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# Gamification of Digital Platform: A Meta-analysis

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# Gamification of Digital Platform: A Meta-analysis

*Completed Research Paper*

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## Abstract

*Gamification has become a popular tool for promoting user engagement on digital platforms. While previous studies have explored gamification affordances and desired behavioral outcomes across various contexts and perspectives, a comprehensive study that consolidates these findings has yet to be proposed. This research employs a meta-analysis research method to examine the relationship between gamification affordances, perceived value, and behavior through a review of 20 papers (N= 7733) using the stimulus-organism-response (S-O-R) framework. The results show that achievement-related, social-related, and immersion-related affordances influence behavior through individuals' perceived functional, social, and emotional values. Significantly, achievement-related affordance and functional value have the strongest effect on user behavior. Interestingly, achievement-related affordances have the most effective influence on social value. Consequently, this study contributes to both the theoretical and practical implications of gamification literature and industry.*

**Keywords:** Gamification, meta-analysis, digital platform, stimulus-organism-response (S-O-R) framework, affordance

## Introduction

Gamification has been widely adopted in many areas by its nature that integrates game elements in the non-game context to achieve the organization desired outcomes (Deterding et al. 2011; Hamari and Koivisto 2015; Schöbel et al. 2020). Corporations like Starbucks, Nike, and eBay have successfully utilized gamification to improve business and customer engagement. According to industry estimates that the global gamification market size is expected to reach $95.5 billion by 2030, growing at a CAGR(compound annual growth rate) of 25.6% ("Gamification Market Size, Growth | Report Forecast - 2030", 2022). As a result, gamification has become an important topic of research in IS academics due to its tremendous market promise and economic benefits. Accordingly, the studies regarding gamification are evolutionary which poses a heat research direction (Bizzi 2023; Hamari et al. 2014).

Current literature primarily concentrates on examining the consequences of gamification (e.g., purchase intention, online learning, knowledge sharing, brand engagement and healthcare APP use intention), however, what gamification affordances could influence these consequences are inconsistent in various contexts among the previous literature (Donnermann et al. 2021; Feng et al. 2022; Wang et al. 2022; Yang and Li 2021). Gamification affordance are the gameful elements that enable and encourage users to immerse in gamification mechanism (Cheikh-Ammar 2018; Gibson 1977; Karahanna et al. 2018). For instance, the implementation of a "share" and "chat" buttons offer users the opportunity to cultivate and develop social connections within their gamification communities. Despite studies have proposed gamification affordances such as social-related affordance and immersion-related affordance but neglected a comprehensive look of gamification affordance in a study that meta-analysis could satisfy this requirement. For example, various scholars have posited that rewards, points and leaderboards are the key affordances in the organization context which relying heavily on an achievement-driven perspective (Suh et al. 2017). But, in the e-commerce context and health APP context, researchers emphasize social aspects such as interactions of users and information-sharing in communities (Donnermann et al. 2021; Huang and Zhou 2020; Yang and Li 2021). Whereas, other literature accentuates competitive affordances such as competition and cooperation (Riar et al. 2022; Santhanam et al. 2016). Consequently, a consistent and systematic construct of gamification affordances for digital platforms is yet to be established, necessitating a summary and extraction of these affordances.

