

Gamification in Mobile Commerce: Dual Affective and Cognitive Pathways to Repurchase Intention

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ABSTRACT

Gamification, the application of game design elements in non-game contexts, has become an effective strategy for enhancing user engagement and behavior in mobile commerce. This study investigates how gamification influences users' repurchase intentions through both affective (perceived enjoyment) and cognitive (customer engagement) pathways, drawing on the Stimulus-Organism-Response theory and Self-Determination theory. Data were collected from 550 m-commerce users who had interacted with gamified features on such platforms. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the results show that gamification significantly enhances both perceived enjoyment and customer engagement, which in

turn positively influence repurchase intention. Moreover, a serial mediation effect was observed, in which gamification indirectly drives repurchase intention through these affective and cognitive mechanisms. These findings offer practical guidance for m-commerce platforms on designing engaging gamified experiences with visually appealing interfaces and team-based challenges to foster customer loyalty and drive repeat purchases.

Keywords: Gamification, M-commerce, Customer cognitive engagement, Perceived enjoyment, SOR theory, Self-determination theory

INTRODUCTION

The rapid advancement of digital technologies has fundamentally reshaped consumer behavior, particularly in how individuals search for, evaluate, and purchase products across digital platforms. Driven by demands for convenience, time efficiency, and personalized experiences, consumers increasingly rely on online and mobile channels for everyday transactions (Pantano & Priporas, 2016; Verhoef et al., 2015). Within this evolving landscape, mobile commerce (m-commerce) has emerged as a dominant medium, enabling consumers to access and purchase products ubiquitously, regardless of time or location (Groß, 2015). Unlike traditional e-commerce, m-commerce facilitates more dynamic and immediate interactions, aligning with the users' high expectations of seamless experiences and fast-paced lifestyles. This shift signals a profound behavioral transformation in how customers interact with digital retail environments. With the continued growth of m-commerce, understanding users' psychological factors and how their interactions with the platform shape their user experience are crucial to maintaining long-term customer engagement and loyalty.

In response to the evolving behavior and expectations of mobile shoppers, the m-commerce platform must adopt innovative strategies that go beyond merely facilitating transactions. One particularly salient strategy is gamification, which involves integrating game-design elements into non-game contexts and employs m-commerce to attract a large number of active users while enhancing their engagement and behavioral outcomes (Yu & Huang, 2022). A widely known gamification strategy employed by m-commerce platforms such as Amazon, Shopee, and SHEIN is Spin the Wheel, in which users can spin the wheel once or more to win rewards such as discounts, free items, or bonus points (Kedia, 2025). By leveraging game mechanics such as points, badges, leaderboards, and challenges as their gamification elements, m-commerce platforms create a more interactive and engaging shopping experience, fostering a sense of achievement and encouraging repeat purchases (García-Jurado et al., 2019).

Most studies in gamification focus on the direct effects of gamification on purchase behavior (e.g., Bouzaabia et al., 2024; Hsu, 2023; Kim et al., 2020). However, prior research has largely focused on the direct effects of gamification on user behavior, leaving the mediating mechanisms through which gamification influences repurchase intentions insufficiently examined. In particular, the simultaneous roles of emotional responses (e.g., perceived enjoyment) and cognitive responses (e.g., engagement) are largely overlooked, especially within the rapidly evolving context of m-commerce, where consumer behaviors differ markedly from those in traditional e-commerce. Although previous research indicates that gamification positively influences perceived enjoyment and customer engagement, critical drivers of consumer loyalty and purchase behavior (Aparicio et al., 2021), the simultaneous roles of both responses are overlooked. Therefore, this gap presents an opportunity for this research to investigate integrating these factors as dual mediators within a unified framework to foster repeat purchase behavior through the influence of m-commerce gamification elements.

This study addresses this knowledge gap by examining the extent to which repurchase intentions on m-commerce platforms are influenced by gamification elements, namely points, badges, and leaderboards. Borrowing from Mehrabian and Russell's (1974) Stimulus-Organism-Response (SOR) theory and Deci and Ryan's (1985) Self-Determination Theory (SDT), this study develops a framework. Within this framework, gamification elements serve as stimuli that not only trigger affective and cognitive organismic responses but also satisfy users' basic psychological needs (autonomy, competence, and relatedness), as proposed by SDT. These internal responses are mediated by the dual mechanisms of affective (perceived enjoyment) and cognitive (customer engagement), which ultimately influence repurchase intention. In the literature, perceived enjoyment acts as a mediator between gamification and behavioral outcomes (Shahzad et al., 2023). Moreover, customer cognitive engagement has been shown to mediate the relationship between gamification and shopping behavior (Hsu, 2023).

This research makes several contributions to the extant literature. This study extends the body of research on electronic commerce by examining the use of gamification elements on m-commerce platforms. By proposing and examining an SOR- and SDT-driven framework for consumer repurchase intention in m-commerce, this research empirically validates the application of these theories in this context. As such, we advance the theoretical understanding of gamification elements as a driver of consumer repurchase intention. In addition, the intervening mechanism involving perceived enjoyment and customer cognitive engagement offers deeper insight into the often-overlooked yet crucial dual affective and cognitive pathways that underlie

gamification's influence on repurchase intention. In practice, this research provides actionable guidance for designing user experiences that are both emotionally satisfying and highly engaging, thereby fostering loyalty and encouraging repeated purchases. As such, this study is highly relevant to businesses aiming to improve long-term performance through gamification.

