

From gamification to work performance: a two-wave, two-study examination of psychological needs and meaningful work of employees in China and Singapore

International
Journal of
Manpower

213

Received 25 August 2025
Revised 1 January 2026
11 April 2026
30 May 2026
20 June 2026
18 July 2026
Accepted 19 July 2026

Kim-Lim Tan

*JCUS Business School, James Cook University, Singapore, Singapore and
Faculty of Business Administration, Ton Duc Thang University,
Ho Chi Minh City, Vietnam*

Jiayi Li

*School of Engineering (Commercial Project Management),
The University of Manchester, Manchester, UK*

Ziwen Guo

HuaDian Heavy Industries Co. Ltd, Beijing, China

Ivy S.H. Hii

Faculty of Business, Curtin University Malaysia, Miri, Malaysia

Dang Hat Nguyen

*Faculty of Economics-Management, Hong Bang International University,
Ho Chi Minh City, Vietnam*

Hiram Ting

*Strategic Research Institute, Asia Pacific University of Technology and Innovation,
Kuala Lumpur, Malaysia;*

*Faculty of Tourism, Van Hien University, Ho Chi Minh City, Vietnam and
School of Business and Management, Universitas Ciputra, Surabaya, Indonesia, and*

Sovia Rosalin

*Department of Business and Hospitality, Faculty of Vocational Studies,
Universitas Brawijaya, Malang, Indonesia*

Abstract

Purpose – Organisations are increasingly adopting gamification as a strategy to enhance employee motivation, engagement, and performance. While prior research has primarily examined gamification as an organisational tool, this study shifts the focus to how employees experience gamification and its impact on their psychological needs, perceived work meaningfulness and motivation.

Design/methodology/approach – Drawing on Self-Determination Theory, we conducted two time-lagged studies in China and Singapore involving hospitality employees to examine the effects of three key affordances of gamification on autonomy, competence, and relatedness. These psychological needs were linked to meaningful work, which, in turn, influenced both intrinsic and extrinsic motivation and perceived performance.

© Kim-Lim Tan, Jiayi Li, Ziwen Guo, Ivy S.H. Hii, Dang Hat Nguyen, Hiram Ting and Sovia Rosalin. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licenses/by/4.0/>



International Journal of Manpower
Vol. 47 No. 10, 2026
pp. 213-236
Emerald Publishing Limited
e-ISSN: 1758-6577
p-ISSN: 0143-7720
DOI 10.1108/IJM-08-2025-0688

Findings – Our findings demonstrate that the affordances of gamification significantly shape employees' psychological experiences, with competence and relatedness emerging as stronger predictors of meaningful work. Furthermore, we emphasise the importance of meaningful work in motivating work performance.

Originality/value – By validating our model across two culturally distinct contexts, this research offers novel insights demonstrating how specific gamification affordances – visibility, comparability and immediacy – affect the three basic psychological needs: autonomy, competence, and relatedness. In turn, how it influences meaningful work fostering both intrinsic and extrinsic motivation.

Keywords Gamification, Self-determination theory, Psychological needs, Meaningful work, Employee motivation, Work performance

Paper type Research article

Introduction

Play is a universal human experience, transcending cultures and ages, as nearly everyone engages in some form of play throughout their lives (Butler and Spoelstra, 2024). People are drawn to play for the intrinsic enjoyment, challenge, and sense of fulfilment. Traditionally, work and play have been viewed as distinct, even opposing, concepts (Carmilleri and Neelim, 2024). However, studies are beginning to challenge this dichotomy, exploring how play can be integrated into the workplace, leading to a new form of workplace practice - workplace gamification (Butler and Spoelstra, 2024).

Increasingly, evidence suggests that gamification is an important intervention in workplaces. For instance, Boston Consulting Group (2024) indicates that experiencing joy at work is a critical component employees value in their workplace. The same report highlighted that employees who do not experience fun at work are 51% more likely to consider seeking alternative employment, underscoring the organisational risks associated with neglecting positive work experiences (Boston Consulting Group, 2024). Moreover, Chartered Institute of Personnel and Development has indicated that workplace gamification is key towards helping to close workforce skills gap, especially when majority of the work force are acquiring new skill sets to stay relevant in the changing workplace (Clemo, 2025).

As explained by Wei *et al.* (2023), workplace gamification involves incorporating game design elements into non-gaming contexts. These game-like elements, such as leader boards, point systems, and rewards, increase employee motivation and benefit the organisation's overall success. A recent Harvard Business Review article highlighted that the workplace gamification market will grow by 27.4% to USD 30.7 billion by 2025, underscoring its increasing popularity and the pressing necessity of understanding its effect in workplaces (Khan *et al.*, 2024).

Building on this, the present study shifts the focus from organisational strategies to individual employees. Rather than viewing workplace gamification as an external initiative imposed by organisations, we examine how workplace gamification shapes their own experiences of motivation, engagement, and productivity.

Firstly, we addressed the calls by Torresan and Hinterhuber (2023) to further understand workplace gamification through its specific affordances (i.e. visibility, comparability, and immediacy) and how it interacts with the basic psychological needs (i.e. autonomy, competence, and relatedness). The necessity to address this gap is further supported by Oppong-Tawiah *et al.* (2024), who highlight that the existing literature provides contradictory evidence on whether gamification possibly infringes upon workers' autonomy and whether the nature of competition affects one's perspective on relatedness and competency. As such, the outcomes of our study will not only advance theory but also provide valuable insights into designing gamification systems that effectively support meaningful work and overall employee productivity.

Secondly, this study offers insight into how the affordances of gamification influence the meaning of work. As pointed out by Butler and Spoelstra (2024), infusing play in the workplace would provide an intrinsic sense of work meaningfulness. On this note, meaningful work is becoming an increasingly important construct in contemporary workplaces.

According to [Tan et al. \(2023b\)](#), meaningful work exists when employees perceive their job as having significance and purpose, which contributes to their sense of self-worth and overall well-being. In other words, the concept of meaningful work is rooted in the broader field of positive psychology, which emphasises the role of intrinsic motivation in enhancing job satisfaction and performance ([Wulff and Finnestrand, 2023](#)). Many scholars, such as [Kačerauskas et al. \(2023\)](#), have argued that integrating game elements into work has the potential to enhance the meaning of work - a concept this study will explore.

Thirdly, many papers on the outcomes of gamification remain conceptual, with no empirical evidence ([Bizzi, 2023](#)). For instance, [Cardador et al. \(2017\)](#) developed a concept that outlines how gamification supports task enjoyment, leading to improved performance. Likewise, [Robson et al. \(2015\)](#) developed a framework explaining how gamification influences behaviours, resulting in beneficial emotions. Without empirical outcomes, the actual effectiveness and generalisability of these gamification frameworks remain speculative. As such, we add value by contributing empirical evidence to this string of discussion. Additionally, we will validate or challenge existing conceptual models, providing insights into how gamification impacts measurable outcomes such as engagement, performance, and user satisfaction.

Finally, using two studies, we provide a cross-cultural validation of our proposed model by testing it among hospitality employees in China and Singapore, two economically advanced yet culturally distinct Asian countries. This multi-wave, two-sample approach enhances the external validity of our findings. Specifically, we assess whether the relationships between gamification affordances, basic psychological needs, meaningful work, motivation, and perceived work performance are consistent or contextually dependent. By so doing, we address a key gap in the literature regarding the generalisability of gamification effects beyond a single-country context and provide culturally grounded insights for both theory and practice.

To sum up, this study will address the following research questions (1) How do gamification affordances shape employees' basic psychological needs and meaningful work? (2) How do these psychological mechanisms translate into motivation and perceived work performance? (3) To what extent are these relationships consistent across different contexts in China and Singapore?

Literature review

Workplace gamification

Workplace gamification entails applying game design elements in work contexts. The literature commonly distinguishes between structural gamification and content gamification ([Sarangi and Shah, 2015](#)). Structural gamification involves overlaying game elements onto existing tasks without altering the core work content ([Pahlavanpour and Gao, 2024](#)). Typical examples include points, badges, leaderboards, or rewards tied to task completion. These elements primarily function as extrinsic motivators, encouraging participation and persistence through visible incentives and social comparison. According to scholars such as [Khan et al. \(2024\)](#), structural gamification is relatively easy to implement and can yield short-term engagement gains. However, its effectiveness may diminish over time if rewards lose novelty or are perceived as controlling rather than supportive ([Butler and Spoelstra, 2024](#); [Sarangi and Shah, 2015](#)). In contrast, content gamification entails a more fundamental redesign of work tasks and processes. By reframing work activities as purposeful challenges or missions, content gamification seeks to foster intrinsic motivation, aligning with the emphasis on autonomy, competence, and relatedness ([Costantini et al., 2025](#)). Although more complex and resource-intensive to design, content gamification is often considered more sustainable, as it enhances employees' internal sense of meaning and engagement rather than relying solely on external rewards ([Butler and Spoelstra, 2024](#); [Miri and Macke, 2021](#)).

In this regard, we focus on structural gamification rather than content gamification. Specifically, we examine how structural gamification affordances (i.e. visibility,

comparability, and immediacy) shape employees’ psychological experiences and behavioural responses. Besides, prior research such as [Pahlavanpour and Gao \(2024\)](#) argued that these affordances are more salient in structural gamification than in content-based ones, as they are enacted through different gamification techniques at the system level. In other words, structural gamification allows clearer manifestation of visibility, comparability, and immediacy that influence employees’ perceptions of performance, progress, and relative standing without altering the underlying task content ([Khan et al., 2024](#)).

To summarise, workplace gamification is conceptualised through three affordances: (1) visibility, which provides transparent and accessible performance feedback; (2) comparability, which enables social benchmarking and relative performance evaluation; and (3) immediacy, which delivers real-time feedback and rapid action-outcome connections. These dimensions represent distinct but complementary mechanisms through which gamified systems influence how employees interpret their work environment. Importantly, these affordances are inherently psychological in nature, as they shape how individuals perceive control, effectiveness, and social connection within their work context.

To this end, This conceptualisation provides a strong theoretical basis for integrating Self-Determination Theory (SDT). Specifically, visibility, comparability, and immediacy function as contextual design features that can either support or hinder the satisfaction of the three basic psychological needs identified by SDT (i.e. autonomy, competence, and relatedness). By offering informational feedback (visibility), social reference points (comparability), and timely reinforcement (immediacy), gamification affordances align closely with SDT’s emphasis on supportive environments that foster intrinsic and extrinsic motivation.

