Gamification in the Workplace: Enhancing Employee Engagement Through Gameful Experiences

Jonas Manske*

Department of Marketing, FOM University of Applied Sciences, 45141 Essen, Germany

* Correspondence: Jonas Manske (jonas.manske@fom.de)

Abstract: In an era characterized by intense labor market competition for skilled and motivated personnel, the adoption of innovative strategies, such as gamification, has emerged as a critical factor for cultivating an engaging workplace environment. This investigation explores the impact of gameful experiences on employee behavior within the context of credit institutions, focusing on three primary behaviors: knowledge sharing, team identity development, and affective commitment to the organization. An empirical analysis, conducted through the collection of 382 employee responses, reveals that gameful experiences exert a significant positive influence on these behaviors. Specifically, it is demonstrated that such experiences enhance the propensity for knowledge sharing among colleagues, foster the development of a stronger team identity, and increase affective commitment towards the company. These findings contribute to the expansion of the nomological network of gameful experience in the professional setting, highlighting the individual team behaviors that are pivotal for organizational success. Furthermore, the results advocate for the integration of gamification strategies within workplace design, underscoring the potential of gameful experiences to promote behaviors that are beneficial to organizational objectives. By delving into the relatively unexplored domain of gamification within workplace design, this research not only enriches the academic discourse on gamification but also provides practical insights for the application of gameful experiences to enhance employee engagement and behavior. In doing so, it underscores the transformative potential of gamification in shaping workplace dynamics and fostering an environment conducive to collaborative and committed work practices.

Keywords: Gameful experience; Gamification; Knowledge sharing; Team identity; Organizational commitment

1 Introduction

Companies face intense competition on the labor market for hiring competent and motivated workers and also face challenges in retaining employees. Considering such competition, the consequent high employee turnover rate, and the shortage of qualified workers, companies also strive to improve employee retention, for example, by designing modern workplaces to motivate their employees [1–3]. In recent years, the integration of gamified applications into the workplace has also been identified as a potential strategy to mobilize employees [3, 4]. Gamification arouses great interest among workplaces to positively change the behavior of employees through innovative gameful solutions and to make tasks more pleasant in everyday work [5–7]. We define gamification as a design approach to implementing game elements in a non-game context, thereby positively influencing the gameful experience and, consequently, user behavior [8–10]. Following Eppmann et al. [11], the gaming experience is defined as a psychological phenomenon that is characterized by the interplay of emotional and involvement components. It encompasses the individual perceptions of employees during the interaction process. An example of an interaction process is the use of leaderboards as a game element, where a gameful experience mobilizes employees to be more active in engaging with customers. Through such experiences, companies can improve the perception of work-related processes and workplace design to create meaningful value for the company through employee behavior change [3, 10]. For example, changing employees' behavior by increasing the frequency of contact with customers should lead to a higher sales opportunity.

Despite numerous empirical studies and the increasing incorporation of gamification in practice, it is surprising that the duality of gamification in terms of gameful experience for the employee versus the employee's behavior is largely missing [12, 13]. One potential approach to explaining these results comes from analyzing extensive research reviews that highlight the challenges of the rapid development and diversity of game elements, the methodological complexity

of the gameful experience, and the theoretical divergences in gamification research. However, investigating this duality is promising, as literature has shown that gameful experience results in positive user behavior (e.g., increasing word-of-mouth intent or changing brand attitude), which is likely relevant for the performance of companies [11, 14]. Our research addresses these challenges of duality by using comprehensive methods, in particular structural equation modeling, to adequately capture and explain the complexity of the gameful experience and to simultaneously test possible behavioral outcomes. Seaborn and Fels [13] conducted a noteworthy review indicating that the use of gamification shows rather mixed outcomes in terms of its effect on employees. This postulates a need for further research to explain gamification. Considering recent studies, user experience is recognized as a necessary perspective in research to harmonize the sometimes disparate and contradictory findings in the literature [10, 12, 15]. Therefore, gameful experience is becoming the focus of various studies [11, 16–18]. For example, a recent study focused on the influence of gameful experience on the frequency of website visits by customers [11]. However, the impact of a game-changing workplace experience on employees is not taken into consideration. Specifically, three major issues remain unanswered.

First, Wolf et al. [18] and Leclercq et al. [15] called for the examination of the gameful experience as an antecedent of gamification outcomes. Liu et al. [5] also urged the same and argue that employee behavioral outcomes should also benefit the company. Likewise, Nacke and Deterding [19] emphasized the need for studies explaining gamification in the context of current literature rather than simply advocating for its adoption in companies [19]. This supports Wolf et al.'s [18] and Leclercq et al.'s [15] stance. Furthermore, Eppmann et al. [11] encouraged testing gameful experiences in relation to additional dependent variables, thereby supporting Eisingerich et al.'s [20] case for further development and research on the principles for gamification success in companies. In this context, we address the relationship between gameful experience as an antecedent and the behavioral outcomes of employees. Second, surprisingly few studies have focused on cooperative, collaborative, and collective opportunities within gamification research, as emphasized by Koivisto and Hamari [12]. The personal development of a team identity in the workplace appears to be an important issue that could influence the success of gamification. For example, Silic et al. [3] pointed to the potential opportunities to promote feedback behaviors in the team. However, the manner in which gameful experiences influence the behavior outcomes of groups remains unclear [5]. Therefore, we investigate the relationship between gameful experience and personal employee behavior in teams. Third, gamification research in the management context is significantly underrepresented compared to other topics, such as education or healthcare, and lacks clarity in terms of employee experience due to unsystematic methods as well as inconsistent variables [1, 12]. Thus, researchers also call for the expansion of gamification research to the context of business and the workplace [11, 21, 22]. Vesa et al. [7] supported this and highlight the idea that simply thinking about the effectiveness of gamification is not enough; we should focus on understanding how gamification operates in everyday work [23]. For these reasons, we consider the relationship between gameful experience and the behavioral outcomes of employees in the workplace. The purpose of this study is to explore meaningful gamification engagement by examining how gameful experience relates to employee behavioral outcomes in the workplace.

By using our research model, we empirically investigated a sample of 382 sales employees from different credit institutions. Based on affordance theory, this study contributes to gamification research in several ways. First, we advance user experience research through the construct of gameful experience. In doing so, we address calls to focus on gameful experience and expand the nomological net by examining behavioral outcomes of intentions to share knowledge, develop team identity, and build affective commitment [5, 11, 15, 18, 20]. Second, we further develop an underexplored stream of research on the influence of team dynamics by analyzing the relationship between gameful experience and employee behavior regarding team identity [3, 12]. Third, we extend the gamification understanding in the context of work by investigating a gamified workplace design [12, 21–23]. Thus, considering management, the research model opens new perspectives for possible strategic decision-making and possible predictions of scenarios following implementation.

