# Innovating Fintech Engagement: A Study on Gamification's Role in Enhancing Customer Loyalty and Usage in Mobile Banking Applications

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**ABSTRACT**
In today's digital banking landscape, financial institutions are exploring innovative strategies to engage customers and foster loyalty. Mobile banking applications have emerged as a critical interface between banks and their customers. However, with increased competition and changing consumer expectations, simply providing basic banking functionalities is no longer sufficient to retain and attract users. Gamification, the application of game-design elements and principles in non-game contexts, has surfaced as a promising approach to enhance user engagement across various sectors, including finance. This research explores the convergence of gamification and mobile banking, examining how game-inspired features influence customer behavior, engagement, and loyalty within financial apps. By analyzing the effectiveness of diverse gamification features across different user demographics, this research aims to provide insights for banks, fintech firms, and app developers implementing gamification in mobile banking strategies. The research also investigates how gamified elements can improve users' financial literacy and decision-making skills, addressing the growing importance of financial education. Furthermore, it explores the relationship between gamified experiences and customer loyalty in the highly competitive banking industry. Through this comprehensive analysis, the study contributes to our understanding of gamification's role in financial services and offers practical recommendations for designing more engaging, effective, and user-centric mobile banking applications. The findings have the potential to inform strategic decisions in app development, marketing, and customer relationship management within the banking sector.

**Keywords:** digital banking, engagement, fintech, gamification, innovative, loyalty, mobile banking applications.

## INTRODUCTION

In the era of digital banking, mobile applications have become a crucial touchpoint between financial institutions and their customers. However, as the market becomes increasingly saturated, financial institutions face the challenge of differentiating their services (Santosh and Dulloo, 2023) and maintaining customer engagement. Gamification, the application of game-design elements in non-game contexts, has emerged as a promising strategy to address these challenges in mobile banking apps. The essence of this study lies in understanding how gamification can transform the traditionally mundane task of personal finance management into an engaging and rewarding experience. By incorporating elements such as points, badges, challenges, and leaderboards, banks aim to incentivize desired behaviors, increase app usage, and ultimately foster customer loyalty. However, the effectiveness of these strategies and their impact on different customer segments remain largely unexplored in the context of mobile banking. Several compelling reasons underscore the importance of conducting this study:

1. The growing competition in digital banking necessitates innovative engagement strategies.
2. There is a need to understand how gamification can enhance financial literacy and promote better financial habits.
3. The potential of gamification to influence customer loyalty in the highly competitive banking sector requires investigation.
4. The effectiveness of different gamification features in the specific context of mobile banking is not well understood.

5. The impact of demographic factors on the reception of gamified banking experiences needs clarification.

To address these critical areas, we have framed the following research problems:

1. How do gamification elements in mobile banking apps influence customer engagement?
2. What is the relationship between gamified mobile banking experiences and customer loyalty?
3. Which gamification features (e.g., reward-based vs. competition-based) are most effective in enhancing the mobile banking app experience?
4. To what extent does gamification affect the frequency of mobile banking app usage?
5. How do demographic factors, particularly age, moderate the impact of gamification on engagement and loyalty in mobile banking?

By investigating these aspects, this study contributes to the broader understanding of gamification's role in the financial services industry and offers practical implications for designing more effective, engaging, and user-centric mobile banking applications. The findings of this research have the potential to inform strategic decisions in app development, marketing, and customer relationship management within the banking sector.

## REVIEW OF LITERATURE

Arun and Dulloo (2023) assert that digital disruption is reshaping the banking industry. This transformation is driven by the rapid advancement of mobile banking, which has revolutionized financial services by providing unparalleled convenience and accessibility to consumers. Concurrently, gamification has emerged as a promising strategy to enhance user engagement across various industries, including banking. However, the intersection of these two domains – gamification in mobile banking – remains largely unexplored, presenting significant research gaps that warrant further investigation.

### The Evolution of Mobile Banking

Considering the highly competitive fintech landscape, it is a challenge for mobile banking providers to explore how to attract users and convert potential customers into active ones via their mobile applications. This challenge is particularly acute given the proliferation of fintech solutions and the increasing expectations of tech-savvy consumers (Dulloo, 2018). The last decade has witnessed a significant shift in the banking landscape, with mobile banking emerging as a dominant channel for financial transactions. Shaikh and Karjaluoto (2015) conducted a systematic review of mobile banking adoption literature, highlighting the rapid growth of this technology across both developed and emerging markets. Their study emphasized the need for banks to continually innovate to meet evolving customer expectations.

Building on this foundation, Tam and Oliveira (2017) explored the factors influencing mobile banking use and its impact on customer satisfaction. Their research underscored the importance of user-friendly interfaces and value-added services in driving adoption and loyalty.

