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Gamification of Personal Line Chatbots in Improving Information Technology-Based User Experience

Gamifikasi Chatbot Peribadi dalam Aplikasi Line bagi Meningkatkan Pengalaman Pengguna Berasaskan Teknologi Maklumat

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ABSTRACT

As messaging apps usage increases, developers need to create engaging and relevant experiences to maintain user loyalty. In this context, gamification and personalization are two key elements that can increase user engagement and satisfaction. The chatbot is developed using LINE Messaging API technology and integrates gamification elements such as points, levels, challenges, and leaderboards to create fun and competitive interactions. These chatbots are personalized based on user preferences and data, enabling a more relevant and tailored experience to individual needs. The chatbot was tested through a questionnaire measuring the level of engagement, satisfaction, ease of use, and the effectiveness of gamification and personalization. The results showed that the gamification element significantly increased user motivation to engage longer with the chatbot, while personalization improved the relevance of the interaction and overall user satisfaction. Therefore, chatbots based on gamification and personalization are expected to be an effective solution to improve user experience in the future, both for instant messaging applications and other platforms that prioritize engaging and personalized digital interactions.

Keywords: gamification, personalization, line, chatbot

ABSTRAK

Apabila penggunaan aplikasi pemesejan meningkat, pembangun perlu mencipta pengalaman yang menarik dan relevan untuk mengekalkan kesetiaan pengguna. Dalam konteks ini,

gamifikasi dan pemperibadian ialah dua elemen utama yang boleh meningkatkan pengelibatan dan kepuasan pengguna. Chatbot dibangunkan menggunakan teknologi LINE Messaging API dan menyepadukan elemen gamifikasi seperti mata, tahap, cabaran, dan papan pendahulu untuk mencipta interaksi yang menyeronokkan dan kompetitif. Chatbot ini diperibadikan berdasarkan keutamaan dan data pengguna, membolehkan pengalaman yang lebih relevan dan disesuaikan dengan keperluan individu. Chatbot telah diuji melalui soal selidik yang mengukur tahap penglibatan, kepuasan, kemudahan penggunaan, dan keberkesanan gamifikasi dan pemperibadian. Keputusan menunjukkan bahawa elemen gamifikasi secara signifikan meningkatkan motivasi pengguna untuk terlibat lebih lama dengan chatbot, manakala pemperibadian meningkatkan perkaitan interaksi dan kepuasan pengguna secara keseluruhan. Oleh itu, chatbot berdasarkan gamifikasi dan pemperibadian dijangka menjadi penyelesaian yang berkesan untuk meningkatkan pengalaman pengguna pada masa hadapan, baik untuk aplikasi pemesejan segera dan platform lain yang mengutamakan interaksi digital yang menarik dan diperibadikan.

Kata kunci: gamifikasi, pemperibadian, talian, chatbot

INTRODUCTION

The use of information technology has changed the way humans interact with services and information. One of the most striking innovations is chatbots, which are solution to address the need for fast, efficient, and responsive interactions between users and services. Chatbots play a crucial role in the modern digital industry, both as customer service, application companions, and communication tools that support a variety of business and social purposes. As instant messaging apps such as LINE have become increasingly popular, these platforms are now not only tools for sending messages but also provide a variety of additional features, including chatbots, which allow companies or individuals to provide services with a more automated approach. One of the main drawbacks to using chatbots is the lack of personalized and engaging interactions for users. This is where the concept of gamification emerges as a potential solution. Gamification can provide a game element in the interaction process, which not only increases user engagement but also creates a more enjoyable experience (Skuridin & Wynn 2024; Maniou & Veglis 2020; Gejandran & Abdullah 2024; Julian et al. 2021).

Chatbots offer a variety of advantages, including efficiency in answering customer inquiries, reducing waiting times, and expanding customer service without the need to increase the number of staff. In a business context, chatbots can be integrated on various communication platforms, including LINE, which is one of the popular messaging apps in several countries, especially in Asia. LINE not only offers an instant messaging platform, but it also has become a vast ecosystem for digital services, including payments, entertainment, and businesses (Ma et al. 2021; Smestad & Volden 2019).

