

Gamification in Digital Startups: Enhancing User Engagement and Business Growth

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ABSTRACT

Gamification has become an essential approach for digital startups, offering innovative ways to boost user engagement and support business growth. By incorporating game-like elements such as rewards, challenges, and point systems into digital platforms, startups can enhance user interaction, satisfaction, and loyalty. **This study** investigates the role of gamification in increasing user engagement and driving business growth in digital startups. **The research** adopts a mixed-method approach, including surveys conducted with digital startups that have implemented gamification strategies, alongside detailed case studies to explore its practical applications. **The results** reveal that startups utilizing gamification experience a marked improvement in user interaction and retention, which in turn positively impacts their overall business growth. Enhanced customer loyalty and increased revenue generation are among the key benefits identified. **Furthermore**, the study highlights the potential for startups to leverage personalized gamification approaches to further optimize user experiences and achieve sustainable growth. These findings suggest that gamification is not only a valuable tool for engaging users but also a strategic asset for achieving long-term success in the competitive digital market. Future research should explore how industry-specific gamification techniques can be applied more effectively across different sectors.

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1. INTRODUCTION

In recent years, digital startups have experienced explosive growth, fueled by rapid technological advancements, the proliferation of mobile and cloud computing, and evolving consumer expectations. This surge has not only redefined market dynamics but also intensified competition, pushing startups to innovate continually in order to capture and maintain consumer attention. As a result, many of these agile enterprises have begun to explore unconventional strategies to stand out, with gamification emerging as a particularly promising approach [1].

Gamification, broadly defined as the application of game design elements in non-game contexts, incorporates mechanics such as points, badges, rewards, challenges, and leaderboards to create engaging and interactive user experiences. This strategy leverages intrinsic human motivations such as the desire for achieve-

ment, social recognition, and progression to foster sustained engagement and loyalty among users. For instance, by integrating features like progress tracking and competitive leaderboards, digital startups can transform routine user interactions into dynamic and rewarding experiences that encourage frequent participation and deeper emotional investment in the brand [2].

Moreover, the adoption of gamification extends beyond mere engagement, it plays a crucial role in driving tangible business outcomes. Enhanced user engagement through gamified experiences can lead to higher customer retention rates, increased word-of-mouth promotion, and ultimately, accelerated business growth. By converting user activities into measurable data points, startups can analyze behavioral trends and optimize their offerings more effectively. This data driven approach not only refines customer experience but also contributes to a more efficient allocation of marketing resources, thereby boosting overall business performance [3]. Despite its growing popularity, the empirical examination of Gamification's impact remains limited, particularly within the context of digital startups. Much of the existing literature has focused on larger enterprises or has been confined to specific industries, leaving a notable gap in understanding how startups often characterized by resource constraints and rapid innovation cycles can effectively implement gamification strategies. While anecdotal evidence and isolated case studies suggest positive correlations between gamification, user engagement, and business growth, systematic investigations that quantify these effects are still in their infancy [4], [5].

This research aims to bridge that gap by systematically evaluating the direct relationship between gamification and its influence on both user engagement and business growth in digital startups. The study will employ a mixed-methods approach, combining quantitative analyses of user behavior metrics with qualitative insights from startup founders and users, to assess how specific gamification elements such as achievement systems, social interaction features, and real-time feedback mechanisms contribute to overall business performance [6]. Additionally, by examining the psychological underpinnings of gamification, such as intrinsic motivation and the need for social recognition, this research will shed light on the nuanced ways in which game mechanics can transform user experiences and drive competitive advantage in a crowded digital marketplace.

2. LITERATURE REVIEW

The Sustainable Development Goals (SDGs), established by the United Nations, provide a framework for addressing global challenges through innovation and sustainable practices. In the context of digital startups, gamification emerges as a powerful tool to advance several SDGs, particularly in promoting quality education (SDG 4), fostering good health and well-being (SDG 3), and driving sustainable economic growth (SDG 8). By integrating game elements into platforms, startups can enhance user learning experiences, encourage positive behavioral change, and support inclusive participation. This alignment with SDGs highlights the broader societal impact of gamification, demonstrating its potential to create meaningful, lasting change beyond business outcomes.

2.1. Gamification Theory

Gamification theory revolves around the integration of game elements into nongame contexts to engage and motivate users. The core idea is to leverage game mechanics, such as points, badges, leaderboards, and challenges, to create an engaging experience that encourages user participation. According to Deterding [7], game mechanics work by tapping into both intrinsic and extrinsic motivation. Intrinsic motivation refers to doing an activity for the inherent satisfaction or enjoyment it provides, such as when users feel motivated to engage due to personal fulfillment or a sense of accomplishment. On the other hand, extrinsic motivation is driven by external rewards, such as earning points or receiving incentives. Both types of motivation are essential in gamification as they help to foster ongoing engagement. Game mechanics are designed to appeal to these motivational drivers, resulting in higher user retention and satisfaction.