Theoretical framework

SDT posits that human motivation is driven by fulfilling three innate psychological needs: autonomy, competence, and relatedness ([Deci and Ryan, 2000](#)). Within the workplace context, SDT suggests that satisfying these needs leads to higher levels of intrinsic motivation, which in turn fosters greater engagement and productivity ([Autin et al., 2022](#)). Through the research model in [Figure 1](#), our key arguments are that incorporating game design elements into

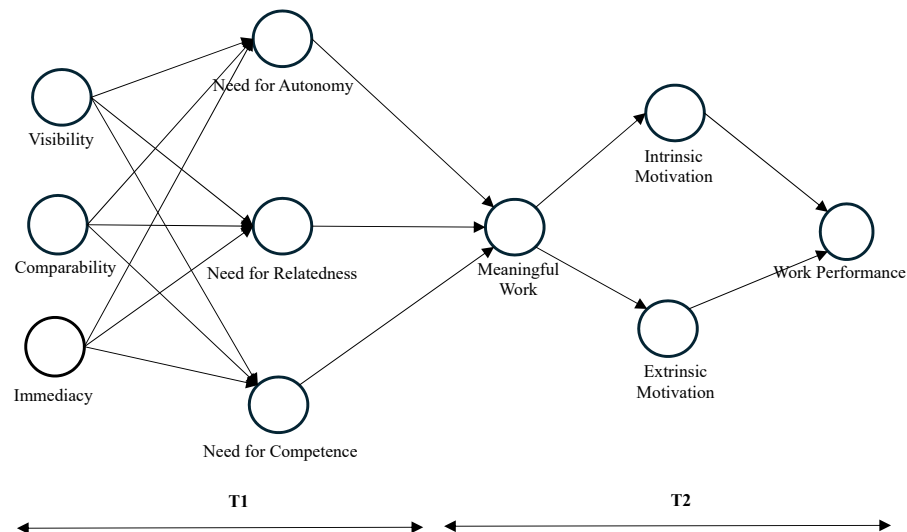


Figure 1. Conceptual framework

workplace contexts offers specific affordances that align with SDT's basic psychological needs.

Autonomy is the sense of volition and self-direction in one's actions (Gagne *et al.*, 2022). Through gamification, employees have greater control over their work approach (Cropanzano *et al.*, 2023). Autonomy fosters a sense of ownership and personal agency, aligning with the intrinsic motivational drive highlighted by SDT (Gagne *et al.*, 2022). When thoughtfully implemented, gamification creates a supportive environment where employees feel trusted and valued, encouraging a proactive and motivated workforce.

Competence is the need to feel capable in performing tasks (Martela and Riekk, 2018). Gamification plays a pivotal role in fostering this sense of accomplishment by offering immediate feedback and recognising achievements. These mechanisms celebrate employees' progress, instilling confidence in their abilities and encouraging continuous growth. Hence, incorporating gamification has the potential to reinforce competence and inspire employees to set and achieve higher goals, cultivating a workplace culture of learning, resilience, and excellence.

Relatedness reflects the innate desire to feel connected to others and be part of a broader community (Salikhova *et al.*, 2020). Gamification effectively nurtures this sense of belonging by incorporating collaborative challenges, team achievements, and social recognition. While competitive elements, such as leaderboards, can energise and motivate, a thoughtfully balanced design ensures that these features complement collaboration, enhancing social cohesion and strengthening the shared sense of purpose within the workplace.

Visibility and basic psychological needs

Visibility in gamification refers to the clarity and transparency with which a user's progress, achievements, or status is presented within a system (Carmilleri and Neelim, 2024). Visibility provides users with explicit and accessible feedback about their performance, making their efforts and outcomes tangible. From an SDT perspective, visibility influences the three basic psychological needs through its role as an informational contextual feature.

First, visibility supports autonomy. By making progress and expectations transparent, it empowers employees to set and pursue their goals effectively (Khan *et al.*, 2024). When performance information is presented in an informational rather than controlling way, individuals experience greater volition and ownership over their actions, aligning with SDT's emphasis on autonomy (Deci and Ryan, 2000). Additionally, visibility strengthens relatedness by making users' achievements observable to others, thereby creating opportunities for recognition and social interaction (Khan *et al.*, 2024). In gamified environments, visibility facilitates social comparison, celebration, and interaction (Seaborn and Fels, 2015). When a user's achievements and progress are visible to peers, supervisors, or teams, it fosters a sense of belonging and inclusion, as others can acknowledge and celebrate those accomplishments. In terms of competence, visibility provides tangible evidence of users' efforts and achievements, reinforcing their sense of mastery. In gamified work settings, visibility makes skill development more concrete, thereby reinforcing feelings of mastery, validating users' efforts and motivating them to continue their tasks. In all, visibility is a key enabler in meeting users' needs by providing actionable insights and fostering positive reinforcement. Given these arguments, our first set of hypotheses is.

- H1a. Visibility in gamification positively influences the basic psychological need for autonomy.
- H1b. Visibility in gamification positively influences the basic psychological need for relatedness.
- H1c. Visibility in gamification positively influences the basic psychological need for competency.

Comparability and basic psychological needs

Comparability in gamification refers to a system's ability to enable users to assess their performance or progress relative to others (Khan *et al.*, 2024). This element fosters a sense of social benchmarking by enabling users to compare achievements, rankings, or efforts within a gamified context.

By benchmarking their progress against others, users can set personal goals and adjust their strategies accordingly, enhancing their sense of autonomy. For example, Cao and Cheng (2024) demonstrated that benchmarking results help users determine how much effort they wish to invest and in which areas, allowing them to take control of their progress. In terms of relatedness, comparability fosters social interactions and connections by providing a shared framework for recognition and engagement. When users compare achievements, it opens opportunities for communication, camaraderie, and mutual encouragement, thereby strengthening feelings of belonging. This is especially true when comparability involves team-based gamification (Papadopoulos *et al.*, 2024). Finally, comparability enhances competence by giving users tangible metrics to evaluate their performance. Studies by Cao and Cheng (2024) have shown that by showcasing relative standing, users can identify areas where they excel or need improvement, reinforcing their sense of mastery. In other words, comparative feedback acts as a motivational tool, encouraging users to strive for better results and validating their skills when they outperform others. It is a crucial gamification element for meeting users' basic psychological needs by providing meaningful social contexts and performance insights that motivate, validate, and connect them. Based on these arguments, our hypotheses are:

- H2a. Comparability in gamification positively influences the basic psychological need for autonomy.
- H2b. Comparability in gamification positively influences the basic psychological need for relatedness.
- H2c. Comparability in gamification positively influences the basic psychological need for competence.

Immediacy and basic psychological needs

Immediacy in gamification refers to the extent to which users receive real-time feedback, instant rewards, or immediate consequences for their actions within a gamified system (Kačerauskas *et al.*, 2023). Examples of immediacy include instant point accumulation, immediate visual or auditory feedback, real-time notifications, progress bars, and live performance updates that provide users with direct responses to their efforts.

Immediacy is expected to positively influence all three basic psychological needs: autonomy, competence, and relatedness. For instance, by delivering real-time feedback, employees can make more informed decisions in reallocating resources to achieve the desired outcomes without delay. This rapid feedback loop reinforces the perception that outcomes are contingent on one's own choices, thereby strengthening the sense of self-regulation and mastery over one's progress. Similarly, immediacy fosters social connections by facilitating instant interactions and communication within gamified environments (Rowicka and Postek, 2023). This is particularly evident in team-based gamification, where instant updates on collective progress encourage group members to coordinate efforts, celebrate achievements, and offer immediate support. Such immediacy enhances social presence and interpersonal responsiveness. Likewise, immediacy enhances competence by allowing users to see the immediate impact of their efforts. SDT posits that competence is enhanced when feedback is timely, task-relevant, and clearly linked to effort. Immediate rewards, progress indicators, and system responses allow users to quickly assess whether their actions are successful, thereby reinforcing learning and mastery. Studies by Torresan and Hinterhuber (2023) have

demonstrated that immediate feedback mechanisms have enabled employees to understand their strengths and areas for improvement, as well as determine whether to master a new skill or acquire additional ones. Based on these arguments, our next set of hypotheses is:

- H3a. Immediacy in gamification positively influences the basic psychological need for autonomy.
- H3b. Immediacy in gamification positively influences the basic psychological need for relatedness.
- H3c. Immediacy in gamification positively influences the basic psychological need for competence.

Effect of basic psychological needs on meaningful work

Meaningful work has become a central focus in human resource management due to its impact on employee well-being, motivation, and performance. At its core, meaningful work refers to work that individuals perceive as significant, purposeful, and aligned with their values, beliefs, and sense of self (Afota *et al.*, 2024).

In this regard, the SDT provides a framework for understanding the antecedents of meaningful work (Deci and Ryan, 2000). For instance, when individuals feel they have control over their tasks, such as having the ability to make choices that align with their values, they are more likely to experience their work as authentic and intrinsically motivating (Arora and Garg, 2024). Research further supports this view, suggesting that autonomy-supportive environments promote higher levels of intrinsic motivation, which are closely tied to feelings of purpose and meaning (Gagne *et al.*, 2022). Additionally, work environments that foster positive interpersonal relationships, social support, and a sense of community enhance the emotional significance attached to work (Tan *et al.*, 2023b). In other words, relatedness helps individuals feel that their work contributes not only to their personal growth but also to the well-being of others, thus enriching the sense of purpose and social value associated with their role. Lastly, the need for competence contributes to meaningful work by reinforcing individuals' perceptions that their efforts are effective and impactful. As highlighted by Szóts-Kováts and Primecz (2024), this sense of efficacy enhances an individual's perceived significance of their work outcomes, thereby reinforcing the sense that one's contributions are worthwhile and meaningful. Hence, employees who perceive themselves as competent are more likely to derive fulfilment from their accomplishments, which directly contributes to a sense of personal meaning. Accordingly, our next set of hypotheses is.

- H4a. The basic psychological need for autonomy positively influences meaningful work.
- H4b. The basic psychological need for relatedness positively influences meaningful work.
- H4c. The basic psychological need for competence positively influences meaningful work.