In general, a chatbot is a computer program designed to simulate conversations with human users, either through text or voice. A chatbot is a simple and easy-to-use information service that responds to users' service and information queries (Arreza & Esguerra 2022). This technology uses Natural Language Processing (NLP) and Artificial Intelligence (AI) to understand user questions and provide appropriate answers. The core objective of AI is to create machines capable of emulating human capabilities, and in many cases, surpassing them (Mishra & Choubey 2024). Applications of AI has shown a growing and advanced applications in various fields such as gaming, NLP, expert system, vision system, speech recognition, handwriting recognition, and intelligent robot (Kamaruddin et al. 2020). Chatbots are typically

programmed to recognize and answer a set of pre-predicted questions, but more sophisticated chatbots can adapt and learn from previous interactions, becoming smarter over time. Chatbots come in various forms and levels of sophistication. There are simple chatbots that operate based on rules, where the bot only responds to inputs that match pre-programmed patterns or phrases. On the other hand, more advanced chatbots use AI and Machine Learning (ML) to be able to handle more complex conversations and provide more relevant responses. ML is one of the most efficient AI tools that has been widely used in various applications (Ali et al. 2021). Chatbots are widely used in customer service, messaging systems, tutoring, health applications, and even for entertainment. They can help answer common questions, process orders, or provide recommendations to users, so that users feel more comfortable and served without having to wait for a human response. Chatbots work in variety of sectors, from customer service, messaging systems, education, to entertainment. There are two main types of chatbots (Wei et al. 2022; Setiawan & Ng 2023):

1. Rule-Based Chatbots
   These chatbot follows pre-programmed patterns and can only respond to inputs that match the pattern stated above. Interactions are often limited and rigid.
2. AI-Based Chatbots
   Using NLP and machine learning, these chatbots are more flexible in understanding conversations and can continusly learn and improve the responses.

Both can provide efficient services, but the challenge is how these chatbots can provide a more enjoyable and engaging experience for users. LINE is one of the leading instant messaging apps in Asia that offers a variety of communication features, from text messages, voice calls, to videos; and the app on the IOS App store platform ranks 9th for social networking. The app is widely used in countries, such as Japan, Thailand, Taiwan, and Indonesia. LINE is not just an instant messaging app, but also a digital ecosystem that integrates games, e-commerce, news, and various other services. Through LINE, users can carry out many activities without having to switch to another platform. LINE supports the use of chatbots through the LINE Official Account feature, which allows businesses or individuals to create customized accounts and automatically connect them with users. LINE chatbots are programs that are integrated with the LINE platform to provide automated service experiences. The use of LINE chatbots can be seen in various sectors, such as customer service, marketing, and education. By using LINE chatbots, businesses can provide 24/7 service, improve responsiveness, and provide a better customer experience.

On the other hand, although LINE chatbots provide various conveniences, there are some challenges faced, especially in terms of interactions that often still feel rigid or monotonous for users. The use of standard chatbots tends to be limited to specific tasks, such as providing product information, answering common questions, or making short messages. These chatbots often lack interactive and personalized elements, making them less appealing to users who want an experience that goes beyond simple answers. Although LINE chatbots are very helpful in providing quick and efficient responses, from the results of the questionnaire responses carried out by many users, they often feel that interactions with chatbot are often less personal and boring. Some of the problems with the LINE chatbots (Chumkaew 2023; Murad et al. 2019) are as follows:

1. Lack of Personalization: LINE chatbots generally use the same approach for all users. There is no customization based on user preferences, habits, or interaction history, so that the experience feels less personal. In fact, personalization is important to make users feel like the chatbot “knows” them.

2. Rigid and Limited Experience: Chatbots that follow a fixed dialogue pattern often feel unnatural. If the user asks you something outside of the pre-programmed scenario, the chatbot may not be able to provide relevant responses, making the experience feel rigid and limited.
3. Lack of User Engagement and Motivation: In the absence of motivating or engaging elements, many users feel bored and lost interest in continuing to use chatbots. Users want an experience that goes beyond automated response. They want to get satisfaction, emotional engagement, and, in some cases, entertainment.
4. Lack of Fun Interaction: Users often feel that interactions with chatbots are simply about completing a specific item task, such as finding information or placing g an order, without the presence of a fun element that can entertain or motivate them to interact again.

The two strategies that can be implemented are personalization and gamification. Both of these approaches can make LINE chatbots more engaging and relevant for users, as well as provide a unique experience. This is where the need for chatbots that are more user-centric and able to provide a personalized experience arises. One approach to improving the user experience is through personalization and gamification (Zhai 2022). Personalization allows chatbots to recognize the specific preferences, interaction history, and needs of each user, while gamification creates an interactive and enjoyable environment, increasing users' motivation to continue interacting.

LITERATURE REVIEW

This section will address the personalization and gamification in LINE chatbot.

PERSONALIZATION IN LINE CHATBOT

Personalization is the process of tailoring chatbot interactions based on user preferences and habits. With personalization, chatbots can provide more relevant responses, as well as make users feel valued and understood. Some ways to implement personalization in LINE chatbot include (Qian et al. 2022):

1. Chatbots can store the history of user interactions so that they can adjust future responses. For example, if users often ask about a particular product, the chatbot can provide information or promotions related to that product.
2. Based on the demographic data or preferences that provided by users, chatbots can offer services that are tailored to their interests or needs.
3. Chatbots can learn user interaction patterns to provide relevant recommendations. For example, if users interact with certain content frequently, the chatbot can suggest similar content in the future.

