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Exploring the Influence of Gamification on Financial Behavior in Digital Financial Applications: A Systematic Literature Review

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Abstract

This study aims to examine the role of gamification elements in influencing user behavior within digital financial applications and to identify which elements are most associated with the development of financial habits. This research adopts a Systematic Literature Review (SLR) approach guided by the PRISMA framework. Literature was collected from three academic databases, namely Scopus, ScienceDirect, and IEEE Xplore, covering publications between 2019 and 2025. After applying predefined inclusion and exclusion criteria, 17 empirical studies were selected and analyzed using thematic analysis. The findings indicate that gamification significantly enhances user engagement and financial behavior by making financial management activities more interactive and motivating. The most frequently implemented elements include points, rewards, badges, leaderboards, and progress tracking. Cash-based rewards show stronger effects in encouraging short-term transactional behaviors, while progress visualization and real-time feedback contribute to sustained financial management practices. This study contributes theoretically by synthesizing behavioral and technology adoption perspectives to explain how gamification mechanisms influence financial behavior in digital contexts. Practically, the findings offer insights for developers and financial institutions to design more effective and user-centered financial applications. However, this review has several limitations. Most included studies rely on self-reported survey data, which limits causal inference. In addition, the majority were conducted in emerging market contexts, which may constrain the generalizability of the findings. Furthermore, most studies focus on short-term behavioral outcomes, leaving long-term habit formation insufficiently explored. Future research is therefore needed to examine long-term effects and to investigate how cultural and socioeconomic factors influence the effectiveness of gamification.

Keywords:
Gamification; Digital Financial Applications; Financial Behavior; User Engagement; Systematic Literature Review.

1. INTRODUCTION

The development of financial technology has driven an increase in the use of digital financial applications to manage personal finances, ranging from budgeting to making daily financial decisions. These applications offer ease of access, automation, and increasingly personalized interaction experiences. However, several studies indicate that high initial adoption often does not lead to sustained long-term use. In digital payment applications, user engagement may decline when the app fails to consistently deliver an engaging and meaningful experience (Neiva et al., 2025). Similar findings are observed in digital microfinance platforms, where user engagement and retention are strongly influenced by the presence or absence of mechanisms to sustain motivation over time (Liu et al., 2024). This pattern shows that the

effectiveness of digital financial applications is highly determined by their ability to build long-term engagement and encourage consistent financial management behavior.

Financial management is an activity that is heavily influenced by behavioral and psychological factors. Users are required to plan, control momentary temptations (impulsiveness), and build consistent financial habits. Although it is not uncommon for users of digital financial applications to feel tired, lose motivation, or fall into less productive habits, such as delaying expense recording or ignoring reminder notifications. This condition causes features that are functionally adequate not always to be utilized optimally in the long term (Şenol & Onay, 2023). This situation underscores the importance of application design approaches that can influence user behavior over the long term.

One of the main innovations for increasing user engagement and promoting behavior change is gamification. This approach integrates game elements into non-game systems to enhance user engagement and motivation. Bayuk & Altobello, (2019) revealed that gamification can improve financial behavior, with its effectiveness influenced by users' experiences with the application. Bitrián et al., (2021) emphasized that gamification can increase enjoyment and user engagement in personal financial management. Other research also shows the influence of gamification on habit formation in saving, repeated use of digital financial services, and more structured investment decision-making (Pal et al., 2021; Rahman et al., 2024).

Beyond increasing engagement, gamification can contribute to habit formation by structuring repeated behavioral loops within financial applications. Game elements such as daily check-ins, streak rewards, and progress milestones act as consistent triggers that encourage users to perform specific financial actions, such as recording expenses, monitoring budgets, or reviewing financial goals. Through repeated interaction, these actions become more automatic and require less conscious effort, gradually forming routine financial behaviors. From a psychological perspective, this process is supported by Self-Determination Theory, which explains that sustained behavior emerges when users' needs for competence, autonomy, and relatedness are continuously fulfilled (Alberts et al., 2024). As users experience a sense of progress and control, motivation can shift from being externally driven by rewards to more internalized forms of regulation. This indicates that gamification not only initiates user engagement but also creates conditions that support the development of stable financial habits. In financial management contexts, such design can encourage consistency in behaviors such as budgeting, saving, and expense tracking over time.