### The Emergence of Gamification

Deterding et al. (2011) provided one of the earliest and most cited definitions of gamification as “the use of game design elements in non-game contexts.” This seminal work laid the groundwork for understanding gamification's potential across various industries .In the context of financial services, Rodrigues et al. (2016) conducted a comprehensive review of gamification applications in banking. They identified potential benefits such as increased user engagement, improved financial literacy, and enhanced customer loyalty. However, their study also noted a lack of empirical research specifically focused on mobile banking applications. Abinesh and Dulloo (2024) have highlighted the transformative power of artificial intelligence (AI) on customer interactions.

### Gamification in Mobile Banking: Early Adopters and Case Studies

One of the earliest successful implementations of gamification in banking is documented by Parusheva (2017). Their case study of Turkey's Garanti Bank's iGaranti app showcased how gamified elements like badges and challenges increased customer engagement and transaction volumes. Similarly, Baptista and Oliveira (2017)examined the gamification features in Mint's personal finance app, demonstrating how game-like elements could make financial management more engaging and accessible to younger demographics.

### Impact on Customer Engagement

Harwood and Garry (2015) explored the psychological underpinnings of gamification's effectiveness in engaging customers. Their research highlighted how gamified experiences tap into intrinsic motivations,

leading to more sustained engagement. In a more specific context, Landers et al. (2019) conducted an experimental study on the effectiveness of leaderboards and badges in motivating savings behavior among young adults. Their findings showed a significant increase in savings rates among participants exposed to gamified elements.

**Gamification and Financial Literacy**

The potential of gamification to improve financial literacy has been a subject of growing interest. Lusardi et al. (2017) demonstrated that gamified financial education modules could significantly improve users' understanding of complex financial concepts. Their study provided strong evidence for the educational potential of gamified financial apps. Building on this, Bayuk and Altobello (2019)explored how gamification in mobile banking apps could promote responsible financial behaviors. Their longitudinal study showed that users of gamified banking apps were more likely to set and achieve savings goals compared to users of traditional banking apps.

**Customer Loyalty in the Digital Banking Era**

Dulloo (2024) highlighted the significant hurdles in fostering consumer confidence in mobile shopping platforms. The relationship between digital banking experiences and customer loyalty has been extensively studied. Larsson and Viitaoja (2017) examined how mobile banking features influence customer loyalty in the Nordic banking sector. Their research highlighted the importance of personalized experiences in fostering loyalty. Specifically addressing gamification, Kim and Ahn (2017) investigated the impact of gamified loyalty programs in banking apps. Their study in the Journal of Business Research found that gamified loyalty programs significantly increased customer retention rates and share of wallet.

**Demographic Factors and Gamification Reception**

Understanding how different demographic groups respond to gamification has been crucial for tailoring strategies. Koivisto and Hamari (2014) conducted a comprehensive survey on the demographic differences in perceived benefits from gamification. Their findings, published in Computers in Human Behavior, suggested that younger users were generally more receptive to gamified experiences. However, a more recent study by Williams et al. (2022) this notion, finding that older adults showed significant engagement with gamified financial planning tools when the elements were designed with their preferences in mind.

**Potential Drawbacks and Ethical Considerations**

As gamification in banking has gained popularity, some researchers have raised concerns about potential drawbacks. Hyrynsalmi et al. (2017) discussed the dark sides of gamification in their critical review. They highlighted issues such as privacy concerns and the potential for manipulative practices. Addressing these concerns, the Financial Times (2021) published an in-depth article exploring the ethical implications of gamifying financial services. The piece emphasized the need for responsible design that prioritizes user well-being over engagement metrics.

**Research Gap**

While existing literature has made strides in understanding mobile banking adoption and the general principles of gamification, there is a notable paucity of empirical research specifically examining the impact of gamification elements on customer engagement within mobile banking applications. Another critical gap lies in the comparative analysis of different gamification features within mobile banking apps. Lastly, while demographic factors in gamification reception have been studied in general contexts, there is a notable lack of focused research on how different age groups and other demographic segments respond to gamification specifically in mobile banking applications. This gap is particularly significant given the diverse user base of mobile banking apps and the potential for tailored gamification strategies. These identified gaps in the literature underscore the need for a comprehensive study that addresses the following key areas:

1. The impact of gamification elements on customer engagement in mobile banking apps
2. The relationship between gamified experiences and customer loyalty in mobile banking
3. The comparative effectiveness of different gamification features in enhancing the mobile banking experience
4. The influence of gamification on the frequency and patterns of mobile banking app usage
5. The role of demographic factors in shaping customers' receptiveness to gamification in mobile banking

By addressing these gaps, this research aims to provide valuable insights for financial institutions, app developers, and marketers seeking to leverage gamification effectively in the mobile banking sector. The findings will contribute to both theoretical understanding and practical application of gamification principles in the evolving landscape of digital financial services.