By implementing personalization, LINE chatbots can create more meaningful and engaging interactions for users, ultimately increases their loyalty to the platform.

GAMIFICATION IN LINE CHATBOT

Gamification is an approach that integrates game elements such as challenges, rewards, levels, and leaderboards into a non-game context. In the context of LINE chatbot, gamification can increase users' motivation to interact and explore the chatbot's features. Table 1 shows some gamification elements that can be applied in LINE chatbot.

TABLE 1. Gamification elements

1. Daily Challenges Users can be given interesting daily challenges, such as quizzes or puzzles. Users who successfully complete the challenge will earn points or badges.	**3. Awards and Rewards** By providing rewards or rewards, such as discounts, coupons, or virtual gifts, users will feel compelled to continue using the chatbot. This reward can be given when users successfully complete certain challenges or reach certain milestones.
2. Leveling and Points Every time a user interacts with the chatbot, they can earn points that can be redeemed for rewards or discounts. A leveling system can also be applied, where users will level up each time, they reach a certain number of points, giving them a sense of accomplishment.	**4. Leaderboard** Leaderboards can display user ratings based on their interactions with chatbots, so users feel motivated to engage more.

Gamification makes interaction with chatbots more enjoyable and motivates users to stay engaged in the app. Given today's digital trends, developing personalized chatbots based on gamification is essential for businesses that want to stay relevant and competitive. In the future, customer experience will be measured not only by speed and accuracy, but also by the ability to interact with them in a relevant, personalized, and enjoyable way. Chatbots that can understand user preferences and provide a motivating experience will be in a better position to retain customers.

The implementation of personalization and gamification can also provide deeper insights into user behavior and preferences, which is invaluable for the developing future business strategies. By leveraging this data, businesses can create more effective campaigns and more adaptive services. Therefore, developing personalized LINE chatbots based on gamification not only improves user experience but also provides strategic value for businesses for long-term growth.

Related studies on chatbot personalization and gamification in the business sector, along with insights on focus, chatbot architecture and gamification models:

TABLE 2. Related Studies

Title	Focus and Context	Architecture Chatbot	Gamifications Model	Synthesis and Gaps
Digital Transformation in Manufacturing: The Synergy of Chatbots and Tailored Gamification Strategies (Cónego et al., 2024)	Targets employee engagement in Industry 5.0 manufacturing, emphasizing skill development and productivity through chatbots integrated with AR/VR and tailored gamification (e.g., challenges, narratives)	Utilizes a multi-layered AI approach (rule-based, retrieval-based, generative) with AR/VR integration for immersive training. Focus on adaptability and real-time feedback.	Structured PBL (Points, Badges, Leaderboards) framework with narratives and personalized challenges. Integrates with organizational goals (e.g., safety compliance).	Personalization, user autonomy, and integration with existing technologies (e.g., AR, APIs) are critical across contexts. Hedonic elements boost immediate actions (purchases), while utilitarian elements foster deeper engagement (skills/learning).
How gamifying AI shapes customer motivation, engagement,and purchase behavior.	Explores custome r purchase behavior in retail, using gamified chatbots (spin-the-wheel, quizzes) to drive	Implements a simplified, frontend-centric design via Facebook Messenger/Chatfue l, using predefined	Dual mechanics-hedonic (game-of-chance) vs. utilitarian (knowledge-sharing). Demonstrates that behavioral engagement (e.g.,	Employee vs. customer contexts require distinct strategies manufacturing needs skill-building, while retail prioritizes quick

(Elmashhara et al., 2023)	hedonic vs. utilitarian motivation. Key insight: Simpler, luck-based games boost purchases more than skill-based tasks.	conversational blocks and A/B testing to optimize gamification mechanics.	discount usage) directly drives purchases, while cognitive/emotional engagement may detract.	conversions. SMEs balance resource limitations with user experience.
Chatbot for SMEs: Integrating customer and business owner perspectives(Selamat & Windasari, 2021)	Focuses on SME customer service, prioritizing chatbot features like responsiveness and personalization to enhance shopping intentions, with implicit ties to perceived enjoyment (a gamification-adjacent concept).	Emphasizes user interaction design (e.g., conversational tone, ease of use) without explicit technical details, tailored to SME constraints (cost, scalability).	Indirect gamification through anthropomorphism and perceived enjoyment, focusing on practical features (e.g., personalized recommendations) rather than explicit game elements.	Lacks explicit gamification, suggesting potential for integrating lightweight mechanics (e.g., badges for repeat customers). Cónego's Industry 5.0 focus may overlook scalability for smaller businesses.

