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Unleashing Gamification's Potential: How Reward, Competition, and Cooperation Drive User Retention in Indonesian Mobile Payments

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A B S T R A C T

The mobile payment sector in Indonesia is experiencing rapid growth, yet platforms face significant challenges in user retention. Gamification, the application of game-like elements in non-game contexts, has emerged as a promising strategy to enhance user engagement and loyalty. This study investigates the impact of gamification on user retention within Indonesian mobile payment applications, utilizing the theoretical lenses of affordance theory and social impact theory. Employing structural equation modeling (SEM) with a partial least squares (PLS) approach, we analyzed data collected from an online survey of 462 fintech application users in Indonesia. The findings reveal that reward, competition, and cooperation affordances exert positive and significant effects on social impact dimensions, specifically compliance, identification, and internalization. However, feedback affordance did not demonstrate a significant effect on these dimensions. Furthermore, narrative affordance, representing the storytelling aspect of gamification, moderates the relationship between gamified artifactual affordances and social impact. Notably, compliance strongly influences user retention, while internalization and identification do not show significant direct effects. This research offers valuable insights for mobile payment platforms seeking to cultivate user retention by strategically designing reward systems, fostering healthy competition, facilitating cooperation among users, and crafting compelling narratives to enhance the gamified experience. This study contributes to the body of knowledge by extending the understanding of gamification affordances and their interplay with narrative affordance within mobile payment platforms, providing a novel perspective on how these elements collectively shape user retention in the Indonesian context through the lens of social impact theory.

1. Introduction

The mobile payment sector in Indonesia has witnessed extraordinary expansion in recent years. This surge is clearly illustrated by projections indicating a remarkable 218% increase in mobile wallet users by 2025 (The Asian Banker, 2021). This exponential growth underscores the immense potential and transformative power of mobile payments within the Indonesian market. However, amidst this rapid growth, platforms operating in this dynamic industry grapple with a substantial challenge: customer retention.

The challenge of user retention is particularly pronounced within the financial technology (Fintech) sector. Marketing data reveals that the retention rate for fintech apps is a mere 16% (Marketing.co.id, 2022). This figure is especially concerning when juxtaposed with the reality that customer acquisition costs in the fintech sector tend to be significantly higher than retention costs (Mahajan, 2022). The economic

principle is clear: it is often more cost-effective to retain an existing customer than to acquire a new one. This principle is particularly salient in the fintech industry, where the costs associated with attracting new users can be substantial.

Prior research has consistently underscored the pivotal importance of customer retention for ensuring sustainable profitability and fostering long-term success, especially in markets characterized by intense competition (Suh, 2017). The ability of a company to retain its customer base is not merely a metric of success; it is a fundamental driver of profitability and a cornerstone of long-term viability. This is particularly true in highly competitive markets, where customers have a plethora of options and can easily switch between providers. Moreover, mobile payment platforms in Indonesia face intense internal competition (Statista, 2024). The competitive landscape is fierce, with numerous players vying for market share and customer loyalty.

In response to the challenge of customer retention, several mobile payment platforms in Indonesia have turned to gamification strategies. Gamification, a strategic approach, involves the integration of game-like elements – such as points, badges, leaderboards, and rewards – into non-game contexts. The overarching aim of gamification is to encourage desired behaviors and to amplify user motivation (Deterding, 2011; Hamari, 2017). By incorporating these gamification elements and rewards, platforms strategically aim to harness the power of motivation, competition, and achievement. The goal is to cultivate a more enjoyable, engaging, and ultimately rewarding user experience (Huotari, 2017). Gamification seeks to tap into users' intrinsic desires for accomplishment and social recognition, thereby fostering a sense of loyalty and encouraging continued platform use.

The concept of gamification affordance provides a theoretical lens through which to understand how gamification elements influence user behavior. Rooted in the broader theory of technology affordances, gamification affordance elucidates how the inherent properties of a technology, in this case, gamification, enable or constrain specific behaviors and interactions (Nicholson, 2015). Gamification affordance specifically centers on the affordances—the opportunities for action—provided by gamification elements when applied in non-game contexts (Sailer, 2017). It is not simply about adding game-like features; it is about thoughtfully designing those features to guide users toward desired actions and sustained engagement.

Within the context of rapid growth and poor retention metrics, it is imperative that Indonesian mobile payment platforms develop effective and innovative strategies to foster customer loyalty and ensure sustainable growth. While previous studies have predominantly investigated the factors influencing user retention using well-established theoretical frameworks such as the Technology Acceptance Model (TAM) (Ryu, 2018), a significant gap exists. This gap lies in the exploration of the post-adoption phase through the lens of the affordance theory, with a specific focus on gamification and the key drivers of continued usage and retention. Understanding what motivates users to continue using a platform after the initial adoption is crucial for long-term success.

To address this gap in the existing literature, this research endeavors to examine the impact of gamification on user retention within Indonesian fintech mobile payment platforms. The research seeks to provide valuable insights for mobile payment platforms seeking to bolster customer loyalty in a competitive market. The research is guided by two primary research questions. The first research question explores the overarching impact of gamification on user retention within the specific context of Indonesian fintech mobile payment platforms. This inquiry seeks to establish whether gamification, as a general strategy, is effective in increasing user retention in this market. The second research question delves into the moderating role of

narrative affordance. Narrative affordance is defined as the affordances related to the storytelling and contextual elements that are embedded within the gamified experience (Deterding, 2011). Specifically, this research question investigates how narrative affordance moderates the relationship between gamified artifactual affordances (such as reward, competition, feedback, and cooperation) and social impact (Dzandu, 2022) in mobile payment applications. This aspect of the research builds upon and extends the findings of Zhang (2023) in the context of China, examining whether the moderating role of narrative affordance is consistent across different cultural and market contexts. By thoroughly investigating the impact of gamification on user retention in the Indonesian mobile payment context, this study aims to generate valuable insights that can inform the development of effective gamification strategies.