The remainder of this article is organized as follows. The next section presents the literature review and hypothesis development, followed by the research method, results, and discussion. The final section presents the conclusion and suggestions based on the findings. The literature review and hypothesis development explore relevant theories and prior research and formulate hypotheses. The following section presents the empirical analysis methodology, detailing data collection and analysis techniques. Results are then given, followed by a discussion of their implications. Finally, the article concludes with practical recommendations, a summary of the study's theoretical contributions, and suggestions for future research directions.

THEORETICAL BACKGROUND

Stimulus Organism Response Theory (SOR Theory)

The SOR theory, developed by Mehrabian and Russell (1974), posits that environmental stimuli (S), such as interface design or marketing cues, can evoke internal emotional reactions and cognitive states (O) that lead to consumer behavioral responses (R), including satisfaction, loyalty, and repurchase intention. This model has been extensively applied to examine how environmental features influence consumer responses across physical and digital environments. In the context of technology and digital commerce, the SOR model has gained empirical support. Park and Lennon (2009) examined how brand name and promotion as stimuli can influence online purchase intention. Furthermore, Peng and Kim (2014) and Zhu et al. (2020) found that website attractiveness increased positive emotions and repeat purchases. More recently, Hewei and Youngsook (2022) and Gupta et al. (2023) demonstrated how digital interactivity and infrastructure act as stimuli that can influence user experience and perceived value, ultimately driving continuous purchase intention. Building on these insights, this study applies the SOR framework to investigate how the gamification strategy operates as a stimulus in mobile commerce (m-commerce). Gamification elements have been proposed as stimuli to influence users' perceived enjoyment and cognitive engagement with the m-commerce platform, thereby acting as organismic states within the model. Ultimately, both the positive affective and cognitive organism states foster repurchase intention as a behavioral reaction. Thus, the SOR framework provides a comprehensive understanding of how environmental gamification features are translated into emotional

and cognitive mechanisms that shape consumer behavior in gamified m-commerce environments.

Self-Determination Theory

To complement the external stimulus–response pathway described by the SOR model, SDT offers a psychological explanation for how gamified environments foster intrinsic motivation among users. Developed by Deci and Ryan (1985), SDT elaborates that individuals are intrinsically motivated when three core psychological needs are fulfilled: autonomy (feeling in control of one’s actions), competence (feeling effective in one’s activities), and relatedness (feeling connected to others). In gamified digital environments, these psychological needs can be fulfilled by the designed elements of gamification strategies such as points, badges, leaderboards, and team-based challenges (Sailer et al., 2017). As a result, SDT is highly relevant for explaining user motivation in gamified m-commerce settings. Moreover, in the mobile app context, various gamification elements have been shown to fulfill users’ needs for autonomy, competence, and relatedness, each of which is essential for encouraging self-driven motivation to use the app (Bitrián et al., 2020). Similarly, Huang and Hew (2018) demonstrated that implementing the components of SDT in mobile learning apps led to stronger continuance intentions. These findings underscore that SDT is particularly suitable for gamification research in m-commerce. Thus, SDT provides a strong theoretical basis for explaining user behavior in gamified m-commerce environments by clarifying the motivational mechanisms underlying affective and cognitive responses. Specifically, when gamification satisfies users’ psychological needs, it can lead to both perceived enjoyment and cognitive engagement. Users’ perceived enjoyment, in turn, drives deeper engagement and enhances the likelihood of repeat purchases. Moreover, SDT supports the role of perceived enjoyment and engagement as psychological mediators, which highlight how intrinsic motivation translates gamification into repurchase intention.

RESEARCH HYPOTHESES

The Effects of Gamification Elements

Gamification is a concept or approach designed to provide positive experiences similar to those found in games, though applied to non-game contexts such as m-commerce, tourism, and loyalty programs. According to Lee and Jin (2019), the core elements of gamification include enjoyment, rewards, competition, and storytelling. García-Jurado et al. (2019) described gamification as a process that enhances service quality by integrating game concepts into customer interactions, thereby creating a play-

like experience. They emphasize that while gamification incorporates game elements into platforms, its objectives differ from those of traditional games.

Gamification elements such as points, badges, and leaderboards are designed to reward user behaviors, recognize achievements, and stimulate competition (Hamari et al., 2014). This perceived value increases the likelihood of repeat usage and purchase behavior. According to SDT, these gamified features support users' basic psychological needs such as competence, autonomy, and relatedness, and lead users to experience greater intrinsic motivation (Luarn et al., 2023). This internal drive encourages voluntary and repeated engagement with the platform, ultimately increasing repurchase intention. A prior study by Hwang and Choi (2020) supported this mechanism by positing that gamification has a significant and positive effect on repurchase intention. In accordance with the related literature and previous arguments, we propose H1.

H1: The higher the consumers perceive the value of m-commerce gamification elements, the greater their intention to repurchase on the m-commerce platform will be.

Perceived enjoyment refers to the degree to which an individual experiences intrinsic pleasure from an activity, independent of any external rewards or benefits (Davis et al., 1992). Perceived enjoyment is closely related to the positive impression provided to consumers (Almaudina et al., 2023). It can be assessed using indicators such as pleasure, engagement, and excitement experienced when using an online shopping website or application (Dogra et al., 2023).