1.1 Derivation of Research Hypotheses

1.1.1 The role of gameful experience in relation to knowledge sharing

Frequent interactions and knowledge exchange between employees are important for companies, for example, to act quickly in the event of changes in business practices. The intention to promote knowledge exchange is therefore of company value [24, 25]. Based on the affordance theory, we conclude that the perception triggered by a gamified application promotes employee behavior. We argue that a gameful experience in the form of enjoyment, activation, and engagement through a transparent application mobilizes employees to share knowledge. Previous studies that consider individual subdimensions of the gameful experience support our argument. Enjoyment, as a hedonistic value, promotes employee engagement and is an important determinant of quantitative and qualitative knowledge inputs [26]. In addition, the company climate, which is characterized by the enjoyment of work, is a positive influencing factor for knowledge sharing [27]. Furthermore, it is likely that companies that design innovative work contexts through game elements increase knowledge sharing through the resulting activation and creative thinking of employees [28].

Moreover, immersion in a gamified application with target activities through incentive points in a competitive mode promotes team exchange [29]. We argue that the perception of dominance and control as a gameful experience through transparent frameworks supports knowledge sharing. Based on the affordance theory, we propose the following hypothesis:

Hypothesis 1: Gameful experience is positively associated with the employee's intention to share knowledge.

1.1.2 The role of the gameful employee experience in relation to team identity

Building a team identity means acting across hierarchical levels in a certain team dynamic and being integrated as part of the team. Considering the affordance theory, we argue that gameful experience, as the perception of an affordance through game elements, promotes the team identity of an employee. We argue that through the emotional properties of the gameful experience, a response is triggered through team interaction, resulting in identification across functional levels. Enjoyable experiences through the gamified application lead to the perception that employees are engaged in activities that involve teamwork [30]. We argue that team collaboration fostered by positive experiences mitigates the negative effects of functional identities [31], resulting in a stronger display of team identity in the workplace. We further argue that cross-functional teams that previously belonged to only one assigned sales unit positively perceive their share of team success due to the involving nature of gameful experiences. Thus, we consider that gameful experience triggers activating experience and creative thinking, thereby reducing prejudices and stereotypes in the group. This in turn leads to the employees acting towards achieving team identity [31–33]. Moreover, some studies of sports teams [34] show that a group's flow experience has a positive effect on team performance [35]. Furthermore, research by Silic et al. [3] suggests that the gamification of work processes can make a company more attractive and collaborative, which should also have an impact on the personal development of team identity. In summary, based on the affordance theory, we propose the following hypothesis:

Hypothesis 2: Gameful experience is positively associated with the employee's team identity.

1.1.3 The role of employees' gameful experience in affective commitment to the company

Employee commitment appears to be a factor for continuity in business development and, in the world of work, a competitive advantage for companies. Therefore, gamified applications try to make the perception of workplace design more attractive to promote employees' commitment to the company. By considering the affordance theory, we argue that gameful experience has a positive relationship with employees' affective commitment for two main reasons. First, gameful experience due to gamified applications in the workplace also accounts for a significant portion of the total workplace experience and thus has a positive effect on affective commitment. In support of our argument, Meyer et al. [36], who define affective commitment as emotional attachment and identification with involvement in the company as part of their commitment model, found in a meta-analysis that workplace experience correlates strongly with affective commitment [36]. Moreover, previous studies [37] have also found workplace experience to be a key antecedent of employee commitment. Therefore, gameful experience is positively related to affective commitment. Second, the perception of a supportive work environment has a positive impact on commitment [38]. Meyer et al. [36], who found the strongest correlation between affective commitment and perceived company support, also support this. In addition, affective commitment, forms of perceived company justice, and transformational leadership are also strongly correlated, further supporting our argument [36]. Therefore, workplace gameful experiences draw psychological perceptions of technical as well as collaborative support and thus have a positive effect on employees' affective commitment. We therefore hypothesize the following:

Hypothesis 3: The gameful experience is positively associated with the employee's affective commitment.

2 Methodology

2.1 Data Collection and Sample

We collected data from a national sample and considered credit institutions using a gamified sales intensification application. In this sales intensification application, employees participated in teams and won points for successful sales activity. These points were added for each team to create team rankings. It is essential that the gamified application does not rank individuals but assigns points to the relevant sales team so that the personal strengths of the employees are promoted within the team and individual development is supported at the workplace level. Scoring teams create a competitive character among the individual sales units, underpinned by a transparent ranking of the teams. All the institutions use an approximately uniform type of gameful sales intensification approach. We sent an online survey to the employees of seven credit institutes individually between November 2020 and February 2021. Specifically, an online link was made available to employees on a decentralized basis.

In total, we received 535 responses, of which we excluded those with more than 10% missing responses and a completion time of less than 5 minutes [39]. The final data set included 382 responses. As shown in Table 1, more than half of the participants (51.6%) had work experience of more than 10 years, and the majority (77.7%) were associates without an academic degree as their highest level of education. Women and male participants constituted 59.2% and 40.8%, respectively.

Table 1. Overall composition of the sample

Years of Work Experience	%
<1	0.8
1-2	2.9
2-4	7.3
4-6	9.4
6-8	6.5
8-10	21.5
>10	51.6
Gender	
Women	59.2
Men	40.8
Education	
Associate	77.7
Bachelor	17.3
Master	4.7
Doctoral	0.3
Duration of participation in the gamified application in years	
<1	10.7
1-2	13.1
2-3	19.6
3-4	28.3
>4	28.3

Note: Sample comprises 382 observations

2.2 Measurement

In designing our questionnaire, we drew on established scales with multiple items and adapted them slightly to the work context so that a consistent and structured view of the gamified application was possible. In doing so, we used a seven-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree." This forms the basis for the following structural equation modeling (SEM), which is particularly suitable for investigating complex relationships between gameful experience with subdimensions and behavior outcomes. This also enables the model fit to be checked, which maps the underlying relationships between the variables.

2.2.1 Gameful experience

To measure gameful experience, we used the GAMEX scale, which was developed and empirically validated by Eppmann et al. [11]. This scale consists of a total of 27 items and is divided into six sub-dimensions. The selection of the GAMEX scale is based on its proven validity and its ability to comprehensively capture the different aspects of the gameful experience. The six sub-dimensions (enjoyment, absence of negative affect, creative thinking, activation, absorption, and dominance) of the scale provide a detailed assessment of different facets of the gameful experience, allowing results to be accurately analyzed and interpreted. Example items included "I liked playing the game" (enjoyment), "While playing the game I felt hostile" (absence of negative affect), "While playing the game I felt adventurous" (creative thinking), "While playing the game I felt activated" (activation), "I forgot about my immediate surroundings while I played the game" (absorption), and "While playing the game I felt influential" (Dominance). Based on the subdimensions, we measured gameful experience as a second-order construct.

2.2.2 Intention to share knowledge

To evaluate the intention to share knowledge, we used a second-order construct consisting of the dimensions "intention to share explicit knowledge" and "intention to share implicit knowledge" [27]. As an example of the "intention to share explicit knowledge" dimension, we assessed the following statement: "I will share my work reports and official documents more frequently with members of my organization in the future." As an example of the "intention to share implicit knowledge" dimension, we assessed the following statement: "I intend to share my experiences or knowledge from work more frequently with other organizational members in the future".

2.2.3 Team identity

We took Sethi et al.'s [31] validated scale to measure superordinate identity, which was modified by Im et al. [40], and further adjusted it slightly to measure personal team identity [40]. For example, we used the items "Team members are committed to common project goals" and "The member teams behaved like department representatives controlled by their respective departments" for our research model [40].