Gamification in digital financial applications has a clear theoretical basis from both psychological and technological perspectives. Self-Determination Theory explains that humans are motivated when their basic needs for competence (feeling capable), autonomy (feeling in control), and relatedness (feeling connected) are fulfilled (Alberts et al., 2024). Gamification elements such as point systems, challenges, and leaderboards help fulfill these three needs in user interactions with the application. In reality, financial behaviors triggered through gamification often still show dependence on reward systems, so the formation of habitual use has not yet become ingrained in individuals independently (Blanchard & Palazzolo, 2025). Additionally, based on the Technology Acceptance Model (TAM) framework, gamification has been shown to increase perceived usefulness and perceived ease of use, thereby fostering positive attitudes and users' continued intention to adopt digital banking applications (Viet Tam et al., 2024).

Although previous studies have shown that gamification can increase engagement and influence user behavior in digital financial applications, the understanding of how specific gamification elements promote specific types of financial behavior remains limited. Most studies assess the effectiveness of gamification in general or focus on short-term outcomes, without mapping clear relationships among the types of gamification elements used, the psychological mechanisms triggered, and the forms of financial behavior produced—whether transactional or long-term habit formation. The lack of a systematic synthesis of these relationships results in gamification in financial applications often being generic and less targeted. Therefore, this research conducts a Systematic Literature Review to critically analyze how various gamification elements function within the context of digital financial applications and to identify the elements most consistently associated with behavioral changes and the formation of users' financial management behaviors.

While previous studies have demonstrated that gamification can increase user engagement and influence financial behavior, its role in supporting long-term habit formation remains unclear. Most existing research focuses on short-term behavioral outcomes, such as increased app usage or transactional activity, without examining whether these behaviors are sustained over time as stable financial habits. As a result, there is limited understanding of how specific gamification elements contribute to the development of consistent and long-term financial management behavior.

RQ1: What is the role of gamification elements in encouraging behavioral change among users of digital financial applications?
RQ2: Which gamification elements are most frequently associated with the formation of financial habits?

The purpose of this study is to systematically examine the role of gamification elements in encouraging behavioral changes among users of digital financial applications and to identify the elements most frequently associated with the formation of financial habits. The results of this research are expected to provide theoretical contributions to the development of gamification and financial behavior studies, as well as

practical contributions to the design of more effective digital financial applications that support users' financial management.

2. RESEARCH METHOD

This research uses a Systematic Literature Review (SLR) approach based on the PRISMA framework. Literature searches were conducted across three reputable academic databases: Scopus, ScienceDirect, and IEEE Xplore, covering publications from 2019 to 2025. The search strategy employed a combination of Boolean-based keywords, namely (gamification OR "game elements" OR gamify OR gamified) AND ("personal finance" OR budgeting OR "money management" OR fintech OR "financial behavior") AND (app OR application OR mobile).

Articles were selected based on predefined inclusion criteria: peer-reviewed articles in English that explicitly discuss gamification elements in the context of digital finance and measure user behavior or behavioral intentions. Articles that did not meet these criteria, as well as duplicate or unavailable full-text articles, were excluded from the review. The selection process resulted in a total of 328 articles identified from three databases (Scopus, n = 264; ScienceDirect, n = 39; IEEE Xplore, n = 25). After removing 9 duplicate articles, 319 articles were screened based on title and abstract. From this process, 266 articles were excluded as irrelevant, leaving 53 for full-text review to assess eligibility. Of these, 35 articles were further excluded due to incorrect outcomes, wrong interventions, inappropriate study designs, unavailable full-texts, or irrelevant populations. Finally, 17 articles were identified as the final corpus and analyzed using thematic analysis. The thematic analysis was conducted through a systematic coding process. First, relevant information from each selected study was extracted, focusing on gamification elements and their associated financial behaviors. Second, initial codes were assigned to categorize different types of gamification elements and behavioral outcomes. These codes were then grouped into broader themes, such as reward-based elements, progress-based elements, and social-based features. Finally, the identified themes were analyzed to examine the relationships between gamification elements and types of financial behavior, including short-term transactional actions and long-term habit formation.

To ensure the methodological rigor of the included studies, a quality assessment was conducted for each of the 17 selected articles using a structured evaluation framework implemented through Covidence systematic review software. Each study was appraised across six domains: (1) clarity of research objectives, (2) appropriateness of study design, (3) adequacy of sampling method description, (4) validity and reliability of measures, (5) appropriateness of data analysis, and (6) clarity of reported results. Only studies that met acceptable quality standards across these domains were retained for thematic analysis, ensuring that the findings are based on methodologically sound empirical evidence.