Extant literature on gamification requires a more comprehensive view to clarify whether (and how) the parallel structural constructs of perceived values in the mechanism influence user behavior. Taking a closer look to the gamification literature, for example, some researchers adopt classic motivation theory (e.g., self-determination theory and self-regulation theory) to explain the mediating mechanism of gamification on behavior, such as why people use gamification and how to extend individuals' continued use intention with a motivation perspective (Bittner and Shipper 2014; Mekler et al. 2013; Xi and Hamari 2019). That stream describes individuals' intrinsic and extrinsic perspectives which filled the gap in the literature as well as explained the psychological elements of individuals to adopt new technology (Bravo et al. 2021; Mitchell et al. 2020). Specifically, intrinsic motivations are employed to elucidate how gamification affordances positively influence behavior by enhancing self-esteem, knowledge sharing contribution, and fostering a sense of virtual community (Feng et al. 2022). Meanwhile, extrinsic motivations are hired to explain the mechanism with financial incentives (Ariely et al. 2009; Friedrich et al. 2020). Others stream followed IS theory (e.g., the technology acceptance model or the unified theory of acceptance and use of technology) to understand the convenience of accepting gamification, such as individuals' perceived usefulness or ease of use (Hess et al. 2014; Venkatesh et al. 2012). However, not so much research has empirically tested the various perceived values as mediating roles on user behavior in gamification studies (Shi et al. 2022). In addition, most of the research studies have utilized an individual study approach rather than employing a meta-analysis research method. Therefore, despite the valuable insights provided by individual studies, the full mechanism by which gamification affects behavior through perceived values remains elusive by meta-analysis of quantitative syntheses (Koivisto and Hamari 2014; Shi et al. 2022). Hence, there is a need for research which observes from more comprehensive perspectives, such as perceived value (Koivisto and Hamari 2014; Sweeney and Soutar 2001), then, organizes and combines these dimensional constructs of perceived value and compares various effects of values.

Hence, we propose the research questions:

RQ1. What are the core affordances of gamification and its effects on consumer behaviors?

RQ2. What is the key mechanism of gamification concerning consumer behaviors based on its affordances?

For answering these following research questions, the coherent and comprehensive affordance construct and perceived value construct that should be raised to examine the relationships among gamification affordances, perceived values and behavior. Meta-analysis derives from previous literature with effect sizes which could match the requirements of completely summarizing and measuring these relationships (Ou et al. 2023; Sailer and Homner 2020). Hence, we build a meta-analysis framework to analyze the relationships among selected variables (affordance, values and behaviors) which collected from previous literature and test these relationships. The remainder of this paper is organized as follows. First, a literature review of gamification is demonstrated. Second, the research model and hypotheses are proposed. Third, we illustrate

the method of Literature retrieving and eligibility criteria, coding process and data analysis. As followed, the result is presented and discussed. As last, we state the theoretical contributions and practical contributions, and conclude this study.

# Literature Review

## *Overview of Gamification on Digital Platforms*

During these years, gamification is a rapidly growing area of research with widespread applications in information system design in areas such as education (Aparicio et al. 2019), healthcare (Lee et al. 2017), and marketing (Poncin et al. 2017), and plays a predominant role in driving user engagement (Hamari and Koivisto 2015). Gamification involves design systems, services, organizations and activities that attempt to deliver positive experiences similar to the ones found in games, thus influencing user behavior and cognitive processes (Hamari 2017; Huotari and Hamari 2017), usually by implementing game mechanics or other game-like designs in the target environment with insight drawn from game design (Deterding et al. 2011). Gamification design can deliver better interactive services and game-like experiences for users through motivational affordances, thus generating user value (Hsu and Chen 2018). According to the literature, research of gamification usually concentrates on either the experiential facet, such as the quest to fulfill inherent need (Huotari and Hamari 2017), or the game design facet (Deterding et al. 2011). Throughout the literature, however, whether the focus is on the motivational sides of game mechanics or not, the assumption has been that gamification can fulfill users' inherent needs and thereby lead to user behavior (Granic et al. 2014).

Past research demonstrates a positive relationship between different gamification characteristics and intrinsic need satisfaction (i.e., Bormann and Greitemeyer 2015; Van Roy and Zaman 2019). Nevertheless, they portray only a very one-sided picture, as most of them investigate a very limited number of gamification features and/or some of the intrinsic needs. Moreover, previous studies have found support for the effect of gamification in human behavior, such as customer relationship management by increasing loyalty (Hwang and Choi 2020), marketing effectiveness improvement by promoting user commitment, willingness to pay and customer referrals (Wolf et al. 2020), and adoption of product innovations (Müller-Stewens et al. 2017).

## *The Stimulus-Organism-Response Framework*

Aiming to structure the constructs associated with study of gamification on digital platforms into a holistic meta-analytic model, the current meta-analysis adopts the stimulus-organism-response (SOR) framework borrowed from Mehrabian and Russell (1974). SOR framework presents a good analytical framework to capture customer's response to new technology environments. Mehrabian and Russell's (1974) conceptualization of the SOR framework is considered to be the foundation of many studies on the effects of environmental factors on consumer behavior (Kaltcheva and Weitz 2006). This framework has also been broadly adopted in information systems research.