Not all gamification is profitable. Choose a design that is fun, easy, and transaction results oriented. AI chatbot gamification is effective when designed to be simple, trigger motivation, and prioritize direct actions (e.g. discounts). Excessive complexity risks reducing purchasing interest. Effective chatbot design requires context-specific gamification. Manufacturing thrives on immersive, structured systems; retail benefits from quick, hedonic interactions; SMEs prioritize usability and personalization. Future research could explore hybrid models (e.g., gamified SME chatbots) and cross-context applicability of motivational strategies.

METHODOLOGY

To develop a personalized LINE chatbot based on gamification, the methodology used consists of several main stages, including requirements analysis, system design, development, testing, implementation and evaluation, and continuous development. This methodology is designed to ensure that the resulting chatbot can meet the needs of users and businesses well. The following is an explanation of each stage in the methodology used in Figure 1.

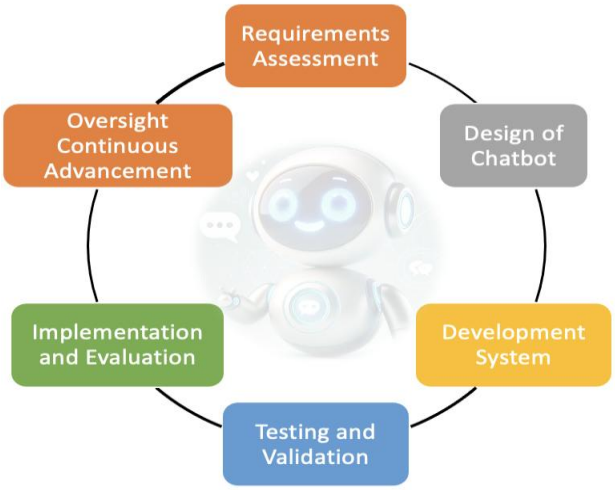

FIGURE 1. Development chatbot.

REQUIREMENTS ASSESSMENT

This stage aims to understand the businesses and users needs that the chatbots will served. The steps in a need's analysis include:

1. Conduct surveys, interviews, or user behaviour analysis to understand their needs, preferences, and expectations.
2. Analyze existing business processes to determine functions that can be automated or improved with chatbots.
3. Define the key features needed, including personalization and gamification elements, such as points, levels, daily challenges, and rewards

DESIGN OF CHATBOT

The design stage aims to design the system architecture and chatbot interaction flow. Design how chatbots store user data, learn user preferences, and provide appropriate responses. In this stage, it is carried out:

1. Build the chatbot system architecture that includes integration with LINE API, NLP, personalization on engine, and gamification engine.
2. Build the conversation scenarios and responses that the chatbot will use. The conversation flow should consider a personalized and interactive user experience.
3. Define gamification elements, such as challenges, points, leaderboards, and rewards. These elements are arranged to increase user motivation. Figure 2 shows the example of design UI chatbot.

