ISSN 2085-4579

Analyzing Factors Influencing Flow Experience in Battle Royale Games: A Case Study of Free Fire MAX

Farrel Andhika Fatih[1], Edi Saputra[2], Rizqa Raaiqa Bintana[2]
[1]Information System Department, Jambi University, Jambi, Indonesia
farrelandhika.fatih09@gmail.com, edisaputra@unja.ac.id, rizqa.raaiqa.bintana@unja.ac.id

Accepted on November 05th, 2025
Approved on December 08th, 2025

***Abstract*—The rapid growth of the mobile gaming industry, particularly within the Battle Royale genre, has reshaped player engagement and competitive play. Free Fire MAX stands out by offering immersive gameplay supported by strong narrative driven elements. This study analyzes the influence of Game Design Factors (GDF) on players Flow Experience using a quantitative approach. Eleven factors Game Goals, Game Mechanism, Interaction, Freedom, Game Fantasy, Narrative, Sensation, Game Value, Challenges, Sociality, and Mystery were examined to identify which elements significantly contribute to psychological immersion. A structured questionnaire based on the Game Design Factors framework was distributed to active Free Fire MAX players aged 13–25 in Indonesia, using a five point Likert scale across 35 indicators. From 284 valid responses, 175 samples were retained for the main analysis. The methodology included Pearson validity testing, Cronbach's Alpha reliability testing, and classical assumption evaluations covering normality, multicollinearity, and heteroscedasticity. Multiple linear regression using SPSS was applied to determine the strongest predictors of Flow. The results indicate that Narrative, Challenges, and Mystery significantly influence Flow (Sig < 0.05), while other factors show no substantial effect. Narrative elements such as themed skins and crossover events enhance emotional involvement, Challenges improve immersion through balanced difficulty, and Mystery strengthens curiosity through hidden rewards and unpredictable events. Gender-based analysis showed no significant difference in Flow, suggesting immersion is consistent across genders. These findings reinforce Flow Theory and highlight key game design aspects essential for sustaining engagement in competitive mobile gaming.**

***Index Terms*—flow experience; game design Factors; free fire max; narrative; challenges; mystery**

I. INTRODUCTION

In recent years, the global mobile gaming industry has experienced significant growth, driven by rapid technological advancements, affordable smartphones, and increasingly accessible internet connectivity. This expansion has encouraged the emergence of various game genres that compete to capture and retain player attention [1]. Recent studies highlight that game engagement is increasingly shaped by design-driven immersion and reward structures that strengthen psychological ownership and sustained motivation [2], [3]. Among these, the Battle Royale genre has become one of the most dominant due to its competitive mechanics, social interaction, and immersive design elements. Free Fire MAX one of the leading titles in this genre has attracted more than 100 million monthly active users, particularly in Southeast Asia [4]. Its popularity is not solely driven by technical optimization but also by carefully structured game design elements that enhance player involvement and long-term engagement [5].

In mobile games, both narrative immersion and adaptive challenge systems have been identified as key determinants of sustained player involvement. Empirical evidence shows that perceived challenge significantly correlates with narrative immersion, enhancing player engagement [6], while unpredictable gameplay events and uncertain successes significantly enhance psychological investment and enjoyment, supporting sustained engagement [7]. Recent findings further emphasize that modern mobile game engagement is also shaped by design elements such as achievability and immersibility, which increase satisfaction, involvement, and continued usage intention among players [8]. Complementary meta-analytic evidence also demonstrates that content structure, interface clarity, and mechanical balance substantially influence enjoyment and behavioral outcomes across game genres [9]. Additionally, qualitative investigations involving professional game designers emphasize that maintaining equilibrium among narrative, mechanical systems, and player flexibility is essential for supporting adaptability and long-term game sustainability [10].

Despite its strong market presence, player engagement in Battle Royale games remains unstable and tends to fluctuate over time. Prior studies indicate that player motivation and flow are strongly influenced by design elements such as challenge balance, goal clarity, narrative depth, and interactive features [11].

However, most empirical research focuses on MOBA and RPG games, resulting in a research gap regarding how game design factors operate within Battle Royale environments [12]. Previous studies on titles like DOTA 2 and Valorant demonstrate that synergy between game mechanics, social interaction, and narrative is essential for sustaining engagement [5], [13]. Yet, systematic analysis of these factors in the context of Free Fire MAX remains limited.

To address this gap, this study aims to analyze the influence of Game Design Factors (GDF) on the Flow Experience of Free Fire MAX players using a quantitative approach. This research examines eleven design factors game goals, mechanics, interaction, freedom, fantasy, narrative, sensation, value, challenge, sociality, and mystery based on Shi and Shih's (2015) framework [14].