Effect of meaningful work on two forms of motivational pathways

Employees who perceive their work as meaningful tend to view their roles as more than tasks or responsibilities (Oppong-Tawiah *et al.*, 2024). Instead, they see their contributions as valuable and aligned with something larger than themselves (Szóts-Kováts and Primecz, 2024). To this end, a key motivational outcome of meaningful work is intrinsic motivation, which refers to performing an activity for the inherent satisfaction it provides (Zhu *et al.*, 2024). Research supports this link. For instance, Aljumah (2023) highlighted that individuals who find their work meaningful are more likely to experience enjoyment, engagement, and interest in their work. Similarly, Allan *et al.* (2019) and Steger *et al.* (2012) demonstrated that

meaningful work predicted sustained interest and engagement over time. In other words, work meaningfulness enhances intrinsic motivation when work aligns with personally important values, thereby facilitating the internalisation of work goals (Ryan and Deci, 2000). In this context, meaningful work strengthens the perceived value of the activity itself, encouraging individuals to persist in their efforts even in the absence of external rewards. Thus, the following hypothesis is proposed:

H5a. Meaningful work positively influences intrinsic motivation.

Beyond intrinsic motivation, meaningful work may also promote extrinsic motivation. Aljumah (2023) explains it as performing an activity to obtain outcomes that are external to the activity itself, such as recognition, financial rewards, or status. While intrinsic and extrinsic motivations are often conceptualised as distinct, they can coexist and even reinforce one another under certain conditions (Ryan and Deci, 2000). In this context, Jin and Rounds (2012) argue that when individuals perceive their work as having a positive impact, they become more invested in how their performance is perceived and evaluated, which can heighten their sensitivity to extrinsic incentives. As such, they may be more inclined to exert discretionary effort, seek out visibility, and strive for excellence. These behaviours are typically associated with external recognition and reward. Through SDT, we can further argue that when work is experienced as meaningful, employees are more likely to internalise the value of external outcomes, making extrinsic goals feel personally significant rather than merely imposed (Ryan and Deci, 2000). In essence, meaningful work can also act as a catalyst for goal-oriented behaviour aimed at achieving valued external outcomes. On this basis, the following hypothesis is proposed:

H5b. Meaningful work positively influences extrinsic motivation.

Effect of two forms of motivational pathways on perceived work performance

When individuals are intrinsically motivated, they tend to engage in tasks for their inherent satisfaction (Miao et al., 2007; Slemph et al., 2024). Such motivation often promotes deeper cognitive engagement, creativity, and persistence, which are factors that are strongly associated with positive performance perceptions (Di Domenico and Ryan, 2017). Aggarwal and Singh (2023) explained that such motivation leads to proactive work behaviours, which in turn enhance individuals' confidence in their effectiveness. Thomas et al. (2022) and Gagne et al. (2022) support this argument, highlighting that intrinsically motivated employees tend to report stronger feelings of competence and achievement. Beyond behavioural outcomes, intrinsic motivation contributes to psychological states such as flow and absorption, which reinforce employees' perceptions of mastery and accomplishment (Gupta and Priyanka, 2022). Consequently, intrinsically motivated individuals are more likely to evaluate their performance positively. Thus, we postulate:

H6a. Intrinsic motivation positively influences perceived work performance.

Employees who are extrinsically motivated are likely to adopt strategies focused on achieving valued external outcomes (Aljumah, 2023). Prior research suggests that externally motivated employees tend to structure their tasks efficiently and concentrate on deliverables that align with reward criteria (Gagne et al., 2022; Gagné et al., 2019). This reinforcement mechanism strengthens both actual and perceived performance, as rewards serve as feedback cues that indicate success (Collins and Cockburn, 2020). This argument is supported by Khayat et al. (2024), who further demonstrates that performance-based extrinsic rewards enhance self-perceived competence, leading employees to evaluate their own performance more favourably, and replicate the behaviour. Therefore, the following hypothesis is proposed:

H6b. Extrinsic motivation positively influences perceived work performance.

Method

Study 1

Sample and procedures. Using purposive sampling, we recruited employees from the hospitality industry in China. China was chosen as the research context for Study 1 as the country's hospitality industry has increasingly integrated digital innovations, including gamification, to improve employee engagement and performance (Carmilleri and Neelim, 2024; Khan *et al.*, 2024; Thomas *et al.*, 2022). Besides, China's distinctive context, characterised by collectivism, hierarchical workplace norms, and an emphasis on harmony, will provide interesting insights into how gamification functions in a non-Western organisational setting. In all, studying this population not only enhances the cultural diversity of gamification research but also allows for broader theoretical generalisations.

A prerequisite for their participation is that they must be employed as frontline hospitality staff with a hospitality organisation and have been exposed to one form of gamification in the past six months. Data were collected across two waves, with a four-week time lag between each wave, via *Wenjuanxing*. The time gap between each wave aligned with similar treatment by Tan *et al.* (2023a).

Similar to many survey platforms, *Wenjuanxing* provides flexibility in designing various types of questionnaires, is free to use, and offers many helpful features, including easy mobile access and distribution through WeChat (Mei and Brown, 2017). Numerous studies, such as those by Zhong *et al.* (2022) have shown that *Wenjuanxing* is widely used as a survey tool in China. A reason for its popularity is that China's stringent cybersecurity laws have made traditional survey software inaccessible (Tan *et al.*, 2022). Through *Wenjuanxing*, a survey link containing the cover page and the survey questions was sent to the respondents. Other than informing the respondents that the study has been approved by the University's ethics committee, the cover page outlines the purpose of the survey, the promise of confidentiality, voluntary participation and informing respondents to be honest in their replies.

Initially, 400 survey forms were distributed to participants through professional and organisational networks to take part in this study. At Time 1, 358 (89.5%) respondents participated in the study. Of these, 308 completed the study at Time 2, representing a dropout rate of 13.94%. The final sample size is 308, which achieved a power of 99.99% at a moderate effect size of 0.15 and a significant level of 0.05. Table 1 provides a breakdown of the respondents.

Measures. The measurement items are adapted from established scales developed by prior studies. At T1, three items on visibility, three items on comparability, and three items on immediacy are adapted from Kinicki *et al.* (2013) and Safari *et al.* (2022). Twenty-four items on the three basic psychological needs are adapted from Chen *et al.* (2014). At T2, 10 items of meaningful work are adapted from Steger *et al.* (2012). Intrinsic motivation (3 items) and extrinsic motivation (3 items) are adapted from Tremblay *et al.* (2009). Finally, perceived work performance is measured using five items adapted from Henttonen *et al.* (2016). Other than the items for intrinsic and extrinsic motivation, which are measured on a 7-point Likert scale, the rest of the responses were recorded on a 5-point Likert scale. Appendix 1 provides the complete list of items. Following Brislin (1970), the survey form was developed in English and then translated into Mandarin, followed by a back-translation into English. This approach ensured that the original meaning of the questions remained intact. At the same time, the survey form was pre-tested with scholars who have similar research areas, and any ambiguities were addressed.

Common method bias. To address common method bias, this study adopted several recommendations from Podsakoff *et al.* (2003). In addition to ensuring that the questions were understood by respondents through pre-testing, we reduced common method bias through two-wave data collection. Besides, we adopted Kock (2015) full collinearity method and noted that the Variance Inflation Factors are less than 3.3, further providing evidence that common method bias is not a serious issue.

Table 1. Respondents’ profile (Study 1 and 2)

	Study 1 (China) <i>n</i> = 308		Study 2 (Singapore) <i>n</i> = 364	
		Percentage		Percentage
<i>Gender</i>				
Male	170	55.19%	185	50.82%
Female	138	44.81%	179	49.18%
<i>Age</i>				
18–25 years old	122	39.61%	95	26.10%
26–30 years old	78	25.32%	71	19.51%
31–40 years old	56	18.18%	100	27.47%
41–50 years old	31	10.06%	63	17.31%
51–60 years old	18	5.84%	29	7.97%
60 years old and above	3	0.97%	6	1.65%
<i>Highest Education</i>				
High School	21	6.82%	36	9.89%
College Diploma	97	31.49%	136	37.36%
Bachelor’s Degree	152	49.35%	153	42.03%
Master’s Degree	35	11.36%	35	9.62%
Doctorate Degree	3	0.97%	4	1.10%
<i>Experience in Hospitality Industry</i>				
<5 years	202	65.58%	275	75.55%
5–10 years	39	12.66%	56	15.38%
11–15 years	25	8.12%	21	5.77%
16–20 years	22	7.14%	7	1.92%
>20 years	20	6.49%	5	1.37%

Analysis. To answer our research questions, we used the partial least squares method of structural equation modelling (PLS-SEM). PLS-SEM has been chosen for its ability to handle complex models which prioritise both explanatory and predictive analysis (Sarstedt *et al.*, 2022). At the same time, Sarstedt *et al.* (2022) PLS-SEM is also suitable for theory extension and comparative analysis across samples. Before analysing the structural model, we examine the measurement model by evaluating the reliability and validity indexes, including internal consistency reliability, convergent validity via the average variance extracted (AVE), and discriminant validity using the Heterotrait-Monotrait (HTMT) ratio (Becker *et al.*, 2022).

Results. Tables 2 and 3 demonstrate that Study 1 met the required thresholds for validity and reliability. The Cronbach’s Alpha, composite reliability, and AVE indicate that it has met the threshold values of 0.7, 0.7, and 0.5, respectively (Sarstedt *et al.*, 2022). At the same time, discriminant validity was achieved as its values were lower than 0.85 (Henseler *et al.*, 2015).

Our bootstrapping results in Table 4 further show that, among the three gamification affordances, visibility has a significant relationship with both autonomy (H1a: $\beta = 0.168$, $p < 0.05$) and competence (H1c: $\beta = 0.151$, $p < 0.05$), but not with relatedness (H1b: $\beta = 0.098$, $p = 0.226$). Comparability fulfils need for autonomy (H2a: $\beta = 0.167$, $p < 0.05$) and need for relatedness (H2b: $\beta = 0.182$, $p < 0.05$) but not competence (H2c: $\beta = 0.118$, $p = 0.141$). Interestingly, the final affordance of immediacy fulfils the need for relatedness (H3b: $\beta = 0.185$, $p < 0.05$), and competence (H3c: $\beta = 0.263$, $p < 0.01$) but not autonomy (H3a: $\beta = 0.135$, $p = 0.107$). Among the three basic psychological needs, only the need for relatedness (H4b: $\beta = 0.196$, $p < 0.05$) competence (H4c: $\beta = 0.314$, $p < 0.01$) have a positive and significant relationship with meaningful work. As expected, the experience of meaningful work has a positive influence on both intrinsic motivation (H5a: $\beta = 0.392$, $p < 0.001$) and extrinsic motivation (H5b: $\beta = 0.426$, $p < 0.001$). In turn, both motivations influence work performance (H6a: $\beta = 0.328$, $p < 0.001$; H6b: $\beta = 0.229$, $p < 0.001$).