2.2.4 Affective commitment

To measure affective commitment, we used Meyer et al.'s [41] scale, which was developed in the context of commitment research. Examples of items we used include "I would be very happy to spend the rest of my career with this organization" and "This organization has a great deal of personal meaning for me".

2.2.5 Controls

Since previous findings show that age and gender possibly influence behavioral dimensions, we followed Wolf et al. [18] and included gender and years of work experience in our study. These variables could also play a role regarding affective commitment in the work context. Furthermore, we included the length of the employees' playing time as a control variable to exclude possible short-term effects through the introduction of the gamified application.

3 Theory and Results

3.1 Affordance Theory: Explaining the Relationships in Gamification Application

To lay the foundation for the relationships in gamified applications, we use Gibson's affordance theory as a baseline, which is widely recognized in the field of human-computer interaction [10, 42]. The theory postulates an offer of action that employees perceive because of an available object (affordance), for instance, a game element. The perception of this affordance determines the employee's action [42]. In our context, we understand affordances as a game element that evokes psychological perceptions such as emotions [43, 44], or experiences [10] in employees. Consequently, affordances as game elements should be understood as stimuli for experiences that lead to behavioral outcomes among employees [10, 12]. In other words, gameful experiences are created through the perception of an affordance and stimulate behavioral outcomes. The affordance theory thus enables a better understanding of the interactions between these affordance characteristics and the gameful experience of employees in the workplace. By focusing on the subjective perception and interpretation of gamification elements, it becomes clear how these features can shape the individual gameful experience and thus influence the working behavior of employees. In our study, we focus on the relationship between gameful experience (perception) and behavioral outcomes (action) of employees.

Studies on gamified applications reveal a nuanced picture of behavioral outcomes [12, 13]. On the one hand, studies show valuable approaches for the implementation of gamified applications, such as increasing user motivation or improving user behavior [15, 17, 20]. Historically, many studies have focused on subsections of the effects of game elements. However, surprisingly, some skip the game experience and look only at its influence on behavioral outcomes [12, 13]. On the other hand, there are mixed and negative outcomes regarding the benefits of gamification solutions [13]. Hammedi et al. [1] stated that despite the widespread use and potential of gamification, its effectiveness remains questionable, highlighting the fact that its implementation need not necessarily lead to a positive impact. However, the literature suggests that experiences likely influence behavioral outcomes that create overall value for the company [10]. Therefore, the potential behavioral outcomes that are explored should also subsequently be meaningful to the organization. To develop and test this perspective in the work context, we examine the relationship between the gameful experience and behavioral outcomes.

3.2 Gameful Experience in the Workplace

Research on gamification literature indicates a paradigm shift from the simple application of game elements to an explanatory view through psychological experiences. Some researchers emphasize the need to consider user experience in gamified applications due to its significant influence on behavioral outcomes [10, 11, 15, 18]. Therefore, researchers are beginning to operationalize game-based experiences. Eppmann et al. [11] defined gameful experience as a psychological phenomenon that is influenced by emotional and involvement components. Studies that consider both pleasure and fun as factors that influence gameful experience [45, 46], as well as studies involving factors such as flow, absorption, or motivation, support our premise [45, 46]. Building on this and drawing on existing game studies and complementary literature from the fields of marketing and psychology [45, 47–50], Eppmann et al. [11] developed the Gameful Experience Measurement Scale (GAMEX), which consists of six subdimensions: pleasure, absence of negative affect, activation, dominance, creative thinking, and absorption.

3.3 Behavioral Outcomes of a Gameful Experience

By following the affordance theory and evidence from researchers [10, 11, 15, 18, 20], we investigate gameful experience as an antecedent for behavioral outcomes in a company. For our study, we specifically look at three outcomes: behavior toward colleagues, the team, and the company.

3.3.1 Employee behavior toward colleagues

By examining research on how employees interact with each other, it is clear that the individual tendency to share knowledge currently does not receive a lot of attention in the context of gamified applications [12]. This is surprising because sharing knowledge within the company has benefits and is considered by researchers to be

an important organizational process [24, 25]. Knowledge sharing in the workplace should be encouraged but is currently not mandated [27]. In this vein, gamification is likely a promising approach to mobilize and encourage employees. Although the current literature investigates possible game elements to promote knowledge management, the psychological gameful experience as an antecedent has hardly been considered [24]. Following Bock et al. [27], we consider knowledge sharing to be a fundamental competitive advantage for companies. Therefore, we examine the relationship between the gameful experience and employees' intention to share knowledge and follow Friedrich et al.'s [24] study to pay more attention to individual willingness to share knowledge.

3.3.2 Employee behavior toward the team

Researchers call for further investigation of the relationship between gamification and the employee's behavior in the team [3, 5, 11]. For this reason, we consider the development of the team identity of the employee a behavioral outcome. Team identity is the extent to which the employees behave, understand, and identify themselves as a team unit, regardless of the functional areas [31]. We examine how gameful experience is related to team identity.

3.3.3 Employee behavior toward the company

It is important to have employees who feel attached and committed to the company and, hence, are less likely to quit. This can be an advantage for the company in a highly competitive environment. In our study, we investigate the relation between gamified application and affective commitment as suggested by previous studies [10, 14, 18]. We specifically investigate the link between gameful experience and affective commitment, described as attachment, identification, and involvement in the company [31], which is integrated and explored in our research model.

To the best of our knowledge, this is the first study to apply the construct of gameful experience in the workplace to examine its relationship with employee behavioral outcomes. The recently developed Gameful Experience Measurement Scale helps in responding to researchers' calls for a better understanding of gameful experience in relation to employee behavior [5, 11, 12]. We derive our research model based on the affordance theory. Adopting this theory as a baseline, we focus on perception and action from employees to examine the relationship between gameful experience and behavioral outcomes by targeting the intention to share knowledge, team identity, and affective commitment. This research model is illustrated in Figure 1.
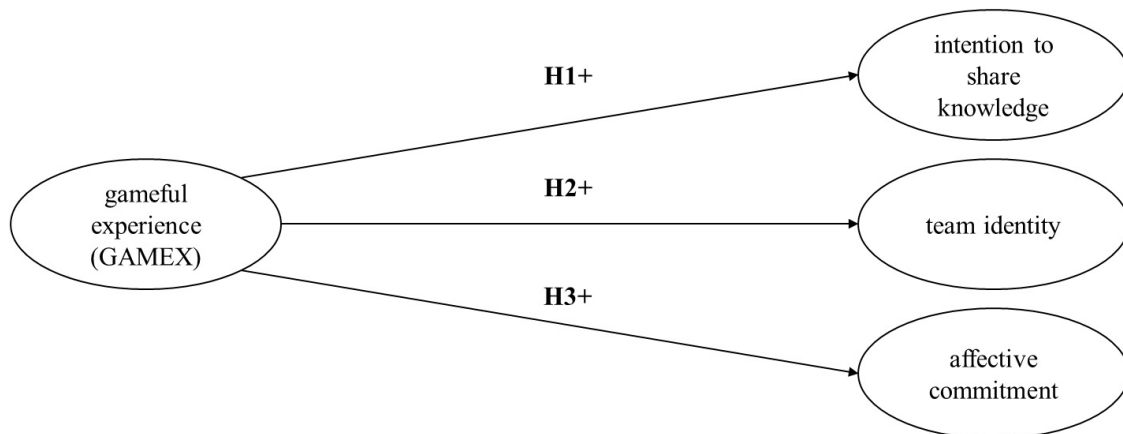
Note: Solid lines indicate significant paths; H= hypothesis
Control variables = gender, work experience in years, duration of participation in the gamified application