The population of this study consists of active Free Fire MAX players in Indonesia aged 13–25 years. A total population estimate of approximately 2–3 million potential players was identified based on regional user statistics, and 284 valid responses were collected through an online survey. After data cleaning, 175 samples were retained for quantitative analysis using SPSS, including validity, reliability, regression, and classical assumption tests.

Based on this background, the study addresses the following research question which Game Design Factors significantly influence the Flow Experience of Free Fire MAX players?. The findings of this study are expected to provide insights for developers seeking to optimize game design elements and strengthen long-term player engagement in competitive mobile gaming environments.

II. LITERATURE REVIEW

A. *Flow Experience Theory*

The concept of Flow Experience was first introduced by Mihaly Csikszentmihalyi (1990), describing a mental state in which individuals are fully absorbed and deeply engaged in an activity. In the context of gaming, flow refers to the immersive experience where players lose track of time and external distractions while focusing entirely on the game [11]. This optimal state occurs when the challenge of the game is well balanced with the player's skills, producing feelings of enjoyment, control, and intrinsic motivation.

Flow in digital games is characterized by several psychological dimensions, including deep concentration, a strong sense of control, enjoyment, reduced self awareness, and distorted perception of time. When these elements align, players enter a state commonly described as "being in the zone," where gameplay feels seamless, rewarding, and intrinsically motivating [11]. In highly competitive environments such as Battle Royale games, sustaining flow becomes essential for retaining players, as those who frequently experience this state tend to play longer and demonstrate higher loyalty toward the game. This highlights the importance of game design factors that maintain equilibrium between challenge and skill, ensuring that players remain engaged without feeling either overwhelmed or bored.

In this study, flow serves as the dependent variable, representing the level of engagement and satisfaction experienced by players during gameplay in Free Fire MAX. By quantifying flow, researchers can evaluate how effectively different game design factors contribute to immersive, enjoyable, and continuous play experiences.

Previous research has shown that flow experience can have both positive and negative implications in gaming contexts. On one hand, strong flow enhances game acceptance, concentration, and learning outcomes, particularly in educational or serious gaming environments [15], [16]. On the other hand, several studies suggest that intensified flow may increase the likelihood of problematic gaming behaviors, particularly within massively multiplayer online (MMO) genres [17]. Flow has been identified as a potential predictor of online gaming addiction, as persistent immersion may lead to compulsive play that becomes difficult to control [18], [19]. Thus, while flow is a desirable design outcome, maintaining a balance that encourages engagement without fostering harmful dependency is crucial especially in fast paced and reward driven games like Battle Royale.

Recent findings also suggest that escapism can function as a psychological pathway that strengthens flow-related experiences, particularly when immersive feedback systems and challenge structures effectively align with intrinsic player motivations. Empirical evidence shows that escapism not only enhances moment-to-moment enjoyment but also increases prolonged game use by reinforcing emotional immersion and perceived competence, thereby amplifying the conditions under which flow is most likely to occur [20]

B. *Game Design Factors (GDF)*

The Game Design Factors framework proposed by Shi and Shih (2015) identifies eleven key elements influencing player engagement and flow in digital games: Game Goals, Game Mechanism, Interaction, Freedom, Fantasy, Narrative, Sensation, Game Value, Challenges, Sociality, and Mystery. Each factor contributes uniquely to shaping the overall gaming experience.

- Game Goals define the objectives players aim to achieve. Clear and rewarding goals sustain motivation and provide direction.

- Game Mechanism refers to the structural rules, balance, and feedback system that govern gameplay.
- Interaction encompasses both player game and player-player communication that enhances social immersion.
- Freedom gives players autonomy to explore, customize, and make meaningful decisions.
- Fantasy provides escapism through imaginative settings and character design.
- Narrative delivers storylines and lore that emotionally connect players to the game world.
- Sensation emphasizes visual, auditory, and tactile stimuli that create excitement and realism.
- Game Value reflects perceived rewards, achievements, and satisfaction gained from playing.
- Challenges test the player's skill and persistence through progressively difficult tasks.
- Sociality involves cooperative or competitive play, fostering community engagement.
- Mystery introduces uncertainty, hidden features, or unpredictable events that maintain curiosity and anticipation.

Shi and Shih (2015) argued that a balance among these factors enhances player immersion and facilitates the emergence of flow. In the case of Battle Royale games, elements like Challenges, Sociality, and Mystery play a dominant role due to their competitive and unpredictable nature.

Prior studies have confirmed that well integrated game design factors significantly improve player engagement and retention [5]. Recent grounded-theory research on mobile game behavior further supports this view, demonstrating that multiple design features particularly challenge structures, reward systems, and narrative depth directly shape user behavior, motivational patterns, and sustained interaction within mobile gaming ecosystems [21].