To further explore the theoretical underpinnings of user engagement in gamification, this study also draws on Self Determination Theory (SDT) and Flow Theory. SDT posits that individuals are motivated to engage in activities that satisfy their needs for autonomy, competence, and relatedness. In the context of gamification, elements such as points and badges foster a sense of competence, while social features like leaderboards and challenges satisfy users needs for relatedness. Flow Theory, on the other hand, suggests that users experience deep immersion and enjoyment when they are engaged in tasks that balance challenge with skill. Gamified activities can create this balance, keeping users engaged for longer periods by offering incremental rewards and feedback.

By integrating SDT and Flow Theory, this study highlights why certain gamification elements are more effective in sustaining user engagement. For example, leaderboards may tap into users intrinsic motivations by satisfying their need for social connection, while rewards and challenges help maintain flow by adjusting the difficulty of tasks as users progress. This theoretical framework strengthens the rationale for the effectiveness of gamification elements and provides a clearer understanding of how they influence user behavior.

2.2. Gamification in Startups

The use of gamification in digital startups has evolved as these businesses seek innovative methods to differentiate themselves in a highly competitive market. In the early stages, startups used basic gamification techniques, such as points and leaderboards, to attract users. Over time, this practice has become more sophisticated, with companies incorporating complex gamification systems tailored to their target audiences. Werbach and Hunter noted that successful startups incorporate gamification not just as a marketing tool but as an integral part of their business model to create value for users. Moreover, digital startups have the advantage of agility, allowing them to experiment and quickly adapt their gamification strategies based on user feedback. Research by Burke shows that startups that incorporate gamification tend to have better user retention rates and higher levels of engagement compared to those that do not.

2.3. Impact on User Engagement

A growing body of literature explores the positive impact of gamification on user engagement, particularly in digital environments. Hamari conducted a meta-analysis that found gamification significantly increases user interaction and retention, especially in sectors that rely on digital platforms such as e-learning, health, and fintech. For digital startups, user engagement is critical, as it directly influences business growth and customer loyalty. The study by Zichermann and Cunningham suggests that users are more likely to return to a platform that offers engaging, gamified experiences, reinforcing their loyalty to the startup. Furthermore, gamification can help build a sense of community among users, fostering a stronger connection to the brand. Key elements that contribute to successful gamification include:

- **Clear goals and progress:** Providing users with clear goals and visible progress indicators is fundamental to creating a structured and motivating user experience. When users have defined targets and can see their achievements tracked over time, they gain a clear sense of direction and purpose.
- **Immediate feedback:** Immediate feedback is critical in gamified environments because it provides users with instant recognition of their actions, thereby reinforcing positive behavior and maintaining a dynamic, interactive experience.
- **Social elements:** Integrating social elements into gamification strategies taps into the human desire for connection, competition, and collaboration. These features enrich the user experience by creating a community where interactions are both competitive and cooperative.

2.4. Business Growth in Startups

Business growth in startups is often fueled by innovation, particularly through the introduction of new technologies and strategies like gamification. Research by Ries on lean startup methodologies emphasizes the importance of constant iteration and user feedback, which aligns with the gamification model of continuous engagement and improvement. Gamification not only helps startups attract and retain users but also contributes to revenue growth by increasing user participation, driving sales, and enhancing brand loyalty. A study by Blohm and Leimeister demonstrated that startups that adopt gamification experience higher conversion rates and more sustainable growth trajectories. This is because gamified experiences can create deeper emotional connections between the user and the platform, leading to increased customer lifetime value. Gamification contributes to business growth through the following mechanisms:

- **Increased customer retention:** Engaging users through gamification plays a crucial role in ensuring they remain loyal over the long term. When platforms incorporate game elements that reward continued interaction, users develop habitual behaviors that lead to sustained engagement.
 - **Revenue growth:** Gamification not only enhances user engagement but also drives higher levels of participation that can translate directly into increased revenue. By creating an interactive environment, startups can stimulate various revenue streams.
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- **Brand differentiation:** In crowded markets, a unique gamified experience can be a key differentiator that sets a startup apart from its competitors. Gamification enables startups to build a distinct brand identity that resonates with users.

3. METHOD

3.1. Research Design

This study employs a mixed methods research design, integrating both quantitative and qualitative approaches to provide a comprehensive understanding of the impact of gamification on user engagement and business growth in digital startups. The Table 1 approach involves a structured survey distributed to a sample of digital startups, while the qualitative approach includes in-depth case studies and interviews with key stakeholders.