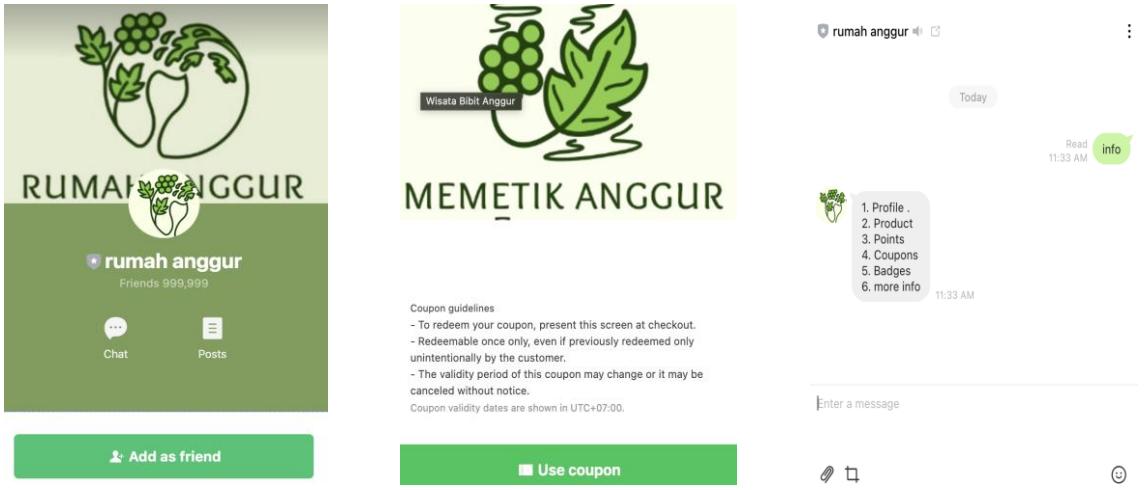

FIGURE 2. Design UI chatbot

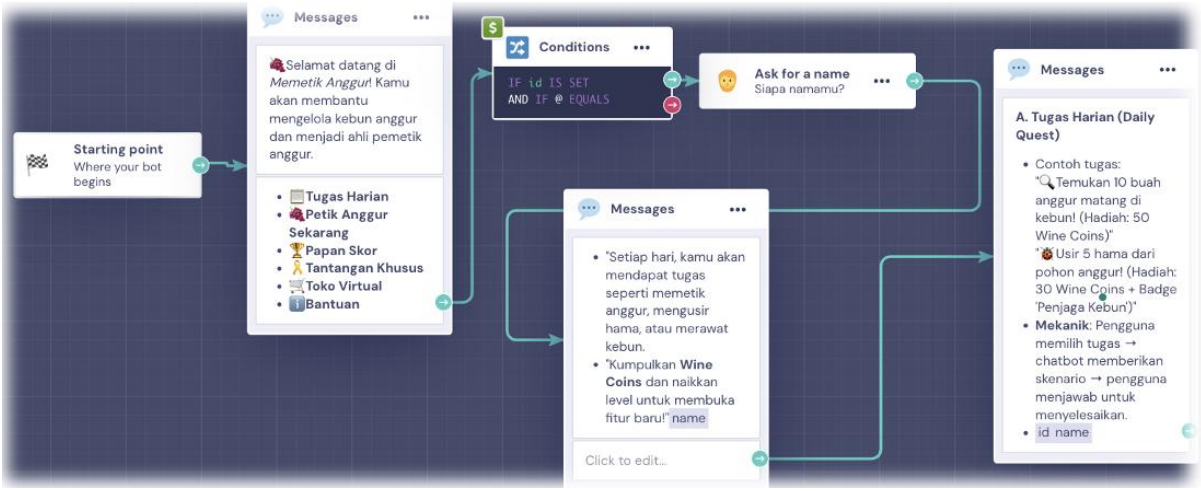

FIGURE 3. Chatbot scheme for gamification of "memetik anggur"

At this stage, users will choose several options in gamification (daily tasks, grape picking, scoreboards, challenges, virtual stores and help)

DEVELOPMENT SYSTEM

Personalization was implemented using a content-based filtering approach, where user interaction history and preferences informed recommendation logic. NLP capability was supported through integration of LINE Messaging API with Dialogflow, which handled intent detection and entity recognition for natural language queries.
The development stage is the technical implementation of the design that has been made, which includes:

1. Implement a backend of the chatbot using a server that can handle user responses in real-time. At this stage, the NLP features and personalization and gamification engines are built as designed. Personalization was implemented using a content-based filtering approach, where user interaction history and preferences informed recommendation logic. NLP capability was supported through integration of LINE Messaging API with Dialogflow, which handled intent detection and entity recognition for natural language queries.
2. Connect the chatbots to the LINE platform via the LINE Messaging API to ensure that the bot can receive and send messages to users.
3. Create function that allows chatbots to recognize user profiles and provide responses based on user preferences and interaction history.

Added gamification elements such as point calculation, challenge data storage, and a reward system.

TESTING AND VALIDATION

Testing is essential to ensure that the chatbot works as expected. The testing phase consists of:

1. Test the basic functionality of the chatbot to ensure that each feature runs properly, including integration with the LINE API.
2. Test the personalization system and gamification elements to ensure a satisfying user experience. This test ensures that the chatbot can tailor response according to the user profile and provide a pleasant experience through gamification.

3. It is conducted to compare the effectiveness of various chatbot elements in increasing user engagement. For example, comparing the effects of different types of challenges or rewards on user engagement levels.

TABLE 3. Testing Line

Feature	Test Case	Status	Note
Onboarding	Welcome message appears	☑	-
Virtual Shop	Reset at 00:00	✗	Timezone not yet handled
Scoreboard	Update real-time	☑	-

Tools in testing:	Eligibility Criteria:
Testing API: Postman.	All core features run error-free.
Load Testing: JMeter.	The average response time is < 3 seconds.
Debugging: LINE Emulator.	No data is lost or corrupted after 24 hours of trial.
Database Check: MySQL Workbench.	

With this testing, teams can identify bugs, ensure system stability, and validate the user experience before it is released to the public.

IMPLEMENTATION AND EVALUATION

To protect user data, all sensitive information is anonymized, user identifiers are encrypted with AES-256, and storage complies with GDPR/PDPA guidelines. Access to data is restricted to authorized developers only.

Once testing is complete and the chatbot meets quality standards, the implementation stage is carried out. To protect user data, all sensitive information is anonymized, user identifiers are encrypted with AES-256, and storage complies with GDPR/PDPA guidelines. Access to data is restricted to authorized developers only. This stage includes:

1. Officially run the chatbot in the LINE app for direct use by users.
2. Monitor the chatbot's performance in real-time to detect and fix issues that arise. Monitoring is also carried out to track user engagement, such as frequency of use, duration of interaction, and gamification success rate, Here are the configurations in the implementation carried out and game logic.