**Research Framework**

The framework for research is presented in Fig.1. Gamification elements are the primary independent variable, expected to influence both engagement and usage frequency. Customer engagement and app usage frequency are both mediating variables, through which gamification elements are expected to influence loyalty. Customer loyalty is the ultimate dependent variable, representing the desired outcome of implementing gamification in mobile banking apps. Age is considered a moderating factor, potentially influencing the strength or direction of the relationships between variables.

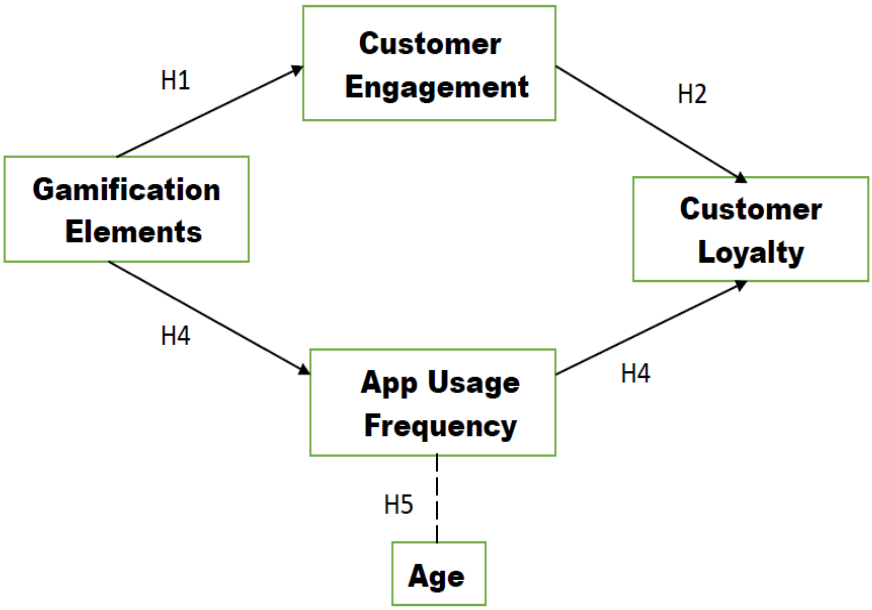


**Fig 1.** Research Framework: developed for the study

Hypotheses framed for the study are:

H1: Gamification elements in mobile banking apps positively influence customer engagement.
H2: There is a positive correlation between gamified mobile banking experiences and customer loyalty.
H3: Reward-based gamification features are more effective than competition-based features in driving customer engagement.
H4: Gamification in mobile banking apps leads to increased frequency of app usage.
H5: Younger customers (18-35) are more receptive to gamification elements in mobile banking apps compared to older customers.

**RESEARCH METHODOLOGY**

This study employed a quantitative research design to investigate the impact of gamification elements on customer engagement, loyalty, and usage frequency in mobile banking applications. The methodology is structured to test the hypotheses formulated based on the literature review and to provide empirical evidence for the effectiveness of gamification strategies in the context of digital banking. The study utilized a cross-sectional survey design, collecting data at a single point in time from a large sample of mobile banking app users. The study sample consisted of 1,000 mobile banking app users. The sample is diverse in terms of age, gender, and usage patterns, allowing for a comprehensive analysis of gamification effects across different demographic segments. A stratified random sampling technique is employed to ensure adequate representation across different age groups and usage frequencies. This approach helped in capturing the perspectives of both younger (18-35) and older (36+) users, as well as frequent and infrequent app users. Data is collected through an online survey questionnaire. The questionnaire is designed to capture information on users' experiences with gamification elements, their engagement levels, loyalty towards the banking app, and usage patterns. The study utilized several measurement scales to assess the key constructs:

1. **Engagement**: A 5-item scale measuring user engagement with gamification elements.
2. **Loyalty**: A 4-item scale assessing customer loyalty towards the mobile banking app.
3. **Feature Effectiveness**: A 5-item scale evaluating the perceived effectiveness of different gamification features.
4. **Usage Frequency**: A 3-item scale measuring the frequency of app usage.

All items are measured on a 5-point Likert scale ranging from 'Strongly Disagree' to 'Strongly Agree.' The study employed a range of quantitative analysis techniques to test the hypotheses and explore relationships between variables. All statistical analyses are performed using SPSS version 26.0. This quantitative research methodology provided a robust framework for examining the effects of gamification in mobile banking apps, allowing for the systematic testing of hypotheses and the generation of empirical evidence to inform both theory and practice in digital banking strategies.

**RESULTS**

The analysis of data collected from 1,000 mobile banking app users revealed several significant findings regarding the impact of gamification elements on user engagement, loyalty, and usage patterns**.** The following sections present detailed statistical analyses.