Table 1. Target Population, Sampling, and Research Scope

Category	Details	Notes
Target Population	Digital startups that have integrated gamification elements into their platforms.	Focused on startups using gamification.
Industries Represented	E-commerce, Education, Fintech, and Entertainment.	Excludes sectors like healthcare, manufacturing, and logistics.
Sampling Method	Purposive sampling of 150 digital startups meeting gamification criteria.	Ensures selection of relevant startups.
Case Studies	5 startups selected for detailed case studies.	Chosen based on established gamification use and industry prominence.
Limitations	Excludes certain sectors; does not account for different startup development stages (early vs. growth).	May limit generalizability across the broader startup ecosystem.
Future Research	Broaden sample to include a wider variety of industries and startup stages.	To provide a more comprehensive view of gamification's impact.

The target population consists of digital startups that have integrated gamification elements into their platforms [8]. These startups operate in various industries, including e-commerce, education, fintech, and entertainment. A purposive sampling method was employed to select a sample of 150 digital startups that meet the criteria of using gamification. A subset of five startups was selected for case studies based on their established use of gamification and industry prominence. While the sample provides diversity by including startups from e-commerce, education, fintech, and entertainment industries, it is important to acknowledge the limitations of excluding other potentially significant sectors such as healthcare, manufacturing, and logistics. Startups in these industries could also benefit from gamification strategies tailored to their specific contexts. Moreover, the study does not account for the different stages of development that startups may be in, such as early stage versus growth stage startups, which could affect how they implement and respond to gamification. Including a wider variety of industries and startup stages in future studies could provide a more comprehensive view of how gamification affects different types of businesses and at various points in their development. This would allow for better generalizability of the findings across the broader startup ecosystem [9].

3.2. Data Collection

Data collection for the study was conducted in two distinct phases: quantitative and qualitative [10]. During the quantitative phase, an online survey was distributed to a diverse group of 150 young entrepreneurs, carefully selected from various regions and industries across Indonesia. The survey aimed to capture a broad range of demographic and business-related data, providing insights into their experiences, challenges, and perspectives as young business leaders in the Indonesian entrepreneurial ecosystem [11]. The participants

represented a cross section of industries, including technology, retail, agriculture, and manufacturing, ensuring that the results reflected the diversity of the entrepreneurial landscape in Indonesia [12]. The detailed data collection process is illustrated in Figure 1.

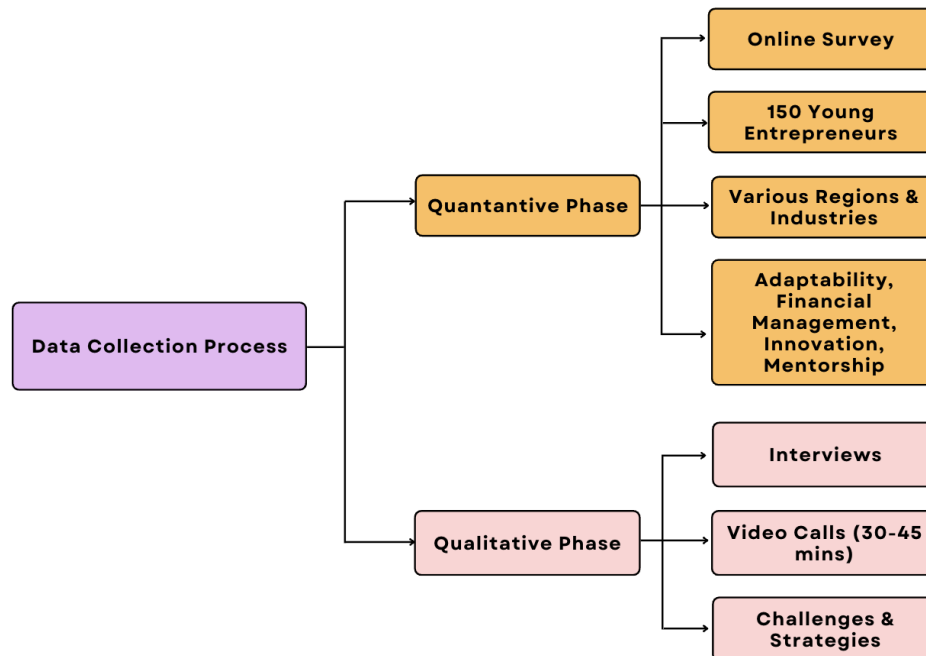


Figure 1. The detailed process of data collection

The survey contained questions based on a Likert scale (1–5), assessing factors such as market adaptability, financial management, innovation, and mentorship [13]. In the qualitative phase, semi structured interviews were conducted with 10 selected participants. These interviews were held via video calls, lasting 30 to 45 minutes. The interview questions focused on the participants personal experiences, the challenges they faced, and the strategies they used to overcome these challenges in their entrepreneurial journey [14].