Table 2. Measurement model (Study 1 and 2)

	<i>Outer loading</i>	<i>CA</i>	<i>CR</i>	<i>AVE</i>
<i>Study 1 (China)</i>				
AUT	0.784–0.875	0.943	0.946	0.715
COM	0.921–0.939	0.919	0.925	0.861
COMP	0.887–0.925	0.932	0.932	0.830
IMM	0.906–0.911	0.906	0.908	0.842
MW	0.847–0.906	0.955	0.960	0.721
REL	0.765–0.875	0.931	0.949	0.667
VIS	0.938–0.940	0.934	0.937	0.883
IM	0.817–0.829	0.766	0.769	0.68
EM	0.770–0.808	0.696	0.700	0.618
WP	0.888–0.934	0.948	0.948	0.828
<i>Study 2 (Singapore)</i>				
AUT	0.798–0.866	0.940	0.942	0.770
COM	0.901–0.910	0.890	0.891	0.820
COMP	0.847–0.890	0.887	0.889	0.748
IMM	0.850–0.915	0.868	0.880	0.792
MW	0.760–0.825	0.931	0.932	0.643
REL	0.847–0.868	0.900	0.901	0.770
VIS	0.892–0.917	0.897	0.901	0.830
IM	0.843–0.874	0.823	0.825	0.738
EM	0.882–0.866	0.813	0.813	0.728
WP	0.831–0.862	0.950	0.906	0.725

Note(s): CA-Cronbach's alpha; CR-Composite reliability; AVE-Average variance extracted; AUT-Need for autonomy; COM-Comparability; COMP: Need for competence; IMM: Immediacy; MW: Meaningful work; REL: Need for relatedness; VIS: Visibility; IM: Intrinsic motivation; EM: Extrinsic motivation; WP: Work performance

Hence, [H1a](#), [H1c](#), [H2a](#), [H2b](#), [H3b](#), [H3c](#), [H4b](#), [H4c](#) [H5a](#), [H5b](#), [H6a](#) and [H6b](#) are supported.

Study 2

We replicated the model in a new sample of hospitality employees based in Singapore. Singapore was selected as a comparative context due to its well-established and globally significant tourism sector. According to the World Travel and Tourism Council (WTTC), Singapore is expected to receive approximately 16.5 million international visitors, recovering to nearly 9.6% above pre-pandemic levels ([WTTC, 2025](#)). To support this growth trend, the Singapore Tourism Board (STB) reported that the industry employed 71,000 individuals in 2024 ([STB, 2024](#)). Finally, while Singapore and China share certain cultural and economic similarities as Asian hubs, they also differ in organisational practices, labour policies, and work cultures. In sum, the growth trajectory and socio-demographic contrasts provide a valuable backdrop for testing the model's robustness across diverse but relevant environments.

Sample and procedures. To ensure consistency in context and relevance, we recruited a new group of respondents who shared the same profile characteristics as those in Study 1. Specifically, participants were employees working in the hospitality industry and had experienced at least one form of gamification at work within the past six months.

Data were collected through Qualtrics. Consistent with Study 1, respondents were first presented with a cover page outlining the study's purpose, the voluntary nature of participation, confidentiality assurances, and approval by the university's ethics committee. Participants were also reminded to respond honestly and were assured that there were no right or wrong answers.

Table 3. Discriminant validity (Study 1 and 2)

	1	2	3	4	5	6	7	8	9	10
<i>Study 1 (China)</i>										
EM										
IMM	0.505									
IM	0.794	0.373								
MW	0.513	0.445	0.440							
AUT	0.471	0.327	0.478	0.376						
REL	0.462	0.331	0.437	0.395	0.434					
COMP	0.497	0.434	0.510	0.501	0.546	0.469				
VIS	0.415	0.559	0.420	0.353	0.329	0.233	0.360			
WP	0.495	0.443	0.540	0.465	0.428	0.436	0.452	0.394		
COM	0.460	0.550	0.333	0.340	0.329	0.296	0.340	0.470	0.416	
<i>Study 2 (Singapore)</i>										
EM										
IMM	0.647									
IM	0.740	0.591								
MW	0.701	0.655	0.643							
AUT	0.636	0.525	0.655	0.603						
REL	0.650	0.566	0.652	0.620	0.566					
COMP	0.601	0.617	0.622	0.653	0.663	0.632				
VIS	0.562	0.628	0.646	0.592	0.525	0.509	0.531			
WP	0.650	0.548	0.660	0.595	0.594	0.573	0.538	0.523		
COM	0.642	0.592	0.575	0.547	0.574	0.571	0.493	0.556	0.529	
Note(s): (1) AUT-Need for autonomy; COM-Comparability; COMP: Need for competence; IMM: Immediacy; MW: Meaningful work; REL: Need for relatedness; VIS: Visibility; IM: Intrinsic motivation; EM: Extrinsic motivation; WP: Work performance (2) Discriminant validity achieve at HTMT _{0.85}										

A total of 400 invitations were distributed through professional and organisational networks, of which 364 usable responses were retained at T2 after data cleaning (see Table 1). This sample size exceeds the recommended threshold for structural equation modelling with medium effect sizes and offers adequate statistical power for our analysis (Faul *et al.*, 2007). *Measures.* The same set of measures used in Study 1 was also employed in Study 2. To reiterate, all constructs (see Appendix 1) were assessed using established scales adapted from prior validated instruments.

Common method bias. The procedural remedies adopted for Study 2 are identical to those used in Study 1. We pre-tested the survey to remove ambiguous items, and ensuring participants of anonymity and confidentiality. At the same time, Harman’s single-factor test indicated no substantial common method bias, as no single factor accounted for the majority of variance. Besides, we adopted Kock (2015) full collinearity method and noted that the Variance Inflation Factor are less than 3.3, indicating common method bias is not a serious concern.

Analysis. For the same reasons highlighted in Study 1, we used PLS-SEM via SmartPLS 4 to test the proposed model.

Results. Using the same benchmarks highlighted earlier, the results in Table 2 and Table 3 indicate that internal consistency, reliability, convergent validity, and discriminant validity have been achieved. At the same time, the structural model result in Table 4 shows that all affordances of gamification (i.e. visibility, comparability, and immediacy) have positive relationships with the need for autonomy (H1a: $\beta = 0.223, p < 0.001$; H2a: $\beta = 0.318, p < 0.001$; H3a: $\beta = 0.187, p < 0.01$), the need for relatedness (H1b: $\beta = 0.171, p < 0.01$; H2b: $\beta = 0.293, p < 0.001$; H3b: $\beta = 0.254, p < 0.001$), and the need for competence (H1c: $\beta = 0.200, p < 0.01$; H2c: $\beta = 0.155, p < 0.001$; H3c: $\beta = 0.354, p < 0.001$). At the same time,

Table 4. Structural model (Study 1 and 2)

Hypotheses	Study 1 (China)			Study 2 (Singapore)		
	Path coefficient	Standard error	t-value	Path coefficient	Standard error	t-value
H1a Visibility → Need for autonomy	0.168	0.072	2.332*	0.223	0.063	3.521***
H1b Visibility → Need for relatedness	0.098	0.084	1.210 ^(NS)	0.171	0.067	2.566**
H1c Visibility → Need for competence	0.151	0.073	2.057*	0.200	0.065	3.089**
H2a Comparability → Need for autonomy	0.167	0.084	1.991*	0.318	0.063	5.045***
H2b Comparability → Need for relatedness	0.182	0.079	2.311*	0.293	0.061	4.824***
H2c Comparability → Need for competence	0.118	0.080	1.476 ^(NS)	0.155	0.065	2.388***
H3a Immediacy → Need for autonomy	0.135	0.084	1.616 ^(NS)	0.187	0.065	2.877**
H3b Immediacy → Need for relatedness	0.185	0.083	2.221*	0.254	0.064	3.942***
H3c Immediacy → Need for competence	0.263	0.087	3.029**	0.354	0.068	5.228***
H4a Need for autonomy → Meaningful work	0.119	0.072	1.655 ^(NS)	0.248	0.062	4.016***
H4b Need for relatedness → Meaningful work	0.196	0.084	2.339*	0.272	0.065	4.184***
H4c Need for competence → Meaningful work	0.314	0.091	3.453**	0.293	0.072	4.063***
H5a Meaningful work → Intrinsic motivation	0.392	0.065	6.018***	0.566	0.043	13.305***
H5b Meaningful work → Extrinsic motivation	0.426	0.061	6.973***	0.612	0.041	14.890***
H6a Intrinsic motivation → Work performance	0.328	0.072	4.559***	0.368	0.061	6.007***
H6b Extrinsic motivation → Work performance	0.229	0.070	3.273***	0.337	0.061	5.493***

Note(s): * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ NS: Not significant

the structural results show that the three basic psychological needs have a positive influence on meaningful work (H4a: $\beta = 0.248$, $p < 0.001$; H4b: $\beta = 0.272$, $p < 0.001$; H4c: $\beta = 0.293$, $p < 0.001$), which in turn positively influences both intrinsic and extrinsic motivation (H5a: $\beta = 0.566$, $p < 0.001$; H5b: $\beta = 0.612$, $p < 0.001$). Finally, both motivations are found to positively impact work performance significantly (H6a: $\beta = 0.368$, $p < 0.001$; H6b: $\beta = 0.337$, $p < 0.001$). Hence, all hypotheses are supported.

Multigroup analysis

Thereafter, we performed a multigroup analysis to determine whether there are significant differences between the two groups. Taking guidance from Cheah *et al.* (2020), we tested measurement invariance by establishing the configural invariance, compositional invariance and the equality of a composite's mean value and variance across groups. The measurement invariance analysis performed focused on ensuring equivalence of the measurement model across the two national samples (China and Singapore). Consistent with established PLS-SEM guidelines such as Sarstedt *et al.* (2011), the multigroup analysis (MGA) was designed to validate cross-sample equivalence at the national level rather than across demographic subgroups such as age.