The SOR framework contains three main components, namely stimulus (external triggers that elicit consumers' responses), organism (consumers' affective, cognitive, or normative evaluations of the external triggers), and response (consumers' behavioral outcomes of reactions). Guided by SOR framework, we propose a research model that incorporates the gamification affordances and its major outcomes: consumer behavior (see Figure. 1). In line with the SOR framework, we expect three gamification affordances (immersion, achievement and social) to influence consumer behavior (outcome) through the mediation of perceived value (functional value, emotional value, and social value). Gamification affordance has the potential to induce changes in the internal or organismic states of users (Mehrabian and Russell 1974). By incorporating gamification affordances, perceived values such as functional, emotional, and social values can be enhanced. For instance, the achievement-related affordance can lead to the flow experience and entertainment phenomenon, which in turn stimulates intrinsic motivation (Cameron et al., 2005). The emotional value perception of customers can be significantly influenced by the perception of fun and entertainment, leading to positive emotions and improved inner feelings (Kim et al., 2015; Ruiz-Mafe et al.,

2018). Moreover, gamification mechanics of immersion, such as tailored avatars and customized homepages, aim to heighten the flow experience of online customers. The social-related affordance allows users to interact with each other and incorporate social qualities into their interactions (Karahanna et al., 2018). This meta-analysis concluded that social-related affordance brings about positive emotions, such as pleasure and contentment. Therefore, the present study employs the SOR framework to elucidate the factors that underlie gamification affordance, consumer behavior, and the internal mechanism of perceived value.

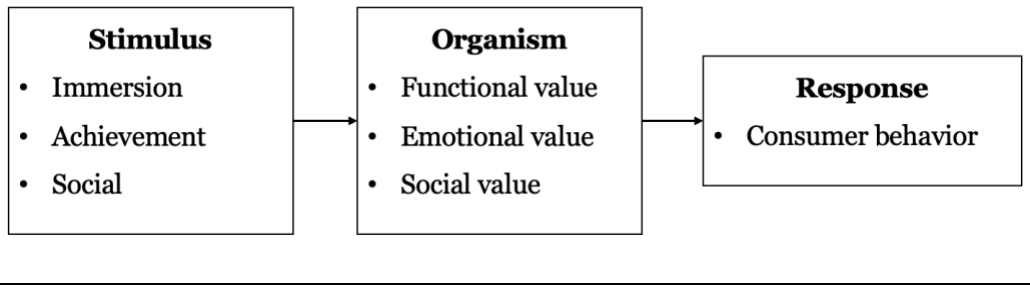


**Figure 1. Proposed structural model based on SOR framework**

## *Gamification Affordance*

Affordance refers to "the possibilities for goal-oriented action afforded to specific user groups by technical object" (Markus and Silver 2008). As an illustration, within the context of physical artifacts, the doorknob affords the possibility of accessing and entering a room. Similarly, in the domain of gamification, the doorknob metaphorically represents the mechanics of gamification which enable and facilitate user engagement and enjoyment of the designed experience. In the gamification literature, gamification affordance employed in digital platforms including points/scores, leaderboards/rankings, badges/achievements, levels, progress, feedback, virtual objects/resources, storytelling, virtual territories, teams, missions, and avatars/virtual characters, are typically grouped into three main categories: immersion, achievement, and social (Koivisto and Hamari 2019).

**Immersion**-related gamification affordance includes elements such as storytelling, avatars, role-playing and others, which serve to encourage users to immerse themselves in self-directed activities that elicit curiosity and, subsequently, enhance their engagement (Goes et al. 2016). Several studies indicated that characteristics associated with immersion can often evoke higher mental engagement in autonomous thinking (Stefanou et al. 2004). Avatars (Peng et al. 2012) and customization (Kim et al. 2015) can provide users with flexibility of selection and generate a greater sense of autonomy. And story or narrative in the game helps users to feel the meaning of their actions and their voluntary participation (Sailer et al. 2017). As a result, we conclude that when users engage with immersion-related features, they are more inclined to experience a higher sense of freedom, engagement, and commitment to the gamified system.