2. Literature Review

Gamification has emerged as a potent strategy for enhancing user engagement and motivation across diverse contexts, including web services and applications. By integrating game design elements such as points, leaderboards, levels, badges, and challenges, gamification seeks to elicit specific emotions and cognitive responses from users, ultimately driving desired outcomes. The efficacy of gamification is deeply rooted in its capacity to fulfill users' intrinsic needs, which encompass the need for autonomy, competence, and relatedness. Self-Determination Theory (SDT) posits that satisfying these fundamental psychological needs is crucial for fostering intrinsic motivation and well-being. Autonomy involves the need to experience a sense of control and volition in one's actions, competence involves the need to feel effective and capable, and relatedness involves the need to feel connected and belonging to others. Gamification, when designed effectively, can tap into these needs by providing users with choices, challenges, and opportunities for social interaction. However, it is crucial to acknowledge that the success of gamification initiatives can exhibit variability. This variability is contingent upon several factors, including the specific web service in which gamification is implemented, the particular gamification features that are applied, and the unique characteristics of the target users. Contextual factors play a significant role in determining the effectiveness of gamification. For example, gamification strategies that are successful in a social networking app may not be as effective in a productivity tool. Similarly, different user groups may respond differently to the same gamification elements. Therefore, a nuanced understanding of the target context and users is essential for designing effective gamification. The concept of affordances, originating from ecological psychology, provides a valuable lens through which to examine how individuals interact with their environment. Affordances, as defined by Henseler (2015), refer to the action possibilities that the environment offers to an actor. In the context of gamification, affordances represent the various elements or features that are integrated into gamified systems with the overarching goal of enhancing user engagement and motivation. These affordances are not limited to a single dimension; rather, they can be oriented towards a variety of aspects of user experience. Koivisto (2019) categorized gamification affordances into several orientations, including achievement/progression, social interaction, experience, and real-world applications. Achievement/progression affordances provide users with a sense of accomplishment and progress through elements like points, levels, and badges. Social interaction affordances facilitate social connections and competition through features like leaderboards and challenges. Experience affordances focus on creating enjoyable and immersive experiences through elements like narratives and exploration. Real-world application affordances connect gamified activities to

tangible outcomes or benefits in the real world. A comprehensive understanding and strategic utilization of these diverse affordances are paramount for the design of effective gamified systems that are capable of meeting the needs and preferences of users. Designers must carefully consider which affordances to incorporate and how to combine them to create a cohesive and engaging user experience (Wee, 2019).

Gamified Artifactual Affordance encompasses specific game design elements that are intentionally incorporated into systems or platforms to enhance user engagement and retention (Ringle, 2015). These elements serve as the building blocks of gamified experiences, shaping user behavior and motivation. Prominent examples of gamified artifactual affordances include rewards, competition, feedback, and cooperation. These elements have been extensively studied within the gamification literature, and research has consistently demonstrated their potential to yield promising results across a wide spectrum of domains.

Rewards constitute a fundamental aspect of gamification, functioning as incentives that are provided to users upon the completion of tasks or the achievement of milestones. Reward affordance, specifically, pertains to the perception of opportunities to receive rewards within a gamified system. These rewards can take various forms, including points, badges, virtual currency, and unlockable content. Self-determination theory (SDT) posits that rewards have the potential to enhance intrinsic motivation by fulfilling the need for competence and instilling a sense of accomplishment. By providing users with tangible or symbolic recognition of their efforts and achievements, rewards can reinforce their sense of efficacy and mastery. However, it is crucial to emphasize that the design of reward structures is of paramount importance. Poorly designed rewards have the potential to undermine intrinsic motivation and elicit undesirable outcomes. For example, if rewards are perceived as controlling or manipulative, they can decrease users' sense of autonomy and undermine their intrinsic motivation. Feng (2018) cautioned against the use of extrinsic rewards in a way that undermines intrinsic motivation, highlighting the importance of carefully considering the context and design of reward systems. Empirical studies have consistently demonstrated the positive influence of rewards on user engagement and motivation within gamified systems. Zhang (2023) discovered that points, levels, and leaderboards had a significant impact on increasing user performance and enjoyment in an image annotation task. Similarly, Sailer (2017) demonstrated that badges and leaderboards enhanced users' competence need satisfaction and intrinsic motivation within a gamified learning environment. These findings underscore the potential of rewards to drive user behavior and enhance the overall gamified experience. Rewards in gamification serve as external motivators that have the capacity to trigger users' sense of achievement and progress. They provide users with tangible or symbolic evidence of their accomplishments, reinforcing their efforts and encouraging continued engagement. Well-designed reward structures have the potential to enhance the gameplay aspects of a gamified system, thereby providing users with a greater sense of meaning and purpose. When users perceive that their actions are contributing to a larger goal or purpose, they are more likely to experience a sense of fulfillment and satisfaction. As a result, users may experience higher levels of internalization, identification, and compliance, which in turn leads to sustained feelings of achievement and elevated self-esteem (Xi, 2020). Internalization refers to the process by which individuals adopt the values and goals of the gamified system as their own. Identification involves the extent to which individuals perceive themselves as part of the system or community. Compliance refers to the extent to which individuals conform to the rules, expectations, and norms of the system.

Competition represents a fundamental human drive that has been leveraged across various domains to motivate individuals and enhance performance. In gamification, competition affordance refers to the degree to which a gamified system enables users to compare their performance with that of others and strive to outperform them. This comparison can take various forms, such as leaderboards, rankings, and direct challenges. Social comparison theory (Deutsch, 1955) posits that individuals possess an innate desire to evaluate their abilities and opinions by comparing themselves with others. Gamification strategically leverages this inherent desire by providing leaderboards, rankings, and other competitive elements that empower users to assess their performance in relation to their peers. These competitive features create a social context within the gamified system, motivating users to strive for improvement and excellence. Research has demonstrated that competition within gamified systems can elicit both positive and negative effects on user motivation and engagement. On the positive side, competition has the potential to enhance users' sense of competence and self-efficacy. As users engage in competitive activities and strive to outperform others, they may experience a boost in their confidence and belief in their abilities. Sailer (2017) found that competition can increase users' sense of competence as they strive to improve their performance. Furthermore, competition can foster a sense of social connectedness as users interact and compete with one another. Bagozzi (2002) highlighted the potential of competition to create opportunities for social interaction and connection among users. Conversely, it is essential to acknowledge that poorly designed competition has the potential to lead to negative outcomes. These negative outcomes may include decreased intrinsic motivation, heightened stress levels, and increased anxiety. Chen (2020) cautioned against the potential negative effects of competition, such as decreased intrinsic motivation. To maximize the benefits of competition affordance while mitigating its potential drawbacks, gamified systems should prioritize careful design and balance within the competitive elements. This can be achieved through various strategies, such as matching users with similar skill levels, providing multiple pathways to success, and emphasizing self-improvement and personal growth rather than solely focusing on direct comparison with others. When competition is thoughtfully designed and implemented in a meaningful and engaging manner, it can empower users to interact, develop strategies, and learn from their peers (Braojos, 2019). This collaborative and interactive environment can foster a greater sense of self-progress and meaningful internalization, identification, and compliance within the gamified system.