III. Results and Discussion

A. Method

This study employed a quantitative research design using an online survey model to examine the influence of Game Design Factors on the Flow Experience of Free Fire MAX players. The survey instrument was adapted from the Game Design Factors (GDF) framework [17], consisting of 35 indicators distributed across eleven dimensions: Game Goals, Game Mechanism, Interaction, Freedom, Game Fantasy, Narrative, Sensation, Game Value, Challenges, Sociality, and Mystery. All items were measured using a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." By adopting the GDF framework, this study systematically evaluates how each design component contributes to the emergence of Flow during gameplay.

The population of this study comprised active Free Fire MAX players in Indonesia aged 13–25 years. Based on regional usage statistics, the estimated player population ranges from 2 to 3 million individuals. A total of 284 valid responses were collected through online distribution via social media platforms. After data cleaning procedures, 175 responses were retained for statistical analysis to ensure data quality, remove outliers, and eliminate incomplete entries.

Data collection was conducted using a self-administered questionnaire delivered through Google Forms. The analysis procedures included: (1) validity testing using Pearson's product–moment correlation, (2) reliability testing using Cronbach's Alpha, and (3) classical assumption tests consisting of normality (Kolmogorov–Smirnov), multicollinearity (VIF and Tolerance), and heteroscedasticity (Glejser). Multiple linear regression was then applied to determine the significant predictors of Flow Experience. All statistical computations were performed using IBM SPSS Statistics.

B. Instrument Validity Test

Table 1 presents the results of the instrument validity and reliability testing for all constructs used in this study. Validity was assessed using Pearson's product–moment correlation by comparing the computed r-value of each indicator with the critical r-value of 0.148 (N = 175, $\alpha = 0.05$). The results show that all indicators exceeded the critical threshold ($r > 0.148$), indicating that each item is valid and suitable for further analysis.

TABLE I. Validity Test

Variables	Indicator	Pearson's r value	Critical R Value	C. Alpha
Game Goals	G1	0.596	0.148	0.749
	G2	0.535	0.148	
	G3	0.600	0.148	
Game Mechanism	G4	0.541	0.148	0.706
	G5	0.489	0.148	
	G6	0.543	0.148	
Interaction	G7	0.601	0.148	0.716
	G8	0.464	0.148	
	G9	0.550	0.148	
Freedom	G10	0.534	0.148	0.725
	G11	0.539	0.148	
	G12	0.575	0.148	
Gama Fantasy	G13	0.480	0.148	0.616
	G14	0.446	0.148	
	G15*	0.405	0.148	
Narrative	G16	0.664	0.148	0.776
	G17	0.608	0.148	
	G18	0.567	0.148	
Sensation	G19	0.492	0.148	0.739
	G20	0.533	0.148	

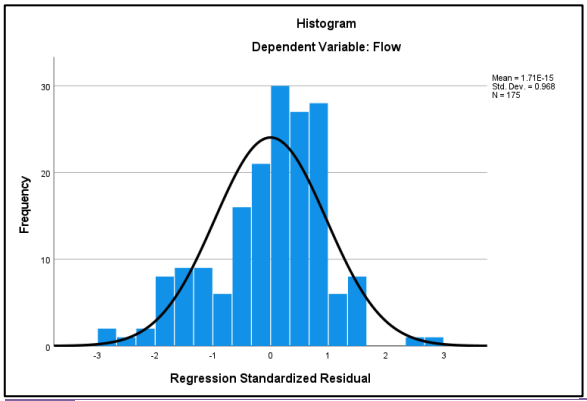
Variables	Indicator	Pearson's r value	Critical R Value	C. Alpha
	G21	0.679	0.148	
Game Value	G22	0.459	0.148	0.628
	G23	0.459	0.148	
Challenges	G24	0.503	0.148	0.667
	G25	0.377	0.148	
	G26	0.581	0.148	
Sociality	G27	0.552	0.148	0.718
	G28	0.490	0.148	
	G29	0.571	0.148	
Mystery	G30	0.433	0.148	0.604
	G31	0.433	0.148	
Flow	G32	0.488	0.148	0.796
	G33	0.650	0.148	
	G34	0.691	0.148	
	G35	0.619	0.148	

Furthermore, reliability was evaluated using Cronbach's Alpha for each variable. All constructs demonstrated acceptable internal consistency, with Cronbach's Alpha values ranging from 0.604 to 0.796, exceeding the minimum reliability criterion of 0.60. The Flow construct achieved the highest reliability (α = 0.796), followed by Narrative (α = 0.776) and Game Goals (α = 0.749), indicating strong measurement stability in these variables. Meanwhile, the lowest but still acceptable reliability was observed in the Mystery construct (α = 0.604), which remains within the acceptable threshold for exploratory studies.