**Achievement**-related gamification affordance typically contain elements such as points, levels, and badges. These gamification elements can improve competitiveness, and act as tangible indicators of users' progress and their level of dependency, which can provide mental stimulus for continued use (Sailer et al. 2017). Specifically, points are usually applied to measure users in-gamified system behavior (Sailer et al. 2013) and offer fine-grained feedback (Sailer et al. 2017); level captures users' progress on the platform by aggregating points or performing specific actions (Gatautis et al. 2016); the badge collection or unlocking can increment goal-related behavior (Hamari 2017). So each time a user achieves an increasingly difficult goal, their status improves, enhancing their sense of achievement (Morschheuser et al. 2017).

**Social**-related gamification affordance encompass social networking features such as chats, blogs, and peer ratings, which can establish social network connections and strengthen users' sense of belonging by facilitating frequent communication, knowledge sharing, and reciprocal assistance (Francisco-Aparicio et al. 2013). These social network-related features can be effective in strengthening interpersonal

relationships and enhancing social participation (Shiau et al. 2018), then ultimately drive player's desire to perform well (Peng et al. 2012). Therefore, social-related features can satisfy the psychological need by helping users to build social relationships with others within the same gamified system or service.

### *Perceived Value*

Based on the findings of the gamification literature meta-analysis, we outline psychological organism to gamification affordances from the perspective of customer value perception, including functional value, emotional value, and social value.

**Functional value** refers to the value gained through good deals and high-quality products (Bolton and Drew 1991). To be specific, economic benefit has been taken as the most significant influential factor determining functional value and positively influencing customers' behavioral intentions (Wang et al. 2013). Customers often seek to minimize the financial outlay, time and energies associated with shopping activities, reinforcing the effect of functional value on purchase intention (Shi et al. 2016). In this sense, customers who expect to get great deals would have higher intentions to engage.

**Emotional value** originates from the feelings and emotions (i.e., fun and entertainment) aroused through interacting with the gamified design on the digital platform. Previous studies found that when a specific product or service stimulates customer emotions, an individual's behavior will be influenced (Shi et al. 2016). Furthermore, the positive impact of emotional value on consumer behavior will be strengthened in hedonic conditions because customers are expecting to have fun and enjoy themselves in such conditions (Kim et al. 2011; Kwon and Brinthaupt 2015).

**Social value** is concerned with strengthening the image of the individual in society, building social bonds and gaining social consensus (Sweeney and Soutar 2001). When engaging in gamified activities on the digital platforms, customers are impacted not only by advertisements and promotions, but also by a sense of shared engagement with peers (Zhao et al. 2019). Such feeling can stimulate customers' behavior because it enhances socialization within like-minded enhances and groups, fulfilling social motivation (Chiu et al. 2014). Similarly, Jang et al. (2018) indicated that a higher level of social value through befriending and sharing experiences in gamified systems would result in higher purchase intention.

### *Consumer behavior*

Recent literature found that gamification on digital platforms commonly leads to consumer behavior, such as customer engagement with the co-creation community (Leclercq et al. 2018), brand engagement in online brand communities (Xi and Hamari 2020), purchase intention on online travel agencies platform (Shi et al. 2022), user retention in mobile payment (Zhang et al. 2023), viewing and purchasing behavior in live streaming (Zheng et al. 2023). Consumer behavior can be described as a comprehensive concept that encompasses both behavioral intention and behavior. This idea draws upon psychological perspectives, as well as perspectives on behavioral engagement and usage (Fan et al. 2022). In this study, consumer behavior includes behavioral intention and behavior that refer to the intention and behavior of users to adopt, use, purchase, engage of gamification on the digital platforms.