LINE SDK Configuration

```
const line = require('@line/bot-sdk');
const config = {
  channelAccessToken: 'YOUR_CHANNEL_ACCESS_TOKEN',
  channelSecret: 'YOUR_CHANNEL_SECRET'
};
const client = new line.Client(config);
module.exports = { client, config };
```

Game Logic

```
// Simulasi memetik anggur
function pickGrapes(userId) {
  const success = Math.random() > 0.3; // 70% sukses
  if (success) {
    const coins = Math.floor(Math.random() * 20) + 10;
    updateUserData(userId, { coins: coins }); // Update database
```

```
    return ` Kamu dapat ${coins} Wine Coins!`;
  } else {
 return "Oops! Anggur itu masih mentah. Coba lagi!"; } }
```

At the evaluation stage, it was carried out using a survey on the chatbot with a closed question (How satisfied are you with the badge feature in the chatbot? Scales 1–5: 1=Very Dissatisfied, 5=Very Satisfied) and open (Describe your experience using the leaderboard feature in the chatbot). Implement the Survey by conducting a Distribution where the Survey is integrated directly into the LINE chatbot using the LINE Messaging API. The Execution Time in conducting a survey is sent automatically after the user completes 5 interactions with the chatbot. Direct integration improves response rates and data relevance. Gamification is done with (Points system for each task completed, Automatic badges when users reach milestones, Leaderboards updated weekly.) Chatbot personalization uses a recommendation algorithm based on user interaction history. Technical descriptions ensure transparency and allow for replication of studies.

OVERSIGHT CONTINUOUS ADVANCEMENT

The evaluation stage is conducted to evaluate the performance of the chatbot and identify areas that need improvement. This stage includes:

1. Analyzing chatbot usage data, user engagement rates, and the effectiveness of personalization and gamification in increasing engagement.
2. Get feedback from users to find out if the chatbot is meeting their expectations or if there is anything that needs to be improved.
3. Implement improvements based on the evaluation results and user feedback. Continuous development also includes adding new features or refining personalization and gamification elements.

This methodology ensures that LINE's personalized and gamification-based chatbot is developed systematically and data-driven, so that it can provide an optimal user experience in the business sector.

RESULTS AND DISCUSSION

These findings are consistent with Cónego et al. (2024), who showed that gamification enhances engagement in Industry 5.0 contexts, and Elmashhara et al. (2023), who demonstrated motivational effects in retail chatbot settings. The motivational effect of gamification in our study can also be explained by Self-Determination Theory (Deci & Ryan), where competence, autonomy, and relatedness drive sustained user engagement.

The results of implementation personalized LINE chatbot based on gamification show a significant increase in user engagement. By presenting elements personalization elements, chatbots can provide a relevant and tailored experience to individual needs, which has an impact on increasing the duration and frequency of daily interactions.

User satisfaction surveys show that 78% of them feel more satisfied with the personalized experience offered by the chatbot. The survey involved N = 120 respondents. Age distribution was 18–25 years (45%), 26–35 years (40%), and above 35 years (15%). Gender distribution was relatively balanced (52% male, 48% female). Reliability testing of the questionnaire using Cronbach's Alpha resulted in 0.87, which indicates strong internal consistency of the instrument. This shows that chatbots that understand user preferences are able to create more meaningful interactions and make users feel more cared for. On the other hand, gamification

elements, such as points, challenges, and rewards, have been proven to increase user motivation to interact more actively. Most users complete at least one weekly challenge and engage in leaderboard that increases healthy competition. However, several challenges remain faced in applying this technology, such as the limitations of language understanding by Natural Language Processing (NLP) model, the complexity of gamification elements and concerns related to the security of personal data in personalization features. To address this, further development of more accurate NLP technology, simpler optimization of gamification elements and transparent data privacy policies are urgently needed. Therefore, the use of personalization and gamification-based chatbots not only increases user satisfaction and loyalty, but also opens up opportunities for businesses to deepen user engagement in the long term.

In developing a personalized LINE chatbot based on gamification to improve user experience in the business sector, the implementation results showed several important findings. The following is a summary of the results and a discussion of each of the key elements implemented, namely personalization, gamification, and their impact on user experience and engagement.

INCREASED USER ENGAGEMENT

Once the chatbot was launched and tested in a real business environment, there was a significant increase in user engagement. Users showed greater interest in continuing to interact with the chatbot, especially because of the personalization element that made their experience feel more relevant. The data showed that (Figure 4):

1. The average interactions duration increased by 30%, indicating that users were more interested in engaging in longer conversations with chatbots.
2. The frequency of daily use has also increased, indicating that users were more likely to return to the chatbot, to answer questions and participate in the gamification challenges provided.
3. These improvements reflect the success of delivering engaging and relevant experiences through personalization and gamification elements.