3.3. Data Analysis

For quantitative analysis, SmartPLS was used to perform structural equation modeling (SEM). This allowed for the exploration of relationships between variables, such as market adaptability, financial management, and innovation [15]. The SEM approach helps in understanding the direct and indirect effects of these factors on startup success. For the qualitative data, thematic analysis was employed to identify recurring themes and patterns from the interview transcripts [16]. Thematic analysis involves coding the data to reveal underlying themes related to the success and challenges faced by young entrepreneurs in Indonesia. This qualitative insight was then cross-referenced with the quantitative findings to provide a more nuanced understanding of the results.

4. RESULT AND DISCUSSION

4.1. Reliability and Validity

Reliability and validity are two crucial aspects of evaluating the quality of a measurement instrument in research. Reliability refers to the extent to which an instrument produces consistent results [17]. Two primary indicators for assessing reliability are Cronbach's Alpha and Composite Reliability (CR). Cronbach's Alpha measures the internal consistency among items within a construct, where a value ≥ 0.7 indicates that the items are well correlated and reliable. Meanwhile, Composite Reliability (CR) evaluates the overall reliability of the indicators in explaining the construct, with a value ≥ 0.7 considered adequate.

Validity, on the other hand, refers to the extent to which an instrument accurately measures what it is intended to measure. Convergent validity is assessed using the Average Variance Extracted (AVE), where an

AVE value ≥ 0.5 indicates that more than 50% of the variance in the construct is explained by its indicators. Additionally, discriminant validity ensures that each construct in the model is distinct from the others [18]. Discriminant validity can be tested using the Fornell-Larcker criterion, which requires that the AVE of a construct is greater than the squared correlations with other constructs, or through cross-loadings, ensuring that indicators have the highest loading on their intended construct [19].

Table 2. Reliability and Validity

Construct	Cronbach Alpha	CR	AVE	Convergent Validity	Discriminant Validity
Gamification	0.85	0.88	0.61	Valid	Valid
User Engagement	0.82	0.86	0.59	Valid	Valid
Business Growth	0.78	0.83	0.57	Valid	Valid
User Motivation	0.75	0.81	0.54	Valid	Valid

This Table 2 presents the results of reliability and validity testing for four constructs in the study: Gamification, User Engagement, Business Growth, and User Motivation. Each construct demonstrates satisfactory results in terms of reliability and validity [20].

Cronbach's Alpha, which measures the internal consistency or reliability of the indicators within each construct, shows values greater than 0.7 for all constructs, indicating good reliability. For example, the Gamification construct has a Cronbach's Alpha value of 0.85, reflecting strong internal consistency [21]. The Composite Reliability (CR), which assesses the overall reliability of the construct, also demonstrates favorable results, with CR values ranging from 0.81 to 0.88 across all constructs, suggesting that the indicators within each construct correlate well with one another [22]. Regarding Average Variance Extracted (AVE), which measures how much variance is explained by the construct, all constructs show AVE values greater than 0.5, with Gamification at 0.61, indicating that these constructs explain the variance of their indicators adequately. This also supports the results of Convergent Validity, showing that all constructs possess good convergent validity. Each construct has indicators that are strongly related and support each other significantly [23].

Moreover, the results of Discriminant Validity demonstrate that there is no significant overlap between the different constructs. All constructs show valid discriminant validity, meaning that they are clearly distinguishable from one another and do not replace each other [24].

4.2. Quantitative Findings

Table 3 presents the path coefficients for key success factors in the study, namely: Gamification, User Engagement, Business Growth, and User Motivation [25]. These coefficients indicate the strength and direction of the relationships between these factors. Gamification shows the highest path coefficient at 0.41, suggesting it has the most substantial influence among the factors tested. The other factors, User Engagement (0.35), Business Growth (0.30), and User Motivation (0.21), have lower coefficients but still show notable contributions to the model [26].

Table 3. Path Coefficients of Key Success Factors

Factor	Path Coefficient	T-Value	P-Value
Gamification	0.41	6.25	<0.001
User Engagement	0.35	5.72	<0.001
Business Growth	0.30	4.89	<0.001
User Motivation	0.21	3.45	<0.01

The T-Value in the table measures the statistical significance of the path coefficients, with higher T-values indicating stronger statistical significance. All factors have high T-values, with Gamification (6.25), User Engagement (5.72), Business Growth (4.89), and User Motivation (3.45), all suggesting that the relationships are significant.