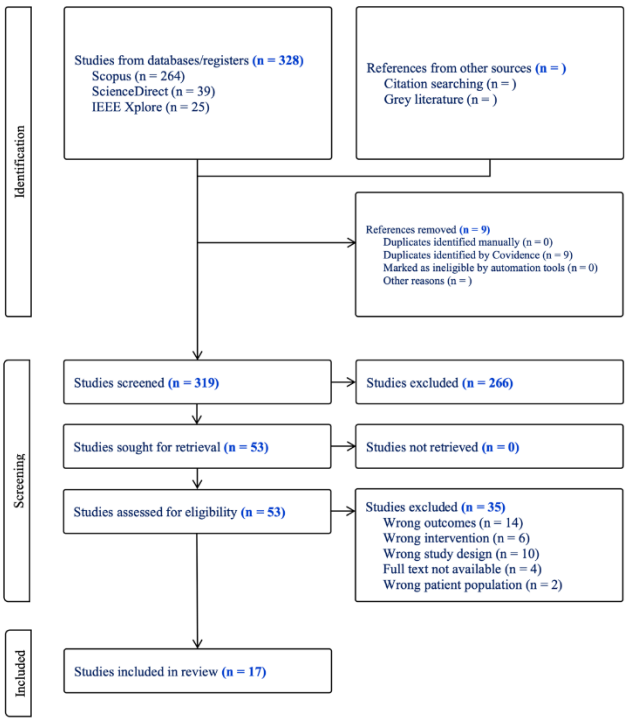

Figure 1. PRISMA Flow Diagram

3. RESULTS AND DISCUSSION

From a market context perspective, most research has been conducted in developing countries, particularly in Asia, Africa, and Latin America. Sample sizes vary from 70 participants in experimental studies to 7,683 users in natural experiments. Most studies use a cross-sectional survey design with structural equation modeling as the primary analysis method.

Table 1. Characteristics of the Reviewed Studies

Study	Study Design	Financial Service Type	Market Context	Sample Size
(Blanchard & Palazzolo, 2025)	Natural experiment	Banking	Emerging (Latin America)	7,683 users
(Agrawal & Sharma, 2025)	Cross-sectional survey	Personal finance management	Emerging (India)	557 users
(Khalid et al., 2023)	Quantitative survey	Investment	Emerging (Thailand)	332 investors
(Dzandu et al., 2022)	Cross-sectional survey	Mobile money payment	Emerging (Ghana)	567 users
(Şenol & Onay, 2023)	Experimental	Investment simulation	Emerging (Turkey)	693 investors
(Rahman et al., 2024)	Cross-sectional survey	Mobile wallet	Emerging (Vietnam)	431 users
(Pal et al., 2021)	Cross-sectional survey	Investment apps	Emerging (India)	209 respondents
(Garaialde et al., 2021)	Experimental	Budget tracking	Developed (UK)	70 participants per study
(Bitrián et al., 2021)	Cross-sectional survey	Personal financial management	Developed (USA)	208 users
(Bayuk & Altobello, 2019)	Survey and experimental	Financial planning/savings	Developed (USA)	216 + 194 participants
(Yang et al., 2023)	Cross-sectional survey	Mobile payments	Emerging (China)	231 respondents
(Viet Tam et al., 2024)	Cross-sectional survey	Digital banking	Emerging (Vietnam)	262 respondents
(Salimon et al., 2021)	Cross-sectional survey	Smartphone banking	Emerging (Nigeria)	388 respondents
(Liu et al., 2024)	Cross-sectional survey	Microfinance platforms	Emerging (China)	405 respondents
(Lee et al., 2022)	Experimental factorial design	Investment platforms	Developed (Singapore)	527 participants
(Nasirzadeh & Fathian, 2020)	Survey study	Banking	Emerging (Iran)	412 participants
(Zhao & Abeysekera, 2024)	Mixed methods	Payments (Alipay)	Emerging (China)	30 participants

Next, after mapping the general characteristics of the reviewed studies, the next step is to identify the specific instruments used to influence user behavior. Table 2 summarizes the gamification elements found across the literature.