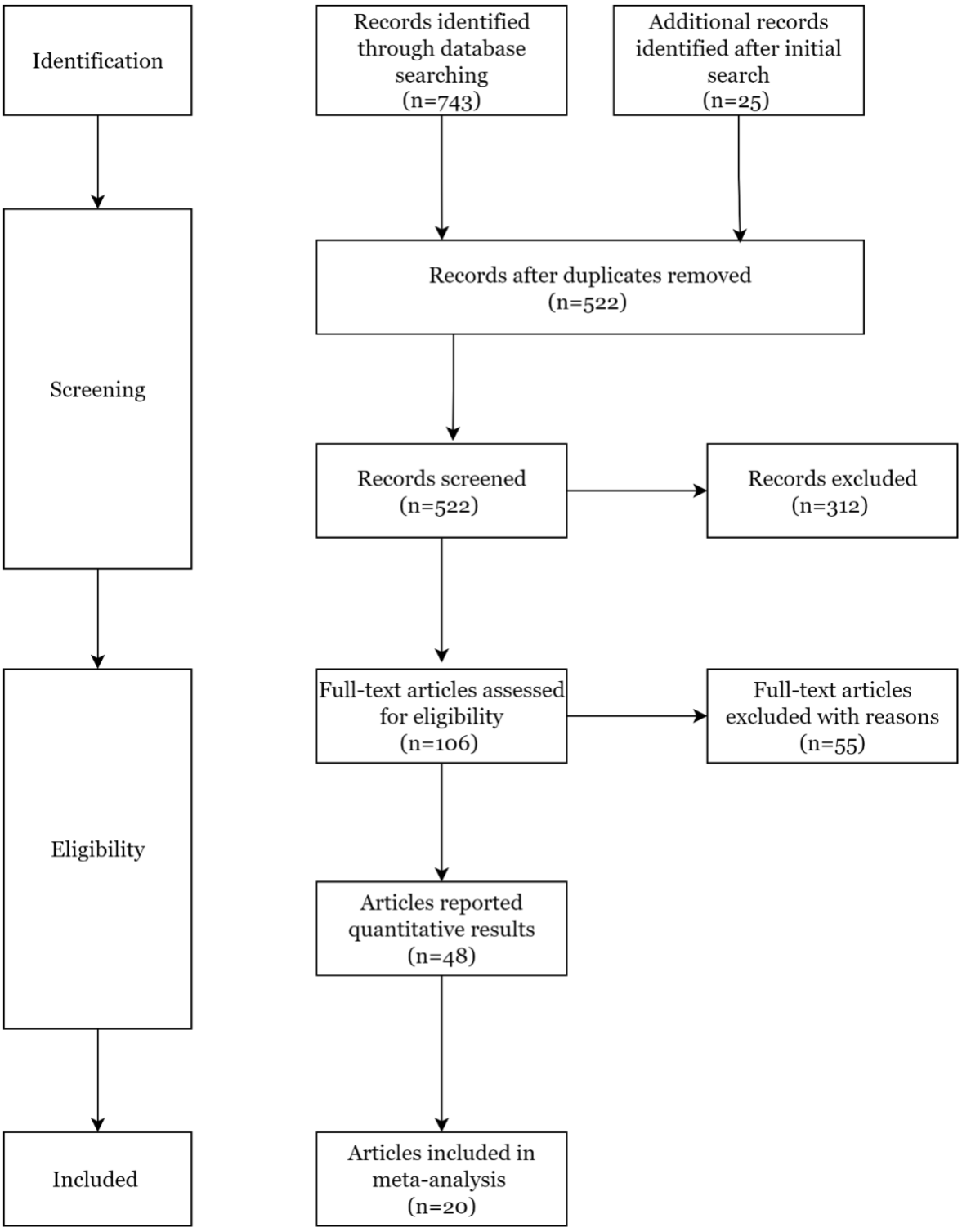


**Figure 2. The PRISMA flow chart used to identify studies for detailed analysis**

# Method

## *Literature retrieving and eligibility criteria*

This meta-analysis study was conducted following the guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement (Tricco et al. 2018). We summarize and merge several constructs that bear similar connotations but vary the manipulations as a single construct, as per previous studies. In detail, this meta-analysis framework includes four independent variables and one dependent variables. Following IS meta-analysis research, we searched the literature on Science Direct, Web of Science, and EBSCO, and with a combination of keywords as follows: ("gamification" OR "gamified") AND ("digital platform" OR "e-commerce" OR "electronic commerce" OR "marketing") (Sailer and Homner 2020; Seaborn and Fels 2015). We retrieved 522 papers (see Fig 2), and we further screened them to ensure that each research meets the following inclusion criteria: (1) undertakes empirical research related to gamification in digital platforms, in particular, e-commerce platform; (2) reports the statistical data such as sample size and offers the path coefficient, Pearson correlation that can be converted to correlation; and (3) is an English-language paper published in a high-standard journal. We ultimately coded from 20 papers (see Figure. 2).

