, P. B., & Gaskin, J. (2014). Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it. *IEEE Transactions on Professional Communication*, 57(2), 123-146.
- Markets, M. a. (2016). Gamification market by solution (consumer driven and enterprise driven), applications (sales and marketing), deployment type (on-premises and cloud), user type (large enterprise, smbs), industry and region - global forecast to 2020.
- Maxwell, S. E., & Cole, D. A. (2007). Bias in cross-sectional analyses of longitudinal mediation. *Psychological methods*, 12(1), 23.
- Mollick, E. R., & Rothbard, N. (2014). Mandatory fun: Consent, gamification and the impact of games at work.
- Morschheuser, B., Henzi, C., & Alt, R. (2015). *Increasing Intranet Usage through Gamification--Insights from an Experiment in the Banking Industry*. Paper presented at the System Sciences (HICSS), 2015 48th Hawaii International Conference on.
- Mouratidis, A. A., Vansteenkiste, M., Sideridis, G., & Lens, W. (2011). Vitality and interest-enjoyment as a function of class-to-class variation in need-supportive teaching and pupils' autonomous motivation. *Journal of Educational Psychology*, 103(2), 353.
- Novak, M. (1996). *Business as a Calling*. New York: Free Press.
- Opreescu, F., Jones, C., & Katsikitis, M. (2014). I play at work - ten principles for transforming work processes through gamification. *Frontiers in psychology*, 5.
- Parker, S. L., Jimmieson, N. L., & Amiot, C. E. (2010). Self-determination as a moderator of demands and control: Implications for employee strain and engagement. *Journal of Vocational Behavior*, 76(1), 52-67.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879.
- Preece, J. (2001). Sociability and usability in online communities: Determining and measuring success. *Behaviour & Information Technology*, 20(5), 347-356.
- Ramarajan, L., & Reid, E. (2013). Shattering the myth of separate worlds: Negotiating nonwork identities at work. *Academy of management review*, 38(4), 621-644.
- Rich, B. L., Lepine, J. A., & Crawford, E. R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of management journal*, 53(3), 617-635.
- Rigby, S., & Ryan, R. M. (2011). *Glued to games: How video games draw us in and hold us spellbound: How video games draw us in and hold us spellbound*: ABC-CLIO.
- Ringle, C., Wende, S., & Will, A. (2005). Smart-PLS Version 2.0 M3. *University of Hamburg*.
- Rivera, J. (2013). Gartner reveals top predictions for IT organizations and users for 2014 and beyond. *Gartner Newsroom*. Retrieved 16/11/2'18, 2018, from <https://www.gartner.com/newsroom/id/2211115>
- Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior*, 69, 371-380. doi: <https://doi.org/10.1016/j.chb.2016.12.033>
- Saks, A. M. (2006). Antecedents and consequences of employee engagement. *Journal of managerial psychology*, 21(7), 600-619.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of organizational Behavior*, 25(3), 293-315.
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, 74(February 2015), 14-31.

- Shuck, B. (2011). Integrative literature review: four emerging perspectives of employee engagement: an integrative literature review. *Human Resource Development Review*, 10(3), 304-328.
- Sonnentag, S. (2003). Recovery, work engagement, and proactive behavior: a new look at the interface between nonwork and work. *Journal of applied psychology*, 88(3), 518.
- Straub, D., Boudreau, M.-C., & Gefen, D. (2004). Validation guidelines for IS positivist research. *The Communications of the Association for Information Systems*, 13(1), 63.
- Strobel, M., Tumasjan, A., Spoerrle, M., & Welpe, I. M. (2017). Fostering employees' proactive strategic engagement: Individual and contextual antecedents. *Human Resource Management Journal*, 27(1), 113-132.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in experimental social psychology*, 29, 271-360.
- Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: An historical overview, emerging trends, and future directions *The decade ahead: Theoretical perspectives on motivation and achievement* (pp. 105-165): Emerald Group Publishing Limited.
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263.
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 11(4), 342-365. doi: 10.1287/isre.11.4.342.11872
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425-478.