Figure 1. Research model
Note: This figure was prepared by the author

3.4 Results

3.4.1 Method

First, we conduct a reliability and validity check of our research model to subsequently estimate our hypotheses. We confirm the convergent validity of our constructs through an exploratory factor analysis (EFA) with promax rotation in SPSS. For the respective constructs, items with a unique factor loading above .40 are retained [51]. Seven items are removed from our data due to cross-loadings or low factor loadings. Second, we check the constructs for thresholds of Cronbach's alpha (α) $\geq$ .7 [52], composite reliability (CR)$\geq$ .6 [53], and average variance extracted (AVE)$\geq$ .5 [53, 54]. All constructs show values above the threshold, as can be seen in Table 2. Furthermore, the square root of AVE is greater than the bivariate correlation in all cases. Therefore, discriminant validity is confirmed, as shown in Table 3 [54].

Table 2. Validity and reliability indicators

	Number of Items	Cronbach's Alpha	AVE	CR
GAMEX- Enjoyment	3	0.94	0.84	0.94
GAMEX- Creative thinking	3	0.91	0.77	0.91
GAMEX- Activation	3	0.89	0.74	0.90
GAMEX- Dominance	4	0.89	0.68	0.90
GAMEX- Absence of negative affect	4	0.86	0.62	0.86
GAMEX- Absorption	6	0.89	0.60	0.90
Affective commitment	5	0.93	0.75	0.94
Intention to share explicit knowledge	3	0.93	0.83	0.94
Intention to share implicit knowledge	4	0.89	0.65	0.88
Team identity	6	0.93	0.71	0.94

GAMEX = Gameful Experience Scale; AVE = Average variance extracted [54]; CR = Composite reliability [54]

Table 3. Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) GAMEX- Enjoyment	**0.92**									
(2) GAMEX- Creative thinking	0.82	**0.88**								
(3) GAMEX- Activation	0.83	0.86	**0.86**							
(4) GAMEX- Dominance	0.67	0.77	0.75	**0.83**						
(5) GAMEX- Absence of negative affect	0.23	0.23	0.15	0.25	**0.79**					
(6) GAMEX- Absorption dominance	0.60	0.64	0.57	0.54	0.20	**0.78**				
(7) Affective commitment	0.33	0.37	0.30	0.27	0.08	0.24	**0.86**			
(8) Intention to share explicit knowledge	0.26	0.33	0.37	0.35	0.13	0.15	0.34	**0.91**		
(9) Intention to share implicit knowledge	0.36	0.43	0.49	0.47	0.13	0.21	0.32	0.76	**0.80**	
(10) Team identity	0.37	0.41	0.40	0.32	0.18	0.23	0.27	0.50	0.50	**0.84**

GAMEX = Gameful Experience Scale; The square root of the AVE is shown in the diagonal

Finally, we assess the model fit with AMOS 27 and analyze the following indicators: chi-square $(\chi^2) = 1629.073$, degrees of freedom $(df) = 854$, minimum discrepancy $(\chi^2/df) = 1.908$, goodness of fit (GFI) = .84, adjusted goodness of fit index (AGFI) = .81, comparative fit index (CFI) = .94, Tucker-Lewis index (TLI) = .94, and root-mean-square error of approximation (RMSEA) = .05 [55, 56]. All indicators show reasonable values. We acknowledge that our values for GFI and AGFI are slightly below the respective thresholds (GFI $\geq$ .95; AGFI $\geq$ .90). However, since the overall picture of the model fit should be evaluated and most values meet the respective thresholds, we consider the overall model fit to be acceptable [57].

3.4.2 Assessing potential biases

As a first step to mitigate concerns about common method bias, we employ procedural and statistical measures [58]. Initially, the questionnaire is validated through close involvement with experts in gamified applications as well as with experts in the field. Consequently, ambiguous wording and comprehension problems among the participants are avoided. Second, it was clearly communicated to the respondents that there are no right or wrong answers, and, furthermore, anonymity is assured. Third, independent and dependent variables are separated within the survey [58]. Fourth, we conduct the Harman single factor test as a statistical measure and obtain no evidence of bias in the data structure [58]. Fifth, we use a marker variable on preference for the color blue [59] to test for correlations and partial correlations with and without this variable [60]. The marker variable, which met all the necessary selection criteria [61], does not lead to any change in the coefficients or significance levels. Lastly, we compare the different models with the marker variable using a x^2-difference test [62]. The results are presented in Table 4 and do not indicate a threat of common method bias. Therefore, the study results do not appear to be influenced by method bias.

3.4.3 Hypotheses testing

We perform the statistical estimation of our hypotheses using structural equation modeling in AMOS 27. The results of the effects on the three hypotheses are shown in Figure 2.

Hypothesis 1 states that employees' gameful experience will be positively related to their intention to share knowledge in the workplace. The relation is found to be significant and positive, as the p-value is <.001 and the standardized path coefficient is .437; thus, the results support Hypothesis 1. Hypothesis 2 suggests that gameful experience will have a positive effect on the team identity of the employees in the team. This hypothesis is also

supported by research results, as the relationship between the variables is positive and significant with a p-value of <.001 and a standardized path coefficient of .380. Finally, Hypothesis 3 suggests that an employee's gameful experience will have a positive relation to their' affective commitment. This hypothesis too is supported, as the p-value is <.001 and the standardized path coefficient is .307. The control variables, like age and length of play time with the gamified application, have no significant effect on the behavioral dimensions of intention to share knowledge, team identity, and affective commitment. In contrast, the control variable, years of work experience, has a significant effect on the employee's affective commitment (p<0.001, ß=.241). This does not seem surprising because, according to Meyer et al.'s [36] findings, attachment can be related to years of service. There are no other significant associations with the other behavioral outcomes. While our research findings show a positive influence between gameful experience in the workplace and certain behavioral outcomes, the results of previous research are mixed in terms of positive and negative behaviors. Some studies show positive outcomes of gamification [63], including reduced stress and improved concentration [64], increased quality of work in task completion, and employee engagement with a positive influence on work behavior [65]. Our results support these research findings with the positive influence of gameful experience on intention to share knowledge, team identity, and affective commitment. On the other hand, some studies point to the negative effects of gamification [1, 15, 66], including, for example, conflictual interactions [67], which contrasts somewhat with our findings on the significant relationship between game experience and the intention to share knowledge. Hammedi et al. [1] also described a decrease in well-being in their study, which also contrasts with the promotion of affective engagement. The empirical results emphasize the focus of our study on specific aspects of gamification in the workplace, which may limit comparability with the existing literature. However, the differences presented may stimulate a broader discussion about the generalizability of our outcomes and the need for future research in this area, particularly through a deeper consideration of the multidimensional construct of gameful experience.