Accordingly, the study achieved configural invariance, as the same set of indicators was used across all datasets for reliability and validity testing, and a consistent standard of data treatment was applied to each dataset. The next step is to conduct measurement invariance. Following Cheah *et al.* (2020) measurement invariance is needed to ensure that the measurement model operates equivalently across different groups, thereby allowing meaningful and unbiased comparisons of latent constructs and structural relationships. Table 5 demonstrates that partial measurement invariance is established when means or

Table 5. Measurement invariance

	C Value (=1)	5% quantile of the empirical distribution of Cu		Permutation <i>p</i> -value	Compositional invariance established (?)
Extrinsic motivation	0.998	0.997		0.122	Yes
Immediacy	1.000	0.999		0.195	Yes
Intrinsic motivation	1.000	0.998		0.593	Yes
Meaningful work	1.000	1.000		0.496	Yes
Need for autonomy	1.000	0.999		0.375	Yes
Need for relatedness	1.000	1.000		0.978	Yes
Need for competence	1.000	0.999		0.741	Yes
Visibility	1.000	1.000		0.313	Yes
Work performance	1.000	1.000		0.817	Yes
Comparability	1.000	0.999		0.741	Yes

	Permutation mean difference	5%	95%	Permutation <i>p</i> -value	Equal mean values (?)
Extrinsic motivation	0.002	−0.115	0.124	0.124	Yes
Immediacy	0.000	−0.126	0.125	0.125	No
Intrinsic motivation	−0.001	−0.134	0.136	0.136	No
Meaningful work	−0.003	−0.13	0.116	0.116	No
Need for autonomy	−0.002	−0.132	0.127	0.127	Yes
Need for relatedness	−0.003	−0.126	0.121	0.121	No
Need for competence	−0.001	−0.13	0.116	0.116	No
Visibility	0.002	−0.124	0.127	0.127	Yes
Work performance	0.001	−0.126	0.130	0.130	Yes
Comparability	0.002	−0.128	0.126	0.126	Yes

	Permutation mean difference	5%	95%	Permutation <i>p</i> -value	Equal variances (?)
Extrinsic motivation	0.002	−0.181	0.176	0.000	No
Immediacy	0.000	−0.171	0.162	0.000	No
Intrinsic motivation	0.005	−0.198	0.19	0.000	No
Meaningful work	0.005	−0.156	0.172	0.009	No
Need for autonomy	0.001	−0.174	0.17	0.000	No
Need for relatedness	0.004	−0.167	0.171	0.000	No
Need for competence	−0.002	−0.181	0.172	0.003	No
Visibility	−0.003	−0.167	0.159	0.000	No
Work performance	−0.003	−0.173	0.156	0.008	No
Comparability	0.000	−0.159	0.166	0.001	No

variances differ significantly. Having said that, MGA can still be conducted as long as configural and compositional invariance are confirmed (Sarstedt *et al.*, 2011). Table 6 demonstrates whether the structural relationships differ significantly across groups after establishing partial measurement invariance. We find a significant difference in the effect of meaningful work on extrinsic and intrinsic motivation, with Chinese hospitality employees showing a weaker effect than Singapore hospitality employees.

Discussion

This two-study investigation aims to understand how gamification affordances influence employees' basic psychological needs, their experience of meaningful work, and their subsequent motivational states and perceived work performance within the hospitality industry.

Visibility and basic psychological needs

For the respondents from China and Singapore, the findings suggest that visibility enhances autonomy and competence. These results are consistent with Khan *et al.* (2024), who argue that visible feedback (e.g. scoreboards or progress indicators) fosters a sense of control and personal achievement, thereby enhancing autonomy and competence. Interestingly, visibility does not inherently promote social interaction in China, explaining its non-significant effect on relatedness. A probable reason is that feedback is limited in hierarchical Chinese work environments. On the other hand, Singapore, which is relatively more collaborative and has a more diverse workplace culture, benefits from enhanced visibility, leading to greater social acknowledgement (Tan *et al.*, 2025). In such settings, visible indicators of performance are more readily interpreted as affirmations of value and inclusion, fostering a stronger sense of relatedness among employees.

Comparability and basic psychological needs

Similarly, comparability supported autonomy and relatedness in both contexts. This result can be attributable to the inherently competitive nature of both Chinese and Singaporean societies, where performance benchmarking is culturally normalised and often encouraged. Similar to views advocated by Moller *et al.* (2024), individuals in a competitive environment tend to see comparisons not as threats but as opportunities to self-monitor and improve, thereby

Table 6. Multigroup analysis

	Difference (China - Singapore)	<i>p</i> -value	Significant Difference
Visibility → Need for autonomy	−0.055	0.564	No
Visibility → Need for relatedness	−0.073	0.482	No
Visibility → Need for competence	−0.049	0.614	No
Comparability → Need for autonomy	−0.151	0.155	No
Comparability → Need for relatedness	−0.112	0.262	No
Comparability → Need for competence	−0.037	0.713	No
Immediacy → Need for autonomy	−0.052	0.626	No
Immediacy → Need for relatedness	−0.069	0.509	No
Immediacy → Need for competence	−0.091	0.409	No
Need for autonomy → Meaningful work	−0.129	0.177	No
Need for relatedness → Meaningful work	−0.076	0.477	No
Need for competence → Meaningful work	0.022	0.850	No
Meaningful work → Intrinsic Motivation	−0.163	0.034	Yes
Meaningful work → Extrinsic motivation	−0.185	0.012	Yes
Intrinsic motivation → Work performance	−0.039	0.673	No
Extrinsic motivation → Work performance	−0.108	0.245	No

reinforcing a sense of personal agency and control (autonomy). At the same time, shared exposure to comparison metrics can foster a collective experience, which in turn enhances relatedness.

However, its impact on competence was only significant in Singapore. A plausible explanation is that many workplaces in Singapore emphasise meritocracy, where performance - based evaluation and structured feedback systems are often tied to clear pathways for professional development (Moore, 2000). This transparency enables employees to view comparability as a meaningful source of performance insight, thereby reinforcing their sense of mastery and skillfulness. In contrast, Chinese organisations may view performance comparison as external judgements or social positioning tools rather than as mechanisms for personal growth (Chen and Eldridge, 2010).

Immediacy and basic psychological needs

Immediacy positively influenced competence and relatedness. This result aligns with Xu *et al.* (2022), who showed that frequent feedback strengthens perceived mastery. Its effect on relatedness may arise from prompt responses reinforcing social acknowledgement or team cohesion. However, immediacy's non-significant effect on autonomy in China could suggest that rapid feedback is sometimes perceived as external control, undermining feelings of volition, which runs contrary to what might be observed in Singapore, where timely feedback is often interpreted as empowering.

Effect of basic psychological needs on meaningful work

The effect of psychological need satisfaction on meaningful work revealed both convergence and divergence. In both studies, competence and relatedness were strong predictors of meaningful work. This result suggests that, regardless of context, employees find their work more meaningful when they feel effective and socially connected. These findings align with the core tenets of SDT (Allan *et al.*, 2016).

Yet, autonomy's influence on meaningful work is context-dependent. It was non-significant in China but positively significant in Singapore. Again, this can be explained based on the cultural settings of both countries. In the Chinese hospitality sector, work is often structured hierarchically with restricted autonomy, which may be less salient in shaping work meaningfulness (Zhang *et al.*, 2024). In contrast, Singapore's focus on proactiveness and empowerment is integral to one's sense of purpose and self-expression at work (Tan *et al.*, 2024).

Effect of meaningful work on two forms of motivational pathways and work performance

Consistent with Ward (2024), our results indicate that meaningful work is associated with higher levels of both intrinsic and extrinsic motivation in both contexts. These findings challenge older motivational dichotomies, which positioned intrinsic and extrinsic motivations in opposition. Our findings support the alignment of more contemporary SDT extensions, such as those by Gagne *et al.* (2022), which acknowledge that meaningful work can simultaneously activate both types of motivation.

Moreover, both intrinsic and extrinsic motivation significantly predicted self-perceived work performance. These findings align with those of van der Deijl (2022). It reinforces the notion that engaged employees, whether motivated by passion or reward, feel more effective and confident in their roles. Interestingly, the effect sizes were slightly larger in Singapore, suggesting that culturally or structurally, employees there may be more likely to translate motivation into action and performance self-assessment.

Multigroup analysis

When combining both, we found that Chinese hospitality employees displayed a weaker influence of meaningful work on both intrinsic and extrinsic motivations than Singapore

hospitality employees. A possible explanation lies in cultural values. Rooted in Confucian traditions, Chinese work culture often places a greater emphasis on duty, perseverance, and the societal value of work (Nguyen *et al.*, 2024). Considering that a key ingredient in the meaning of work is going beyond oneself, the collectivist mentality embedded in their culture could mean that they are less likely to channel this sense of purpose into higher levels of motivation. Conversely, Singapore's relatively diverse yet individualistic work setting and promotion of meritocracy would mean that employees place greater value on personal fulfilment, with the end goal of achieving both intrinsic and extrinsic values.

Theoretical contributions

Theoretically, this study advances SDT by empirically examining how specific gamification affordances of visibility, comparability, and immediacy can affect the three basic psychological needs: autonomy, competence, and relatedness. While traditional SDT research such as Tan *et al.* (2023a) primarily focused on general social environments (e.g. leadership style, job design, or organisational climate), our study demonstrates that specific system-level design features, namely visibility, comparability, and immediacy, can also function as micro-level environmental conditions that systematically shape the satisfaction of the basic psychological needs. This shifts the application of SDT from broad organisational contexts to more fine-grained, technology-enabled work design, thereby extending its explanatory scope to digitalised and gamified workplaces.

Furthermore, our findings refine SDT by showing that the three basic psychological needs are not uniformly influenced nor equally consequential within gamified contexts. This suggests that the relative salience of basic psychological needs may vary depending on the structural characteristics of the work environment and cultural context. For instance, we challenge the assumption within SDT that autonomy is universally central to meaningfulness and highlight how cultural and organisational norms can shape the relevance of different psychological needs. Such evidence provides boundary conditions to SDT, indicating that although the three needs are universal, their functional importance may not be equivalent across settings.

Moreover, our research contributes to motivational theory by empirically validating a dual-pathway model in which meaningful work fosters both intrinsic and extrinsic motivation. This study challenges traditional binary distinctions between the two forms of motivation and supports contemporary views that meaningful work can simultaneously drive both internal engagement and externally oriented effort. Together, these insights offer a more nuanced understanding of how gamification and psychological needs jointly shape motivation and work outcomes, particularly across diverse cultural and organisational contexts.

Managerial contributions

In addition to its theoretical contributions, we offer insights for managers seeking to design effective gamification strategies that enhance employee motivation and productivity. Given the differentiated results of gamification affordances to SDT, managers should avoid a uniform approach. Rather, they should deploy gamification affordances that best match the psychological drivers they aim to enhance. For example, introducing leaderboards might be more effective for strengthening relatedness and motivation in team-based roles than for encouraging autonomy.