Tables

Table 1 - Demographic characteristics of the respondents

Variable	Treatment Group	Control Group	Total sample
Age	39.8 (SD 10.25)	38.7 (SD 11.15)	38.9 (SD 10.35)
Gender	Male: 145 (53.7%) Female: 125 (46.3%)	Male: 66 (51.5%) Female: 62 (48.5%)	Male: 211 (53%) Female: 187 (47%)
<i>Country</i>			
UK	94	45	139
USA	87	38	125
UAE	57	24	81
Australia	32	21	53
<i>Function</i>			
Administrative	110 (40.7%)	55 (42.9%)	165
Manager	79 (29.1%)	42 (32.8%)	121
Others	81 (30.2%)	31 (24.3%)	112

Table 2 - Measurement of quality indicators measures at T3

Latent construct	AVE	Composite Reliability	Cronbach's Alpha
Enjoyment of gaming	0.80	0.94	0.92
Recognition of gaming	0.80	0.92	0.88
Usefulness of gaming	0.80	0.95	0.93
Reciprocal Benefit	0.87	0.96	0.95
Performance Expectancy	0.86	0.97	0.96
Job Satisfaction	0.82	0.93	0.89
Job Engagement	0.65	0.92	0.91

Table 3 - Discriminant validity

Item	M	SD	ENJ	JS	PE	REB	REC	USEF	JE
Age	38.3	10.25							
Gender	1.25	-							
Experience	3.42	0.94							
Enjoyment of Gaming (ENJ)	4.75	0.75	.89						
Job Satisfaction (JS)	4.84	0.86	.55	.91					
Performance Expectancy (PE)	4.36	0.98	.50	.20	.93				
Reciprocal Benefit (REB)	4.88	0.69	.50	.14	.48	.93			
Recognition of Gaming (REC)	4.36	0.97	.42	.19	.30	.49	.90		
Usefulness of Gaming (USEF)	4.74	0.85	.39	.19	.31	.20	.16	.89	
Job Engagement (JE)	4.55	0.69	.36	.25	.46	.12	.17	.27	.81

Note: According to the Fornell-Larcker criterion (Fornell & Larcker, 1981b), the AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct. The discriminant validity test is shown on Table 3, where the square root of the reflective constructs' AVE is on the diagonal, and the correlations between the constructs are in the lower left triangle. Results indicated the discriminant validity test has been established.

Table 4 - Treatment Group Data Collection Results

Relationships tested	T1: Baseline data after 6 months	T2: Base line data after 9 months	T3: Final data collection (after 1 year)
H1. Enjoyment of gaming → Job Satisfaction	0.31***	0.41***	0.46***
H2. Recognition → Reciprocal Benefit	0.40***	0.52***	0.69***
H3a. Reciprocal benefit → Job Satisfaction	0.24**	0.39***	0.42***
H3b. Reciprocal benefit → Job Engagement	0.19**	0.37***	0.42***
H4. Usefulness of gaming → Performance Expectancy	0.50***	0.59***	0.71***
H5. Performance Expectancy → Job Engagement	0.09 n/s	0.14**	0.17**
H6. Motivation → Job Engagement	0.11**	0.12***	0.14***
Control: Age	0.01 n/s	0.01 n/s	0.01 n/s
Control: Gender	0.00 n/s	0.01 n/s	0.00 n/s
Control: Experience	0.01 n/s	0.02 n/s	0.02 n/s
R ² for Job Satisfaction	0.40	0.52	0.66
R ² for Job Engagement	0.18	0.28	0.31
R ² for Reciprocal Benefit	0.26	0.34	0.48
R ² for Performance Expectancy	0.30	0.41	0.50
RMSEA	0.03	0.04	0.04
SRMR	0.05	0.06	0.06
CFI	0.96	0.96	0.97
TLI	0.96	0.96	0.97
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, n/s = not significant			