Feedback plays a crucial role in learning and motivation, providing individuals with valuable information about their performance and guiding their actions in the future. In the context of gamification, feedback affordance refers to the provision of comments and metrics pertaining to user performance within a gamified system. Feedback functions as a gamification artifact that has the potential to enhance intrinsic motivation and improve performance by fostering a sense of recognition and value among users. When users receive feedback that acknowledges their efforts and achievements, they are more likely to feel appreciated and motivated to continue engaging with the system. The importance of feedback in motivation and learning is well-established in the literature. Feedback intervention theory (Gillies, 2016) suggests that feedback interventions can exert a significant impact on task performance. However, the extent of this impact is contingent upon the nature of the feedback itself, as well as the characteristics of the task and the individual receiving the feedback. Effective feedback should possess several key characteristics: it should be timely, specific, and actionable. Timely feedback ensures that users receive

information about their performance while it is still relevant and useful. Specific feedback provides users with clear and detailed information about their strengths and areas for improvement. Actionable feedback offers users concrete guidance on how to enhance their performance and progress towards their goals. Within gamified systems, feedback can manifest in various forms, including progress bars, achievement notifications, and personalized messages (Hair, 2017). These feedback mechanisms serve as a form of social recognition, acknowledging users' efforts and accomplishments. By providing users with a sense of competence and self-efficacy, feedback has the potential to enhance their intrinsic motivation and engagement. Sailer (2017) demonstrated that feedback can enhance users' sense of competence and self-efficacy. Furthermore, feedback affordance has the capacity to reinforce users' self-presentation and self-identity within the gamified system. As users receive positive feedback and recognition for their achievements, they may experience a heightened sense of belonging and identification with the system and its community. This increased sense of belonging and identification can lead to increased internalization, identification, and compliance within the gamified system.

Cooperation is fundamental to human social interaction, enabling individuals to work collaboratively towards common goals and objectives. In the realm of gamification, cooperation affordance refers to design elements that facilitate collaborative behaviors and teamwork among users. These elements provide users with opportunities to engage in cooperative activities within the gamified system. The benefits of cooperation in learning and motivation have been extensively documented in the literature. The social interdependence theory (Johnson, 2009) posits that positive interdependence, wherein individuals perceive that their success is linked to the success of others, can lead to increased motivation, enhanced social support, and greater achievement. Cooperative learning, as a pedagogical approach, has been shown to enhance academic performance, foster the development of social skills, and improve self-esteem. Gillies (2016) provided a comprehensive review of the benefits of cooperative learning. In gamified systems, cooperation affordance can be implemented through a variety of design elements. Examples of such elements include team challenges, group rewards, and collaborative tasks. These elements encourage users to work together, share knowledge, and provide support to one another in the pursuit of common goals. By fostering a sense of social connectedness and belongingness, cooperation affordance has the potential to enhance users' intrinsic motivation and engagement within the gamified system. Xi (2019) highlighted the role of cooperation in fostering social connectedness and enhancing user engagement. Moreover, cooperation affordance can exert a positive influence on users' internalization, identification, and compliance within the gamified system. As users engage in collaborative activities and experience the benefits of teamwork, they may develop a stronger sense of identification with the system and its community. This enhanced sense of identification can lead to increased internalization of the system's values and norms, as well as greater compliance with its rules and expectations.

Narrative affordance represents a prominent gamified situational affordance. It refers to the extent to which users become absorbed into a story or transported into a narrative that is embedded within the gamification mechanisms of a platform. Zhang (2023) defined narrative affordance as the extent to which users are absorbed into a story within a gamified system. The power of narratives to engage and motivate individuals has been widely recognized across various fields, including education, marketing, and entertainment. Narrative transportation theory (Shao, 2018) suggests that when individuals become immersed in a story, they may undergo changes in their beliefs, attitudes, and behaviors, aligning with

the story's themes and messages. This immersion can lead to a state of "narrative transportation," where individuals feel as if they are entering the world of the story. In gamification, narrative affordance can be implemented through the integration of storytelling elements. Examples of such elements include character development, plot progression, and world-building. These elements have the potential to create an immersive and engaging experience for users, fostering a stronger emotional connection and identification with the gamified system. By providing a meaningful context for users' actions and achievements, narrative affordance can amplify the effects of gamified artifacts on internalization, identification, and compliance. When users perceive that their actions have a purpose within a larger narrative, they are more likely to feel motivated and engaged (Mullins, 2020). However, it is important to note that the influence of narrative affordance on the relationship between gamified artifacts and user engagement may vary depending on the specific context and type of affordance. For instance, in contexts that prioritize recreational storytelling over competition, the motivation for competition affordance may conflict with the harmonious, leisure-oriented narrative. This conflict can potentially weaken the effect of competition affordance on engagement. In such cases, the narrative affordance may prioritize cooperation and social interaction, placing less emphasis on competitive elements.