Overall, the results confirm that all indicators in the Game Design Factors (GDF) and Flow Experience constructs are both valid and reliable, demonstrating strong psychometric quality and supporting their use in subsequent regression and classical assumption analyses.

C. Classical Assumption Test

To ensure that the multiple regression model meets the classical assumptions, a normality test was conducted on the standardized residuals derived from the Flow variable. The assessment utilized both graphical and statistical approaches. Fig. 1 presents the histogram of the regression standardized residuals, which illustrates a bell-shaped distribution with a mean close to zero and a standard deviation near one, indicating that the residuals are symmetrically distributed. Furthermore, Fig. 2 shows the Normal P–P Plot, where the plotted points closely follow the diagonal reference line without notable deviations or clustering patterns. This alignment demonstrates that the observed cumulative probabilities are consistent with those of a normal distribution.



In addition to graphical evaluation, the Kolmogorov–Smirnov test was conducted to provide statistical confirmation. The resulting significance value exceeded 0.05, indicating that the null hypothesis of normally distributed residuals cannot be rejected. Taken together, the graphical patterns and statistical results affirm that the regression residuals satisfy the normality assumption, allowing the subsequent regression analysis to be performed reliably.

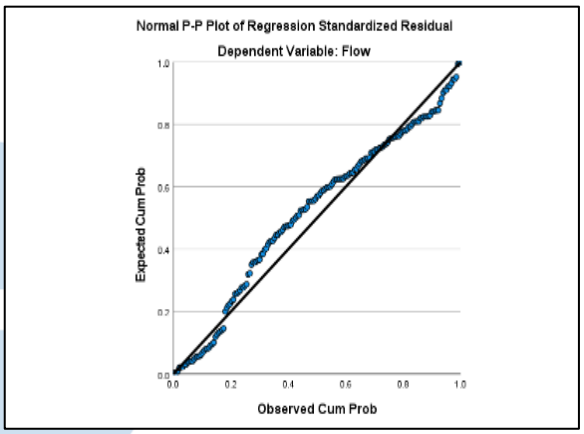


Fig 1. Normal P–P Plot of Standardized Regression Residuals

D. Descriptive Statistics

The descriptive analysis in Table 1 illustrates that all eleven Game Design Factors received relatively high mean values, ranging between 3.89 and 4.19 on a 5 point Likert scale. This indicates that players generally perceived the design elements of Free Fire MAX positively. Among these factors, Game Goals (M = 4.19, SD = 0.75), Challenges (M = 4.16, SD = 0.74), and Sociality (M = 4.18, SD = 0.71) recorded the highest mean scores, suggesting a consistent perception among players regarding the clarity of objectives, competitive engagement, and community interaction. The relatively low standard deviations (< 0.8) for most factors demonstrate that player responses were stable and homogeneous, implying agreement in how these elements were experienced.

Conversely, Narrative (M = 3.94, SD = 0.90) and Mystery (M = 4.03, SD = 0.89) exhibited slightly higher standard deviations, indicating greater variability in how players experienced these elements. This variability may stem from differences in players' interpretations of the game's storyline or exposure to limited time events and hidden features. Interestingly, despite the moderate means and higher dispersion, these two variables along with Challenges were found to significantly affect the Flow Experience in regression analysis. This suggests that elements capable of

evoking emotional, cognitive, and exploratory engagement tend to be more influential in sustaining Flow, even when perceptions vary among players. Although Game Goals and Sociality were rated highly by players, their lack of statistical significance suggests that perceived importance does not necessarily translate into deeper immersive flow.

These consistent mean values and stable deviations validate the reliability of the dataset, ensuring that the subsequent regression analysis reflects genuine player perceptions rather than random variability.

TABLE II. Descriptive Statistics.

Variable	Descriptive Statistics	
	Mean	*Std. Deviation*
GameGoals	4.1924	0.74908
GameMechanism	4.1600	0.76049
Interaction	4.1048	0.78691
Freedom	4.0838	0.83005
GameFantasy	3.8952	0.83647
Narrative	3.9448	0.90203
Sensation	4.0095	0.87204
GameValue	4.1514	0.83644
Challenges	4.1638	0.74095
Sociality	4.1829	0.71176
Mystery	4.0286	0.89333
Flow	3.7600	0.95380

E. Regression Analysis

TABLE III. Model Summary

Model Summary[b]			
R	*R Squere*	*Adjusted R Square*	*Std. Error of The Estimate*
0.788[a]	0.622	0.596	0.60610

a. Predictors: (Constant), Mystery, GamaFantasy, Narrative, GameGoals, Sensation, Freedom, Interaction, Sociality, Challenges, GameValue, GameMechanism
b. Dependent Variable: Flow

To identify which factors significantly affect the Flow Experience, a multiple linear regression test was conducted with Flow as the dependent variable and eleven GDFs as independent variables. The model produced an R^2 value of 0.622, indicating that 62.2% of the variance in Flow can be explained by the combined influence of the game design factors. This indicates a moderately strong explanatory power, suggesting that while GDFs explain a substantial portion of flow variance, other psychological or contextual factors may also contribute.