Gamification motivates customers to continue using e-marketplace services by offering enjoyable gaming experiences, which increase their engagement with the service (García-Jurado et al., 2019). Users' perceived enjoyment and comfort drive this engagement. Studies have indicated that incorporating game-like features, immersive interactions, and intuitive user interfaces significantly enhance enjoyment, ultimately boosting user engagement and retention (Hamari et al., 2014). When individuals find an activity enjoyable, they are more likely to participate voluntarily, even without external motivators (Venkatesh et al., 2012). As a fundamental psychological mechanism in gamification, perceived enjoyment plays a crucial role in fostering sustained user involvement and motivation (Davis et al., 1992).

In the m-commerce context, when consumers use in-game-like elements, they interpret these experiences as affective responses to the gamification stimuli (Xi & Hamari, 2020). These enjoyable feelings come from the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017).

Gamification elements are designed to support these needs, and when these needs are met, users tend to feel more intrinsically motivated (Luarn et al., 2023). This inner motivation is often experienced as enjoyment during the activity (Ryan & Deci, 2017). Previous research by Raman (2021) found that gamification in online shopping websites significantly and positively influences perceived enjoyment. Thus, drawing on the related literature and prior arguments, we propose H2.

H2: The higher the consumers perceive the value of m-commerce gamification elements, the greater their perceived enjoyment of the m-commerce platform will be.

Customer engagement is defined as the extent of consumers' interaction, emotional attachment, and active participation with a brand, product, or service across multiple channels (Brodie et al., 2011).

Customer cognitive engagement leads to a specific type of interactive relationship with the brand or product, as individuals are likely to invest more personal resources in interactions and perceive them as adding value (Hollebeek et al., 2019). In the m-commerce context, when consumers engage with gamified elements such as progress bars, levels, and goal-oriented challenges, they interact more actively with the platform and develop a stronger cognitive focus (Yu & Huang, 2022). Gamified interactions can fulfill consumers' psychological needs such as competence and autonomy (Ryan & Deci, 2017). When users feel they are making progress, achieving goals, or choosing their own tasks, they are more likely to experience intrinsic motivation; this encourages them to think more deeply, process information actively, and stay cognitively engaged with the platform (Luarn et al., 2023; Suh et al., 2018). Accordingly, gamification has emerged as an effective approach to enhancing customer cognitive engagement (Hollebeek et al., 2019). Similarly, Xi and Hamari (2020) demonstrated that gamification elements in online brand communities have a significant positive effect on customer cognitive engagement. Based on the reasoning above, we propose the following:

H3: The higher the consumers perceive the value of m-commerce gamification elements, the more cognitively engaged they will be with the m-commerce platform.

The Effects of Perceived Enjoyment

Perceived enjoyment refers to the intrinsic satisfaction or pleasure users derive from interacting with a system, independent of its functional outcomes (Davis et al., 1992). Individuals are more inclined to engage deeply with a technology when they anticipate that the interaction is enjoyable (Wang & Li, 2016). In m-commerce environments, features such as gamification, personalized content, and intuitive interfaces enhance the user experience and foster enjoyment, thereby increasing mental focus and cognitive immersion (Hamari et al., 2014). Enjoyment emerges when users' basic psychological needs, such as competence and autonomy, are fulfilled through gamified experiences (Ryan & Deci, 2017). When consumers experience a sense of achievement during their interactions with the platform, their intrinsic motivation increases (Luarn et al., 2023), leading to deeper concentration and stronger cognitive involvement (Suh et al., 2018). Game dynamics such as rewards, competition, and altruism serve as meaningful antecedents to need satisfaction, triggering enjoyment and ultimately prompting deeper user engagement with gamified platforms. Hence, perceived enjoyment serves as a vital emotional stimulus that facilitates cognitive engagement, particularly in dynamic and interactive environments such as m-commerce platforms. Prior studies by Suh et al. (2018) and Xi and Hamari (2020) demonstrate that enjoyment is a key motivational force encouraging user engagement with digital content. With these studies and earlier reasoning in mind, we put forward the following:

H4: The higher the perceived enjoyment the customers experience when using the m-commerce platform, the higher their cognitive engagement with the m-commerce platform will be.

Perceived enjoyment is crucial in shaping consumer behavior, particularly in fostering positive emotional responses toward a product or service. When consumers experience perceived enjoyment, they tend to feel comfortable and develop positive feelings while interacting with a product or service (Hernandez & Handan, 2014). This finding aligns with Shahzad et al. (2023), who describe perceived enjoyment as a psychological construct referring to an individual's subjective experience of pleasure during an activity.

In the context of m-commerce, gamification elements such as points, rewards, and interactive features significantly enhance perceived enjoyment, thereby influencing repurchase behavior (Huang et al., 2022). This enjoyment results from the satisfaction of consumers' basic psychological needs (Ryan & Deci, 2017). When gamified elements fulfill users' needs for competence, autonomy, and relatedness, they foster intrinsic motivation that manifests as enjoyment during the shopping experience (Luarn

et al., 2023). These positive emotions, grounded in the satisfaction of psychological needs, can finally reinforce consumers' motivation to make repeat purchases. Empirical studies by García-Jurado et al. (2019), Kitjaroenchai and Chaipooipiratana (2022), and So et al. (2021) have highlighted that perceived enjoyment plays a key role in determining repurchase. Guided by the work and arguments discussed earlier, we propose the following hypothesis:

H5: The higher the perceived enjoyment the customers experience when using the m-commerce platform, the higher their repurchase intention on the m-commerce platform will be.