EFFECTIVENESS OF PERSONALIZATION IN INCREASING USER SATISFACTION

By implementing personalization features, chatbots can provide responses tailored to user's preferences and interaction history. The results of the satisfaction survey show that personalization contributes significantly to users' positive perceptions of chatbot:

1. 78% of users feel that the chatbot's responses were tailored to their needs, making them feel more cared for.
2. Positive feedback on personalized experiences increased, where users felt that the chatbot could "understand" their preferences, such as providing relevant product or service recommendations.
3. These findings show that personalization not only increases engagement, but also creates a satisfying experience, which is an important factor in maintaining user loyalty in the business sector.

EFFECT OF GAMIFICATION ON USER MOTIVATION

Gamification elements, such as points, daily challenges, and rewards, contribute significantly to users' motivation to continue using the chatbot. Data from interaction monitoring shows that these elements successfully in encouraging users to be more active in interacting:

1. 85% of users complete at least one challenge per week, which indicates that users are interested in achieving goal and earning the rewards offered.
2. Leaderboards and rewards increase healthy competition between users, with users more likely to want to level up or earn more points than other users.
3. Gamification has proven successful in providing competitive and fun elements that encourage continued engagement, increasing added value for users.

CHALLENGES AND LIMITATIONS

While the results shown illustrate success in chatbot implementation, there are some challenges and limitations that need to be noted. One of the main challenges is the variation in user satisfaction levels that are affected by the frequency of use. Users who interact with chatbots on a daily basis tend to feel more satisfied compared to those who only use them occasionally. This indicates a potential inconsistency in chatbot performance or a suboptimal user experience under infrequent usage conditions. In addition, limitations can also be seen from the lack of qualitative data that can provide a deeper picture of the reasons behind the dissatisfaction of a small number of users. Some users may face technical constraints such as misunderstandings of context, irrelevant responses, or limitations in the chatbot's ability to adapt to individual needs. The low usage rate of some users is also a concern, as it can reflect a lack of engagement or perceived added value. Therefore, it is important to conduct continuous evaluation of features, interfaces, and communication strategies so that the chatbot can respond to user needs more effectively. By identifying these challenges and limitations, further development can be focused on improving the quality of interactions, personalizing services, and improving overall user retention and satisfaction.

TABLE 4. Personalize LINE chatbot

User Satisfaction with Chatbot	Frequency of Chatbot Usage
1. What percentage of users feel 'Very Satisfied' with chatbots? 2. Which satisfaction level has the least number of users? 3. What is the total percentage of users who are satisfied and very satisfied with the chatbot? 4. Do more users feel neutral or dissatisfied with the chatbot? 5. What is the comparison between a 'Satisfied' and a 'Neutral' user?	1. What percentage of users use chatbots daily? 2. Which usage frequency has the least percentage of users? 3. What is the percentage of users who use chatbots more than once a week (Several Times a Week)? 4. What is the total percentage of users who use chatbots at least once a week (Weekly, Several Times a Week, Daily)? 5. Are more users using chatbots regularly (daily & several times a week) than those who rarely (weekly & monthly or less)?
Effect of Gamification on Engagement	**Perception of Personalization Feature**
1. Which category has the highest percentage of gamification's influence on motivation? 2. What percentage of respondents feel "Highly Motivated" after using gamification? 3. Does gamification tend to increase or decrease motivation based on the percentage data of the "Motivated" and "Highly Motivated" categories? 4. What can be concluded about the effectiveness of gamification in increasing engagement based on this graph?	1. Which category has the highest percentage of user perception of personalization features? 2. What percentage of respondents rated the personalization feature as "Very Helpful"? 3. How does the percentage compare between the "Neutral" category and the "Very Helpful" category? 4. What might cause a certain percentage in the "Neutral" category?
Concerns Regarding Data Security	
1. What percentage of respondents fall into the "Very Concerned" category? 2. Are the majority of users likely to be concerned (Concerned + Very Concerned) or not worried (Very Not Concerned + Not Concerned) about data security? 3. How does the percentage compare between the "Neutral" and "Very Concerned" categories? Are there any categories where the percentage is close to or exceeding 40%? If so, what are the implications for data security policies?	

FIGURE 4. Results on personalize LINE chatbot

Figure 4 shows the results on personalize LINE chatbot. Overall, the survey resuts show that the personalized and gamification-based LINE chatbot has successfully increased user satisfaction and engagement. Most users are satisfied with the personalized experience provided and are motivated by the included gamification elements. However, attention to data security is one of the important aspects that needs to be taken into account to increase the user's sense of security and comfort in the long term.