Table 2. Gamification Elements from All Studies

Gamification Element	Studies Reporting	Implementation Status
Points	11 studies	Implemented
Rewards (cash and non-cash)	10 studies	Implemented
Badges	9 studies	Implemented
Leaderboards	8 studies	Implemented
Progress bars/tracking	7 studies	Implemented
Social features (sharing, comparison)	7 studies	Implemented
Challenges/quests	6 studies	Implemented
Feedback mechanisms	6 studies	Implemented
Avatars	5 studies	Implemented
Raffles/lotteries	3 studies	Implemented
Prize wheels	1 study	Implemented
Virtual pets	1 study	Implemented

The most frequently discussed gamification element in various studies is points. Of the 17 sources reviewed, 11 identify points as a main component. Points are used as currency within reward systems, as indicators of user engagement levels, and as triggers for motivation tailored to specific demographic characteristics. Reward systems are also widely used and documented in 10 studies, including incentives such as cash prizes and discounts, as well as non-monetary rewards. These come in various forms, from cash prizes won through prize wheels to points accumulated from digital wallet activities, to virtual rewards directly linked to financial management behaviors.

Badges and leaderboards are at the next level in terms of implementation frequency. Badges serve as status symbols that represent user achievements, such as stars or digital medals, when certain financial targets are met. Leaderboards foster a competitive atmosphere by allowing users to compare their achievements with others, and their effectiveness has been widely analyzed in the context of social interactions among users. Additionally, progress-tracking features such as progress bars and real-time feedback are consistently cited as favored elements, especially by experienced app users. This visual representation helps users understand their financial progress more clearly and measurably.

Findings in this study indicate that the effectiveness of gamification in digital financial applications operates through several complementary mechanisms. Psychologically, gamification elements help fulfill the needs for competence and autonomy, as explained in Self-Determination Theory, making financial management activities feel more meaningful and controllable to users. At the same time, gamification also creates hedonic motivation, increasing users' initial engagement with the application (Bitrián et al., 2021).

This mechanism has been proven to strengthen the relationship between financial attitudes and actual financial management behaviors ($z=2.333$, $p<0.05$) (Pal et al., 2021). One study using a natural experiment showed that integrating these elements significantly increased user engagement, such as a 20% increase in login frequency and an 18% increase in bill payments. The most notable impact was an improvement in timely loan repayments, which reached 31% (Blanchard & Palazzolo, 2025). However, this effectiveness depends heavily on the sustainability of the implementation, as discontinuing gamification features led to a drastic decline in the target behavior over the long term.

Furthermore, the role of each gamification element is specific to the type of behavior targeted. Reward systems such as points, lotteries, and spinning wheels are more effective in encouraging short-term transactional behaviors. Meanwhile, progress visualization tools and goal-setting play a greater role in supporting long-term financial management behaviors and users' confidence in managing their finances. The effectiveness of gamification also varies by user characteristics: new users tend to be more responsive to incentives, while experienced users are more motivated by social features and peer comparisons. The timing of rewards is also a determining factor, with pre-task rewards (given before the task) shown to have a stronger motivational impact than post-task rewards, due to the system's sensitivity to reward timing (temporal discounting) (Garaialde et al., 2021).

Table 3. Summary of the Impact of Gamification on Financial Behavior

Study	Behavioral Measure	Effect Direction	Effect Size/Significance	Duration
(Blanchard & Palazzolo, 2025)	App logins	Decrease after discontinuation	20% reduction	Effects increased over time
(Blanchard & Palazzolo, 2025)	Bill payments	Decrease after discontinuation	18% reduction	Persistent
(Blanchard & Palazzolo, 2025)	On-time loan repayments	Decrease after discontinuation	31% reduction	Persistent
(Şenol & Onay, 2023)	Overconfidence bias	Decrease	Significant with active participation	Observed across participation levels
(Şenol & Onay, 2023)	Disposition effect	Decrease	Significant with active participation	Observed across participation levels
(Şenol & Onay, 2023)	Familiarity bias	Increase	Significant	Unintended consequence
(Şenol & Onay, 2023)	Status quo bias	Increase	Significant	Unintended consequence
(Agrawal & Sharma, 2025)	Financial behavior variance	Increase	$R^2 = 45.5\%$	Not specified
(Pal et al., 2021)	FA→FMB moderation	Positive	$z = 2.333$, $p < 0.05$	Not specified
(Pal et al., 2021)	FPA→FMB moderation	Positive	$z = 3.014$, $p < 0.05$	Not specified
(Garaialde et al., 2021)	App selection frequency	Increase with pre-task rewards	Significant preference for pre-task placement	Immediate effects
(Liu et al., 2024)	Helping behavior	Increase	$\beta = 0.606$, $p < 0.001$	Not specified
(Lee et al., 2022)	Perceived ease of use	Increase	Effect size = 0.02	Not specified
(Bayuk & Altobello, 2019)	Motivation (experienced users)	Increase with social features	$F(1,163) = 48.45$, $p < 0.01$	Not specified