## *Coding*

Two PhD candidates took responsibility for the coding process which followed the coding criteria with independent code standards, and this process aligned a 90% coding consistency agreement rate. In specific, we collected and coded the sample size, t-test, F-test, path coefficient, and Pearson correlation reported in previous papers. Given the gamification features and elements are not consolidated in various literature, we extracted similar elements as consistent affordances and averaged estimates of the same relationships but recorded estimates separately when affordances were independent of each other (Bai et al. 2020).

## *Effect size and data analyze*

In line with the meta-analysis procedure, we adopted R to calculate effect sizes into correlations(r) (Assink and Wibbelink 2016). However, the included literature may report in different standards (e.g., correlations or β coefficients). Thus, this research followed the formula to convert all reported statistics to Pearson's correlations (Pearson's r) (Peterson and Brown 2005; Rosenthal and DiMatteo 2001). For the studies which lack parts of path coefficients or correlations, we followed the previous meta-analysis literature to convert existing statistics data to correlations. Using random-effect models, we adopted the sample-weighted r value of each relationship as the effect sizes. In addition, homogeneity test with Q values and I2 values was used to examine the heterogeneity in the effect size of each relationships (Borenstein et al. 2009). Then, the relationships of overall correlations between gamification affordances and behaviors, and, gamification affordance and perceived values, as well as perceived values and behaviors are estimated by weighting each observed correlation which relied on the sample sizes. In case the measurement error of multiple studies, we used Hunters and Schmidt's methods the reliability values of factors in each study were used to correct the measurement error (Schmidt 2015; Schmidt and Hunter 2004). Due to studies with significant results are more likely to attain published opportunities than non-significant results which may lead to publication bias (Lin and Chu 2018; Thornton and Lee 2000). Therefore, for avoiding publication bias in this research, we examined the fail-safe N by Rosenthal approach (Rosenthal and DiMatteo 2001). In detail, we followed Rosenthal approach to estimate fail-safe N with 5k+10 that k refers to the number of studies examining each given relationship (Orwin 1983; Rosenthal 1979). The threshold of fail-safe N is 1, when fail-safe N is higher than 1 which reveals there is no publication bias.

# Results of overall relationships

The results of the sample-weighted mean effect sizes were interpreted following the comparing thresholds for correlation that a correlation coefficient of 0.10 is regarded as a weak level; a correlation coefficient ranged from 0.30 to 0.49 represents a moderate level; a correlation coefficient of 0.50 or higher means strong level (Cohen 1992). Table 1. illustrates the r-weighted of each relationship.