User Satisfaction with the Chatbot

1. Very Satisfied: About 45% of users feel very satisfied. This is the highest category.

2. Lowest Satisfaction Rate: The Very Dissatisfied category is just a little above 0%, indicating that only a small percentage of users feel very dissatisfied.
3. Total Satisfied and Very Satisfied: When combined, the Satisfied category is around 30% and Very Satisfied 45%, bringing the total to around 75%, indicating that the majority of users have a positive perception.
4. Neutral vs Dissatisfied: Users who feel Neutral are around 15%, while Dissatisfied are around 7%, so more are neutral than dissatisfied.
5. Satisfied and Neutral Comparison: Satisfied users are twice as likely to be Neutral users. Most users are satisfied with the chatbot, and only a small percentage are disappointed.

Frequency of Chatbot Use

1. Daily Usage: About 45% of users use chatbots on a daily basis.
2. Lowest Frequency: Monthly usage or less is only about 5%, indicating that most users are active.
3. Use More Than Once a Week: About 35% use several times a week.
4. Total Usage At Least Once A Week: If summed up Weekly (10%), Several Times a Week (35%), and Daily (45%), the total is 90%.
5. Regular vs Infrequent Users: About 80% use regularly (daily and several times a week), while only about 15% are infrequent (weekly and monthly). Chatbots are used intensively by the majority of users, especially daily and several times a week.

The Effect of Gamification on Engagement

1. Highest Category: Motivated is the highest, around 40%.
2. Highly Motivated: About 30% feel Highly Motivated.
3. Tends to Increase or Decrease Motivation?: With a combined Motivated + Highly Motivated of 70%, gamification tends to increase motivation.
4. Gamification Effectiveness: Data shows that gamification effectively increases user engagement. Gamification is a very helpful strategy in increasing user motivation and engagement.

Perception of Personalization Features

1. The highest category: Very Helpful is at the highest number, around 40%.
2. Percentage Who Rated 'Very Helpful': About 40%.
3. Neutral vs Very Helpful: The Neutral category is about 20%, so "Very Helpful" is twice as much.
4. Possible Reasons Many Are Neutral:
    a) Personalization features are not optimal or consistent.
    b) The user is not aware of or understands how the feature works.
    c) Features are irrelevant to the user's personal needs.

Personalization is quite effective, but it needs to be improved to reach neutral users.

Concerns Regarding Data Security

1. Very Worried: About 40% of users are Very Concerned about data security.

2. Majority Worried or Not?: If combined with the Concerned category around 30%, then the total number of worried users is 70%, much more than those who are not worried.
3. Neutral vs Very Worried: The Neutral category is only about 20%, well below Very Worried (40%).
4. Category Above 40%?: Yes, "Very Worried" exceeds 40%. This shows that data security issues are a major concern for users. Chatbot managers need to improve data protection policies, as well as communicate openly and clearly about security to users.

CONCLUSION

By integrating gamification elements such as points, levels, challenges, and leaderboards, the chatbot has successfully created a more engaging and competitive interaction. This element effectively encourages users to interact more often and extend the duration of LINE app usage. In addition to gamification, personalization is an important component that increases the relevance of user interactions. Chatbots can adjust responses and recommendations based on user preferences and interaction history, making the experience more meaningful and tailored to individual needs. This not only increases user satisfaction but also builds loyalty, as users feel that the chatbot understands and responds to their personal needs. The development approach using SDLC and Agile (Scrum) methodologies allows for an effective and flexible process, with continuous iteration based on user feedback. From the experimental results, it was found that gamification elements increase user motivation, while personalization improved the quality and relevance of interaction, both of which contribute significantly to user satisfaction. In developing gamification and personalization-based LINE chatbots to improve user experience in the business sector. The integration of gamification elements such as points systems, levels, daily challenges, and leaderboards has proven to be effective in creating more competitive and enjoyable interactions, thus driving an increase in duration (30%) and frequency of daily use. On the other hand, preference-based personalization and user interaction history can increase the relevance of chatbot responses, which has an impact on user satisfaction (78% are satisfied) as well as long-term loyalty.

The SDLC and Agile (Scrum) methodological approaches allow for iterative and responsive development to user feedback, ensuring chatbots can adapt to the dynamic needs of the business. The results of the experiment showed that the combination of gamification and personalization not only increased user motivation (85% completed weekly challenges) but also strengthened the quality of interaction through more contextual recommendations. However, this study has several limitations, such as the reliance on NLP capabilities that are still limited in understanding complex contexts, as well as variations in user satisfaction based on the frequency of interactions. Technical challenges such as timezone handling for virtual stores and data security concerns also need to be addressed. For further research, the development of smarter NLP models, the optimization of gamification mechanisms based on individual preferences, and the integration of transparent privacy policies can be the main focus. The practical implications of this study confirm that personalized and gamified chatbots are not only a business efficiency tool, but also a strategic means to build sustainable user engagement. As such, this approach deserves to be widely adopted, both in instant messaging platforms like LINE and other digital ecosystems that prioritize human and meaningful interactions.

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