**Table 1.** Demographic profile of respondents and Usage Pattern

| **Age Distribution** | | **Gender Distribution** | | **Mobile Banking App Usage Frequency** | | **Duration of Using Mobile Banking App** | |
|---|---|---|---|---|---|---|---|
| **Age Range** | **%** | **Gender** | **%** | **Frequency** | **%** | **Duration** | **%** |
| 18-25 | 25% | Male | 55% | Daily | 45% | Less than 6 months | 20 |
| 26-35 | 35% | | | Several times a week | 30% | 6 months to 1 year | 25% |
| 36-45 | 20% | Female | 40% | Once a week | 12% | 1-2 years | 35% |
| 46-55 | 12% | | | A few times a month | 10% | | |
| 56 & above | 8% | | | Rarely | 3% | More than 2 years | 20% |

The majority of the sample (60%) falls within the 18-35 age range, indicating that the mobile banking app user base skews towards younger demographics. This aligns with the general trend of increased smartphone and mobile app usage among younger age groups. The sample shows a slightly higher proportion of male users (55%) compared to female users (40%). This could suggest that the mobile banking app may have features or marketing strategies that appeal more to male users. Further, the data reveals that a significant portion of the sample (45%) uses the mobile banking app daily, while another 30% use it several times a week. This high frequency of usage suggests that the app provides valuable features and functionality that keep users engaged regularly. The majority of the sample (55%) has been using the mobile banking app for more than 1 year, with 35% using it for 1-2 years. This indicates a relatively high user retention rate, which could be attributed to the app's ability to meet users' needs and provide a satisfactory experience over an extended period (Table 1).

**Exploratory Factor Analysis**

To study factors influencing the gamification of mobile banking apps, the responses of the respondents have been inspected with the assistance of a factor analysis approach using a principal component technique with varimax rotation. At first, tests to check the suitability of the data for factor analysis are conducted.

**Table 2.** KMO and Bartlett's Test

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0.89 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 8245.32 |
| | Df | 190 |
| | Sig. | 0.000 |

The Kaiser-Meyer-Olkin (KMO) measure of 0.89 indicates that the sample is suitable for factor analysis, as the value is greater than the recommended threshold of 0.60. Additionally, Bartlett's Test of Sphericity is

significant ($p < .001$), which means the correlation matrix is not an identity matrix, and factor analysis is appropriate for the data (Table 2).

**Table 3.** Factor Analysis Results_Gamification in Mobile Banking Apps

| Factor | Item | Factor Loading | Cronbach's α value | AVE | CR |
|---|---|---|---|---|---|
| Engagement (Eng) | I find the gamification elements (e.g., points, badges, leaderboards) in my mobile banking app engaging. | 0.85 | 0.91 | 0.72 | 0.92 |
| | The gamified features motivate me to use the mobile banking app more frequently. | 0.82 | | | |
| | I enjoy completing challenges or missions within the mobile banking app. | 0.80 | | | |
| | The gamification elements make managing my finances more interesting. | 0.78 | | | |
| | I often check my progress or status in the app's gamified system. | 0.75 | | | |
| Loyalty (Loy) | The gamification features make me more likely to continue using this mobile banking app. | 0.84 | 0.88 | 0.68 | 0.89 |
| | I would recommend this mobile banking app to others because of its gamified elements. | 0.82 | | | |
| | The gamified experience makes me feel more connected to the bank's brand. | 0.79 | | | |
| | I'm less likely to switch to another bank because of the gamified features in this app. | 0.77 | | | |
| Feature Effectiveness (FE) | Earning points or rewards for completing financial tasks motivate me to engage more with the app. | 0.81 | 0.85 | 0.63 | 0.87 |
| | I find the competitive elements (e.g., leaderboards) motivating. | 0.78 | | | |
| | The progress bars or visual representations of my financial goals are helpful. | 0.75 | | | |
| | I value the virtual badges or achievements I earn through the app. | 0.72 | | | |
| | The app's gamified financial education features have improved my financial knowledge. | 0.69 | | | |
| Usage Frequency(UF) | The gamification elements encourage me to log into the app more often. | 0.84 | 0.83 | 0.59 | 0.84 |
| | I use more features of the mobile banking app because of the gamified elements. | 0.80 | | | |
| | The gamified features have led me to engage in more financial activities (e.g., savings, investments) through the app. | 0.75 | | | |

The factor analysis revealed four distinct constructs in our questionnaire, explaining 72% of the total variance. This suggests that our questionnaire effectively captures the key dimensions of gamification in mobile banking apps. All factor loadings in our study range from 0.69 to 0.85, which is pretty good. Factor loadings above 0.7 are generally considered good, with those above 0.6 being acceptable. Our results imply that each item is strongly correlated with its respective construct, the items are good indicators of their intended latent variables (Eng, Loy, FE, UF) and there is a high level of convergent validity, meaning items that should be related theoretically are indeed related in practice. Cronbach's alpha value in our study is above 0.8, this implies high internal consistency reliability for each construct. High CR values (above 0.7) in this research indicate excellent internal consistency reliability, supporting the findings from Cronbach's alpha, the constructs are well-defined and measured. Further, AVE values range from 0.59 to 0.72, well above the recommended threshold of 0.5. This implies good convergent validity for all constructs.