The Effects of Customer Engagement

Customer cognitive engagement refers to the cognitive dimension of customer engagement, developed through interactions with a brand or platform (Hollebeek, 2011). Weiger et al. (2017) suggested that highly engaged consumers tend to experience greater satisfaction, which leads them to retain positive perceptions of a product or platform and fosters stronger loyalty. In the context of gamification as a tool to enhance engagement, platforms that integrate interactive features such as rewards and community-driven content strengthen consumer attachment, ultimately encouraging repeat purchases (Harrigan et al., 2018). Positive gamified experiences in m-commerce, as noted by Xi and Hamari (2020), can foster this attachment by engaging consumers cognitively through meaningful interactions. This engagement is internally driven when users feel competent and autonomous in their navigation and decision-making (Ryan & Deci, 2017). When these psychological needs are fulfilled, users experience intrinsic motivation (Luarn et al., 2023), which deepens their cognitive involvement and strengthens their connection to the platform (Suh et al., 2018). This mental focus makes users more likely to revisit the platform and form the intention to repurchase (García-Jurado et al., 2019). Studies by Xi and Hamari (2020), Molinillo et al. (2020), and Lim et al. (2020) have further confirmed that customer cognitive engagement has a significant positive effect on repurchase intention. Accordingly, we propose the following:

H6: The higher the customers' cognitive engagement with the m-commerce platform, the greater their intention to repurchase on the m-commerce platform will be.

The Mediating Role of Perceived Enjoyment and Customer Cognitive Engagement

Perceived enjoyment refers to consumers' affective experience when they find an

activity enjoyable (Venkatesh & Davis, 2000). In the context of gamification in m-commerce, elements such as points, rewards, and leaderboards foster enjoyment, making consumers feel more connected to and satisfied with the platform. Almaudina et al. (2023) highlight that enjoyable experiences enhance consumer comfort during their interactions. Similarly, Xi and Hamari (2020) found that gamification elements can generate positive experiences that are perceived as enjoyable, while García-Jurado et al. (2019) conclude that such enjoyment directly increases repurchase intention. This relationship occurs because consumers who derive pleasure from their interactions with the platform are more likely to return for similar experiences, thereby strengthening their repurchase intention. Consequently, perceived enjoyment acts as a mediator, explaining how gamification fosters repurchase intention through the positive experiences it creates. Based on the above arguments, H7 is proposed.

H7: Perceived enjoyment mediates the relationship between the value of gamification elements and repurchase intention.

Customer cognitive engagement refers to the cognitive processes associated with the persistent and active mental states directed toward an object with which the consumer is engaged (Hollebeek, 2011). When gamification is effectively embedded in digital platforms such as mobile commerce (m-commerce), it enhances user interaction by integrating elements such as points, badges, and challenges that capture and sustain users' attention (Darejeh & Salim, 2016). Individuals who demonstrate attentiveness to a specific platform are more likely to allocate cognitive resources to actively engaging with it voluntarily (Dessart et al., 2015). A high level of cognitive attention drives customers to engage in deeper mental processing of platform-related information, thereby reinforcing their cognitive commitment and loyalty. These gamified elements foster cognitive engagement by immersing consumers and prompting them to actively process relevant content. This heightened cognitive involvement enhances the perceived value, relevance, and satisfaction derived from the interaction, ultimately strengthening consumer trust and brand connection.

Furthermore, Xi and Hamari (2020) observe that consumers who actively participate in gamification activities tend to feel a stronger sense of connection with the platform, reinforcing their preference for it. Therefore, customer cognitive engagement serves as a mediating variable in the relationship between gamification and repurchase intention, amplifying the positive influence of gamification on consumers' subsequent purchasing decisions. In agreement with the argument above, we suggest H8.

H8: Customer cognitive engagement mediates the relationship between the value of gamification elements and repurchase intention.

Serial Mediating Role of Perceived Enjoyment and Customer Cognitive Engagement

To provide a comprehensive overview of the theoretical model, a sequential mediation path is proposed to explain the underlying mechanisms by which gamification affects repurchase intention in m-commerce. Our hypotheses assert that perceived enjoyment, along with customer cognitive engagement, should be considered serial mediators in the relationship between gamification and repurchase intention. We estimate that gamification features in m-commerce can predict m-commerce repurchase intention through the mediating mechanisms explained in H1–H8. Therefore, the serial hypothesis below is proposed.

H9: Perceived enjoyment and customer cognitive engagement serially mediate the relationship between the value of gamification elements and repurchase intention.

RESEARCH METHODOLOGY

Research Design and Data Collection

This explanatory study employed a quantitative approach to examine the causal relationships between gamification, perceived enjoyment, and customer engagement, providing insights into factors influencing repurchase intention. Data were collected through an online survey targeted at Shopee users in Indonesia. Shopee, a leading m-commerce platform in Indonesia (Javier, 2025), has actively integrated gamification features, including in-app games, loyalty rewards, and interactive promotions (Shah, 2021). Indonesia's high m-commerce usage and rapid digital adoption (Javier, 2025) further supported its suitability as an empirical context for testing the proposed constructs. Therefore, the Shopee platform in Indonesia has been deemed a suitable and theoretically aligned setting for this research.