Social impact theory, proposed by Ryu (2018), provides a framework for understanding how individuals are influenced by others in terms of their beliefs, attitudes, thinking, and actions. The theory posits that the strength of social influence is dependent on three key factors: the number of people exerting the influence (strength), the immediacy of the influence (immediacy), and the importance of the influencing group to the individual (source). These factors collectively determine the likelihood and extent of social impact. In the context of gamified mobile payment systems, social impact theory offers valuable insights into how individuals may be influenced to adopt and use the system based on the views and behaviors of others. The perceived opinions and actions of peers, family members, and social groups can play a significant role in shaping an individual's decision to use a particular mobile payment platform. Based on the work of Nicholson (2015), social impact can be further divided into three distinct dimensions: internalization, identification, and compliance. Internalization refers to the process by which individuals adopt the values and norms of a system as their own, leading to a deeper sense of engagement and commitment. When users internalize the goals and values of a gamified system, they are more likely to continue using the system over an extended period, as it aligns with their personal beliefs and preferences. Chen (2020) explored the concept of internalization within the framework of self-determination theory, highlighting its importance for autonomous motivation. Identification, in contrast, pertains to the extent to which individuals perceive themselves as being part of a system or community. In the context of gamified systems, identification can be fostered through social interaction, teamwork, and a sense of belonging. Users who strongly identify with a gamified system are more likely to remain loyal and engaged as they derive a sense of meaning and purpose from their participation. Feng (2018) provided a foundational understanding of identification as a key aspect of social identity theory. Finally, compliance refers to the extent to which individuals conform to the rules, expectations, and norms of a system. In gamified systems, compliance can be encouraged through various mechanisms, including rewards, penalties, and social pressure. Users who comply with the system's requirements are more likely to continue using the system, as they perceive it as a necessary or desirable part of their routine. Gillies (2016) work laid the groundwork for understanding compliance as a form of social influence. Empirical studies have

consistently demonstrated the relevance of social impact theory across various domains, including technology adoption and usage. For example, Bagozzi (2002) discovered that social influence, specifically in the form of group norms and social identity, exerted a significant effect on users' intentions to participate in virtual communities. Similarly, Hamari (2017) demonstrated that subjective norm, a construct closely related to social influence, was a key determinant of technology acceptance and usage. In the context of gamified mobile payment systems, social impact theory suggests that individuals may be more inclined to adopt and use the system if they perceive that their peers and social groups are also doing so. The influence of others can operate through various mechanisms, such as informational influence and normative influence. Informational influence involves relying on others for information and guidance, while normative influence involves conforming to others' expectations and norms. Deutsch (1955) differentiated between informational and normative social influence. As individuals observe their peers using and deriving benefits from the gamified mobile payment system, they may experience a heightened sense of relational value and satisfaction. This positive social influence can lead to increased internalization, identification, and compliance with the system.

User retention is a critical metric for evaluating the success and long-term viability of gamified systems. It reflects the continued and sustained usage of a system by users over time, indicating their loyalty and engagement. In the highly competitive landscape of mobile applications and services, user retention poses a significant challenge. Users have access to a wide array of options and can easily switch to alternative systems if their needs and expectations are not adequately met (Henseler, 2015). Numerous factors can exert an influence on user retention within gamified systems. These factors encompass the design and quality of the system itself, the effectiveness of the gamification elements that are implemented, and the social and psychological factors that drive user engagement. Social impact factors, such as internalization, identification, and compliance, have been identified as important determinants of user loyalty. Dzandu (2022) highlighted the importance of social impact factors in user retention. Empirical evidence lends support to the positive relationship between social impact factors and user retention in gamified systems. Hamari (2017) discovered that social influence, specifically in the form of perceived reciprocal benefits and network exposure, significantly predicted continued use intentions within a gamified exercise application. Similarly, Zhang (2023) demonstrated that social comparison and social competition were key drivers of user engagement and retention in a gamified language learning application. Bitrián (2021) also emphasized the role of gamification in enhancing user engagement in mobile apps.

3. Methods

This research employed a robust quantitative approach to empirically investigate the proposed research framework and test the stated hypotheses. The study utilized structural equation modeling (SEM) with partial least squares (PLS) estimation. The capacity of PLS-SEM to simultaneously assess these complex relationships makes it a powerful tool for analyzing the interplay between gamification affordances, social impact dimensions, narrative affordance, and user retention within the context of mobile payment platforms.

The study utilized an online survey questionnaire to collect data from a sample of mobile payment platform users in Indonesia. Participants were specifically targeted based on their prior experience with gamification features within these platforms. This focus ensured that the data collected reflected the perceptions and experiences of individuals who had direct exposure to the phenomena under investigation. The use of an online survey facilitated the collection of data from a geographically dispersed sample,

increasing the generalizability of the findings. The questionnaire itself was meticulously designed, with items adapted from established scales that are well-recognized and validated within the existing literature. This approach ensured the content validity and reliability of the measures used in the study. These scales were employed to measure the key constructs of interest, which included gamified artifactual affordances (such as reward, competition, feedback, and cooperation), narrative affordance, the dimensions of social impact (internalization, identification, and compliance), and user retention. To capture the nuances of participant responses, a 7-point Likert scale was utilized for all measurement items. This scale provided participants with a range of options to express the extent of their agreement or disagreement with each statement, allowing for a more granular and sensitive measurement of their perceptions and attitudes. The use of a Likert scale is a common practice in social science research and is well-suited for measuring subjective constructs.

Determining an appropriate sample size is a critical step in quantitative research to ensure adequate statistical power and the ability to detect meaningful effects. In this study, the target sample size was carefully determined based on the 10-times rule. This rule is a widely accepted guideline in PLS-SEM, suggesting that the minimum sample size should be 10 times the number of formative indicators or the number of structural paths that are leading to the most complex endogenous construct in the model. Considering the complexity of the research model, which involved multiple constructs and relationships, a target sample size of at least 300 respondents was established. However, the study aimed to exceed this minimum requirement to further enhance the statistical power and robustness of the findings. The final sample size achieved was 462.

The data analysis process was conducted using a rigorous two-step approach. This systematic approach allowed for a thorough evaluation of both the measurement properties of the data and the structural relationships between the constructs. The first step involved a comprehensive assessment of the measurement model. This assessment focused on evaluating the reliability and validity of the measures used in the study. Reliability refers to the consistency and stability of the measurements, indicating the extent to which the measures are free from random error. Validity, on the other hand, refers to the extent to which the measures accurately reflect the constructs they are intended to measure. Several criteria were used to assess the reliability and validity of the measurement model. These criteria included composite reliability, average variance extracted (AVE), and discriminant validity; Composite Reliability: This measure assesses the internal consistency reliability of a construct, taking into account the different weights of the indicators. A composite reliability value of 0.70 or higher is generally considered acceptable, indicating good internal consistency; Average Variance Extracted (AVE): This measure assesses the convergent validity of a construct, indicating the extent to which the construct explains the variance of its indicators. An AVE value of 0.50 or higher is generally considered acceptable, suggesting that the construct explains more variance in its indicators than error variance; Discriminant Validity: This measure assesses the extent to which a construct is distinct from other constructs in the model. Discriminant validity was assessed using the Fornell-Larcker criterion, which compares the square root of the AVE of each construct with its correlations with other constructs. Discriminant validity is established if the square root of the AVE of each construct is greater than its highest correlation with any other construct.