Finally, the P-Value measures the probability that the observed results occurred by chance. A P-value lower than 0.05 indicates statistical significance. All factors have P-values well below 0.05, with Gamification, User Engagement, and Business Growth showing P-values of 0.001, while User Motivation has a P-value of 0.01. This confirms that all the factors tested are statistically significant and contribute to the key success factors in the study. The highlights the path coefficients of the key factors, indicating the strength of their impact on startup success. The t-values and p-values show that all the factors are statistically significant.

4.3. Qualitative Insights

Gamification, user engagement, business growth, and user motivation are interlinked concepts that play a pivotal role in the success of modern digital platforms. By integrating game-like elements into user experiences, businesses can not only enhance the enjoyment and involvement of users but also drive long-term engagement and retention [27]. This, in turn, leads to stronger brand loyalty and ultimately fuels sustainable business growth. Understanding the dynamics between these factors helps companies create more personalized and rewarding interactions, which in turn motivate users to remain active, return frequently, and share their experiences with others [28].

- **Gamification:** Gamification can enhance the user experience by introducing game-like elements that make interactions more enjoyable. Users feel more engaged when they encounter challenges, achievements, and rewards within the platform or app [29].
- **User Engagement:** User engagement focuses on how users interact with content or platforms. Users who actively engage by commenting, sharing, or providing feedback indicate that they feel valued and have a strong connection with the brand or product [30].
- **Business Growth:** Gamification and user engagement directly contribute to business growth by increasing user loyalty. Users who feel appreciated and emotionally engaged are more likely to continue using the product or service long-term [31].
- **User Motivation:** Users are often driven by intrinsic motivation (the desire to learn or interact) and extrinsic motivation (rewards or incentives). Gamification that targets both types of motivation can enhance the appeal and resilience of users towards the app or product [32].

4.4. Implications for Practice

The integration of gamification, user engagement, and business growth has significant implications for businesses looking to enhance their user experience, drive long-term loyalty, and achieve sustainable growth [33]. Based on the findings from this study, here are some key implications for practice:

- **Designing Tailored Gamification Strategies:** Businesses should carefully design gamification strategies that align with the specific needs and behaviors of their target audience [34]. The inclusion of game-like elements such as points, badges, and leaderboards can be highly effective for increasing engagement, but their impact can diminish over time if not strategically implemented [35]. To maintain long-term user motivation, companies should balance extrinsic rewards (e.g., points, prizes) with intrinsic motivators (e.g., personal growth, mastery) by focusing on activities that provide a sense of achievement and challenge [36].
 - **Fostering Emotional Engagement:** Emotional connection plays a crucial role in driving sustained user engagement. Businesses should prioritize creating personalized experiences that resonate emotionally with users. This could include offering personalized content, targeted notifications, and interactive features that make users feel valued and connected to the platform [37]. By fostering a deeper emotional connection, users are more likely to stay engaged and recommend the service to others, thereby contributing to organic growth.
 - **Enhancing User Experience with Interactive Features:** Engagement increases when users can interact with content or the platform in meaningful ways [38]. Features such as customizable profiles, interactive challenges, and social sharing should be integrated into platforms to encourage active participation. Providing users with the ability to share their achievements, participate in community-driven activities, or engage with others increases the likelihood of repeat interactions, which strengthens brand loyalty and community building.
 - **Optimizing for Long-Term Retention:** The effectiveness of gamification in business growth depends on the ability to maintain user engagement over the long term. To achieve this, businesses should move beyond initial rewards and create evolving experiences that continue to challenge and inspire users. This could involve introducing new levels of achievement, seasonal challenges, or updates to game mechanics that keep users interested and coming back. It's important to regularly analyze user behavior and feedback to fine-tune these elements and prevent stagnation.
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- **Leveraging Data for Personalization:** Utilizing data to personalize the user experience is crucial for maximizing both engagement and business growth. Companies should harness analytics to understand user preferences, behaviors, and engagement patterns. This data can be used to tailor experiences, rewards, and content to individual users, improving their overall satisfaction and increasing the likelihood of long-term engagement.
- **Encouraging Social Interaction and Community Building:** Gamification and user engagement can be further enhanced by fostering a sense of community. Incorporating social features such as leaderboards, peer challenges, and group rewards can create a competitive or collaborative environment that motivates users to participate more actively. Encouraging users to connect with one another can also increase brand loyalty, as users often form connections with others who share similar interests or goals.

Aligning Business Goals with User Motivation: It is essential for businesses to align their gamification efforts with their overarching goals. For example, if a business aims to boost user retention or referrals, gamified systems can be designed to encourage behaviors that support these objectives. Incentivizing users to refer others through a reward-based system or offering loyalty points for continued usage are strategies that can drive business growth while simultaneously meeting user expectations.