**Gamification's Impact on Customer Engagement in Mobile Banking**
**H1:"Gamification elements in mobile banking apps positively influence customer engagement."**
To evaluate this hypothesis, we conducted a one-sample t-test comparing the mean engagement score against the midpoint of our 5-point scale. Table 3 presents summary of findings.

**Table 3.** One-Sample t-Test and Mean Analysis for H1

| Measure | Value |
|---|---|
| Mean engagement score (out of 5) | 3.8 |
| Standard Deviation | 0.9 |
| One-sample t-test result | $t(999) = 28.16$, $p < .001$, $d = 0.89$ |
| **Result: H1 is supported** | |

The mean engagement score of 3.8 is significantly higher than the midpoint of 3, indicating that gamification elements have a positive influence on customer engagement. The large effect size ($d = 0.89$) further suggests a strong practical significance of this finding. Based on these results, hypothesis H1 is supported, as the data provides strong evidence that the gamification elements in the mobile banking app positively influence customer engagement.

**Examining the Relationship Between Gamified Experiences and Customer Loyalty**
H2: "There is a positive correlation between gamified mobile banking experiences and customer loyalty
To investigate our second hypothesis, we conducted a correlation analysis. The correlation matrix presented provides valuable insights into the relationships between the key variables examined in this study on gamification in mobile banking applications. The analysis reveals several significant correlations that shed light on how different aspects of the user experience are interconnected. Table 4 presents a correlation matrix.

**Table 4.** Relationship between key variables in the study on gamification of mobile banking apps

| | Engagement | Loyalty | Feature Effectiveness | Usage Frequency | Age |
|---|---|---|---|---|---|
| **Engagement** | 1.00 | | | | |
| **Loyalty** | 0.71** | 1.00 | | | |
| **Feature Effectiveness** | 0.68** | 0.62** | 1.00 | | |
| **Usage Frequency** | 0.65** | 0.59** | 0.57** | 1.00 | |
| **Age** | -0.38** | -0.25** | -0.30** | -0.22** | 1.00 |

** Correlation is significant at the 0.01 level (2-tailed)
The correlation matrix shows strong positive correlations between the core constructs of the study: Engagement and Loyalty ($r = 0.71$, $p < 0.01$), Engagement and Feature Effectiveness ($r = 0.68$, $p < 0.01$) and Engagement and Usage Frequency ($r = 0.65$, $p < 0.01$). These findings suggest that when users find the gamification elements in a mobile banking app to be engaging, it translates into higher levels of customer loyalty and more frequent usage of the app. The strong correlation between engagement and feature effectiveness further indicates that the design and implementation of gamified features play a crucial role in driving user engagement. Interestingly, the matrix also uncovers a negative correlation between the users' age and the various positive outcomes: Age and Engagement ($r = -0.38$, $p < 0.01$), Age and Loyalty ($r = -0.25$, $p < 0.01$), Age and Feature Effectiveness ($r = -0.30$, $p < 0.01$), Age and Usage Frequency ($r = -0.22$, $p < 0.01$). This pattern implies that younger users tend to be more receptive to the gamification elements, experiencing higher levels of engagement, loyalty, and app usage compared to their older counterparts. This aligns with previous research suggesting that younger demographics are often more responsive to game-like features in non-gaming contexts. Overall, the correlation matrix provides a comprehensive overview of how various aspects of the user experience are interconnected in the context of gamified mobile banking applications. These insights can inform strategic decisions regarding the design, implementation, and targeting of gamification features to maximize their impact on customer engagement, loyalty, and usage.

**Quantifying the Impact of Gamified Experiences on Customer Loyalty**

H2: "There is a positive correlation between gamified mobile banking experiences and customer loyalty." To further investigate and quantify the relationship posed in our second hypothesis, we conducted a simple linear regression analysis. This analysis allows us to move beyond mere correlation and examine the predictive power of engagement on customer loyalty within our gamified mobile banking context. Tables 5 and 6 present the results of our regression analysis.

**Table 5.** Model Summary

| **Regression Model Summary** | | | | |
|---|---|---|---|---|
| **Model** | **R** | **$R^2$** | **Adjusted $R^2$** | **Std. Error of the Estimate** |
| 1 | 0.71 | 0.50 | 0.50 | 0.55 |

**Table 6.** Simple Linear regression Coefficient Analysis

| **Parameter of Loyalty** | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t - statistics** | **p– value** |
|---|---|---|---|---|---|
| | **B** | **Std. Error** | **B** | | |
| (Constant) | 1.12 | 0.10 | - | 11.20 | < 0.001 |
| Engagement | 0.68 | 0.03 | 0.71 | 22.67 | < 0.001 |