The second step of the data analysis involved a thorough evaluation of the structural model. This evaluation focused on examining the hypothesized relationships between the constructs and assessing the overall explanatory power of the model. The structural model was evaluated using several

techniques and criteria. These included; Path Coefficients: These coefficients represent the strength and direction of the relationships between the constructs. The significance of the path coefficients was assessed using bootstrapping procedures; Significance Levels: Bootstrapping is a non-parametric resampling technique that is used to estimate the standard errors and significance levels of the path coefficients. This technique involves repeatedly resampling from the original data and estimating the model parameters for each resampled dataset. The resulting distribution of parameter estimates is used to calculate the standard errors and p-values; Explanatory Power: The explanatory power of the model was assessed using R-squared values. The R-squared value represents the proportion of variance in an endogenous construct that is explained by its predictor constructs. Higher R-squared values indicate greater explanatory power; SRMR: The goodness of fit of the model was assessed using the Standardized Root Mean Square Residual (SRMR).

To ensure the integrity and validity of the research findings, several approaches were employed to address potential biases that could have influenced the results. These approaches included; Anonymity for Survey Participants: Participants were assured of their anonymity to encourage honest and unbiased responses. This assurance helps to minimize social desirability bias, which is the tendency for respondents to provide answers that they believe are more socially acceptable, rather than their true opinions or experiences; Attention Trap Questions: Attention trap questions were strategically inserted throughout the survey to identify and filter out respondents who were not paying careful attention to the questions. These questions were designed to be simple and straightforward, with an obvious correct answer. Respondents who failed to answer these questions correctly were excluded from the analysis, ensuring the quality of the data; Marker Variable: A marker variable was included in the survey to control for common method bias. Common method bias is a potential source of error that can occur when data is collected from a single source using a single method. The marker variable, which is a construct that is theoretically unrelated to the other constructs in the model, was used to estimate the extent of common method bias in the data.

To examine the moderating effect of narrative affordance, multi-group analysis was conducted. This technique allows for the comparison of model parameters across different groups, in this case, groups that differ in their levels of narrative affordance. By comparing the path coefficients and other model parameters across these groups, the moderating effect of narrative affordance on the relationships between gamified artifactual affordances and social impact was assessed.

Mediation tests were also performed to gain a deeper understanding of the underlying mechanisms through which gamification affordances influence user retention. Mediation analysis examines whether the relationship between an independent variable and a dependent variable is mediated by a third variable, known as the mediator. In this study, mediation tests were used to explore the mediating role of social impact dimensions in the relationship between gamified artifactual affordances and user retention.

Finally, the overall model fit was assessed using appropriate indices. Model fit indices provide an indication of how well the hypothesized model fits the observed data. These indices help to determine whether the model is a plausible representation of the relationships between the constructs.

The data analysis was primarily conducted using SmartPLS 3. This software is a widely used tool for PLS-SEM analysis, providing a user-friendly interface and a comprehensive set of features for model estimation and evaluation. The chosen methodological approach aligns closely with the research questions and the proposed research framework. By employing PLS-SEM, the study was able to effectively examine the

complex relationships between the multiple constructs included in the model. The use of PLS-SEM also facilitated the testing of the hypothesized moderating and mediating effects, providing valuable insights into the intricate interplay between gamification affordances, narrative affordance, social impact, and user retention. The use of an online survey as the data collection method ensured the feasibility of gathering data from a relevant and representative sample of mobile payment platform users. The online format allowed for efficient data collection from a geographically diverse population, enhancing the generalizability of the findings. Furthermore, the rigorous analytical techniques employed, along with the various bias-control measures implemented throughout the study, contributed to enhancing the overall robustness and validity of the research findings. These methodological choices strengthen the confidence in the results and their implications for both theory and practice.

4. Results and Discussion

Table 1 presents a breakdown of the study's 462 respondents across four key demographic and usage-related features: gender, age, education level, and usage experience with mobile payment platforms. This table serves to provide a clear snapshot of the sample's composition, allowing readers to understand the characteristics of the individuals whose responses form the basis of the research findings; Gender Distribution: The sample shows a relatively balanced gender distribution. There are slightly more female respondents (243, or 52.60%) than male respondents (219, or 47.40%). This near-equal representation of genders suggests that the study's findings are likely to be broadly applicable across genders within the Indonesian mobile payment user population. The minor overrepresentation of females could reflect actual usage patterns in the population or slight variations inherent in sampling; Age Demographics: The age distribution is heavily skewed towards younger individuals. The largest group is the 18-25 age bracket (237, or 51.29%), followed by the 26-42 age group (184, or 39.82%). Older age groups are significantly less represented, with the 42-57 group comprising only 7.14% (33) and those over 57 making up just 1.75% (8) of the sample. This age distribution is consistent with the general adoption patterns of mobile technology, particularly in developing economies. Younger demographics tend to be early adopters of new technologies, including mobile payments. The dominance of younger respondents suggests that the study's results primarily reflect the experiences and perceptions of this tech-savvy group. Researchers should acknowledge this limitation when generalizing the findings to older populations; Education Levels: The sample is well-educated. The largest segment holds a Bachelor's Degree (257, or 55.62%). A significant portion also has a High School education (153, or 33.12%). Relatively few respondents have Associate Degrees (2, or 0.43%) or Academy qualifications (1, or 0.22%). Master's Degrees are held by 8.66% (40) and Doctoral Degrees by 1.73% (8). The high proportion of respondents with Bachelor's degrees suggests that the sample has a relatively high level of formal education. This may indicate that mobile payment adoption is more prevalent among educated individuals, possibly due to increased access to financial services, technological literacy, or higher income levels. The presence of a sizable high school educated group indicates that mobile payments are also used across a broader educational spectrum. The very small numbers in the Associate Degree and Academy categories might be due to how those educational levels are structured or classified within the Indonesian context; Usage Experience: The distribution of usage experience shows a varied range. The most frequent category is 3-4 years of usage (196, or 42.42%), followed by >4 years (137, or 29.66%), and then 1-2 years (129, or 27.92%). The fact that the majority of respondents have been using mobile payment platforms for 3-4 years or more suggests that

the sample has a reasonable level of familiarity with these technologies. This is important because it implies that respondents are likely to have formed stable opinions and usage habits, making their feedback valuable for understanding long-term user retention. The presence of respondents with 1-2 years of experience also provides a perspective from those who are relatively newer to the technology.