Besides, managers have to recognise cultural contexts in gamification design. For instance, organisations operating in collectivist or hierarchical cultures should be cautious in assuming strategies will universally enhance meaningfulness. Instead, fostering competence through feedback systems and enhancing relatedness through team-based gamification may be more impactful in such settings. Gamification should not be viewed merely as a tool for increasing engagement or productivity. It can also be a strategic lever for

creating a more meaningful work environment. For instance, by reinforcing employees' sense of mastery and social belonging, gamification can indirectly improve both intrinsic and extrinsic motivation.

Finally, this study highlights that while comparability supports relatedness in collectivist settings, excessive competition can potentially undermine this effect. Managers must ensure that competitive gamification elements are balanced with collaborative features that foster camaraderie, team identity, and mutual recognition.

Limitations and future research directions

Despite the strengths of this study. Several limitations should be acknowledged, each offering opportunities for future research. First, while the inclusion of two distinct national contexts enhances the robustness of our findings, both samples were drawn exclusively from the hospitality industry. Future studies should, therefore, expand this comparative model to other regions (e.g. Western or Middle Eastern cultures) and industries (e.g. healthcare, education, technology) to explore how cultural dimensions and sector-specific norms moderate the effects of gamification and the fulfilment of psychological needs.

Second, the study relied on self-reported measures for all constructs. While appropriate for assessing subjective experiences, self-reports are inherently vulnerable to biases such as social desirability. To address this, future research should incorporate multi-source or objective data, such as peer evaluations, customer satisfaction ratings, or system-tracked performance indicators, to validate and enrich the findings.

At the same time, we did not explore the effect of players typology on gamifications outcome. Future studies could extend our framework by examining whether different player or user typologies moderate the relationships. Such work would allow scholars to integrate individual difference perspectives with organisational-level gamification design, offering a more fine-grained understanding of how and for whom workplace gamification is most effective.

Lastly, this study focused primarily on the positive outcomes of gamification. However, gamification may also lead to unintended or adverse effects. For instance, in high-pressure environments, constant exposure to comparative metrics may increase stress or demotivation, particularly for lower-performing individuals. Additionally, if not carefully implemented, gamification systems can inadvertently foster excessive competition, reduce intrinsic interest, or raise ethical concerns regarding monitoring and control. Future research should thus adopt a more balanced perspective, examining both the benefits and potential downsides of gamification across diverse cultural and organisational landscapes.

Table A1. Instrument items

Instrument items

Visibility

- VIS1. Through gamification, I can access comprehensive information related to my work performance
VIS2. Through gamification, I can access a large amount of information related to my work performance
VIS3. Through gamification, I can access to supplementary information related to my work performance

Comparable

- COM1. Through gamification, I can access comprehensive information related to my colleagues' work performance
COM2. Through gamification, I can access a large amount of information related to my colleagues' work performance
COM3. Through gamification, I can access to supplementary information related to my colleagues' work performance

Immediacy

- IMM1. Through gamification, it provides timely feedback about my work performance
IMM2. Through gamification, it provides me specific feedback about my work performance
IMM3. Through gamification, it gives honest feedback about my work performance

Meaningful Work [10 items]

- MW_PM1: I have found a meaningful career
MW_MM1: I view my work as contributing to my personal growth
MW_GG1 (R): My work really makes no difference to the world (R)
MW_PM2: I understand how my work contributes to my life's meaning
MW_PM3: I have a good sense of what makes my job meaningful
MW_GG2: I know my work makes a positive difference in the world
MW_MM2: My work helps me better understand myself
MW_PM4: I have discovered work that has a satisfying purpose
MW_MM3: My work helps me make sense of the world around me
MW_GG3: The work I do serves a greater purpose

Work Performance

- WP1. Through gamification, I am better at my work compared to my colleagues
WP2. Through gamification, I am more effective in my work compared to my colleagues
WP3. Through gamification, The quality of my work is better than my colleagues
WP4. Through gamification, I am more creative in my work compared to my colleagues
WP5. Through gamification, I have better collaborative capability compared to my colleagues

Intrinsic Motivation

Using the scale below, please indicate to what extent each of the following items corresponds to the reasons why you are presently involved in gamification at work?

- IM1. Because I derive much pleasure from learning new things
IM2. For the satisfaction I experience from taking on the challenges
IM3. For the satisfaction I experience when I am successful at doing difficult tasks

Extrinsic Motivation

Using the scale below, please indicate to what extent each of the following items corresponds to the reasons why you are presently involved in gamification at work?

- EM1. For the income it provides me
EM2. Because it allows me to earn money
EM3. Because this type of gamification provides me with security

Need for Autonomy

- AUT1. At work, I feel a sense of choice and freedom in the things I undertake
AUT2. At work, I feel that my decisions reflect what I really want
AUT3. At work, I feel my choices express who I really am
AUT4. At work, I feel I have been doing what really interests me
AUT5(R). At work, most of the things I do feel like "I have to"
AUT6(R). At work, I feel forced to do many things I wouldn't choose to do

(continued)

Table A1. Continued

Instrument items
AUT7(R). At work, I feel pressured to do too many things
AUT8(R). At work, my daily activities feel like a chain of obligations
<i>Need for Relatedness</i>
REL1. I feel that the colleagues I care about also care about me
REL2. I feel connected with colleagues who care for me, and for whom I care
REL3. I feel close and connected with other colleagues who are important to me
REL4. I experience a warm feeling with the colleagues I spend time with
REL5(R). I feel excluded from the work group I want to belong to
REL6(R). I feel that colleagues who are important to me are cold and distant towards me
REL7(R). I have the impression that colleagues I spend time with dislike me
REL8(R). I feel the relationships I have at work are just superficial
<i>Need for Competence</i>
COMP1. At work, I feel confident that I can do things well
COMP2. At work, I feel capable at what I do
COMP3. At work, I feel competent to achieve my goals
COMP4. At work, I feel I can successfully complete difficult tasks
COMP5(R). At work, I have serious doubts about whether I can do things well
COMP6(R). At work, I feel disappointed with many of my performance
COMP7(R). At work, I feel insecure about my abilities
COMP8(R). At work, I feel like a failure because of the mistakes I make

References

Afota, M.C., Provost Savard, Y., Léon, E. and Ollier-Malaterre, A. (2024), "Changes in belongingness, meaningful work, and emotional exhaustion among new high-intensity telecommuters: insights from pandemic remote workers", *Journal of Occupational and Organizational Psychology*, Vol. 97 No. 3, pp. 817-840, doi: [10.1111/joop.12494](https://doi.org/10.1111/joop.12494).

Aggarwal, P. and Singh, R.K. (2023), "Employee-level consequences of perceived internal and external CSR: decoding the moderation and mediation paths", *Social Responsibility Journal*, Vol. 19 No. 1, pp. 38-78, doi: [10.1108/SRJ-02-2021-0053](https://doi.org/10.1108/SRJ-02-2021-0053).

Aljumah, A. (2023), "The impact of extrinsic and intrinsic motivation on job satisfaction: the mediating role of transactional leadership", *Cogent Business and Management*, Vol. 10 No. 3, 2270813, doi: [10.1080/23311975.2023.2270813](https://doi.org/10.1080/23311975.2023.2270813).

Allan, B.A., Autin, K.L. and Duffy, R.D. (2016), "Self-determination and meaningful work: exploring socioeconomic constraints", *Frontiers in Psychology*, Vol. 7, pp. 1-9, doi: [10.3389/fpsyg.2016.00071](https://doi.org/10.3389/fpsyg.2016.00071).

Allan, B.A., Batz-Barbarich, C., Sterling, H.M. and Tay, L. (2019), "Outcomes of meaningful work: a meta-analysis", *Journal of Management Studies*, Vol. 56 No. 3, pp. 500-528, doi: [10.1111/joms.12406](https://doi.org/10.1111/joms.12406).

Arora, N. and Garg, N. (2024), "Meaningful work in the digital Age- A comprehensive review and framework", *Human Resource Development International*, Vol. 28 No. 2, pp. 169-193, doi: [10.1080/13678868.2024.2336866](https://doi.org/10.1080/13678868.2024.2336866).

Autin, K.L., Herdt, M.E., Garcia, R.G. and Ezema, G.N. (2022), "Basic psychological need satisfaction, autonomous motivation, and meaningful work: a self-determination theory perspective", *Journal of Career Assessment*, Vol. 30 No. 1, pp. 78-93, doi: [10.1177/10690727211018647](https://doi.org/10.1177/10690727211018647).

Becker, J.-M., Cheah, J.-H., Gholamzade, R., Ringle, C.M. and Sarstedt, M. (2022), "PLS-SEM's Most wanted guidance", *International Journal of Contemporary Hospitality Management*, Vol. 35 No. 1, pp. 321-346, doi: [10.1108/ijchm-04-2022-0474](https://doi.org/10.1108/ijchm-04-2022-0474).

Bizzi, L. (2023), "Why to gamify performance management? Consequences of user engagement in gamification", *Information and Management*, Vol. 60 No. 3, 103762, doi: [10.1016/j.im.2023.103762](https://doi.org/10.1016/j.im.2023.103762).