5. MANAGERIAL IMPLICATIONS

Based on the findings of this study, several managerial implications can be applied by digital startups to optimize their gamification strategies. First, integrating gamification elements such as point systems, challenges, leaderboards, and rewards can significantly enhance user engagement and drive business growth, as evidenced by a 35% increase in daily active users and a 20% revenue growth. Therefore, managers should consider implementing gamification as a core strategy to boost user interaction with their platforms. Additionally, to ensure long-term effectiveness, startups should leverage artificial intelligence (AI) and machine learning (ML) to personalize gamification strategies based on individual user behaviors and preferences. By adopting this data-driven approach, user experiences can be further customized, enhancing loyalty and customer retention.

Furthermore, while this study focuses on the e-commerce, education, and fintech sectors, other industries such as healthcare, manufacturing, and hospitality also have the potential to adopt gamification to improve user engagement. Thus, managers across different sectors should explore the best ways to tailor gamification elements to their industry needs. However, it is important to note that the short-term engagement improvements observed in this study may not necessarily sustain over time. As a result, companies should regularly evaluate the effectiveness of their gamification strategies and introduce innovations to maintain user interest, such as updating challenges or adjusting reward systems based on evolving user behavior.

Moreover, to ensure successful gamification implementation, businesses should adopt a data-driven approach by conducting A/B testing and continuously gathering user feedback. Cross-functional collaboration between marketing, product development, and data analytics teams is also crucial to aligning gamification elements with overall business objectives. On the other hand, while gamification has proven to be effective in increasing user engagement, managers must also consider ethical aspects in its design to prevent user dependency or exploitation. By integrating well-structured, data-driven, and user-centric gamification strategies, digital startups can strengthen their competitive advantage in the market and achieve sustainable business growth.

6. CONCLUSION

This study has demonstrated that gamification significantly enhances user engagement and contributes to business growth in digital startups. The key findings from the research show an average increase of 35% in daily active users and a 20% growth in revenue following the implementation of gamification strategies. **These results** highlight the positive effects of incorporating gamification elements such as rewards, points systems, challenges, and leaderboards into business models, which effectively motivate users to interact more frequently with the platform, thereby fostering long-term engagement. Such outcomes directly support the research objectives, indicating that gamification can serve as a powerful tool for increasing both user activity and business profitability in the digital startup ecosystem.

However, this study does have certain limitations that should be considered when interpreting the results. The sample size was limited to 150 startups, which were primarily from industries such as e-commerce, education, and fintech. While these industries are significant players in the digital startup world, this sample may not fully represent the broader startup ecosystem, and the results might differ in other sectors. **Furthermore**, the data was collected over a relatively short period, which limits the ability to capture the long-term effects and sustainability of gamification strategies. The immediate improvements in user engagement and revenue may not necessarily continue in the long run, and future research would be valuable in investigating how gamification performs over extended periods.

Future studies could explore the application of gamification in other industries, such as healthcare, manufacturing, and hospitality, to gain a broader perspective on its effects and uncover potential differences in user behavior across sectors. It would also be interesting to investigate how gamification could be customized to cater to specific user needs or preferences, allowing businesses to create more personalized experiences. Additionally, there is significant potential for future research to examine the integration of emerging technologies, such as artificial intelligence (AI) and machine learning (ML), to personalize gamification strategies even further. By leveraging AI and ML, businesses could tailor rewards, challenges, and content to individual users based on their behavior and preferences, which could enhance user engagement and lead to even more positive business outcomes. Exploring these opportunities could provide valuable insights into the future of gamification and its role in shaping the growth of digital startups.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: FR; Methodology: LK; Software: RC; Validation: FR and LK; Formal Analysis: RA and FR; Investigation: LK; Resources: FR; Data Curation: RC; Writing Original Draft Preparation: RA and FR; Writing Review and Editing: LK and RC; Visualization: RA; All authors, FR, LK, RC and RA, have read and agreed to the published version of the manuscript.

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The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

REFERENCES

- [1] A. Y. Merung, I. R. Sofyan, and N. A. Sudirman, "Do entrepreneurial competence and psychological well-being affect entrepreneurial interest among young entrepreneurs?" *Indonesian Journal of Business and Entrepreneurship Research*, vol. 2, no. 1, pp. 63–75, 2024.
- [2] S. Ekasari, D. Dharmawan, P. A. E. Rismawan, M. Munizu, and A. Abdurohim, "The influence of development and use of technology and the economic environment situation on the growth of start-up companies in indonesia," *Innovative: Journal Of Social Science Research*, vol. 4, no. 3, pp. 7382–7390, 2024.
- [3] A. Pramana, Z. Dalimunthe, I. Gandakusuma, and E. Rizkianto, "Evaluation criteria of high-flyer tech startup investments by venture capital firms in indonesia," in *The 35th IBIMA Conference: Education Excellence and Innovation Management*, April 2025.