| **Variable relationship** | **Relationships identified** | **No. of raw effects** | **Total N** | **r-weighted** | **95% Confidence interval** | | **Z value (two_tailed)** | **Heterogeneity Test** | | **Test for Publication Bias** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Lower bound** | **Upper bound** | | **Q value for homogeneity test** | **I2** | **Failsafe N** |
| X→Y | Antecedents on outcomes | | | | | | | | | |
| | Achievement-related affordances →Behavior | 9 | 3490 | 0.346 | 0.288 | 0.434 | 8.843 | 48.959 | p-val < .00001 *** | 1537 |
| | Immersion-related affordances →Behavior | 3 | 1319 | 0.295 | 0.086 | 0.665 | 2.434 | 70.112 | p-val < .00001 *** | 194 |
| | Social-related affordances →Behavior | 5 | 2143 | 0.332 | 0.206 | 0.463 | 4.768 | 42.520 | p-val < .00001 *** | 455 |
| X→M | Antecedents on mediators | | | | | | | | | |
| | Achievement-related affordances →Functional value | 6 | 2043 | 0.420 | 0.314 | 0.502 | 7.551 | 33.333 | p-val < .00001 *** | 867 |
| | Achievement-related affordances →Emotional value | 7 | 2934 | 0.437 | 0.357 | 0.505 | 9.991 | 35.952 | p-val < .00001 *** | 1582 |
| | Achievement-related affordances →Social value | 4 | 1416 | 0.653 | 0.182 | 0.903 | 5.533 | 90.048 | p-val <.0001 *** | 1345 |
| | Immersion-related affordances →Functional value | 3 | 1059 | 0.464 | 0.286 | 0.630 | 4.535 | 27.186 | p-val < .00001 *** | 307 |
| | Immersion-related affordances →Emotional value | 3 | 1452 | 0.347 | 0.211 | 0.552 | 4.033 | 26.685 | p-val < .00001 *** | 233 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Social-related affordances →Functional value | 4 | 1138 | 0.412 | 0.262 | 0.514 | 5.464 | 18.972 | p-val = 0.00028 *** | 295 |
| | Social-related affordances →Emotional value | 6 | 2349 | 0.470 | 0.379 | 0.574 | 8.119 | 45.234 | p-val < .00001 *** | 1332 |
| | Social-related affordances →Social value | 3 | 1029 | 0.652 | 0.380 | 0.862 | 3.697 | 94.946 | p-val < .00001 *** | 747 |
| M→Y | Mediators on outcomes | | | | | | | | | |
| | Functional value→ Behavior | 8 | 2787 | 0.466 | 0.412 | 0.504 | 16.666 | 16.380 | p-val = 0.02186 * | 1942 |
| | Emotional value→ Behavior | 12 | 3885 | 0.450 | 0.393 | 0.493 | 15.076 | 40.938 | p-val = 0.00002 *** | 3809 |
| | Social value→ Behavior | 3 | 1062 | 0.410 | 0.359 | 0.459 | 14.153 | 1.502 | p-val = 0.47191 ns | 208 |
| Note: p < 0.1, *p < 0.05, **p < 0.01, ***p < 0.001, ns not significant. | | | | | | | | | | |

**Table 1. Descriptive statistics and relationships**

## *Effects of gamification affordances on behavior*

Considering the effect of gamification affordances on behavior, achievement-related affordance on behavior (r-weighted=0.346), immersion-related affordances on behavior (r-weighted=0.295), social-related affordances on behavior (r-weighted=0.332). Hence, achievement-related affordance plays an important role in affecting individuals' behavior.

### Effects of gamification affordances on perceived values

Regarding the perceived values as the mediators, we found that social-related affordance significantly affects social value (r-weighted=0.652). In functional value aspect, achievement-related affordance positively influences functional value (r-weighted=0.420), immersion-related affordance positively influences functional value (r-weighted=0.464), social-related affordances positively influence functional value (r-weighted=0.412). In emotional value aspect, achievement-related affordance positively influences emotional value (r-weighted=0.437), immersion-related affordances positively affect emotional value (r-weighted=0.347), social-related affordance positively influences emotional value (r-weighted=0.470). Given the limit of literature, the literature numbers of immersion-related affordance to social value is less than 3. Therefore, we could connect social-related affordance to social value, and achievement-related affordance to social value. Social-related affordance positively influences social value (r-weighted=0. 652), and achievement-related affordance positively influences social value (r-weighted=0. 653).

**Effect of perceived values on behavior**

We found that functional value positively influences consumer behavior (r-weighted=0. 466), emotional value positively affects consumer behavior (r-weighted=0. 450), and social value positively influences consumer behavior (r-weighted=0. 410).

# Discussion

## *Theoretical contributions*

Overall, the study includes 20 primary studies with sample sizes and effect sizes. The overall results demonstrate the positive influence of gamification affordances on perceived values and behavior, revealing detailly how gamification affordances affect various perceived values of consumers and behaviors. The results could contribute in academic and help practitioners to design more reasonable and useful gamification dynamics. There are three theoretical contributions.