TABLE IV. Coefficients

Coefficients[a]				
Model	*Standardized coefficients Beta*	*Sig.*	*Tolerance*	*VIF*
(Constant)		0.554		
GameGoals	0.014	0.890	0.240	4.175
Game Mechanism	- 0.056	0.598	0.205	4.885
Interaction	0.141	0.140	0.257	3.894
Freedom	0.060	0.528	0.260	3.843
GameFantasy	- 0.128	0.061	0.499	2.003
Narrative	0.311	< 0.001	0.343	2.913
Sensation	0.096	0.262	0.320	3.126
GameValue	0.113	0.262	0.231	4.320
Challenges	0.341	< 0.001	0.231	4.333
sociality	- 0.180	0.053	0.272	3.675
Mystery	0.156	0.045	0.390	2.565

a. Dependent Variable: Flow

The regression results revealed that Narrative (Sig = 0.001), Challenges (Sig = 0.001), and Mystery (Sig = 0.045) had significant positive effects on Flow (Sig < 0.05). This finding indicates that the storyline, difficulty level, and hidden or unpredictable elements within the game play crucial roles in enhancing players' immersion and enjoyment. In particular, the Narrative aspect in Free Fire MAX is not limited to traditional storytelling but is creatively expressed through thematic collaborations, limited edition skins, and character based events. These collaborations often involving well known brands, anime series, or pop culture icons allow players to engage emotionally with the game world while expressing individuality through visual customization. As a Battle Royale game, Free Fire MAX integrates narrative elements dynamically within its seasonal content, transforming each event into part of a larger story arc that sustains player curiosity and attachment. This approach strengthens players' sense of identity and belonging in the game ecosystem, contributing significantly to the creation of a sustained Flow experience.

Among the significant variables, Challenges had the highest standardized beta coefficient ($\beta = 0.341$), indicating that the sense of challenge is the most dominant predictor of Flow among Free Fire MAX players.

F. Gender Based Flow Experience Analysis

This analysis was conducted to examine whether there were significant differences in the level of flow experience between male and female players in Free Fire MAX. Prior to the comparison of mean differences, a homogeneity of variance test was performed using Levene's Test to ensure that the data

variances between groups were homogeneous, thereby validating the assumptions required for the Independent Samples t-Test.

TABLE V. Independent Samples Test

Independent Samples Test				
	F	***Sig.***	***t***	***Sig. (2-tailed)***
Equal variances assumed	1.996	0.160	- 0.189	0.850

The results of Levene's Test for Equality of Variances indicated a significance value of 0.160 (> 0.05), confirming that the variances between male and female groups were homogeneous. This finding implies that the distribution of flow scores between the two gender groups was relatively even, suggesting that both male and female players exhibited similar variability in their engagement levels during gameplay.

Following this, the Independent Samples t-Test revealed a Sig. (2-tailed) value of 0.850 (> 0.05), indicating that there was no significant difference in the mean flow experience between male and female players. In other words, both genders demonstrated comparable levels of psychological immersion and engagement while playing the Battle Royale game Free Fire MAX.

These results align with previous studies suggesting that gender does not necessarily determine the degree of flow experience in gameplay. Instead, player engagement is more strongly influenced by game design factors particularly narrative depth, challenge balance, and elements of mystery that shape players' emotional and cognitive involvement during play.

G. Discussion

The findings confirm that Narrative, Challenges, and Mystery are key determinants of Flow Experience in mobile battle royale games. The results of the regression analysis show that the Narrative factor has a significant influence on players' Flow Experience (Sig < 0.05), indicating that the narrative dimension directly contributes to the level of psychological immersion while playing Free Fire MAX. Mechanistically, a strong narrative helps create emotional immersion by facilitating deep focus, a sense of connectedness, and player identification with the game world elements that align with the concentration and loss of self-consciousness aspects of Flow Theory. This finding is supported by Shi and Shih (2015), who asserted that narrative design can expand the game's context through symbolic, visual, and thematic experiences that influence player perception and motivation.