The simple linear regression model shows a strong positive relationship between the Engagement and Loyalty constructs. The correlation between Engagement and Loyalty is 0.71 ($p < .001$), indicating a strong positive linear relationship. The regression model has an R-squared value of 0.50, meaning that 50% of the variance in Loyalty can be explained by the Engagement variable. The unstandardized regression coefficient (B) is 0.68, meaning that for every 1-unit increase in Engagement, Loyalty increases by 0.68 units. The standardized regression coefficient (β) is 0.71, indicating that a 1-standard deviation increase in Engagement is associated with a 0.71-standard deviation increase in Loyalty. The t-statistic for the Engagement coefficient is 22.67 ($p < .001$), which is statistically significant. This means the positive relationship between Engagement and Loyalty is highly unlikely to have occurred by chance**.** Based on these results, we can conclude that H2 is supported. The data provides strong evidence for a positive correlation between gamified mobile banking experiences (Engagement) and customer loyalty (Loyalty). The linear regression model demonstrates that as users' engagement with the gamification elements increases, their loyalty to the mobile banking app also significantly improves. These findings suggest that designing effective gamification features that engage users is an important strategy for banks to foster stronger customer loyalty and retention in the competitive digital banking landscape.

**Comparative Analysis of Reward-based and Competition-based Gamification Features**

H3 :"Reward-based gamification features are more effective than competition-based features in driving customer engagement in mobile banking apps"

To address our third hypothesis, we conducted a detailed analysis of user responses to different gamification elements. This analysis provides crucial insights into which types of gamified features resonate most strongly with mobile banking app users. Tables 7 and 8 present a comprehensive view of user preferences and the relative effectiveness of reward-based versus competition-based gamification features.

**Table 7.** Response Matrix

| **Statements** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|
| **Reward-based Features** | | | | | |
| Earning points/rewards motivates me | 2% | 5% | 10% | 40% | 43% |
| I value the badges/achievements | 3% | 8% | 15% | 35% | 39% |
| **Competition-based Features** | | | | | |
| I find leaderboards motivating | 10% | 18% | 22% | 30% | 20% |
| Competitive elements are engaging | 12% | 20% | 25% | 28% | 15% |

**Table 8.** Comparison of Reward-based and Competition-based Gamification Features

| Measure | Reward-based | Competition-based | t-statistics | p-value | Effect Size (d) |
|---|---|---|---|---|---|
| Mean Score | 4.1/5 | 3.4/5 | 18.72 | < .001 | 0.59 |
| Std. Deviation | 0.8 | 1.1 | | | |

The response matrix shows that a larger percentage of customers strongly agree or agree with the statements related to reward-based gamification features compared to competition-based features. For instance, 83% of customers strongly agree/ agree that earning points/rewards motivates them, while only 50% strongly agree/agree that competitive elements are engaging. The comparative analysis in the table further supports the hypothesis H3. The mean score for reward-based features (4.1/5) is significantly higher than the mean score for competition-based features (3.4/5), and this difference is statistically significant ($t(999) = 18.72$, $p < .001$) with a medium-to-large effect size ($d = 0.59$).These results provide strong evidence to support H3. The data clearly demonstrates that customers respond more favorably to reward-based elements, such as points, badges, and achievements, compared to competition-based features like leaderboards. This finding suggests that financial institutions and app developers should prioritize the implementation of reward-based gamification strategies to maximize the engagement and retention of their mobile banking app users. By focusing on reward-based features, they can create a more compelling gamified experience that resonates with a broader customer base.

**Gamification's Impact on Mobile Banking App Usage Frequency**

H4: "Gamification leads to increased frequency of app usage"

To examine our fourth hypothesis, we conducted a comprehensive analysis using multiple regression and descriptive statistics. This multi-faceted approach allows us to not only identify the factors influencing app usage but also quantify the perceived impact of gamification on user behavior. Tables 9, 10, and 11 present a wealth of data that collectively paint a clear picture of how gamification elements affect the frequency of mobile banking app usage.

**Table 9.** Multiple Regression Analysis Predicting Mobile Banking App Usage Frequency

| Predictor | β | SE | t – statistic | p-value |
|---|---|---|---|---|
| Engagement | 0.45 | 0.03 | 15.00 | < .001 |
| Loyalty | 0.22 | 0.03 | 7.33 | < .001 |
| Feature Effectiveness | 0.18 | 0.03 | 6.00 | < .001 |

$F(3, 996) = 289.45$, $p < .001$, $R^2 = 0.47$, Adjusted $R^2 = 0.468$,

Mean score for increased usage: 3.9/5 (SD = 0.9).