Purposive sampling was applied. A total of 550 respondents were collected, all of whom met the criteria of having played at least one gamified feature on an m-commerce platform (e.g., Shopee) and having made at least one purchase on the platform. The respondents consisted of 58.5% females and 41.5% males, as shown in Table 1. The majority of respondents were aged between 21 and 30 years (55.4%), followed by those aged 18 to 20 years (23.5%), 31 to 40 years (17.5%), and over 41 years (3.6%). More than two-thirds of the respondents were married (68.7%), while the remaining 31.3% were unmarried. Finally, in terms of education level, 56.0% of respondents had only

completed senior high school or below, 33.8% had obtained an undergraduate degree, and 10.2% had attained a master's degree or higher.

Table 1 *Demographic Characteristics of Respondents*

Characteristic	<i>N</i>	%
Gender		
Female	228	41.5
Male	322	58.5
Age		
18-20	129	23.5
21-30	305	55.4
31-40	96	17.5
≥ 41	20	3.6
Marriage Status		
Unmarried	172	31.3
Married	378	68.7
Education Level		
Senior high school and below	308	56.0
Undergraduate	186	33.8
Postgraduate	56	10.2

Note. *N* = 550

Research Instrument and Measures

The study's measures for the four main variables are shown in Table 2. Gamification was assessed using indicators adapted from García-Jurado et al. (2019), including points, badges, and leaderboards. Perceived enjoyment was measured with indicators from Chiu et al. (2009) and Yang et al. (2017). Customer cognitive engagement was measured using four items adapted from Xi and Hamari (2020). Meanwhile, repurchase intention, as the dependent variable, was measured using indicators such as the user's intent to repurchase, to make the platform their primary choice for shopping, and to avoid switching to other platforms (Bilgihan, 2016). Control variables were also included in our framework, such as profile variables (gender, income, age, education level, monthly income, and marriage status), which have been identified in the literature as influencing repurchase intention (e.g., Raman, 2021). These measures were translated into Bahasa Indonesian and then back-translated into English. The questionnaire was designed on a 5-point Likert scale. A pilot test with 30

respondents outside the sample population confirmed the instrument's validity and reliability.

Table 2 *Research Instrument*

Variables	Dimensions	Scale Items
Gamification The incorporation of game design elements on an m-commerce platform	Points	Inviting friends to play games on the m-commerce platform can increase my rewards. The m-commerce game's reward system aligns with my efforts in playing games. I can understand the reward system from playing games on the m-commerce platform.
	Badges	This m-commerce platform provides badges that reflect my gaming efforts (e.g., silver, gold, and platinum members). I can understand the badge system on this m-commerce platform. My gaming efforts are reflected in my reputation on this m-commerce platform.
	Leaderboards	The player ranking in the m-commerce games is well-designed. I want to know my ranking compared to other game players. I can easily find my reputation as a buyer on this m-commerce platform (i.e., buyer rating). I feel happy when accessing the m-commerce platform.
Perceived Enjoyment The pleasure and enjoyment users experience while using the m-commerce platform.		I feel happy purchasing items through the m-commerce platform. I enjoy the games offered by the m-commerce platform. I enjoy accessing the m-commerce platform during my free time.
Customer Cognitive Engagement The extent to which consumers actively and consistently direct their mental attention and cognitive resources toward interacting with the m-commerce platforms		I like accessing the m-commerce platform. I learned about the features available on the m-commerce platform. I pay attention to the features available on the m-commerce platform. All information about the m-commerce platform catches my attention.
Repurchase Intention The subjective likelihood that an individual will continue purchasing products from a specific m-commerce platform in the future		I intend to make repeat purchases on the m-commerce platform. The m-commerce platform is my first choice when I want to purchase something. As long as the services on the m-commerce platform continue, I will not switch to another m-commerce platform.

RESULTS AND ANALYSIS

This study employed the PLS-SEM method for inferential statistical analysis using SmartPLS v.4.0.9.9 software (Ringle et al., 2022). The PLS-SEM analysis was conducted in two phases. First, the measurement model was assessed to determine the items' validity and reliability. Subsequently, the structural model was analyzed to evaluate its theoretical explanatory power and the statistical significance of the hypothesized relationships.

Bias Tests

Common Method Bias Despite all the precautions taken in the study design, statistical approaches were employed to assess whether common method bias was a concern. We used the common latent factor for the measurement model before moving to the structural model. The difference in estimates between the two models (without and with a common latent factor) was no more than 0.20, indicating no potential common method bias.

Non-response Bias: We accounted for nonresponse bias by following Armstrong and Overton (1977) and comparing the respondent profile categories of early (25%, $n=137$) and late (25%, $n=137$) respondents. None of the t-tests were significant, indicating no differences in profiles for gender, age, monthly income, highest education level, or marital status between the respondent groups, suggesting that nonresponse bias did not significantly affect our results.

Scale Accuracy Test To examine construct reliability and validity, this study assessed construct reliability and validity using several indices, including indicator loadings, composite Cronbach's alpha (α), reliability (CR), convergent validity, and discriminant validity. As shown in Table 3, the reliability and validity evaluation results showed that all factor loadings for each construct exceeded the recommended threshold of 0.6, ranging from 0.703 to 0.853. Cronbach's alpha and composite reliability values for all constructs exceeded 0.7, demonstrating strong internal consistency. Additionally, each construct's average variance extracted (AVE) exceeded the 0.5 threshold, confirming adequate convergent validity. Discriminant validity was confirmed using both the Fornell–Larcker criterion and cross-loading assessment. According to the Fornell–Larcker criterion, all construct correlations were lower than the square root of the AVE, as shown on the diagonal of the bottom panel of Table 4. The outer loadings of the indicators on their associated constructs were greater than their cross-loadings on other constructs. In conclusion, all constructs met the required reliability and validity criteria.