Table 4. Model comparison test with marker variable based on Williams et al. [62]

Model	x^2	df	CFI
1. CFA	1644	847	0.943
2. Baseline	1670	863	0.943
3. Method-C	1663	862	0.942
4. Method-U	1619	822	0.943
5. Method-R	1619	867	0.946
x^2-Model comparison tests	Δx^2	Δ df	x^2 critical value: .05
1. Baseline vs. Method-C	6	1	3.84
2. Method-C vs Method-U	45	40	30.14
3. Method-U vs. Method-R	0	45	7.82
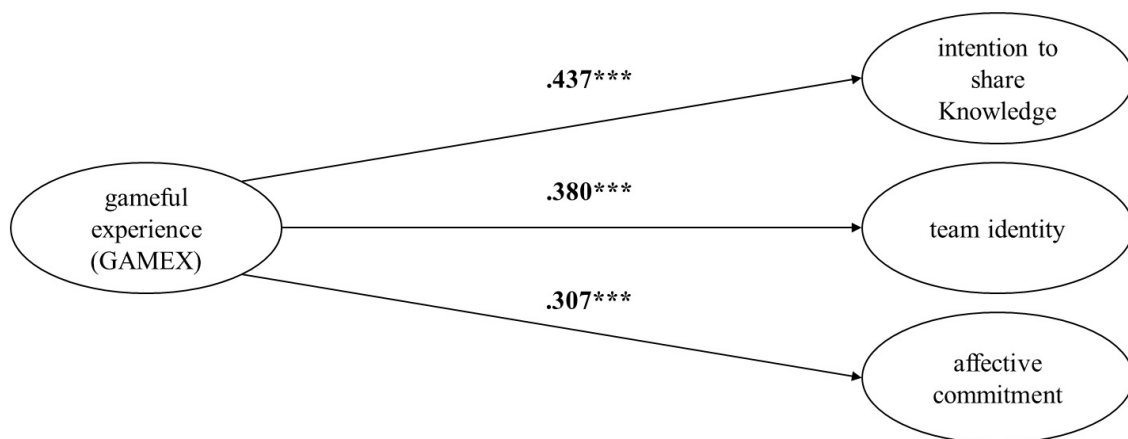
Note: Solid lines indicate significant paths; Standardized regression weights are shown next to each path; *** p<.001
Control variables = gender, work experience in years, duration of participation in the gamified application

Figure 2. Result model

Note: This figure was prepared by the author

4 Discussion

The goal of our study is to explain gameful experience as an antecedent of behavioral outcomes. In doing so, we are addressing the calls to expand the nomological network of gameful experience [10, 11, 15, 18] and to investigate employee behavior in teams [5, 12]. We also explore the underrepresented context of gamification in the workplace [12, 22]. Our analysis of the research model shows that gameful experience has a significant positive relationship with employee behavioral outcomes: intention to share knowledge, development of team identity, and affective commitment to the company. With our results, we contribute to gamification research in three ways.

First, by showing the role of gameful experience as an antecedent of employee behavior outcomes, we explain the relevance of the users' perspective of the experience that researchers consider necessary in relation to the successful adoption of gamified applications [15, 18]. We use the GAMEX scale to look at the gaming experience as a multidimensional concept that includes both emotional and involvement properties [11]. It adds to the nomological net by showing that intention to share knowledge, team identity, and affective commitment all have positive effects on how employees behave. Following Liu et al. [5], we thereby reveal meaningful gamification engagement for companies as the psychological perception through the gameful experience that influences employees' behaviors that benefit the company. The results we got back up Huotari and Hamari's [10] definitional approach. They say that gameful experience is the best way to change people's behavior and that it should be used as a control variable for gamified app implementations to go smoothly. Thus, the GAMEX scale seems suitable to test the relationship with behavioral outcomes.

Second, we contribute to the literature in terms of the behavioral outcomes that were found to be positively influenced by gameful experience. This contribution to the literature can be subdivided in terms of general behavioral outcomes or specifically according to the outcomes of intentions of knowledge sharing, team identity, and affective commitment. Given the range of possible employee behavioral outcomes, a positive relationship between gameful experience and one behavioral outcome seems too simplistic to be meaningful to companies; we suggest the need to categorize behavioral outcomes. In our study, we analyze the behavioral outcomes towards colleagues (knowledge sharing intention), team (team identity), and company (affective commitment). This could be a suitable categorization of behavioral outcomes for further exploration of gameful experience as an antecedent. With our outcomes, we explain that meaningful gamification engagement for companies can be achieved when gamified experiences have a positive relationship with all categories of colleagues, teams, and the company. Our findings are in line with the emerging areas of research at the intra-organizational, employee, and transformative stages [68]. In summary, our study explains that the employee gamification experience created by affordance has a positive relationship with the behavioral outcomes of the three categories (colleagues, team, and company). We thereby contribute to a better understanding of a game-changing experience for a company. We also extend the existing research in relation to knowledge management by further demonstrating the effect of emotional experiences and involving properties through the construct of the gameful experience. Bock et al. [27] showed that fostering knowledge sharing is a huge competitive advantage for companies. Our results build on this finding, as we explain that knowledge sharing is promoted through gameful experience. Team identity is a key success factor for cross-functional teams, such as in sales units, to identify themselves as employees in an organizational unit, to perceive success, and ultimately to promote group dynamics [31]. Our results show that the gameful experience of the individual employee has a significant influence on the team identity development of the employee. This adds to the gamification literature in team dynamics, and to our knowledge, till date no other study has investigated the relationship between these two variables. Regarding the workplace context, which is strongly characterized by cross-functional teams, we interpret the promotion of team identity through a gamified application as a building block for meaningful gamification engagement. Our research results also show a positive relationship between gameful experience and affective commitment. Given the relevance of employee commitment to the current work environment, our study supports the perspective that gamified applications can drive positive outcomes for companies.

Third, we contribute to the gamification literature by further exploring the underrepresented work context and offline context associated with sales units. The extensive reviews by Koivisto and Hamari [12] and Seaborn and Fels [13] suggest that current research mainly focuses on education, learning, and health. Thus, we extend research in the workplace context and promote a more accurate understanding of gameful experience through gamified application in relation to employee behavioral outcomes. Looking at three different behavior outcomes clarifies the effectiveness of gamification in the workplace, and to our knowledge, this is the first study to examine gameful experience in terms of behavioral outcomes from the employee perspective.