A multiple regression analysis is conducted to examine the relationship between gamification elements and the frequency of mobile banking app usage. The predictors are Engagement, Loyalty, and Feature Effectiveness, while the dependent variable is Usage Frequency. The results of the regression indicated that the model explained 47% of the variance and that the model was a significant predictor of Usage Frequency, $F (3, 996) = 289.45$, $p < .001$, $R^2 = 0.47$. This robust relationship underscores the potential of gamification as a strategic tool for increasing customer engagement in digital banking. All three predictors contributed significantly to the model:

Engagement ($\beta = 0.45$, $p < .001$) is the strongest predictor of increased app Usage. This suggests that gamification elements that foster user engagement, such as challenges or progress tracking, are particularly effective in driving app usage.

Loyalty ($\beta = 0.22$, $p < .001$) also positively predicted Usage Frequency, indicating that gamification can strengthen customer relationships and encourage more frequent interactions with the bank's digital platform.

The perceived effectiveness of gamification features positively influences usage ($\beta = 0.18$, $p < .001$), highlighting the importance of well-designed, user-centric gamification elements.

The standardized beta coefficients indicate that for every one standard deviation increase in Engagement, Usage Frequency increases by 0.45 standard deviations, holding other variables constant. Similarly, one standard deviation increase in Loyalty and Feature Effectiveness are associated with 0.22 and 0.18 standard deviation increases in Usage Frequency, respectively. These findings strongly support Hypothesis 4, which posited that gamification leads to increased frequency of app usage. The results demonstrate that gamification elements not only directly increase usage but also work through enhanced engagement, loyalty, and perceived effectiveness of features to drive more frequent app usage. The

substantial $R^2$ value of 0.47 indicates that a considerable portion (47%) of the variance in Usage Frequency can be explained by these gamification-related factors. This underscores the significance of gamification strategies in influencing user behavior within mobile banking applications. These results have important implications for financial institutions and app developers.

**Table 10.** Frequency of Mobile Banking App Usage After Gamification Introduction

| Response | Frequency | Percentage | Mean Score | Std. deviation |
|---|---|---|---|---|
| Much less frequently | 15 | 1.5% | 3.89 | 0.91 |
| Less frequently | 45 | 4.5% | | |
| No change | 250 | 25% | | |
| More frequently | 420 | 42% | | |
| Much more frequently | 270 | 27% | | |
| Total | 1000 | 100% | | |

Table 10 highlights 69% of respondents using the app either "More frequently" (42%) or "Much more frequently" (27%). Only 6% reported using the app less frequently, while 25% reported no change. The mean score of 3.89 (SD = 0.91) indicates a clear trend towards increased usage after the introduction of gamification features in mobile banking apps.

**Table 11.** Agreement on Increased Usage Due to Gamification Elements

| Response | Frequency | Percentage | Mean score | Std. deviation |
|---|---|---|---|---|
| Strongly disagree | 20 | 2% | 3.88 | 0.93 |
| Disagree | 50 | 5% | | |
| Neutral | 230 | 23% | | |
| Agree | 430 | 43% | | |
| Strongly agree | 270 | 27% | | |
| Total | 1000 | 100% | | |

70% of respondents either "Agree" (43%) or "Strongly agree" (27%) that gamification elements have increased their usage of the mobile banking app. Only 7% disagree or strongly disagree with this statement. The mean score of 3.88 (SD = 0.93) shows a strong agreement with the statement. The results from these two tables (Table 10 &11) provide additional support for Hypothesis 4, which states that gamification leads to increased frequency of app usage. These results align closely with the previously reported mean score for increased usage of 3.9/5 (SD = 0.9) in the multiple regression analysis. The consistency between these direct questions and the regression results strengthens the evidence supporting Hypothesis 4. The data clearly demonstrates that a significant majority of users perceive an increase in their app usage frequency following the introduction of gamification features. This self-reported increase in usage, combined with the strong agreement that gamification elements are responsible for this change, provides compelling evidence for the effectiveness of gamification strategies in driving user engagement and app usage in the mobile banking context. These findings further reinforce the importance of gamification as a tool for financial institutions to enhance user engagement and increase the frequency of interactions with their mobile banking applications.

H5: "Younger customers are more receptive to gamification elements."

Table 5 shows the correlation coefficient value between age and engagement: $r = -0.38, p < 0.001$. This negative correlation suggests that as age increases, engagement with gamification elements decreases.

**Table 12.** Independent Samples t-Test: Age Groups and Gamification Engagement

| Age Group | N | Mean | Std. Deviation | t-statistic | df | p-value | Cohen's d |
|---|---|---|---|---|---|---|---|
| 18-35 | 1000 | 4.2 | 0.7 | 15.45 | 998 | < .001 | 0.98 |
| 36+ | 1000 | 3.3 | 1.0 | | | | |
| **Result: H5 is supported** | | | | | | | |

Table 12 presents the results of the independent samples t-test comparing gamification engagement between younger (18-35) and older (36+) age groups. The mean engagement score for the 18-35 age group (4.2) is higher than the 36+ age group (3.3), indicating that younger users tend to be more engaged

with gamification elements. The standard deviation is smaller for the younger group (0.7) compared to the older group (1.0), suggesting more consistent responses among younger users. The t-statistic (15.45) with 998 degrees of freedom and a p-value less than 0.001 indicates that the difference between the two groups is statistically significant. Cohen's d value of 0.98 suggests a large effect size, meaning the difference in engagement between the two age groups is not only statistically significant but also practically meaningful. These results strongly support the hypothesis (H5) that younger customers are more receptive to gamification elements in mobile banking apps. The significant difference in mean scores, combined with the large effect size, provides compelling evidence for this conclusion.