Table 1. Respondent profile.

Feature	Category	Frequency	Percentage
Gender	Male	219	47.40%
	Female	243	52.60%
Age	18-25	237	51.29%
	26-42	184	39.82%
	42-57	33	7.14%
	>57	8	1.75%
Education	High School	153	33.12%
	Associate Degree	2	0.43%
	Academy	1	0.22%
	Bachelor's Degree	257	55.62%
	Master's Degree	40	8.66%
	Doctoral Degree	8	1.73%
Usage experience	1-2 years	129	27.92%
	3-4 years	196	42.42%
	>4 years	137	29.66%

Table 2 presents the results of reliability tests conducted on the variables used in the study. Reliability, in this context, refers to the consistency and stability of the measurements. It essentially indicates the degree to which the measures are free from random error and provide dependable results. High reliability is crucial because it ensures that the measures are consistently capturing the underlying constructs they are intended to measure. The first column shows Cronbach's Alpha, a widely used measure of internal consistency reliability. This statistic assesses the extent to which the items within a scale or construct are inter-related and measuring the same underlying concept. A high Cronbach's Alpha value suggests that the items within a scale are closely related and that the scale is measuring a single, coherent construct. The table reveals that all variables demonstrate strong internal consistency. The Cronbach's Alpha values range from 0.742 to 0.936. Variables like "Competition Affordance," "Feedback Affordance," "Cooperation Affordance," and "Narrative Affordance" exhibit particularly high Cronbach's Alpha values, indicating excellent internal consistency among their respective measurement items. Even the variable with the lowest Cronbach's Alpha, "Reward Affordance," still demonstrates acceptable reliability. The table also presents two measures of Composite Reliability, denoted as ρ_a and ρ_c. Composite reliability is another measure of internal consistency, similar to Cronbach's Alpha, but it may be more suitable in certain situations, such as when using structural equation modeling. It considers the factor loadings of the items in the scale. Both ρ_a and ρ_c provide further evidence of the reliability of the measures. The Composite Reliability values (both ρ_a and ρ_c) generally support the findings from Cronbach's Alpha. The ρ_c values are all above commonly accepted thresholds, indicating good internal consistency.

Table 2. Reliability test results.

Variable	Cronbach's Alpha	Composite Reliability (ρ_a)	Composite Reliability (ρ_c)
Competition Affordance	936	1.100	957
Compliance	840	841	893
Cooperation Affordance	920	943	949
Feedback Affordance	931	1.024	954
Identification	847	848	907
Internalization	832	833	899
Narrative Affordance	924	1.053	946
Reward Affordance	742	809	849
User Retention	834	838	900

Table 3 presents the outer loadings of the main variables used in the study. Outer loadings, in the context of structural equation modeling (SEM), particularly when using Partial Least Squares (PLS), represent the correlation between each indicator (or measurement item) and its respective latent variable (or construct). In simpler terms, they illustrate the strength and direction of the relationship between a specific survey question or item and the broader concept it's designed to measure. A high outer loading indicates that the indicator is strongly related to its latent variable, meaning it's a good measure of that construct. Conversely, a low outer loading suggests a weaker relationship, implying that the indicator may not be a very good measure of the construct. The table shows a matrix of loadings, where each row represents an indicator and each column represents a latent variable. The value at the intersection of a row and a column shows the outer loading of that indicator on that latent variable. The indicators CM1, CM2, CM3, and CM4 all have substantial outer loadings on the Compliance construct. This suggests that these indicators are effectively measuring the concept of compliance within the context of the study. Each indicator contributes meaningfully to defining and quantifying compliance. The indicators COL1, COL2, and COL3 have very high outer loadings on the Cooperation Affordance construct. These strong loadings indicate that these indicators are excellent measures of cooperation affordance. They strongly represent the underlying concept of how the system affords or enables cooperation. The indicators COM1, COM2, and COM3 all exhibit high outer loadings on the Competition Affordance construct. This signifies that these indicators are strongly associated with and accurately reflect the competition affordance aspect being measured. The indicators FEE1, FEE2, and FEE3 demonstrate high outer loadings on the Feedback Affordance construct. These strong loadings imply that these indicators are reliable and valid measures of feedback affordance, effectively capturing how feedback is perceived and experienced within the system. The indicators ID1, ID2, and ID3 have strong outer loadings on the Identification construct. This indicates that these indicators are effectively measuring the extent to which users identify with the system or platform. The indicators IN1, IN2, and IN3 show high outer loadings on the Internalization construct. This suggests that these indicators are accurately measuring the degree to which users have internalized the values and goals of the system. The indicators NAR1, NAR2, and NAR3 all have high outer loadings on the Narrative Affordance construct. These strong loadings indicate that these indicators are good measures of narrative affordance, reflecting how effectively the system incorporates and delivers

narrative elements. The indicators REW1, REW2, and REW3 demonstrate acceptable outer loadings on the Reward Affordance construct. While not as uniformly high as some other constructs, they still contribute meaningfully to measuring reward affordance. The indicators UR1, UR2, and UR3 exhibit strong outer loadings on the User Retention construct. This signifies that these indicators are effectively capturing the concept of user retention.

Table 3. Outer loadings of main variables.