Table 5 - Control Group Data Collection Results

Relationships tested	T1: Results after 6 months	T2: Results after 9 months	T3: Final data collection (after 1 year)
H1. Enjoyment of gaming → Job Satisfaction	0.01 n/s	0.01 n/s	0.01 n/s
H2. Recognition → Reciprocal Benefit	0.00 n/s	0.01 n/s	0.01 n/s
H3a. Reciprocal benefit → Job Satisfaction	0.01 n/s	0.01 n/s	0.01 n/s
H3b. Reciprocal benefit → Job Engagement	0.01 n/s	0.01 n/s	0.02 n/s
H4. Usefulness of gaming → Performance Expectancy	0.32***	0.21***	0.19***
H5. Performance Expectancy → Job Engagement	0.01 n/s	0.01 n/s	0.01 n/s
H6. Motivation → Job Engagement	0.10*	0.10*	0.11*
Control: Age	0.01 n/s	0.01 n/s	0.03 n/s
Control: Gender	0.00 n/s	0.01 n/s	0.01 n/s
Control: Experience	-0.01 n/s	-0.01 n/s	-0.01 n/s
R ² for Job Satisfaction	0.11	0.10	0.11
R ² for Job Engagement	0.09	0.08	0.09
R ² for Reciprocal Benefit	0.01	0.01	0.01
R ² for PE	0.13	0.13	0.13
RMSEA	0.03	0.03	0.04
SRMR	0.05	0.05	0.05
CFI	0.96	0.96	0.96
TLI	0.95	0.95	0.95
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, n/s = not significant;			

Table 6 - Treatment Group Data Collection Results – Cross-lagged analysis

Relationships tested	Result
H1. Enjoyment of gaming T1 → Job Satisfaction T3	0.48***
H2. Recognition of gaming T1 → Reciprocal Benefit T2	0.68***
H3a. Reciprocal benefit T2 → Job Satisfaction T3	0.47***
H3b. Reciprocal benefit T2 → Job Engagement T3	0.49***
H4. Usefulness of gaming T1 → Performance Expectancy T2	0.82***
H5. Performance Expectancy T2 → Job Engagement T3	0.18**
H6. Motivation T1 → Job Engagement T3	0.19***
Control: Age	0.02 n/s
Control: Gender	0.01 n/s
Control: Experience	0.03 n/s
R ² for Job Satisfaction T3	0.68
R ² for Job Engagement T3	0.35
R ² for Reciprocal Benefit T2	0.49
R ² for Performance Expectancy T2	0.51
RMSEA	0.05
SRMR	0.06
CFI	0.97
TLI	0.97
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, n/s = not significant	