In the context of Free Fire MAX, narrative aspects emerge not only through the storyline or characters but also through thematic collaborations, limited-edition skins, and cross-franchise events. Collaborations such as with anime, artists, or global franchises function as narrative extensions, extending the story by connecting the game world to popular culture trends. This integration transforms cosmetic elements into storytelling devices that strengthen player identity, build emotional engagement, and create story continuity from one event to the next. This mechanism explains why narrative has a significant impact on Flow: players who feel symbolically "connected" tend to focus better, enjoy the game longer, and more easily enter a state of deep immersion.

In terms of implications, these results indicate that developers need to maintain and expand their narrative-driven content approach, particularly through collaborative events, themed battle passes, and consistent lore development. This approach has proven effective not only in improving Flow Experience, but also in extending the player engagement cycle in the highly competitive Battle Royale genre.

Regression results show that Challenges have a significant influence on players' Flow Experience (Sig < 0.05), confirming the crucial role of the balance between difficulty level and player ability in creating optimal engagement. From a Flow Theory perspective, a challenge-skill balance is a fundamental element that enables players to achieve a state of deep focus, increase persistence, and minimize frustration or boredom. When challenges align with individual abilities, players are more likely to experience a sustained sense of accomplishment and a clear goal orientation.

In Free Fire MAX, this balance is realized through various design systems. Ranked mode utilizes a skill-based matchmaking mechanism, ensuring players are continually faced with relevant challenges. Furthermore, dynamic arena conditions such as randomly changing safe zones, varying loot locations, and competitive pressure from other players create a game environment that demands constant adaptation. This aspect enhances strategic engagement and supports the development of a sustained Flow experience.

Elements of surprise, such as hidden missions, limited-rotation modes, and limited-time events, contribute to strengthening intrinsic motivation by adding a sense of novelty and anticipation of rewards. This aligns with progression design theory, which emphasizes that games need to demonstrate clear forms of achievement and make the journey towards those achievements feel meaningful [22]. The alignment between measurable challenges and a valuable progression system ensures players feel a real sense of progress, thus maintaining long-term engagement in the competitive Battle Royale ecosystem.

The results of this study indicate that Mystery has a significant influence on players' Flow Experience, indicating that curiosity and the desire to explore new

content are powerful motivational drivers in Battle Royale environments. In the context of game design, the construct of Mystery refers not simply to secrets or surprises, but encompasses various mechanisms that create structured unpredictability. This uncertainty fuels exploration, increases focus, and maintains player engagement as they are encouraged to continually seek out new information, unexpected rewards, or undiscovered plot developments.

In Free Fire MAX, Mystery is embodied through secret missions, unannounced collaboration events, hidden clues in teasers, and layered rewards that can only be discovered through active exploration. These elements create curiosity and stimulate exploratory behavior, encouraging players to engage with the game for longer. These findings align with recent research showing that level design patterns that encourage curiosity-driven exploration significantly increase player engagement and search behavior [23]. Furthermore, follow-up studies confirm that managed uncertainty acts as a motivational force that maintains long-term engagement, as players are continually driven to discover the next surprise [24].

Within the Flow Theory framework, elements of surprise and discovery increase selective attention and enhance enjoyment, encouraging players to remain in a state of optimal engagement [4]. The findings of this study demonstrate that an immersive narrative, balanced challenges, and mystery-driven exploratory elements form a critical combination for maintaining the Flow experience in modern Battle Royale games like Free Fire MAX. These results reinforce the validity of Shi and Shih's (2015) Game Design Factors framework, confirming that the alignment of emotional storytelling, adaptive challenge structures, and curiosity-oriented mechanics is essential to sustaining deep player immersion.

Furthermore, recent research in educational and esports contexts strengthens this conclusion by showing that well-designed game mechanics and narrative elements not only enhance engagement but also support higher-order cognitive involvement, strategic thinking, and skill development among players [25]. This suggests that the design principles effective in competitive mobile games parallel those observed in structured learning and esports environments, underscoring the broader cognitive and motivational impact of integrated narrative, challenge, and discovery-based game design.

IV. CONCLUSION

This study examined the influence of Game Design Factors (GDF) on the Flow Experience of players in the mobile Battle Royale game Free Fire MAX. The findings indicate that three factors Narrative, Challenges, and Mystery significantly contribute to the emergence of Flow, whereas Game Goals, Mechanics, Interaction, Freedom, Fantasy, Sensation, Value, and Sociality do not exhibit a meaningful effect. Narrative elements were found to enhance emotional involvement through collaboration-based thematic events, while Challenges supported Flow by maintaining an optimal alignment between player skills and task difficulty. The Mystery factor further strengthened engagement by encouraging exploration through hidden content and unpredictable in-game events. Additionally, the analysis revealed no significant gender-based differences in Flow, suggesting that immersive engagement is shaped primarily by design quality rather than demographic attributes. These findings reinforce Csikszentmihalyi's Flow Theory and align with Shi and Shih's (2015) GDF framework, emphasizing the importance of emotionally resonant storytelling, well-balanced progression systems, and curiosity-driven exploratory mechanics in sustaining long-term immersion.