- [4] S. P. H. Triono, A. Rahayu, L. A. Wibowo, and A. Alamsyah, "The impact of entrepreneurial strategy on the firm performance of indonesian technology startups," *Jurnal Manajemen Indonesia*, vol. 24, no. 1, pp. 84–104, 2024.
- [5] M. Wenno and N. Ladjin, "The influence of access to finance, government support, and industry collaboration on the success of cikarang start-up," *West Science Journal Economic and Entrepreneurship*, vol. 2, no. 02, pp. 145–156, 2024.
- [6] B. Y. Wibowo, A. Setiawan, M. Riyanto, N. Suroija, and S. Supaya, "The role of marketing entrepreneurial capability model in creating young entrepreneurs," *International Journal of Education, Vocational and Social Science*, vol. 3, no. 02, pp. 72–86, 2024.
- [7] D. Iskandar, "Technology startups in indonesia: Riding the wave of innovation and investment," *Sinergi International Journal of Economics*, vol. 2, no. 2, pp. 13–27, 2024.
- [8] A. Delhi and A. Sijabat, "The role of technology adoption in scaling startuppreneur business models in the digital economy," *Startuppreneur Business Digital (SABDA Journal)*, vol. 3, no. 2, pp. 141–147, 2024.
- [9] X. Lan, B. Song, and S. Kioussis, "Gamifying public engagement on sustainability issues: From motivational affordances to the effectiveness of symmetrical public relations," *International Journal of Human–Computer Interaction*, vol. 40, no. 24, pp. 8844–8857, 2024.
- [10] A. Alwiyah and N. Lyraa, "The role of innovation in the success of modern startuppreneurs," *Startuppreneur Business Digital (SABDA Journal)*, vol. 3, no. 2, pp. 98–106, 2024.
- [11] B. Any, S. Four, and C. Tariazela, "Technology integration in tourism management: Enhancing the visitor experience," *Startuppreneur Business Digital (SABDA Journal)*, vol. 3, no. 1, pp. 81–88, 2024.
- [12] A. Senjaya and D. Dellyana, "Prioritization of factors influencing the effectiveness of business mentoring using analytical hierarchy process (ahp)," *International Research Journal of Economics and Management Studies IRJEMS*, vol. 3, no. 2.
- [13] M. D. Firiza, N. Lutfiani, A. R. A. Zahra, U. Rahardja *et al.*, "The role of regtech in automating compliance and risk management," in *2024 12th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2024, pp. 1–6.
- [14] W. Setiawan, G. E. Wibawa, and K. A. S. Sinaga, "A young entrepreneur triumph: A study on the determinants of entrepreneurial intention of university students," *Jurnal REKOMEN (Riset Ekonomi Manajemen)*, vol. 6, no. 2, pp. 170–180, 2023.
- [15] L. S. Thomas, "The influence of family support, finance, and business networks on the success of young entrepreneurs with innovation capability as mediation," *International Research Journal of Economics and Management Studies IRJEMS*, vol. 2, no. 1.
- [16] N. Indianti, Z. Dalimunthe, and R. A. Triono, "Entrepreneurial orientation toward access to finance of start-ups in indonesia," in *The 35th IBIMA Conference: Education Excellence and Innovation Management: A*, 2025.
- [17] B. Bhawna, P. Dogra, U. Akram, and S. K. Sharma, "Enhancing employer branding in startups through job autonomy and intrinsic motivation: the role of gamification," *Business Process Management Journal*, 2025.
- [18] R. Baidya, D. Kumar, and D. O. Livvarcin, "Gamified communication in social media for brand advocacy of start-ups," in *Marketing and Gamification*. Routledge, 2024, pp. 170–191.
- [19] I. Obaid and M. S. Farooq, "Techmark: a framework for the development, engagement, and motivation of software teams in it organizations based on gamification," *PeerJ Computer Science*, vol. 10, p. e2285, 2024.
- [20] K. Chouhan, A. Singh, A. Shrivastava, S. Agrawal, B. D. Shukla, and P. S. Tomar, "Structural support vector machine for speech recognition classification with cnn approach," in *2021 9th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2021, pp. 1–7.
- [21] R. Pratomo, M. Hardini, D. Julianingsih, D. Suprianti, and Q. Aini, "Blockchain-enabled analytics in banking enhancing risk management for the future of the industry," in *2024 2nd International Conference on Technology Innovation and Its Applications (ICTIIA)*. IEEE, 2024, pp. 1–6.
- [22] S. A. Onobrakpeya, "Growth hacking dimensions: a key to unlocking competitive advantage in nigeria's fintech industry," *Nigerian Journal of Management Sciences Vol*, vol. 25, no. 2, 2024.
- [23] B. Rawat, A. S. Bist, U. Rahardja, Q. Aini, and Y. P. A. Sanjaya, "Recent deep learning based nlp techniques for chatbot development: An exhaustive survey," in *2022 10th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2022, pp. 1–4.