Boston Consulting Group (2024), "Enjoying work matters more than you may realize", available at: <https://www.bcg.com/publications/2024/joy-at-work-matters-more-than-you-realize>

- Brislin, R.W. (1970), "Back-translation for cross-cultural research", *Journal of Cross-Cultural Psychology*, Vol. 1 No. 3, pp. 185-216, doi: [10.1177/135910457000100301](https://doi.org/10.1177/135910457000100301).
- Butler, N. and Spoelstra, S. (2024), "Redemption through play? Exploring the ethics of workplace gamification", *Journal of Business Ethics*, Vol. 193 No. 2, pp. 259-270, doi: [10.1007/s10551-023-05584-w](https://doi.org/10.1007/s10551-023-05584-w).
- Cao, C. and Cheng, S. (2024), "Does competition in online games foster green behaviour in life? The relationship between gamification affordances and engagement in green behaviours", *International Journal of Human-Computer Interaction*, pp. 1-18, doi: [10.1080/10447318.2024.2338657](https://doi.org/10.1080/10447318.2024.2338657).
- Cardador, M.T., Northcraft, G.B. and Whicker, J. (2017), "A theory of work gamification: something old, something new, something borrowed, something cool?", *Human Resource Management Review*, Vol. 27 No. 2, pp. 353-365, doi: [10.1016/j.hrmr.2016.09.014](https://doi.org/10.1016/j.hrmr.2016.09.014).
- Carmilleri, A.R. and Neelim, A. (2024), "How gamification can boost employee engagement", available at: <https://hbr.org/2024/03/how-gamification-can-boost-employee-engagement> (accessed 29 June 2024).
- Cheah, J.-H., Thurasamy, R., Memon, M.A., Chuah, F. and Ting, H. (2020), "Multigroup analysis using SmartPLS: step-By-Step guidelines for business research", *Asian Journal of Business Research*, Vol. 10 No. 3, pp. 1-19, doi: [10.14707/ajbr.200087](https://doi.org/10.14707/ajbr.200087).
- Chen, J. and Eldridge, D. (2010), "Are 'standardized performance appraisal practices' really preferred? A case study in China", *Chinese Management Studies*, Vol. 4 No. 3, pp. 244-257, doi: [10.1108/17506141011074138](https://doi.org/10.1108/17506141011074138).
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E.L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R.M., Sheldon, K.M., Soenens, B., Van Petegem, S. and Verstuyf, J. (2014), "Basic psychological need satisfaction, need frustration, and need strength across four cultures", *Motivation and Emotion*, Vol. 39 No. 2, pp. 216-236, doi: [10.1007/s11031-014-9450-1](https://doi.org/10.1007/s11031-014-9450-1).
- Clemo, F. (2025), "Gamification, reverse mentoring and training can help close UK's digital skills gap, report reveals", available at: <https://www.peoplemanagement.co.uk/article/1931697/gamification-reverse-mentoring-training-help-close-uks-digital-skills-gap-report-reveals> (accessed 11 April 2026).
- Collins, A.G.E. and Cockburn, J. (2020), "Beyond dichotomies in reinforcement learning", *Nature Reviews Neuroscience*, Vol. 21 No. 10, pp. 576-586, doi: [10.1038/s41583-020-0355-6](https://doi.org/10.1038/s41583-020-0355-6).
- Costantini, A., Scharp, Y.S., Avanzi, L., van Iperen, L.P. and Vignoli, M. (2025), "The bright and dark side of playful work design: navigating work engagement and workaholism", *Journal of Business and Psychology*, Vol. 41 No. 4, pp. 809-828, doi: [10.1007/s10869-025-10091-y](https://doi.org/10.1007/s10869-025-10091-y).
- Cropanzano, R., Keplinger, K., Lambert, B.K., Caza, B. and Ashford, S.J. (2023), "The organizational psychology of gig work: an integrative conceptual review", *Journal of Applied Psychology*, Vol. 108 No. 3, pp. 492-519, doi: [10.1037/apl0001029](https://doi.org/10.1037/apl0001029).
- Deci, E.L. and Ryan, R.M. (2000), "The 'what' and 'why' of goal pursuits: human needs and the self-determination of behavior", *Psychological Inquiry*, Vol. 11 No. 4, pp. 227-268, doi: [10.1207/S15327965PLI1104_01](https://doi.org/10.1207/S15327965PLI1104_01).
- Di Domenico, S.I. and Ryan, R.M. (2017), "The emerging neuroscience of intrinsic motivation: a new frontier in self-determination research", *Frontiers in Human Neuroscience*, Vol. 11, p. 145, doi: [10.3389/fnhum.2017.00145](https://doi.org/10.3389/fnhum.2017.00145).
- Faul, F., Erdfelder, E., Lang, A.-G. and Buchner, A. (2007), "G * power 3 : a flexible statistical power analysis program for the social , behavioral , and biomedical sciences", *Behavior Research Methods*, Vol. 39 No. 2, pp. 175-191, doi: [10.3758/BF03193146](https://doi.org/10.3758/BF03193146).
- Gagné, M., Tian, A.W., Soo, C., Zhang, B., Ho, K.S.B. and Hosszu, K. (2019), "Different motivations for knowledge sharing and hiding: the role of motivating work design", *Journal of Organizational Behavior*, Vol. 40 No. 7, pp. 783-799, doi: [10.1002/job.2364](https://doi.org/10.1002/job.2364).
- Gagne, M., Parker, S.K., Griffin, M.A., Dunlop, P.D., Knight, C., Klonek, F.E. and Parent-Rocheleau, X. (2022), "Understanding and shaping the future of work with self-determination theory", *Nature Reviews Psychology*, Vol. 1 No. 7, pp. 378-392, doi: [10.1038/s44159-022-00056-w](https://doi.org/10.1038/s44159-022-00056-w).

- Gupta, S. and Priyanka, P. (2022), "Gamification and e-learning adoption: a sequential mediation analysis of flow and engagement", *VINE Journal of Information and Knowledge Management Systems*, Vol. 54 No. 6, pp. 1342-1359, doi: [10.1108/vjikms-04-2022-0131](https://doi.org/10.1108/vjikms-04-2022-0131).
- Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity in variance-based structural equation modeling", *Journal of the Academy of Marketing Science*, Vol. 43 No. 1, pp. 115-135, doi: [10.1007/s11747-014-0403-8](https://doi.org/10.1007/s11747-014-0403-8).
- Henttonen, K., Kianto, A. and Ritala, P. (2016), "Knowledge sharing and individual work performance: an empirical study of a public sector organisation", *Journal of Knowledge Management*, Vol. 20 No. 4, pp. 749-768, doi: [10.1108/jkm-10-2015-0414](https://doi.org/10.1108/jkm-10-2015-0414).
- Jin, J. and Rounds, J. (2012), "Stability and change in work values: a meta-analysis of longitudinal studies", *Journal of Vocational Behavior*, Vol. 80 No. 2, pp. 326-339, doi: [10.1016/j.jvb.2011.10.007](https://doi.org/10.1016/j.jvb.2011.10.007).
- Kačerauskas, T., Sederevičiūtė-Pačiauskienė, Ž. and Šliogerienė, J. (2023), "Gamification in management: positive and negative aspects", *E+M Ekonomie a Management*, Vol. 26 No. 4, pp. 86-98, doi: [10.15240/tul/001/2023-4-006](https://doi.org/10.15240/tul/001/2023-4-006).
- Khan, J., Zhang, Q., Zada, M., Saeed, I. and Khattak, S.A. (2024), "Gamification in hospitality: enhancing workplace thriving and employee well-being", *Acta Psychologica*, Vol. 246, 104243, doi: [10.1016/j.actpsy.2024.104243](https://doi.org/10.1016/j.actpsy.2024.104243).
- Khayat, A.H., El Keshky, M.E.S. and Elewlat, S.K.H. (2024), "Self-efficacy, group effectiveness, and individual work performance in saudi employees with disabilities: the mediation roles of intrinsic and extrinsic motivation", *Sage Open*, Vol. 14 No. 3, 21582440241286361, doi: [10.1177/21582440241286361](https://doi.org/10.1177/21582440241286361).
- Kinicki, A.J., Jacobson, K.J.L., Peterson, S.J. and Prussia, G.E. (2013), "Development and validation of the performance management behavior questionnaire", *Personnel Psychology*, Vol. 66 No. 1, pp. 1-45, doi: [10.1111/peps.12013](https://doi.org/10.1111/peps.12013).
- Kock, N. (2015), "Common method bias in PLS-SEM: a full collinearity assessment approach", *International Journal of E-Collaboration*, Vol. 11 No. 4, pp. 1-10, doi: [10.4018/ijec.2015100101](https://doi.org/10.4018/ijec.2015100101).
- Martela, F. and Riekk, T.J.J. (2018), "Autonomy, competence, relatedness, and beneficence: a multicultural comparison of the four pathways to meaningful work", *Frontiers in Psychology*, Vol. 9, p. 1157, doi: [10.3389/fpsyg.2018.01157](https://doi.org/10.3389/fpsyg.2018.01157).
- Mei, B. and Brown, G.T.L. (2017), "Conducting online surveys in China", *Social Science Computer Review*, Vol. 36 No. 6, pp. 721-734, doi: [10.1177/0894439317729340](https://doi.org/10.1177/0894439317729340).
- Miao, C.F., Evans, K.R. and Shaoming, Z. (2007), "The role of salesperson motivation in sales control systems — intrinsic and extrinsic motivation revisited", *Journal of Business Research*, Vol. 60 No. 5, pp. 417-425, doi: [10.1016/j.jbusres.2006.12.005](https://doi.org/10.1016/j.jbusres.2006.12.005).
- Miri, D.H. and Macke, J. (2021), "Gamification, motivation, and engagement at work: a qualitative multiple case study", *European Business Review*, Vol. 34 No. 2, pp. 263-276, doi: [10.1108/eb-04-2020-0106](https://doi.org/10.1108/eb-04-2020-0106).
- Moller, A.C., Kornfield, R. and Lu, A.S. (2024), "Competition and digital game design: a self-determination theory perspective", *Interacting with Computers*, Vol. 38 No. 3, pp. 433-446, doi: [10.1093/iwc/iwae023](https://doi.org/10.1093/iwc/iwae023).
- Moore, R.Q. (2000), "Multiracialism and meritocracy: singapore's approach to race and inequality", *Review of Social Economy*, Vol. 58 No. 3, pp. 339-360, doi: [10.1080/00346760050132364](https://doi.org/10.1080/00346760050132364).
- Nguyen, H.Q., Nguyen, L.N.H., Hoang, L.C., Phan, T.T.H., Dang, T.P.H. and Ngo, M.B.P. (2024), "The influence of workplace Confucian culture on employees' organizational commitment through the modelling role of moral identities", *Society and Business Review*, Vol. 19 No. 4, pp. 603-619, doi: [10.1108/sbr-01-2024-0027](https://doi.org/10.1108/sbr-01-2024-0027).
- Oppong-Tawiah, D., Minocher, X., Boroomand, F. and Webster, J. (2024), "Meaningful work as an ethical approach: shaping the next generation of organizational gamification", *Information Systems Frontiers*, Vol. 27 No. 3, pp. 941-964, doi: [10.1007/s10796-024-10478-x](https://doi.org/10.1007/s10796-024-10478-x).
- Pahlavanpour, O. and Gao, S. (2024), "A systematic mapping study on gamification within information security awareness programs", *Heliyon*, Vol. 10 No. 19, e38474, doi: [10.1016/j.heliyon.2024.e38474](https://doi.org/10.1016/j.heliyon.2024.e38474).