Despite generating meaningful insights, the present study is subject to several limitations. First, the sample size, although adequate for statistical analysis, represents only a small fraction of the broader Free Fire MAX player base and may not fully capture the diversity of player experiences across Indonesia. Second, the data rely entirely on self-reported responses, which are susceptible to recall bias, social desirability bias, and subjective interpretation. Third, the study focuses solely on one Battle Royale game title, limiting the generalizability of results across different game genres or competitive environments. Fourth, the cross-sectional design restricts the ability to infer causal relationships between GDF and Flow. Additionally, the study did not incorporate behavioral or telemetry data, which may offer richer insights into actual gameplay patterns.

Future research may address these limitations by employing larger and more heterogeneous samples, integrating multi-method approaches such as in-game behavioral analytics, physiological measures, or experimental designs. Comparative studies across multiple Battle Royale titles or cross-genre analyses may further validate the robustness of the findings. Moreover, longitudinal research could explore how Flow evolves over time in response to game updates, seasonal events, or changes in competitive meta. Future studies may also investigate the mediating or moderating roles of psychological constructs such as escapism, emotional regulation, or personality traits to provide a more comprehensive understanding of Flow formation within modern mobile gaming ecosystems.

ACKNOWLEDGMENT

Farrel Andhika Fatih contributes in conceptualization, methodology, formal analysis, data curation, and writing original draft. **Edi Saputra** providing expert guidance, supervision, writing review either in conception or writing processes. **Rizqa**

Raaiqa Bintana providing expert guidance, supervision, writing review either in conception or writing processes.

REFERENCES

[1] A. Nurfitriya and T. C. Kusumandyoko, "Analisis User Experience Pada Game Among Us Dengan Menggunakan Game-Design Factors Questionnaire," *Barik*, vol. Vol. 2, no. No. 3, pp. 148–162, 2021, doi: https://doi.org/10.26740/jdkv.v2i3.42314.

[2] W.-K. Tan and C.-Y. Yang, "An exploration of MMORPG in-game virtual-item contribution to game enjoyment from the perspectives of purchase behavior and psychological ownership," *Comput. Human Behav.*, vol. 134, p. 107303, 2022, doi: 10.1016/j.chb.2022.107303.

[3] Z. Wu, "Research and Application of SUP Educational Game Framework Based on Mobile Interaction in Learning Process," *Entertain. Comput.*, vol. 46, p. 100574, 2023, doi: 10.1016/j.entcom.2023.100574.

[4] Activeplayer, "GARENA FREE FIRE," Activeplayer. [Online]. Available: https://activeplayer.io/garena-free-fire/

[5] W. K. Sihite, A. R. Santoso, E. M. Setiady, T. D. Sutanto, P. A. Wicaksono, and P. Nastiti, "Analisis User Experience pada Game Valorant dengan Menggunakan Metode Game Design Factors Questionnaire," *Pros. Semin. Nas. konstelasi*, vol. 1, no. 1, 2024, [Online]. Available: https://ojs.uajy.ac.id/index.php/prosidingkonstelasi/article/view/8967

[6] M. Domingues, V. Filipe, and A. Carita, "Understanding the Impact of Perceived Challenge on Narrative Immersion in Video Games : The Role-Playing Game Genre as a Case Study," *information*, vol. 15, p. 294, 2024, doi: 10.3390/info15060294.

[7] S. Deterding, M. M. Andersen, J. Kiverstein, and M. Miller, "Mastering uncertainty : A predictive processing account of enjoying uncertain success in video game play," no. July, pp. 1–16, 2022, doi: 10.3389/fpsyg.2022.924953.

[8] C. Teng, T. Huang, G. Huang, C. Wu, T. C. E. Cheng, and G. Liao, "International Journal of Information Management Creatability , achievability , and immersibility : New game design elements that increase online game usage," *Int. J. Inf. Manage.*, vol. 75, no. November 2022, p. 102732, 2024, doi: 10.1016/j.ijinfomgt.2023.102732.

[9] C. Interaction, *Player enjoyment in video games : A systematic review and meta- analysis of the effects of game design choices Loïc Caroux * and Morgane Pujol Player enjoyment in video games : A systematic review and meta-analysis of the effects of game design choices*. 2023. doi: 10.1080/10447318.2023.2210880.