To answer RQ2, further analysis was conducted on the specific effectiveness of each element in forming financial habits. An analysis of 17 studies showed that the effectiveness of gamification elements varies greatly depending on the users and the context in which gamification is applied. Figure 2 maps the hierarchy of these elements' effectiveness based on the empirical evidence collected.

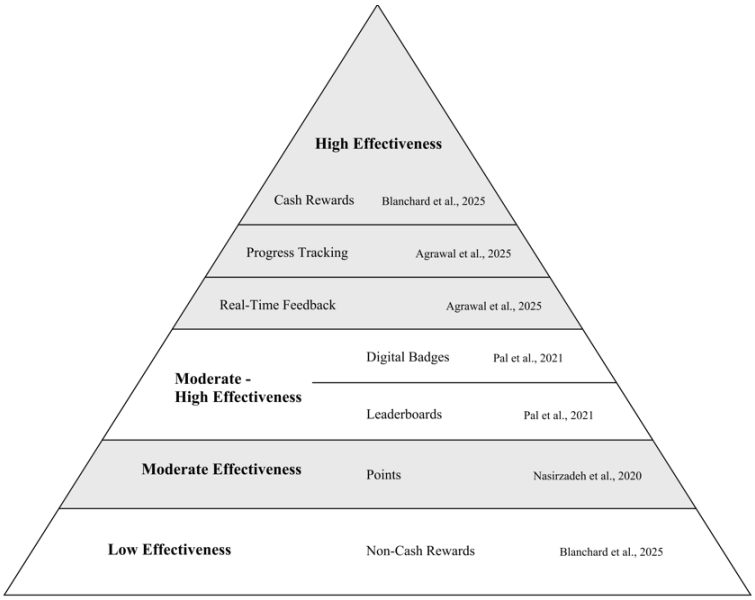

Figure 2. Hierarchy of the Effectiveness of Gamification Elements

3.1. Cash Gifts vs Non-Cash Gifts

Findings indicate that reward systems, particularly cash-based prizes, have the strongest influence on user engagement in the short term. Cash rewards provided through mechanisms such as lotteries, spin-the-wheel, or scratch cards significantly increase users' login frequency and transactional activity (Blanchard & Palazzolo, 2025). This effect can be explained through the perspective of temporal discounting, where individuals tend to place greater weight on immediate, certain rewards with real economic value compared to more abstract long-term benefits. Therefore, cash prizes serve as an instant motivation trigger that encourages users to interact with the application immediately.

Conversely, non-cash rewards such as virtual points or symbolic prizes show more limited effectiveness. These findings indicate that when the value of the reward cannot be converted into tangible benefits, its motivational drive significantly decreases. In the context of Self-Determination Theory, such rewards are more superficial extrinsic motivators and less supportive of the internalization of financial management behaviors. As a result, although non-cash rewards can enhance initial engagement, this element tends to fail in maintaining user behavior when external stimuli are reduced or discontinued.

This finding also explains why the discontinuation of reward-based gamification features leads to a drastic decline in user behavior. Dependence on immediate rewards creates behavior patterns that are only active as long as there is external motivation, but have not yet become ingrained habits. Therefore, reward systems are better positioned as mechanisms to activate initial behavior rather than as the main strategy for establishing long-term financial management habits.

3.2. Digital Badge and Leaderboard

Digital badges and leaderboards have proven to be quite effective in encouraging financial management behaviors through social mechanisms, particularly social comparison and symbolic recognition. Badges serve as representations of achievement that provide social meaning to users' behaviors, while leaderboards allow users to compare their performance with others. These mechanisms increase engagement by introducing a social dimension to financial management activities that were previously individual (Pal et al., 2021).