4.1 Limitations and Opportunities for Future Research

Though our study offers good grounds for future research, there are limitations to be considered. First, we investigate meaningful gamification engagement in the context of sales intensification applications in credit institutions. We are thereby able to reveal the outcomes of gameful experience in an underexplored context. While this is a promising start, future research is needed to generalize the findings across contexts and industries. The transferability

of our outcomes to other sectors may be limited by specific characteristics of the financial services industry, differences in organizational culture, sales processes, and the customer base. A differentiated analysis of industry specifics is therefore necessary. Further research is needed to identify and analyze additional influencing factors that can explain the observed changes in employee behavior, e.g., changes in corporate culture, external influences, individual life events, alternative management practices, and competing influences. The influence of affordance (game elements) could also have an impact here. Second, we consciously adopt the affordance theory as the basis of our research model and focus on perception (gameful experience) and action (behavioral outcome) triggered by affordance. We encourage researchers to further investigate the influence of the application's user interaction capabilities and design principles on experience and behavioral outcomes. Moreover, our efforts are focused on studying individual employee behavioral outcomes. Given the wealth of possibilities [12]. for behavioral outcomes through a gamified application, we suspect that the employee's gameful experience in the workplace should act as an experience-based perspective of gamified applications on further employee behavioral outcomes. To establish a consistent categorization and, thus, a possible structure for gamification research, we encourage researchers to expand and include other relevant behavioral outcomes in terms of colleagues, team, and company, as presented in our study. In summary, future research should include diverse occupational groups and industries, use longitudinal designs, and analyze specific implementation characteristics of gamification in more detail to improve generalizability and insight generation. Despite these limitations, our findings provide a solid foundation for the further development of gamification research in the workplace.

4.2 Practical Implications

This study has significant implications for practitioners, especially for management, as we establish an improved understanding between gameful experience and the behavioral outcomes of a gamified application. We emphasize two findings for management. First, when making decisions to introduce a gamified application to positively change the workplace and ultimately employee behavior, the question for management is whether a gamification engagement really provides an advantage for the company. Our study provides a guideline to managers for making this decision: Our findings demonstrate that gamification experience has a positive impact on the behavioral outcomes of intention to share knowledge, team identity development, and affective commitment. These empirically derived results can help sway the management's decision in favor of implementing a gamified application, as all three behavioral outcomes bring strategic competitive advantages to the company. Through the targeted integration of gamification into these strategic areas, managers can not only promote positive behavior but also create a motivating and collaborative working environment. With these practical implementation strategies, companies can maximize the benefits of gamification. Second, we use the GAMEX scale by Eppmann et al. [11] to assess gameful experience, thereby validating it in an offline context. Eppmann et al. [11] described the scale as context-independent, easy-to-understand, and practice-oriented in assessing gameful experience. Our findings provide management with a practical measurement construct to sustainably measure the game-changing experience of an application. Managers benefit because they can better understand potential relationships as the application changes and make better predictions.

5 Conclusion

In summary, our research focuses on meaningful gamification engagement by examining employees' gameful experiences as an antecedent of behavioral outcomes. Based on the affordance theory, we explain the positive relationship between employees' gameful experience and various strategically important behavioral outcomes of promoting knowledge sharing, team identity development, and building affective commitment for the company. Future studies could extend the existing model by investigating game elements as antecedents of the gameful experience to further explore their key role. Furthermore, implementation in different organizational contexts and consideration of other influencing factors, such as organizational culture and individual personality traits, could contribute to a more comprehensive modeling of gamification in the workplace. We hope that our study will inspire researchers and practitioners to further explore the relevance of gamification experiences in relation to employee behavioral outcomes and that it will help practitioners promote meaningful gamification engagement.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

References

[1] W. Hammedi, T. Leclercq, I. Poncin, and L. Alkire, "Uncovering the dark side of gamification at work: Impacts on engagement and well-being," *J. Bus. Res.*, vol. 122, pp. 256–269, 2021. https://doi.org/10.1016/j.jbusres.2020.08.032

[2] R. Mitchell, L. Schuster, and H. S. Jin, "Gamification and the impact of extrinsic motivation on needs satisfaction: Making work fun?" *J. Bus. Res.*, vol. 106, pp. 323–330, 2020. https://doi.org/10.1016/j.jbusres.2018.11.022

[3] M. Silic, G. Marzi, A. Caputo, and P. M. Bal, "The effects of a gamified human resource management system on job satisfaction and engagement," *Hum. Resour. Manag. J.*, vol. 30, no. 2, pp. 260–277, 2020. https://doi.org/10.1111/1748-8583.12272

[4] E. D. Mekler, F. Brühlmann, A. N. Tuch, and K. Opwis, "Towards understanding the effects of individual gamification elements on intrinsic motivation and performance," *Comput. Hum. Behav.*, vol. 71, pp. 525–534, 2017. https://doi.org/10.1016/j.chb.2015.08.048

[5] D. Liu, R. Santhanam, and J. Webster, "Toward meaningful engagement: A framework for design and research of gamified information systems," *MIS Q.*, vol. 41, no. 4, pp. 1011–1034, 2017. https://doi.org/10.25300/MISQ/2017/41.4.01

[6] S. Thiebes, S. Lins, and D. Basten, "Gamifying information systems-a synthesis of gamification mechanics and dynamics," in *Proceedings of the 20th European Conference on Information, Tel Aviv, Israel*, 2014, pp. 1–17.

[7] M. Vesa, J. Hamari, J. T. Harviainen, and H. Warmelink, "Computer games and organization studies," *Organ. Stud.*, vol. 38, no. 2, pp. 273–284, 2017. https://doi.org/10.1177/0170840616663242

[8] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: Defining 'gamification'," in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, Tampere, Finland*, 2001, pp. 9–15. https://doi.org/10.1145/2181037

[9] J. Hamari, J. Koivisto, and H. Sarsa, "Does gamification work?- A literature review of empirical studies on gamification," in *47th Hawaii International Conference on System Sciences, Wailea, HI, USA*, 2013.

[10] K. Huotari and J. Hamari, "A definition for gamification: Anchoring gamification in the service marketing literature," *Electron. Mark.*, vol. 27, no. 1, pp. 21–31, 2017. https://doi.org/10.1007/s12525-015-0212-z

[11] R. Eppmann, M. Bekk, and K. Klein, "Gameful experience in gamification: Construction and validation of a gameful experience scale [GAMEX]," *J. Interact. Mark.*, vol. 43, no. 1, pp. 98–115, 2018. https://doi.org/10.1016/j.intmar.2018.03.002

[12] J. Koivisto and J. Hamari, "The rise of motivational information systems: A review of gamification research," *Int. J. Inf. Manag.*, vol. 45, pp. 191–210, 2019. https://doi.org/10.1016/j.ijinfomgt.2018.10.013

[13] K. Seaborn and D. I. Fels, "Gamification in theory and action: A survey," *Int. J. Hum. Comput. Stud.*, vol. 74, pp. 14–31, 2015. https://doi.org/10.1016/j.ijhcs.2014.09.006

[14] L. Alkire, C. Mooney, F. A. Gur, S. Kabadayi, M. Renko, and J. Vink, "Transformative service research, service design, and social entrepreneurship: An interdisciplinary framework advancing wellbeing and social impact," *J. Serv. Manag.*, vol. 31, no. 1, pp. 24–50, 2020. https://doi.org/10.1108/JOSM-05-2019-0139

[15] T. Leclercq, I. Poncin, and W. Hammedi, "Opening the black box of gameful experience: Implications for gamification process design," *J. Retail. Consum. Serv.*, vol. 52, p. 101882, 2020. https://doi.org/10.1016/j.jretconser.2019.07.007

[16] J. Högberg, J. Hamari, and E. Wästlund, "Gameful Experience Questionnaire (GAMEFULQUEST): An instrument for measuring the perceived gamefulness of system use," *User Model. User-Adap. Interact.*, vol. 29, no. 3, pp. 619–660, 2019. https://doi.org/10.1007/s11257-019-09223-w