**DISCUSSION**

This comprehensive study on gamification in mobile banking apps provides compelling evidence for the effectiveness of game-like elements in enhancing customer engagement, loyalty, and usage frequency. The research, encompassing a diverse sample of mobile banking app users, offers several key insights:

1. **Positive Impact on Engagement**: The study strongly supports the hypothesis that gamification elements positively influence customer engagement in mobile banking apps. With a mean engagement score of 3.8 out of 5 and a large effect size (d = 0.89), the findings underscore the significant role of gamification in creating more engaging digital banking experiences.
2. **Strong Correlation with Loyalty:** The research reveals a robust positive correlation (r = 0.71) between gamified mobile banking experiences and customer loyalty. This relationship, further supported by regression analysis ($R^2$ = 0.50), suggests that effective gamification strategies can be instrumental in fostering stronger customer relationships and reducing churn in the competitive digital banking landscape.
3. **Effectiveness of Reward-Based Features:** The study demonstrates that reward-based gamification features (mean score 4.1/5) are significantly more effective than competition-based features (mean score 3.4/5) in driving customer engagement. This finding provides a clear direction for prioritizing gamification strategies in mobile banking app development.
4. **Increased App Usage:** With 69% of respondents reporting increased app usage following the introduction of gamification elements, and a mean score of 3.89 out of 5 for increased usage, the study strongly supports the hypothesis that gamification leads to more frequent app engagement. This increased usage can translate into more opportunities for banks to interact with and provide value to their customers.
5. **Age-Based Differences:** The research confirms that younger customers (18-35 years) are more receptive to gamification elements compared to older users (36+ years), with a significant difference in mean engagement scores (4.2 v/s. 3.3) and a large effect size (d = 0.98). This finding highlights the need for age-specific strategies in implementing gamification features.

In conclusion, this study provides robust evidence for the efficacy of gamification in mobile banking apps, demonstrating its potential to significantly enhance customer engagement, app usage and loyalty. However, the findings also underscore the importance of tailored approaches, particularly considering demographic factors like age, in maximizing the impact of gamification strategies.

**Managerial Implications**

Based on the research findings, several key implications emerge for managers and decision-makers in the banking and fintech sectors:

1. **Prioritize Gamification in App Development**: Given the strong positive impact on engagement and loyalty, managers should prioritize the integration of gamification elements in their mobile banking app development roadmaps. This should be viewed not as a novelty feature, but as a core strategy for enhancing the digital banking experience.
2. **Focus on Reward-Based Features**: With reward-based features proving significantly more effective than competition-based ones, managers should allocate resources towards developing and refining point systems, achievement badges, and other reward mechanisms. While competitive elements shouldn't be entirely discarded, they should play a secondary role in the gamification strategy.
3. **Personalize Gamification Experiences**: The notable differences in gamification receptiveness across age groups highlight the need for personalized experiences. Managers should consider implementing age-segmented gamification strategies, potentially allowing users to customize their level of gamification engagement.
4. **Leverage Gamification for Financial Education**: Given the positive impact on engagement and usage frequency, managers should explore using gamification as a tool for improving financial literacy among their customers. This could involve creating gamified modules for teaching complex financial concepts or incentivizing good financial habits through rewards.

5. **Monitor and Iterate**: As with any digital strategy, continuous monitoring and iteration are crucial. Managers should implement robust analytics to track the performance of different gamification elements and be prepared to refine strategies based on user feedback and engagement metrics.
6. **Balance Engagement and Ethics**: While pursuing increased engagement, managers must be mindful of ethical considerations. Gamification strategies should be designed to promote positive financial behaviors rather than potentially harmful activities like excessive trading or spending.
7. **Integrate with Overall Digital Strategy**: Gamification should not be viewed in isolation but as part of a broader digital engagement strategy. Managers should ensure that gamified elements align with and enhance other aspects of the digital banking experience, from onboarding to customer service.
8. **Invest in User Education**: To maximize benefits of gamification, particularly among older users who may be less familiar with such features, managers should invest in user education. This could involve in-app tutorials, email campaigns, or even in-branch demonstrations to help customers understand and engage with gamified elements.

By carefully considering and implementing these implications, managers in the banking sector can leverage gamification to create more engaging, loyal, and active user bases for their mobile banking applications, potentially leading to significant competitive advantages in the digital banking landscape.

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