First, this research integrates previous literature and exploits a theoretical model that bridges gamification affordance, perceived values, and behaviors, and extends the SOR framework in gamification research field. Despite various studies that have examined the relationship between gamification affordances or elements, and following behaviors or intentions, existing studies have overlooked the analysis of mechanisms for improving perceived values and behaviors. In addition, systematical literature reviews have summarized the research progress on certain topics, but only a few considerations have been taken by a meta-analysis method. Therefore, meta-analysis is hired as research method. The present meta-analysis formulates a theoretical framework by utilizing the constructive relationships extracted through cross-study analysis of gamification affordance literature. Moreover, this meta-analysis bridges the gamification experience (user behavior) based on the various gamification affordances and following perceived values. Besides, this research summarizes the concepts of social, immersion and achievement as gamification affordance, enrich and align with the classification of previous studies on gamification (Schöbel et al. 2020). Consequently, our findings are more robust than those derived from individual studies or alternative forms of literature reviews due to the incorporation of data that establish the effect size and significance level of the connections between the constructs through meta-analysis (Field and Gillett 2010; Peterson and Brown 2005).

Second, this study validates the primary gamification affordance and incorporates it into a comprehensive construct. Extant studies have discovered the influence of gamification affordances on perceived values such as rewards, points and leaderboards (Hwang and Choi 2020; Mekler et al. 2013). However, previous literature failed to conceptualize affordances and integrate them into a single construct. In our study, we proposed three key gamification affordances and revel the innate influence on each perceived value and behavior. Moreover, we have utilized the concept of achievement to consolidate elements such as points, red pockets, and rewards, thus resulting in more robust findings. In particular, this meta-analysis research combines and concludes the previous gamification literature to answer the research question by estimating the relationships between gamification affordances (e.g., achievement, immersion, and social) and behaviors.

Third, this research confirms the perceived values as mediating roles between gamification affordance and behavior. We have added to findings that perceived values of functional value, emotional value and social value positively affect individual behavior of using gamification in gamification context, which provides a more comprehensive look of perceived values as mediating roles. At the same time, we provide counterintuitive findings which contributes to future studies. For example, immersion-related affordances only play a small role in behaviors which runs counter to some current studies (Feng et al. 2022). From the findings of this research, we discover that immersion is an essential affordance in the previous literature which has been overestimated in the gamification context.

### *Practical contributions*

In terms of practical implications, our research is beneficial for gamification designers and corporations. Firstly, gamification practitioners can align themselves with conventional gamification affordances and develop more dynamic social perspectives. It is noteworthy that the impact of achievement-related affordance on social value surpasses that of social-related affordance. Therefore, gamification designers could combine achievement elements with social attributes such as communicate within leaderboards to indirectly improve social value, and behaviors of users. Secondly, functional value is a crucial perceived value which compares with emotional value and social value for users. Meanwhile, achievement-related affordances have the prefund effect on behavior. Hence, gamification designers could incorporate functional elements such as monetary rewards and points to increase engagement in gamification activities. More interestingly, compared with other affordances, social-related affordance has a profound effect on emotional value. These findings encourage practitioners to design more interactivity between users in the gamification (e.g., communication box, teams-forming mechanism and sharing button). For example, in the knowledge-sharing platform, there could be more social-related gamification design such as inviting expert to answer questions to improve sense of community which represents the emotions and recognitions of this platform.

## Conclusion and limitation

This study contributes significantly to the field of gamification, both practically and theoretically. It presents the first meta-analysis of gamification on digital platforms and forms a theoretical framework that offers valuable insights into this emerging field. To ensure accuracy and consistency in our findings, we meticulously collected and coded data from 20 relevant literature sources that support empirical evidence for this framework. Our analysis suggests that achievement-related affordances and functional value are key factors that can influence behavior, and gamification designers can leverage these insights to create more effective incentive mechanisms that can enhance desired behaviors in individuals within corporations. Despite the advantages of our study, it also has some limitations. First, we only developed a theoretical framework and coded for potential moderators but failed to consider actual moderators. Future studies should account for contextual or demographic variables to better understand the nuances of gamification. Second, our sample size was smaller compared to other meta-analyses, which is attributed to the fact that gamification is still an emerging field. Therefore, future studies could expand the sample size by including more completed literature and providing valuable insights into meta-analysis research.

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