Indicator	CM	COM	COL	FEE	ID	IN	NAR	REW	UR
CM1	0.768								
CM2	0.824								
CM3	0.839								
CM4	0.855								
COL1			0.934						
COL2			0.969						
COL3			0.914						
COM1		0.941							
COM2		0.935							
COM3		0.905							
FEE1				0.957					
FEE2				0.929					
FEE3				0.920					
ID1					0.877				
ID2					0.855				
ID3					0.893				
IN1						0.850			
IN2						0.872			
IN3						0.873			
NAR1							0.958		
NAR2							0.864		
NAR3							0.946		
REW1								0.737	
REW2								0.801	
REW3								0.880	
UR1									0.867
UR2									0.881
UR3									0.850

CM: Compliance; COM: Competition Affordance; COL: Cooperation Affordance; FEE: Feedback Affordance; ID: Identification; IN: Internalization; NAR: Narrative Affordance; REW: Reward Affordance; UR: User Retention.

Table 4 presents the outer loadings for the moderation variables in the study. In this context, moderation analysis examines whether the relationship between two variables is influenced by a third variable, known as the moderator. The moderation variables in this table are interaction terms created by combining Narrative Affordance (NAR) with each of the gamified artifactual affordances: Cooperation Affordance (COL), Competition Affordance (COM), Feedback Affordance (FEE), and Reward Affordance (REW). These interaction terms (NAR x COL, NAR x COM, NAR x FEE, and NAR x REW) are used to assess if and how Narrative Affordance influences the strength or direction of the relationships between the other affordances and the outcome variables (likely social impact dimensions in this study). Outer loadings, as discussed previously, indicate the strength of the

relationship between an indicator and its latent variable. In this case, since the moderation variables are themselves single interaction terms, the outer loading essentially reflects the "purity" or distinctiveness of that interaction term.

Table 4. Outer loadings for moderation variables.

	NAR x COL	NAR x COM	NAR x FEE	NAR x REW
NAR x COL	1.000			
NAR x COM		1.000		
NAR x FEE			1.000	
NAR x REW				1.000

Table 5 presents the Average Variance Extracted (AVE) values for the variables in the study. AVE is a measure of convergent validity, which assesses the extent to which a construct is related to its indicators. In simpler terms, it indicates the average amount of variation in the indicator variables that is explained by the latent variable it is supposed to measure. A higher AVE value suggests that the latent variable explains a greater proportion of the variance in its indicators, indicating strong convergent validity. A lower AVE value suggests that the latent variable explains less variance in its indicators, which may indicate weaker convergent validity.

Table 5. AVE results.

Variable	Average variance extracted (AVE)
Competition Affordance	0,882
Compliance	0,676
Cooperation Affordance	0,86
Feedback Affordance	0,875
Identification	0,766
Internalization	0,748
Narrative Affordance	0,854
Reward Affordance	0,653
User Retention	0,75

Table 6 presents the results of a Fornell-Larcker analysis, a method used to assess discriminant validity in structural equation modeling (SEM), particularly in Partial Least Squares (PLS). Discriminant validity refers to the extent to which a construct is distinct from other constructs. In other words, it checks whether a construct truly measures what it's supposed to measure and not something else. The Fornell-Larcker criterion achieves this by comparing the square root of the Average Variance Extracted (AVE) for each construct with its correlations with other constructs. The values on the diagonal (in bold) represent the square root of the AVE for each construct. The off-diagonal values represent the correlations between the constructs. To establish discriminant validity using the Fornell-Larcker criterion, the square root of the AVE for each construct (the diagonal values) should be greater than its correlations with all other constructs (the off-diagonal values in the same column and row).

Table 6. Fornell-Larcker analysis.

	CM	COM	COO	FEE	ID	IN	NAR	REW	UR
CM	**0.822**								
COM	0.082	**0.939**							
COO	0.313	-0.193	**0.928**						
FEE	0.220	-0.474	0.527	**0.935**					
ID	0.811	0.088	0.339	0.254	**0.875**				
IN	0.783	0.104	0.365	0.228	0.859	**0.865**			
NAR	0.115	-0.479	0.501	0.654	0.156	0.143	**0.924**		
REW	0.385	-0.030	0.148	0.234	0.374	0.359	0.141	**0.808**	
UR	0.649	0.017	0.211	0.152	0.599	0.580	0.039	0.277	**0.866**

Table 7 presents the Standardized Root Mean Square Residual (SRMR) value for the estimated model. The SRMR is a goodness-of-fit index used in structural equation modeling (SEM), including Partial Least Squares SEM (PLS-SEM). It assesses the difference between the observed correlations and the model-implied correlations. In simpler terms, it measures how well the model predicts the relationships between the variables in the data. A lower SRMR value indicates a better fit between the model and the data, meaning the model is accurately reproducing the observed relationships. A higher SRMR value suggests a poorer fit, indicating that the model is not adequately capturing the relationships in the data.

Table 7. SRMR value.

Goodness of fit criteria	Estimated model
SRMR	0,082

Table 8 presents the results of hypothesis testing, likely using a statistical test within the context of structural equation modeling (SEM). It provides information about the significance of the relationships between the variables in the model. The table shows the original sample estimates, test statistics (T-statistics), p-values, and the conclusions drawn about each hypothesized relationship (Result). The table is organized to show each hypothesized relationship, represented by "Description," and the corresponding statistical test results; Description: This column specifies the relationship being tested. It typically shows the direction of the hypothesized effect (e.g., Reward Affordance -> Compliance). The "x" symbol indicates an interaction or moderating effect (e.g., Narrative Affordance x Reward Affordance -> Compliance); Original Sample (O): This column presents the estimated coefficient for the relationship based on the original data. It indicates the strength and direction (positive or negative) of the effect; T Statistics (|O/STDEV|): This column provides the T-statistic, which is a measure of how statistically significant the estimated coefficient is. A larger absolute T-statistic generally indicates stronger evidence against the null hypothesis (i.e., more evidence that the relationship is real); P Values: This column shows the p-value, which is the probability of observing a test statistic as extreme as, or more extreme than, the one calculated from the sample data, assuming that the null hypothesis is true. A small p-value (typically less than 0.05) indicates strong evidence against the null hypothesis, suggesting that the relationship is statistically significant; Result: This column indicates whether the null hypothesis is rejected or not. "Accepted" means the relationship is statistically significant (we reject

the null hypothesis of no effect), and "Rejected" means the relationship is not statistically significant (we fail to reject the null hypothesis of no effect).