Table 3 Scale Accuracy Tests

Constructs Dimensions	No. of Scale Items		Item Loading/ Highest Cross Loading	α^a	CR ^b	AVE ^c
	Original	Final				
Gamification	9	9	.897/n.a.; .883/n.a.; .886/n.a	.867	.918	.789
Points	3	3	.846/.742; .828/.750; .767/.708	.745	.855	.663
Badges	3	3	.813/.722; .824/.723; .798/.721	.741	.853	.659
Leaderboards	3	3	.807/.713; .797/.708; .814/.696	.730	.847	.649
Customer Cognitive Engagement	4	4	.797/.415; .781/.381; .740/.339; .775/.337	.777	.781	.598
Perceived Enjoyment	4	4	.766/.384; .755/.369; .764/.453; .770/.406	.762	.764	.583
Repurchase Intention	3	3	.852/.435; .830/.373; .853/.411	.800	.802	.714
^a Cronbach's Alpha	^b Composite Reliability		^c Average Variance Extracted		n.a.: not applicable	

Table 4 Discriminant Validity Assessment

Construct Dimension	Gmf			CCE	PE	RI
	Pts	Bdg	Ldb			
Gamification (Gmf)	.888					
Points (Pts)	n.a	.814				
Badges (Bdg)	n.a	.715	.812			
Leaderboards (Ldb)	n.a	.682	.656	.806		
Customer Cognitive Engagement (CCE)	.414	.363	.310	.423	.773	
Perceived Enjoyment (PE)	.521	.455	.469	.464	.469	.764
Repurchase Intention (RI)	.390	.334	.332	.372	.466	.480
						.845

Note. The bold diagonal elements were the square roots of AVEs; n.a.: not applicable.

Model Fit Analysis

To evaluate how well the exogenous variables explained the endogenous variables in the study, the Q-Square (Q^2) predictive relevance value was assessed, calculated from the R-Square (R^2) values for the dependent variables. The R^2 estimates for the three constructs ranged from 0.259 to 0.321, indicating weak to moderate explanatory power. Furthermore, the Q^2 calculated in this study ranged from 0.150 to 0.218. A Q^2 value between 0 and 1 indicated the model's predictive power, with values closer to 1 indicating a better predictive model. Therefore, our results demonstrated sufficient predictive relevance.

Additionally, we measured SRMR as a goodness-of-fit measure to assess model misspecification. The SRMR value for our model was 0.089, below the 1 threshold, indicating an acceptable fit. Therefore, the model fit could be considered acceptable.

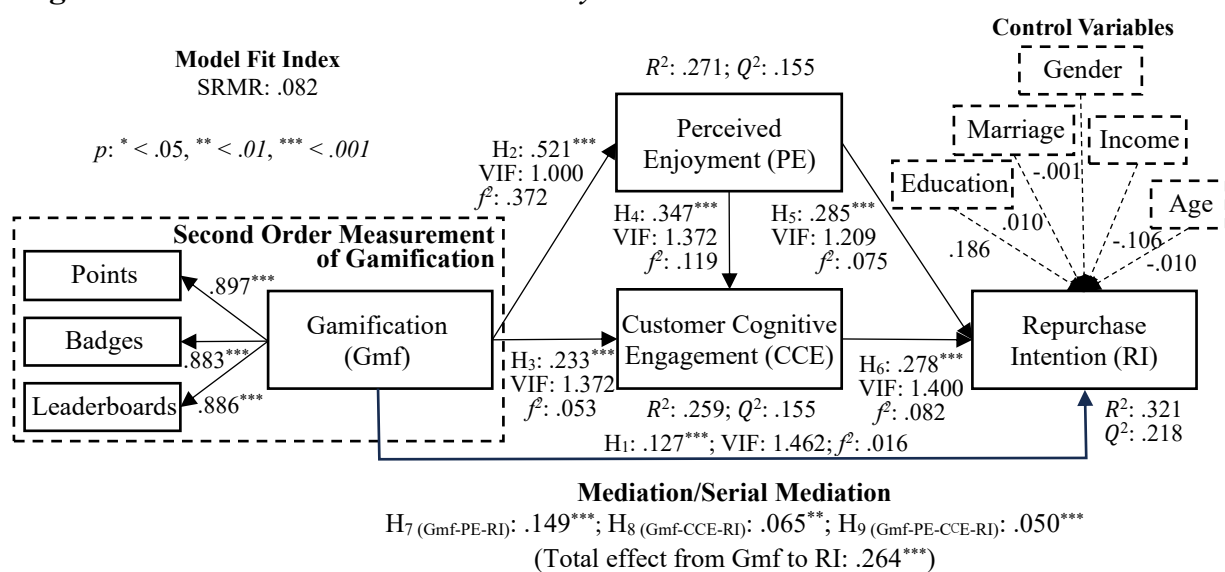
Taken together, both indices showed that our model fit the data well.