- Papadopoulos, P.M., Steinrücke, J. and de Jong, T. (2024), "As it unfolds: exploring the impact of team-based gamification on performance, confidence, and engagement", *Learning and Individual Differences*, Vol. 116, 102565, doi: [10.1016/j.lindif.2024.102565](https://doi.org/10.1016/j.lindif.2024.102565).
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903, doi: [10.1037/0021-9010.88.5.879](https://doi.org/10.1037/0021-9010.88.5.879).
- Robson, K., Plangger, K., Kietzmann, J.H., McCarthy, I. and Pitt, L. (2015), "Is it all a game? Understanding the principles of gamification", *Business Horizons*, Vol. 58 No. 4, pp. 411-420, doi: [10.1016/j.bushor.2015.03.006](https://doi.org/10.1016/j.bushor.2015.03.006).
- Rowicka, M. and Postek, S. (2023), "Who likes to learn new things? How gamification user types and satisfaction but not the frustration of basic psychological needs explain the preference for learning new things", *Acta Psychologica*, Vol. 236, 103925, doi: [10.1016/j.actpsy.2023.103925](https://doi.org/10.1016/j.actpsy.2023.103925).
- Ryan, M.R. and Deci, L.E. (2000), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American Psychologist*, Vol. 55 No. 1, pp. 68-78, doi: [10.1037/0003-066X.55.1.68](https://doi.org/10.1037/0003-066X.55.1.68).
- Safari, N., Díaz Andrade, A. and Techatassanasoontorn, A.A. (2022), "Visibility of knowledge in social media: conceptualization and instrument development", *Information and Management*, Vol. 59 No. 6, 103676, doi: [10.1016/j.im.2022.103676](https://doi.org/10.1016/j.im.2022.103676).
- Salikhova, N.R., Lynch, M.F. and Salikhova, A.B. (2020), "Psychological aspects of digital learning: a self-determination theory perspective", *Contemporary Educational Technology*, Vol. 12 No. 2, pp. 1-13, doi: [10.30935/cedtech/8584](https://doi.org/10.30935/cedtech/8584).
- Sarangi, S. and Shah, S. (2015), "Individuals, teams and organizations score with gamification", *Human Resource Management International Digest*, Vol. 23 No. 4, pp. 24-27, doi: [10.1108/hrmid-05-2015-0074](https://doi.org/10.1108/hrmid-05-2015-0074).
- Sarstedt, M., Ringle, C.M. and Henseler, J. (2011), "Multigroup analysis in partial least squares (PLS) path modeling: alternative methods and empirical results", *Advances in International Marketing*, Vol. 22, pp. 195-218, doi: [10.1108/S1474-7979\(2011\)0000022012](https://doi.org/10.1108/S1474-7979(2011)0000022012).
- Sarstedt, M., Hair, J.F. and Ringle, C.M. (2022), "PLS-SEM: indeed a silver bullet – retrospective observations and recent advances", *Journal of Marketing Theory and Practice*, Vol. 31 No. 3, pp. 261-275, doi: [10.1080/10696679.2022.2056488](https://doi.org/10.1080/10696679.2022.2056488).
- Seaborn, K. and Fels, D.I. (2015), "Gamification in theory and action: a survey", *International Journal of Human-Computer Studies*, Vol. 74, pp. 14-31, doi: [10.1016/j.ijhcs.2014.09.006](https://doi.org/10.1016/j.ijhcs.2014.09.006).
- Slemp, G.R., Field, J.G., Ryan, R.M., Forner, V.W., Van den Broeck, A. and Lewis, K.J. (2024), "Interpersonal supports for basic psychological needs and their relations with motivation, well-being, and performance: a meta-analysis", *Journal of Personality and Social Psychology*, Vol. 127 No. 5, pp. 1012-1037, doi: [10.1037/pspi0000459](https://doi.org/10.1037/pspi0000459).
- STB (2024), "Tourism human capital", available at: <https://www.stb.gov.sg/licensing-support/tourism-human-capital> (accessed 8 June 2025).
- Steger, M.F., Dik, B.J. and Duffy, R.D. (2012), "Measuring meaningful work: the work and meaning inventory (WAMI)", *Journal of Career Assessment*, Vol. 20 No. 3, pp. 322-337, doi: [10.1177/1069072711436160](https://doi.org/10.1177/1069072711436160).
- Szöts-Kováts, K. and Primecz, H. (2024), "How do human resource managers make sense of their work? A study of changing work meaningfulness using the critical incident technique", *Human Resource Development International*, Vol. 28, pp. 1-20, doi: [10.1080/13678868.2024.2310656](https://doi.org/10.1080/13678868.2024.2310656).
- Tan, K.-L., Gim, G., Hii, I. and Zhu, W. (2023a), "STARA fight or flight: a two-wave time-lagged study of challenge and hindrance appraisal of STARA awareness on basic psychological needs and individual competitiveness productivity among hospitality employees", *Current Issues in Tourism*, Vol. 27 No. 13, pp. 2151-2169, doi: [10.1080/13683500.2023.2224550](https://doi.org/10.1080/13683500.2023.2224550).
- Tan, K.-L., Sim, P.-L., Ting, H.-B., Sim, W.-Y. and Donohue, T. (2022), "A gendered discourse of third-generation Chinese migrants on diaspora tourism: implications to industry players in Malaysia", *Journal of China Tourism Research*, Vol. 19 No. 2, pp. 335-358, doi: [10.1080/19388160.2022.2069900](https://doi.org/10.1080/19388160.2022.2069900).

- Tan, K.-L., Sim, A.K.S., Yap, S.S.-N., Vithayaporn, S. and Rachmawati, A.W. (2023b), "A systematic review of meaningful work unifying 20 years of theoretical and substantive contributions (2000-2020)", *Journal of Advances in Management Research*, Vol. 20 No. 3, pp. 462-512, doi: [10.1108/jamr-11-2022-0225](https://doi.org/10.1108/jamr-11-2022-0225).
- Tan, K.-L., Loganathan, S.R., Pidani, R.R., Yeap, P.-F., Ng, D.W.L., Chong, N.T.S., Liow, M.L.S., Cheong, K.C.-K. and Yeo, M.M.L. (2024), "Embracing imperfections: a predictive analysis of factors alleviating adult leaders' digital learning stress on Singapore's lifelong learning journey", *Human Resource Development International*, Vol. 28 No. 3, pp. 371-392, doi: [10.1080/13678868.2024.2389029](https://doi.org/10.1080/13678868.2024.2389029).
- Tan, K.-L., Sim, A.K.S., Lew, T.Y., Cham, T.-H. and Hii, I.S.H. (2025), "Beyond laptops and tables: unveiling Singapore's success in hybrid work through a two-wave gender multigroup analysis of compassionate leadership", *Employee Relations: The International Journal*, Vol. 47 No. 1, pp. 148-172, doi: [10.1108/er-02-2024-0108](https://doi.org/10.1108/er-02-2024-0108).
- Thomas, N.J., Baral, R. and Crocco, O.S. (2022), "Gamification for HRD: systematic review and future research directions", *Human Resource Development Review*, Vol. 21 No. 2, pp. 198-224, doi: [10.1177/15344843221074859](https://doi.org/10.1177/15344843221074859).
- Torresan, S. and Hinterhuber, A. (2023), "Continuous learning at work: the power of gamification", *Management Decision*, Vol. 61 No. 13, pp. 386-412, doi: [10.1108/md-12-2020-1669](https://doi.org/10.1108/md-12-2020-1669).
- Tremblay, M.A., Blanchard, C.M., Taylor, S., Pelletier, L.G. and Villeneuve, M. (2009), "Work extrinsic and intrinsic motivation scale: its value for organizational psychology research", *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement*, Vol. 41 No. 4, pp. 213-226, doi: [10.1037/a0015167](https://doi.org/10.1037/a0015167).
- van der Deijl, W. (2022), "Two concepts of meaningful work", *Journal of Applied Philosophy*, Vol. 41 No. 2, pp. 202-217, doi: [10.1111/japp.12614](https://doi.org/10.1111/japp.12614).
- Ward, S. (2024), "Choosing money over meaningful work: examining relative job preferences for high compensation versus meaningful work", *Personality and Social Psychology Bulletin*, Vol. 50 No. 7, pp. 1128-1148, doi: [10.1177/01461672231159781](https://doi.org/10.1177/01461672231159781).
- Wei, Z., Zhang, J., Huang, X. and Qiu, H. (2023), "Can gamification improve the virtual reality tourism experience? Analyzing the mediating role of tourism fatigue", *Tourism Management*, Vol. 96, 104715, doi: [10.1016/j.tourman.2022.104715](https://doi.org/10.1016/j.tourman.2022.104715).
- WTTC (2025), "Singapore's travel boom: international arrivals set to break records in 2025", available at: <https://wtcc.org/news/singapores-travel-boom-international-arrivals-set-to-break-records-in-2025> (accessed 9 June 2025).
- Wulff, K. and Finnestrand, H. (2023), "Creating meaningful work in the age of AI: explainable AI, explainability, and why it matters to organizational designers", *AI and Society*, Vol. 39 No. 4, pp. 1843-1856, doi: [10.1007/s00146-023-01633-0](https://doi.org/10.1007/s00146-023-01633-0).
- Xu, J., Du, H.S., Shen, K.N. and Zhang, D. (2022), "How gamification drives consumer citizenship behaviour: the role of perceived gamification affordances", *International Journal of Information Management*, Vol. 64, 102477, doi: [10.1016/j.ijinfomgt.2022.102477](https://doi.org/10.1016/j.ijinfomgt.2022.102477).
- Zhang, Y., Xu, W., Yoon, S., Chen, W. and Parmenter, S. (2024), "Workplace support, job autonomy, and turnover intention among child welfare workers in China: the mediating role of job satisfaction", *Child Protection and Practice*, Vol. 2, 100027, doi: [10.1016/j.chipro.2024.100027](https://doi.org/10.1016/j.chipro.2024.100027).
- Zhong, Y., Zhang, Y., Luo, M., Wei, J., Liao, S., Tan, K.-L. and Yap, S.S.-N. (2022), "I give discounts, I share information, I interact with viewers: a predictive analysis on factors enhancing college students' purchase intention in a live-streaming shopping environment", *Young Consumers*, Vol. 23 No. 3, pp. 449-467, doi: [10.1108/yc-08-2021-1367](https://doi.org/10.1108/yc-08-2021-1367).
- Zhu, Y., Xu, Y. and Zhang, Y. (2024), "Does perceived overqualification promote (or inhibit) knowledge-sharing behavior? The roles of intrinsic motivation and rewards for knowledge sharing", *Journal of Knowledge Management*, Vol. 28 No. 9, pp. 2667-2688, doi: [10.1108/jkm-05-2022-0366](https://doi.org/10.1108/jkm-05-2022-0366).

Corresponding author

Kim-Lim Tan can be contacted at: kimlim.tan@jcu.edu.au, tankimlim@tdtu.edu.vn