[10] L. Cormio, C. Giaconi, M. Mengoni, and T. Santilli, "Exploring game design approaches through conversations with designers," *Des. Stud.*, vol. 91–92, no. 1999, p. 101253, 2024, doi: 10.1016/j.destud.2024.101253.

[11] G. Amada, "Flow: The Psychology of Optimal Experience," *Am. J. Psychother.*, vol. 45, no. 1, pp. 142–143, 1991, doi: 10.1176/appi.psychotherapy.1991.45.1.142.

[12] L. D. Purnami and A. A. Agus, "The Effect Of Perceived Value And Mobile Game Loyalty On In-App Purchase Intention In Mobile Game In Indonesia (Case Study: Mobile Legend And Love Nikki)," *ASEAN Mark. J.*, vol. 12, no. 1, Jun. 2020, doi: 10.21002/amj.v12i1.12887.

[13] M. Meidhike, W. Jayadi, E. Muhammad, A. Jonemaro, and W. S. Wardhono, "Analisis Minat Bermain pada Gim DOTA 2 dengan Metode Game Design Factors," vol. 6, no. 6, pp. 2996–2999, 2022, [Online]. Available: https://j-ptiik.ub.ac.id/index.php/j-ptiik/article/view/11255/4972

[14] Y. R. Shi and J. L. Shih, "Game Factors and Game-Based Learning Design Model," 2015, *Hindawi Publishing Corporation*. doi: 10.1155/2015/549684.

[15] P. Kiatsakared, "The Effect of Flow Experience on Online Game Addiction during the COVID-19 Pandemic : The Moderating Effect of Activity Passion," *sustainability*, vol. 14, no. 19, p. 12364, 2022, doi: 10.3390/su141912364.

[16] H. Hou, C. Wu, and C. Wu, "scaffolding-based game editor : analysis of learners ' performance , anxiety and," *J. Comput. Educ.*, no. April 2022, 2023, doi: 10.1007/s40692-022-00231-1.

[17] M. Li and W. Hui, "Investigating the Moderating Effect of Massively Multiplayer Online (MMO) Games on the Correlation Between Flow and Game Addiction : A Meta-Analysis," vol. 27, pp. 1–28, 2023, doi: 10.3127/ajis.v27i0.3995.

[18] J. Costes, "Spending Money in Free-to-Play Games : Sociodemographic Characteristics , Spending Money in Free-to-Play Games : Sociodemographic Characteristics , Motives , Impulsivity and Internet Gaming Disorder Specificities," vol. 19, no. 23, p. 15709, 2022, doi: 10.3390/ijerph192315709.

[19] J. Behavioral, T. Oka, T. Kubo, M. Murakami, and N. A. O. Kobayashi, "The relationship of game genres , in-game purchases , and playing duration with probable gaming disorder in two independent , large-scale online surveys of Japanese adults," 2024, doi: 10.1556/2006.2023.00076.

[20] T.-L. Huang, J.-R. Yeh, G.-Y. Liao, T. C. E. Cheng, Y.-C. Chang, and C.-I. Teng, "How does escapism foster game experience and game use?," *Decis. Support Syst.*, vol. 181, p. 114207, 2024, doi: 10.1016/j.dss.2024.114207.

[21] C. Ma and J. Shao, "Modeling Mobile Game Design Features Through Grounded Theory : Key Factors Influencing User Behavior," vol. 20, no. 2, p. 132, 2025, doi: 10.3390/jtaer20020132.

[22] A. Brazie, "Game Progression and Progression Systems," gamedesignskills.com. [Online]. Available: https://gamedesignskills.com/game-design/game-progression/

[23] M. A. Gómez-maureira, I. Kniestedt, M. Van Duijn, C. Rieffe, and A. Plaat, "Level Design Patterns That Invoke Curiosity-Driven Exploration : An Empirical Study Across Multiple Conditions Level Design Patterns That Invoke Curiosity-Driven Exploration : An Empirical Study Across Multiple Conditions," *Proc. ACM Human-Computer Interact.*, vol. 5, no. CHI PLAY, 2021, doi: 10.1145/3474698.

[24] Z. Tang and B. Kirman, "Exploring Curiosity in Games : A Framework and Questionnaire Study of Player Perspectives," 2024, doi: 10.1080/10447318.2024.2325171.

[25] Y. Zhong, K. Guo, and L. Kutszik, *More than just fun : Investigating students ' perceptions towards the potential of leveraging esports for promoting the acquisition of 21st century skills*, vol. 30, no. 1. Springer US, 2025. doi: 10.1007/s10639-024-13146-4.