[17] R. N. Landers, G. F. Tondello, D. L. Kappen, A. B. Collmus, E. D. Mekler, and L. E. Nacke, "Defining gameful experience as a psychological state caused by gameplay: Replacing the term 'Gamefulness' with three distinct constructs," *Int. J. Hum. Comput. Stud.*, vol. 127, pp. 81–94, 2019. https://doi.org/10.1016/j.ijhcs.2018.08.003

[18] T. Wolf, W. H. Weiger, and M. Hammerschmidt, "Experiences that matter? The motivational experiences and business outcomes of gamified services," *J. Bus. Res.*, vol. 106, pp. 353–364, 2020. https://doi.org/10.1016/j.jbusres.2018.12.058

[19] L. E. Nacke and S. Deterding, "The maturing of gamification research," *Comput. Hum. Behav.*, vol. 71, pp. 450–454, 2017. https://doi.org/10.1016/j.chb.2016.11.062

[20] A. B. Eisingerich, A. Marchand, M. P. Fritze, and L. Dong, "Hook vs. hope: How to enhance customer engagement through gamification," *Int. J. Res. Mark.*, vol. 36, no. 2, pp. 200–215, 2019. https://doi.org/10.1016/j.ijresmar.2019.02.003

[21] N. A. Celestine and G. Yeo, "Having some fun with it: A theoretical review and typology of activity-based play-at-work," *J. Organiz. Behav.*, vol. 42, no. 2, pp. 252–268, 2021. https://doi.org/10.1002/job.2444

[22] C. A. Petelczyc, A. Capezio, L. Wang, S. L. D. Restubog, and K. Aquino, "Play at work: An integrative review

and agenda for future research," *J. Manage.*, vol. 44, no. 1, pp. 161–190, 2018. https://doi.org/10.1177/014920 6317731519

[23] S. Deterding, "Gamification in management: Between choice architecture and humanistic design," *J. Manage. Inq.*, vol. 28, no. 2, pp. 131–136, 2019. https://doi.org/10.1177/1056492618790912

[24] J. Friedrich, M. Becker, F. Kramer, M. Wirth, and M. Schneider, "Incentive design and gamification for knowledge management," *J. Bus. Res.*, vol. 106, pp. 341–352, 2020. https://doi.org/10.1016/j.jbusres.2019.02.009

[25] R. Helm, R. Meckl, and N. Sodeik, "Systematisierung der erfolgsfaktoren von wissensmanagement auf basis der bisherigen empirischen forschung," *J. Bus. Econ.*, vol. 77, no. 2, pp. 211–241, 2007. https://doi.org/10.1007/s1 1573-007-0017-4

[26] A. Suh and C. Wagner, "How gamification of an enterprise collaboration system increases knowledge contribution: An affordance approach," *J. Knowl. Manag.*, vol. 21, no. 2, pp. 416–431, 2017. https://doi.org/10.1108/JKM-10 -2016-0429

[27] G. Bock, R. Zmud, Y. Kim, and J. Lee, "Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate," *MIS Q.*, vol. 29, no. 1, pp. 87–111, 2005. https://doi.org/10.2307/25148669

[28] Y. Kim and B. Lee, "R&D project team climate and team performance in Korea: A multidimensional approach," *R&D Manag.*, vol. 25, no. 2, pp. 179–196, 1995. https://doi.org/10.1111/j.1467-9310.1995.tb00910.x

[29] L. Deng, D. Turner, R. Gehling, and B. Prince, "User experience, satisfaction, and continual usage intention of IT," *Eur. J. Inf. Syst.*, vol. 19, no. 1, pp. 60–75, 2010. https://doi.org/10.1057/ejis.2009.50

[30] C. Lin, C. Huang, and C. Ko, "The impact of perceived enjoyment on team effectiveness and individual learning in a blended learning business course: The mediating effect of knowledge sharing," *Australas. J. Educ. Technol.*, vol. 36, no. 1, pp. 126–141, 2019. https://doi.org/10.14742/ajet.4446

[31] R. Sethi, D. Smith, and C. Park, "Cross-functional product development teams, creativity, and the innovativeness of new consumer products," *J. Mark. Res.*, vol. 38, no. 1, pp. 73–85, 2001. https://doi.org/10.1509/jmkr.38.1.73 .18833

[32] M. Brewer, N. Miller, M. Brewer, N. Miller, and M. B. Brewer, "Beyond the contact hypothesis: Theoretical perspectives on desegregation," in *Groups in Contact: The Psychology of Desegregation.* Academic Press, 1984, pp. 281–302.

[33] R. Sethi, "Superordinate identity in cross-functional product development teams: Its antecedents and effect on new product performance," *J. Acad. Mark. Sci.*, vol. 28, no. 3, pp. 330–344, 2000. https://doi.org/10.1177/0092 070300283003

[34] A. B. Bakker, "Flow among music teachers and their students: The crossover of peak experiences," *J. Vocat. Behav.*, vol. 66, no. 1, pp. 26–44, 2005. https://doi.org/10.1016/j.jvb.2003.11.001

[35] C. Aubé, E. Brunelle, and V. Rousseau, "Flow experience and team performance: The role of team goal commitment and information exchange," *Motiv. Emot.*, vol. 38, no. 1, pp. 120–130, 2014. https://doi.org/10.100 7/s11031-013-9365-2

[36] J. P. Meyer, D. J. Stanley, L. Herscovitch, and L. Topolnytsky, "Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences," *J. Vocat. Behav.*, vol. 61, no. 1, pp. 20–52, 2002. https://doi.org/10.1006/jvbe.2001.1842

[37] R. M. Steers, "Antecedents and outcomes of organizational commitment," *Adm. Sci. Q.*, vol. 22, no. 1, pp. 46–56, 1977. https://doi.org/10.2307/2391745

[38] R. Eisenberger, R. Huntington, S. Hutchison, and D. Sowa, "Perceived organizational support," *J. Appl. Psychol.*, vol. 71, no. 3, pp. 500–507, 1986. https://doi.org/10.1037/0021-9010.71.3.500

[39] D. A. Newman, "Longitudinal modeling with randomly and systematically missing data: A simulation of ad hoc, maximum likelihood, and multiple imputation techniques," *Organ. Res. Methods*, vol. 6, no. 3, pp. 328–362, 2003. https://doi.org/10.1177/1094428103254673

[40] S. Im, M. M. Montoya, and J. P. Workman, "Antecedents and consequences of creativity in product innovation teams," *J. Prod. Innov. Manag.*, vol. 30, no. 1, pp. 170–185, 2013. https://doi.org/10.1111/j.1540-5885.2012.0 0887.x

[41] J. P. Meyer, N. J. Allen, and C. A. Smith, "Commitment to organizations and occupations: Extension and test of a three-component conceptualization," *J. Appl. Psychol.*, vol. 78, no. 4, pp. 538–551, 1993. https://doi.org/10.1037/0021-9010.78.4.538

[42] J. J. Gibson, *The Ecological Approach to Visual Perception.* Boston, MA: Houghton Mifflin, 2014.