From the perspective of Self-Determination Theory, badges and leaderboards can fulfill the need for social relatedness, especially when users' achievements can be seen or compared with others. Additionally, symbolic recognition expressed through badges also reinforces a sense of competence, as financial achievements are translated into easily recognizable indicators of success. In this context, gamification not only motivates through rewards or individual progress but also through the drive to maintain social identity and status within the application environment.

However, the effectiveness of these social elements is not universal. Some studies show that competitive mechanisms like leaderboards are more effective for users with higher levels of experience or confidence, while for certain users, social comparison can actually create pressure or reduce motivation. These findings indicate that badges and leaderboard’s function more as behavior reinforcers for specific user segments, rather than as triggers for initial behavior or primary tools for establishing long-term habits.

3.3. Factors of Moderation That Affect Effectiveness

The effectiveness of gamification elements is not universal but highly depends on user characteristics and the implementation context. Several condition factors that influence the results include:

a. User Experience and Expertise
   Individuals with experience using financial applications prefer social features such as leaderboards and sharing achievements, while inexperienced users are more motivated by economic features including real money or discounts (Bayuk & Altobello, 2019). This difference indicates that gamification strategies need to be tailored to the user's level of expertise to be effective and deliver optimal results.
b. Risk Tendency
   Risk-taking users tend to prefer platforms with gamification; they find gamified platforms easier and more enjoyable. Conversely, users who tend to avoid risks are less comfortable with gamification (Lee et al., 2022). This finding suggests that gamification may be more effective for certain user segments based on their risk profiles.
c. Demographic Factors
   Gamification preferences vary based on age, gender, and education level. Younger individuals are motivated by points and badges, while older individuals prefer raffles. Gender differences also play a role, with women favoring leaderboards and progress indicators, whereas men prefer informational features and virtual rewards (Nasirzadeh & Fathian, 2020).
d. Personality
   Extroverted individuals prefer avatars, levels, and points. Neurotic (anxious) individuals respond more to elements that create urgency, such as countdowns, fixed rewards, and epic meaning. Individuals who are open to new experiences (openness) are more interested in badges and competitions. Meanwhile, meticulous and organized individuals are more motivated by epic meaning, showing alignment with long-term goals and values (Nasirzadeh & Fathian, 2020).

3.4. Potential Drawbacks and Limitations of Gamification in Financial Contexts

Despite its demonstrated benefits, gamification in digital financial applications also carries potential drawbacks that warrant careful consideration. A comprehensive review of gamification in the banking sector emphasizes that while gamification may appear appealing, its implementation must be approached with caution as it comes with inherent challenges, particularly the recognition that a single gamification design cannot be uniformly effective across all users and contexts (Chauhan et al., 2021). This concern is especially relevant in financial applications, where user characteristics and behavioral goals vary significantly.

One of the most critical risks is reward dependency, wherein users engage with financial management behaviors primarily in response to external incentives rather than intrinsic motivation. Evidence from Blanchard & Palazzolo, (2025) illustrates this clearly: when gamification features were discontinued, app logins declined by 20%, bill payments by 18%, and on-time loan repayments by 31%. These figures suggest that while gamification successfully activates behavioral change during its operation, the behaviors have not yet become internalized habits independent of external stimulation, raising important questions about the long-term sustainability of gamification as a behavior change strategy in financial contexts.

Furthermore, gamification does not universally produce positive outcomes. (Şenol & Onay, 2023) found that while gamification reduced overconfidence bias and disposition effect among investors, it simultaneously increased familiarity bias and status quo bias, unintended consequences that could negatively affect investment decision-making. Similarly, (Zhang et al., 2021) demonstrated that competitive leaderboards, while effective in boosting saving intentions among regular savers, showed no significant impact on individuals who do not save regularly, highlighting that the effectiveness of specific gamification elements is highly contingent on pre-existing user behavior and motivation.

These findings collectively suggest that gamification should not be treated as a one-size-fits-all solution in financial contexts. Developers and financial institutions must be mindful of designing gamification systems that gradually transition users from extrinsic to intrinsic motivation for instance, by shifting from reward-based elements toward progress-based and goal-oriented features as users become more experienced. Without such deliberate design considerations, gamification risks functioning as a temporary engagement tool rather than a sustainable mechanism for long-term financial habit formation.