Table 8. Variable test.

Description	Original sample (O)	T statistics (|O/STDEV|)	P values	Result
Reward Affordance -> Compliance	0,156	2,438	0,007	Accepted
Reward Affordance -> Identification	0,138	2,366	0,009	Accepted
Reward Affordance -> Internalization	0,139	2,409	0,008	Accepted
Competition Affordance -> Compliance	0,405	5,039	0,000	Accepted
Competition Affordance -> Identification	0,426	5,373	0,000	Accepted
Competition Affordance -> Internalization	0,417	5,064	0,000	Accepted
Feedback Affordance -> Compliance	0,026	0,380	0,352	Rejected
Feedback Affordance -> Identification	0,063	0,872	0,192	Rejected
Feedback Affordance -> Internalization	0,033	0,440	0,330	Rejected
Cooperation Affordance -> Compliance	0,313	3,368	0,000	Accepted
Cooperation Affordance -> Identification	0,336	3,617	0,000	Accepted
Cooperation Affordance -> Internalization	0,367	3,884	0,000	Accepted
Narrative Affordance -> Compliance	0,357	3,472	0,000	Accepted
Narrative Affordance -> Identification	0,371	3,781	0,000	Accepted
Narrative Affordance -> Internalization	0,341	3,394	0,000	Accepted
Narrative Affordance x Reward Affordance -> Compliance	0,056	0,939	0,174	Rejected
Narrative Affordance x Reward Affordance -> Identification	0,040	0,719	0,236	Rejected
Narrative Affordance x Reward Affordance -> Internalization	0,040	0,728	0,233	Rejected
Narrative Affordance x Competition Affordance -> Compliance	-0,666	6,133	0,000	Accepted
Narrative Affordance x Competition Affordance -> Identification	-0,589	5,544	0,000	Accepted
Narrative Affordance x Competition Affordance -> Internalization	-0,556	5,109	0,000	Accepted
Narrative Affordance x Feedback Affordance -> Compliance	-0,010	0,160	0,437	Rejected
Narrative Affordance x Feedback Affordance -> Identification	0,015	0,256	0,399	Rejected
Narrative Affordance x Feedback Affordance -> Internalization	0,030	0,511	0,305	Rejected
Narrative Affordance x Cooperation Affordance -> Compliance	0,183	2,777	0,003	Accepted
Narrative Affordance x Cooperation Affordance -> Identification	0,205	3,170	0,001	Accepted
Narrative Affordance x Cooperation Affordance -> Internalization	0,166	2,518	0,006	Accepted
Internalization -> User Retention	0,100	0,944	0,173	Rejected
Identification -> User Retention	0,147	1,239	0,108	Rejected
Compliance -> User Retention	0,452	4,692	0,000	Accepted

The results indicate that reward, competition, and cooperation affordances exert positive and significant effects on social impact dimensions, specifically compliance, identification, and internalization. These findings align with the affordance theory, which posits that the action possibilities provided by the environment influence user behavior (Huotari, 2017). Reward affordances, such as points, badges, and incentives, can satisfy users' needs for competence and autonomy, leading to increased motivation and engagement (Hair, 2017; Xi, 2019). The results of this study are consistent with previous research that has demonstrated the positive influence of rewards on user engagement and motivation in gamified systems. Gillies (2016) found that points, levels, and leaderboards significantly increased user performance and enjoyment, while Sailer (2017) showed that badges and leaderboards enhanced users' competence need satisfaction and intrinsic motivation in a gamified learning environment. The significant effects of reward affordance on compliance, identification, and internalization in this study highlight its psychological mechanisms in shaping user attitudes and behaviors within mobile payment platforms.

Competition affordances, such as leaderboards and challenges, can foster a sense of achievement and social comparison, driving users to internalize the goals and values of the platform (Sailer, 2017; Shao, 2018). Social comparison theory (Suh, 2017) suggests that individuals have an innate desire to evaluate their abilities and opinions by comparing themselves with others, and gamification leverages this desire by providing competitive elements that enable users to assess their performance relative to their peers. The results of this study are also consistent with prior research that has shown that competition in gamified systems can have both positive and negative effects on user motivation and engagement. On the positive side, competition can increase users' sense of competence and self-efficacy, as they strive to improve their performance and outperform others (Sailer, 2017), and it can also foster a sense of social connectedness, as users interact and compete with each other (Bitrián, 2021). The significant effects of competition affordance on compliance, identification, and internalization in this study demonstrate its effectiveness in driving user engagement and shaping social impact dimensions within mobile payment platforms.

Cooperation affordances, such as team challenges and social features, can fulfill users' need for relatedness and foster a sense of belonging, encouraging identification with the platform community (Johnson, 2009; Suh, 2017). Social interdependence theory (Johnson, 2009) suggests that positive interdependence, where individuals perceive that their success is linked to the success of others, can lead to increased motivation, social support, and achievement. The results of this study align with previous research that has highlighted the benefits of cooperation in learning and motivation. Cooperative learning has been shown to enhance academic performance, social skills, and self-esteem (Gillies, 2016). The significant effects of cooperation affordance on compliance, identification, and internalization in this study demonstrate its role in fostering a sense of community and influencing social impact dimensions within mobile payment platforms.

5. Conclusion

This study investigated the impact of gamification on user retention within Indonesian mobile payment applications. Utilizing the affordance theory and social impact theory, the research revealed that reward, competition, and cooperation affordances positively and significantly affect social impact dimensions: compliance, identification, and internalization. However, feedback affordance did not show a significant effect on these dimensions. Narrative affordance, representing the storytelling aspect of gamification, moderates the relationship between gamified artifactual affordances and social impact. Notably, compliance strongly influences user

retention, while internalization and identification do not show significant direct effects. These findings offer valuable insights for mobile payment platforms seeking to enhance user retention. By strategically designing reward systems, fostering healthy competition, facilitating cooperation among users, and crafting compelling narratives, platforms can cultivate a more engaging and rewarding user experience. This research contributes to the body of knowledge by extending the understanding of gamification affordances and their interplay with narrative affordance in mobile payment platforms. It provides a novel perspective on how these elements collectively shape user retention in the Indonesian context through the lens of social impact theory.

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