[43] J. H. Jung, C. Schneider, and J. Valacich, "Enhancing the motivational affordance of information systems: The effects of real-time performance feedback and goal setting in group collaboration environments," *Manag. Sci.*, vol. 56, no. 4, pp. 724–742, 2010. https://doi.org/10.1287/mnsc.1090.1129

[44] P. Zhang, "Motivational affordances: Reasons for ICT design and use," *Commun. ACM*, vol. 51, no. 11, pp. 145–147, 2008. https://doi.org/10.1145/1400214.1400244

[45] T. Harwood and T. Garry, "An investigation into gamification as a customer engagement experience environment," *J. Serv. Mark.*, vol. 29, no. 6/7, pp. 533–546, 2015. https://doi.org/10.1108/JSM-01-2015-0045

[46] L. F. Rodrigues, A. Oliveira, and C. J. Costa, "Playing seriously – How gamification and social cues influence bank customers to use gamified e-business applications," *Comput. Hum. Behav.*, vol. 63, pp. 392–407, 2016. https://doi.org/10.1016/j.chb.2016.05.063

[47] J. H. Brockmyer, C. M. Fox, K. A. Curtiss, E. McBroom, K. M. Burkhart, and J. N. Pidruzny, "The development of the Game Engagement Questionnaire: A measure of engagement in video game-playing," *J. Exp. Soc. Psychol.*, vol. 45, no. 4, pp. 624–634, 2009. https://doi.org/10.1016/j.jesp.2009.02.016

[48] C. Jennett, A. L. Cox, P. Cairns, S. Dhoparee, A. Epps, T. Tijs, and A. Walton, "Measuring and defining the experience of immersion in games," *Int. J. Hum. Comput. Stud.*, vol. 66, no. 9, pp. 641–661, 2008. https://doi.org/10.1016/j.ijhcs.2008.04.004

[49] K. Poels, W. van den Hoogen, W. Ijsselsteijn, and Y. de Kort, "Pleasure to play, arousal to stay: The effect of player emotions on digital game preferences and playing time," *Cyberpsychol. Behav. Soc. Netw.*, vol. 15, no. 1, pp. 1–6, 2012. https://doi.org/10.1089/cyber.2010.0040

[50] K. Robson, K. Plangger, J. H. Kietzmann, I. McCarthy, and L. Pitt, "Game on: Engaging customers and employees through gamification," *Bus. Horiz.*, vol. 59, no. 1, pp. 29–36, 2016. https://doi.org/10.1016/j.bushor.2015.08.002

[51] J. K. Ford, R. C. MacCallum, and M. Tait, "The application of exploratory factor analysis in applied psychology: A critical review and analysis," *Pers. Psychol.*, vol. 39, no. 2, pp. 291–314, 1986. https://doi.org/10.1111/j.1744-6570.1986.tb00583.x

[52] J. C. Nunnally, *Psychometric Theory, 2nd.* McGraw-Hill, 1978.

[53] R. P. Bagozzi and Y. Yi, "On the evaluation of structural equation models," *J. Acad. Mark. Sci.*, vol. 16, no. 1, pp. 74–94, 1988. https://doi.org/10.1007/BF02723327

[54] C. Fornell and D. F. Larcker, "Structural equation models with unobservable variables and measurement error: Algebra and statistics," *J. Mark. Res.*, vol. 18, no. 3, pp. 382–388, 1981. https://doi.org/10.1177/002224378101 800313

[55] M. W. Browne and R. Cudeck, "Alternative ways of assessing model fit," *Sociol. Methods Res.*, vol. 21, no. 2, pp. 230–258, 1992. https://doi.org/10.1177/0049124192021002005

[56] K. Schermelleh-Engel, H. Moosbrugger, and H. Müller, "Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures," *Methods Psychol. Res. Online*, vol. 8, no. 2, pp. 23–74, 2003.

[57] C. Homburg and H. Baumgartner, "Beurteilung von kausalmodellen. bestandsaufnahme und anwendungsempflungen," *Mark. Z. Forsch. Prax.*, vol. 17, no. 3, pp. 162–176, 1995.

[58] P. M. Podsakoff, S. B. MacKenzie, J.-Y. Lee, and N. P. Podsakoff, "Common method biases in behavioral research: A critical review of the literature and recommended remedies," *J. Appl. Psychol.*, vol. 88, no. 5, pp. 879–903, 2003. https://doi.org/10.1037/0021-9010.88.5.879

[59] R. E. Johnson, C. C. Rosen, and E. Djurdjevic, "Assessing the impact of common method variance on higher order multidimensional constructs," *J. Appl. Psychol.*, vol. 96, no. 4, pp. 744–761, 2011. https://doi.org/10.1037/a0021504

[60] M. K. Lindell and D. J. Whitney, "Accounting for common method variance in cross-sectional research designs," *J. Appl. Psychol.*, vol. 86, no. 1, pp. 114–121, 2001. https://doi.org/10.1037//0021-9010.86.1.114

[61] M. J. Simmering, C. M. Fuller, H. A. Richardson, Y. Ocal, and G. Atinc, "Marker variable choice, reporting, and interpretation in the detection of common method variance," *Organ. Res. Methods*, vol. 18, no. 3, pp. 473–511, 2015. https://doi.org/10.1177/1094428114560023

[62] L. J. Williams, N. Hartman, and F. Cavazotte, "Method variance and marker variables: A review and comprehensive cfa marker technique," *Organ. Res. Methods*, vol. 13, no. 3, pp. 477–514, 2010. https://doi.org/10.1177/1094428110366036

[63] R. N. Landers, E. M. Auer, A. B. Collmus, and M. Armstrong, "Gamification science, its history and future: Definitions and a research agenda," *Simul. Gaming*, vol. 49, no. 3, pp. 315–337, 2018. http://doi.org/10.1177/10 46878118774385

[64] R. Patrício, A. C. Moreira, and F. Zurlo, "Gamification in innovation teams," *Int. J. Innov. Stud.*, vol. 6, no. 3, pp. 156–168, 2022. https://doi.org/10.1016/j.ijis.2022.05.003

[65] I. Hamza, T. Sarolta, and K. Shatila, "The effect of gamification on employee behavior: The mediating effects of culture and engagement," *J. Asian Fin. Econ. Bus.*, vol. 9, no. 5, pp. 213–224, 2022. https://doi.org/10.13106/jafeb.2022.vol9.no5.0213

[66] M. B. Armstrong and R. N. Landers, "Gamification of employee training and development," *Int. J. Train. Dev.*, vol. 22, no. 2, pp. 162–169, 2018. https://doi.org/10.1111/ijtd.12124

[67] T. Leclercq, I. Poncin, and W. Hammedi, "The engagement process during value co-creation: Gamification in new product-development platforms," *Int. J. Electron. Commer.*, vol. 21, pp. 454–488, 2018. https://doi.org/10.1080/10864415.2016.1355638

[68] N. V. Wünderlich, A. Gustafsson, J. Hamari, P. Parvinen, and A. Haff, "The great game of business: Advancing knowledge on gamification in business contexts," *J. Bus. Res.*, vol. 106, pp. 273–276, 2020. https://doi.org/10.1016/j.jbusres.2019.10.062

Nomenclature

EFA   Exploratory Factor Analysis
GFI   Goodness of Fit
AGFI   Adjusted Goodness of Fit Index