Figures

Figure 1 - Proposed Model

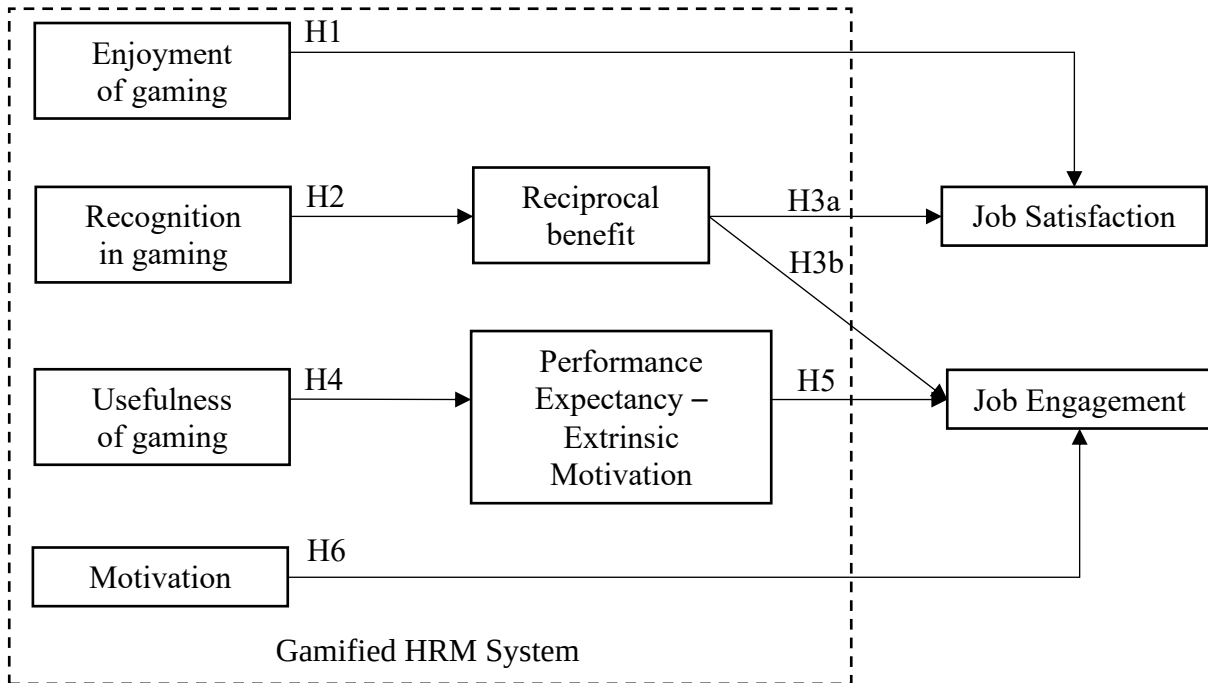
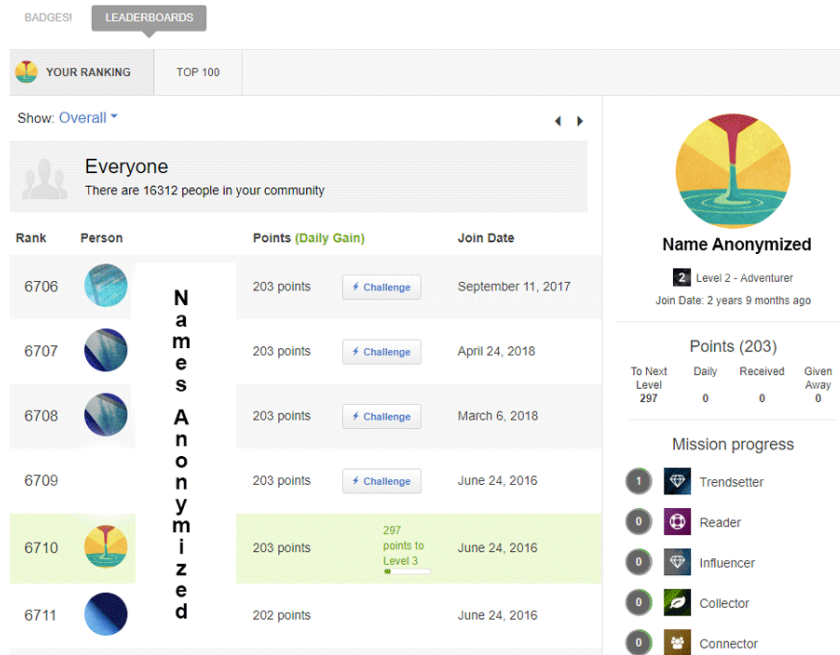
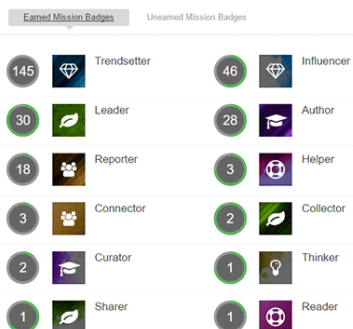


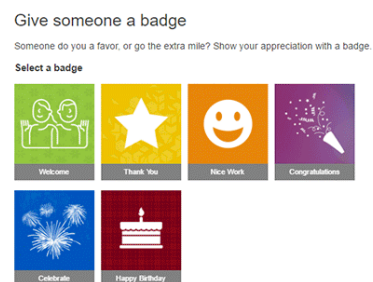
Figure 2 - Examples of the Gamified HRM System BRAVO



Leaderboard and Personal Profile



Badges Received



Recognition Badges

Employee Bravo Recognition, Manager Discretionary Recognition 2018



Recognition Badges given by Managers

Figure 3 - Results of Model Testing at T3