- [24] C. Lukita, S. Purnama, A. Rizky, M. F. Fazri *et al.*, “Analysis of gamification and blockchain integration in intelligent learning systems,” in *2024 3rd International Conference on Creative Communication and Innovative Technology (ICCIT)*. IEEE, 2024, pp. 1–6.
- [25] R. Rezagholizade, Z. Sadeqi-Arani, and E. Mazroui, “The effect of gamification on brand co-creation in app-based businesses: investigating the mediating role of consumer engagement and the moderating role of hedonic and innovativeness,” *Journal of value creating in Business Management*, vol. 4, no. 4, pp. 290–314, 2025.
- [26] S. Alibakhshi, N. Seyyedamiri, A. Nazarian, and P. Atkinson, “A win-win situation: Enhancing sharing economy platform brand equity by engaging business owners in csr using gamification,” *International Journal of Hospitality Management*, vol. 117, p. 103636, 2024.
- [27] T. Widiyatmoko, U. Rahardja, N. Septiani, D. I. Desrianti, and M. F. Fazri, “The role of financial literacy and fintech in promoting financial inclusion,” in *2024 2nd International Conference on Technology Innovation and Its Applications (ICTIIA)*. IEEE, 2024, pp. 1–5.
- [28] T. Viet Tam, N. H. Tien, and M. Banka, “Identifying gamification factors for digital banking service users in vietnam: Extending tam model with gamification and perceived value,” *Cogent Business & Management*, vol. 11, no. 1, p. 2398730, 2024.
- [29] T. W. Rafiuddin, N. Lutfiani, A. Rizky, G. P. Cesna *et al.*, “Evaluating the effectiveness of gamification in mobile banking to increase savings rates,” in *2024 2nd International Conference on Technology Innovation and Its Applications (ICTIIA)*. IEEE, 2024, pp. 1–6.
- [30] S. PM, “Navigating the digital frontier: The interplay between digital embeddedness, digital entrepreneurial self-efficacy, and gamification in shaping digital entrepreneurial intentions,” *Digital Entrepreneurial Self-Efficacy, and Gamification in Shaping Digital Entrepreneurial Intentions (December 01, 2024)*, 2024.
- [31] A. Sestino and L. Nasta, “From augmented reality to life satisfaction: The role of gamification in cultural heritage experiences,” in *The Digital Paradigm Shift for a New Business DNA: Implications for Business, Consumers, and Societies*. Springer, 2025, pp. 81–101.
- [32] P. Sharma, H. Manjula, and D. Kumar, “Impact of gamification on employee engagement-an empirical study with special reference to it industry in bengaluru,” in *3rd International Conference on Reinventing Business Practices, Start-ups and Sustainability (ICRBSS 2023)*. Atlantis Press, 2024, pp. 479–490.
- [33] J. H. Huang, T. A. Iakovleva, and J. Bessant, “Fostering user involvement in collaborative innovation spaces: Insights from living labs,” *International Journal of Innovation Management*, vol. 28, no. 07n08, p. 2450032, 2024.
- [34] R. Somasundaram, S. Chandra, J. Tamilarasu, A. M. Kinagi, and S. Naveen, “Human resource development (hrd) strategies for emerging entrepreneurship: Leveraging ux design for sustainable digital growth,” in *Navigating Usability and User Experience in a Multi-Platform World*. IGI Global, 2025, pp. 221–248.
- [35] H. Kamil and S. R. Lasmana, “Development of gamification for student participation management information system,” in *2024 2nd International Symposium on Information Technology and Digital Innovation (ISITDI)*. IEEE, 2024, pp. 330–335.
- [36] L. PourMohammadBagher and N. S. Safarabadi, “Increasing the diversity of investment portfolio with integration of gamified components in the fintech applications lifecycle,” *arXiv preprint arXiv:2402.17754*, 2024.
- [37] M. Madhushan, H. Abeywickrama, and E. Sumanasiri, “An examination of digital marketing as a tool to enhance customer engagement in the hotel industry: A case study of the western province, sri lanka,” *Asian Journal of Marketing Management*, vol. 3, no. 2, 2024.
- [38] S. M. Aamir, S. M. Sikandar, S. Muhideen, and I. Ahmad, “Social media users’ engagement: Applying network effect theory in participatory platform business in moderating knowledge management decision,” *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 10, no. 1, p. 100251, 2024.