Another important limitation relates to contextual differences across cultural and socioeconomic settings. Since most of the reviewed studies were conducted in emerging markets, the findings of this review may not be fully generalizable to developed countries. Differences in factors such as financial literacy, digital adoption, and user motivation may influence how users respond to specific gamification elements. In this context, gamification design may need to be adapted to local user characteristics. This highlights the importance of context-sensitive approaches and the need for future research to examine how gamification performs across different contexts.

4. CONCLUSION

Through a Systematic Literature Review of 17 studies, it was found that gamification functions as a driver of behavior change by fulfilling users' psychological needs for competence and self-control, as well as making financial management activities more enjoyable. Empirical evidence shows that when gamification is

discontinued, there is a significant decrease in app logins by 20%, bill payments by 18%, and on-time loan payments by 31%. Regarding the most effective elements, points emerged as the most frequently implemented element (11 out of 17 studies), followed by reward systems (10 studies), badges (9 studies), and leaderboards (8 studies). However, cash-based rewards showed the strongest influence on user engagement, while non-cash rewards showed neutral or negative effects. Real-time feedback and progress tracking proved effective in strengthening the connection between financial planning and actual actions, whereas digital badges and leaderboards reinforced the relationship between financial attitudes and behavior. These findings reveal that the effectiveness of gamification depends on the type of element and the targeted behavior, with reward-based elements being more effective for transactional behaviors, while progress-based elements better support long-term financial management. However, the findings also indicate that while gamification is effective in activating financial behavior, its ability to sustain long-term habit formation remains uncertain.

Theoretically, this research contributes by demonstrating that Self-Determination Theory, Temporal Discounting Theory, Social Impact Theory, and Technology Acceptance Model are not standalone explanations, but each explains how different types of gamification elements work. Reward-based elements encourage behavior through users' tendency to prioritize immediate and tangible rewards, as explained in Temporal Discounting Theory. Progress-based elements operate by fulfilling users' needs for competence and self-control, in accordance with SDT principles. Meanwhile, social elements like leaderboards promote behavior through the drive to compare and maintain a position among other users, as described in Social Impact Theory.

Other important findings indicate that gamification successfully changes user behavior during the system's operation, but these behaviors tend to decline when gamification is stopped because they have not become ingrained habits. Additionally, this research shows that the success of gamification is heavily influenced by user profiles, including their level of experience with the application, their attitudes toward risk, their demographic backgrounds, and their personality types. Understanding these determining factors provides practical guidelines for designing digital systems tailored to user needs, which are not limited to the context of financial applications but can be adapted for various other digital platforms.

The practical implications of this research are relevant for app developers, financial technology companies, financial institutions, and policymakers. Gamification design needs to adopt a personalized approach based on user segmentation, considering experience levels, demographic characteristics, and personality profiles. In implementation, cash-based rewards have proven to be more effective than symbolic rewards, while combining various gamification elements produces a stronger effect than approaches with only one element. Therefore, gamification may be more effective when implemented as a sustained feature within the system to maintain behavioral changes and prevent them from fading in the short term. However, especially in investment applications, the implementation of gamification requires caution due to the potential increase in certain behavioral biases, even though it may also successfully reduce other biases.

This research has several limitations that need to be considered. Most of the reviewed studies used survey-based methods, making it difficult to establish direct causal relationships, while only one study employed a natural experiment with stronger causal evidence. In addition, most studies focused on short-term behavioral changes without examining whether financial habits are sustained over time. Furthermore, the majority of the reviewed studies were conducted in emerging market contexts, such as Asia, Africa, and Latin America. This raises concerns regarding the generalizability of the findings, as differences in cultural, socioeconomic, and technological conditions, such as financial literacy, digital adoption, and user behavior, may influence the effectiveness of gamification in different settings.

Beyond these methodological and contextual limitations, future research should further explore the boundaries and potential risks of gamification in financial contexts. First, longitudinal studies are needed to examine the sustainability of gamification-induced behavioral changes, particularly whether these behaviors evolve into stable financial habits or diminish once gamification features are removed. Second, future studies should investigate the conditions under which gamification may produce unintended consequences, especially given evidence that it can simultaneously reduce certain cognitive biases while amplifying others in financial decision-making. Third, the issue of reward dependency requires deeper examination, particularly how gamification systems can be designed to gradually shift users from extrinsic reward-driven engagement toward intrinsic motivation and autonomous financial behavior. Addressing these gaps would contribute to a more comprehensive understanding of the limitations of gamification and support the development of more responsible and effective financial technologies.

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