Hypothesis Testing

Direct Effect Testing. Overall results of the hypothesis testing for direct effects, as shown in Figure 1, indicated significant direct relationships among the variables in H1–H6. All the coefficient values for these direct effects (i.e., H1=0.127; H2=0.521; H3=0.233; H4=0.347; H5=0.285; H6= 0.278) were supported at a 99.9% confidence level for H2–H6, and 97% for H1. Among the control variables, customers' latest education level was found to influence repurchase intention at the 93% confidence level. For the effect sizes (f^2), the largest effect was 0.372 (H2), followed by H4 with a medium effect ($f^2=0.119$), three paths with small effect sizes (0.053, 0.075, 0.119) of H3, H5, and H6, respectively, and one negligible effect of H1 (0.016). In addition, all variance inflation factor (VIF) values were below the threshold of 3, indicating no critical collinearity issues in our model (see Figure 1).

Indirect Effect Testing All of the hypotheses (i.e., H7 and H8) were supported. Our results showed that H7 was supported, indicating that the relationship between gamification and repurchase intention was mediated by perceived enjoyment ($\beta = 0.149$, $p < 0.001$). H8 was also supported at the 99.9% confidence level ($\beta=0.065$, $p=0.003$). Lastly, our results also support the serial mediation hypotheses of perceived enjoyment and customer cognitive engagement proposed in H9 at a 99.9% confidence level ($\beta = 0.050$), with a total effect of 0.264, which was also supported at the same confidence level.

Figure 1 Research Framework and Analysis Results



Robustness Test

Unobserved Heterogeneity Test

To substantiate the robustness of our findings, Finite Mixture Partial Least Squares (FIMIX-PLS) was employed to assess the potential for unobserved heterogeneity in the dataset (Sarstedt et al., 2020). An analysis using FIMIX-PLS helped us determine whether the dataset contained more than one segment, indicating unobserved heterogeneity. To determine the maximum number of segments to extract, we first computed the minimum sample size required to estimate each segment. The results of a post hoc power analysis using G*Power suggested a minimum sample size of 109, which would allow extraction of up to 5 segments. To examine the number of segments to retain, we assessed the lowest value of the model fit indices for model comparisons of segments 1–5. The lowest value of the model selection criterion indicated that one segment was the best solution (see Table 5). Therefore, the FIMIX-PLS results indicated that unobserved heterogeneity was unlikely to be an issue.

Table 5 *FIMIX-PLS Results for The Relative Segment Sizes and Retention Criteria*

K (no. of pre-specified segments)	Relative Segment Sizes (%)										Sample Size		
	I		II		III		IV		V				
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%	
K=1	550	100									550	100	
K=2	360	65	190	35							550	100	
K=3	324	59	174	32	52	10					550	100	
K=4	321	58	159	29	57	10	14	3			550	100	
K=5	219	53	155	28	55	10	30	5	19	4	550	100	
Segment retention criteria (fit indices)				K=1		K=2		K=3		K=4		K=5	
AIC (Akaike’s information criterion)				4158.934		3714.999		3658.114		3615.232		3588.049	
AIC3 (modified AIC with Factor 3)				4172.934		3743.999		3702.114		3674.232		3662.049	
AIC4 (modified AIC with Factor 4)				4186.934		3772.999		3746.114		3733.232		3736.049	
BIC (Bayesian information criterion)				4219.273		3839.986		3847.75		3869.517		3906.983	
EN (normed entropy statistic)				0		0.625		0.614		0.693		0.702	

Endogeneity Test

Following Sarstedt et al. (2020), the Gaussian copula approach was employed after the Kolmogorov–Smirnov test with Lilliefors correction indicated that the variables in our dataset do not follow a normal distribution. The results of the Gaussian copula tests revealed that none of the Gaussian copulas in different model configurations are significant. Therefore, endogeneity concerns are not raised in our

study.

CONCLUSION

The findings of this study confirm that gamification has a significant and positive influence on repurchase intention on m-commerce platforms, highlighting the importance of gamified features, including badges, points, and leaderboards, in encouraging consumers to make repeat purchases. The findings reveal that gamification features in the m-commerce platform affect perceived enjoyment and customers' cognitive engagement with gamified m-commerce, ultimately increasing repurchase intention.

Theoretical Implications

This study entails several theoretical implications for understanding consumer responses to a growing m-commerce innovation, gamification. We have added to the extant research on online shopping behavior, specifically on the driving forces of purchase intention from the use of gamification elements. Most recent studies on gamification have often focused on the hedonic and utilitarian values of gamification (e.g., Bouzaabia et al., 2024; Yu & Huang, 2022) or on the determinants of m-commerce repurchase intention; however, their scopes are limited to those such as m-commerce ease of use and usefulness (e.g., Chiu et al., 2009) and brand leadership constructs (Kitjaroenchai & Chaipoopiratana, 2022). In the literature, gamification is considered a crucial antecedent of online shopping behavior (García-Jurado et al., 2019; Hwang & Choi, 2020), whereas few articles have investigated its direct effect on repurchase intention (e.g., Hsu, 2023; Kim et al., 2020). The proposed serial mediation model enables the simultaneous examination of dual mechanisms linking the independent antecedent, namely gamification, to the consequent variables within a single integrated model, thereby offering greater insight into how gamification relates to the intention to repurchase on m-commerce platforms. As a result, our findings support the notion that the effect of gamification on repurchase intention in m-commerce is more complex than a simple direct effect on buying intention.

This research also advances theoretical development by integrating SOR and SDT theories, particularly in m-commerce. Although the SOR theory by Mehrabian and Russell (1974) has been widely applied across various fields (e.g., Anisimova et al., 2019), it has lacked explanatory depth regarding why users respond emotionally and cognitively to digital features. By incorporating SDT, this study provides a motivational explanation of how gamification satisfies users' basic psychological needs for competence, autonomy, and relatedness, thereby fostering intrinsic motivation. This

internal drive is reflected in perceived enjoyment and cognitive engagement, which jointly mediate the impact of gamification on repurchase intention. Through this dual-theory integration, the study bridges the structural and psychological models, contributing a more comprehensive account of consumer behavior in gamified environments.

Furthermore, the findings extend gamification research by clarifying the dual affective and cognitive pathways through which gamified elements shape user experience and loyalty. Perceived enjoyment enhances emotional stimulation and satisfaction, while customer cognitive engagement reflects mental involvement and attentional investment. Together, these mechanisms explain how gamified features not only capture attention but also sustain behavioral commitment over time. In doing so, this study deepens theoretical insight into the design and effectiveness of gamification strategies in m-commerce while reinforcing the importance of creating experiences that are both engaging and psychologically fulfilling.

Practical Implications

This study provides important managerial implications for increasing repurchase intention in m-commerce. The findings show that gamification significantly enhances perceived enjoyment and customer engagement, which in turn positively influence repurchase intention (Kim et al., 2020; Xi & Hamari, 2020). Therefore, m-commerce platforms should optimize gamification elements such as points, badges, and leaderboards. Points and badges serve as extrinsic rewards for consumers, boosting the fun and playfulness they experience. In contrast, the leaderboard (ranking) is primarily associated with competitions in which users compare their positions with others (García-Jurado et al., 2019). To enhance the effectiveness of these gamification elements, m-commerce platforms can introduce tiered reward systems that offer progressively valuable incentives based on user engagement levels (Hamari, 2017). However, the reward system should also clearly state how points and badges are earned, making it easier for users to understand how to use the service and triggering their cognitive mechanisms to achieve their goals and enjoy the game. M-commerce platforms should also focus on incorporating social and community-driven gamification features. For example, they can implement multiplayer challenges where users compete or collaborate with friends, fostering a sense of community and brand attachment (Bouzaabia et al., 2024).

In addition, m-commerce designers could incorporate gamification elements with visually appealing interfaces and interactive game features (Hollebeek et al., 2019). Those interfaces and features quickly provide users with greater perceived enjoyment

(García-Jurado et al., 2019). Introducing user-generated content, such as shared achievements and reviews, can also create a more immersive and engaging experience, encouraging repeated interactions (Zhu et al., 2020). Leveraging data analytics to personalize gamification experiences based on user preferences can increase customer retention (Alnawas & Altarifi, 2016). Finally, as seamless integration of gamification across multiple touchpoints is essential for maintaining engagement and driving repurchase behavior (Peng & Kim, 2014), businesses should ensure a consistent user experience across mobile applications and websites. For example, businesses can implement a unified rewards system whereby customers accumulate and redeem points across different shopping channels. By adopting these measures, m-commerce platforms can effectively enhance customer cognitive engagement, perceived enjoyment, and repurchase intention. A combination of well-designed gamification strategies, seamless integration, and personalized user experiences will be key to fostering customer loyalty and maintaining a competitive advantage in the evolving digital marketplace.

Limitations and Recommendations for Further Research

This study has some limitations that open up opportunities for future research. First, it focused solely on Shopee's m-commerce platform in Indonesia, thereby limiting the generalizability of its findings to other e-commerce models or geographic regions (Hwang & Choi, 2020). As such, future research should consider expanding the scope to various e-commerce settings and countries to evaluate the universality of these findings. For example, investigating omnichannel retail platforms, where gamification also plays a crucial role in customer retention (Hamari, 2017), could offer a broader perspective. Additionally, researching emerging markets with high levels of digital adoption, such as India or Brazil, could provide valuable insights into how gamification strategies influence customer engagement and repurchase behavior across diverse cultural and economic contexts (Xi & Hamari, 2020). Such research would offer a more comprehensive understanding of gamification's role in shaping consumer loyalty in diverse settings. Second, this study employs a survey method to collect data, which may have limitations in capturing the depth and complexity of customer interactions (Kim et al., 2020), and the data obtained may be insufficient to capture real behavior in a dynamic m-commerce environment. Future research should employ more diverse methods, such as experiments, behavioral tracking, and in-depth qualitative case studies, to gain a more detailed and accurate understanding of customer engagement mechanisms (Zhu et al., 2020). Such methodological advancements could enhance the robustness of the findings, providing stronger empirical evidence for gamification's

impact on consumer behavior. Third, this study focused on two key mediators, perceived enjoyment and customer cognitive engagement, while other influencing factors may be relevant (Hollebeek et al., 2019). We recommend that future research include additional relevant intervening variables, such as social interactions among users, social influence, and technological awareness, to provide a more holistic picture of gamification's role in m-commerce (Huang et al., 2022; Raman, 2021; Shahzad et al., 2023). Lastly, temporal aspects such as how customer engagement and repurchase intention may evolve also warrant investigation (Bouzaabia et al., 2024). Therefore, to fully understand the long-term dynamics of consumer behavior, future research should employ a longitudinal design, in addition to cross-sectional surveys, to track changes in customer cognitive engagement and repurchase behavior over extended periods (Alnawas & Altarifi, 2016).

Funding: This research was funded by the Badan Penelitian dan Pengabdian Kepada Masyarakat (BPPM) of the Faculty of Economics and Business, Universitas Brawijaya, under the DPP Research Scheme in 2024.

Disclosure statement: The author has declared no conflicts of interest

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