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Gacha Mechanisms and Digital Consumer Behavior: A Systematic Literature Review on the Drivers of Impulsive Buying Among Gamers

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Abstract

Probability-based monetization mechanisms in digital games, such as gacha, loot boxes, and microtransactions, have become important revenue-generating strategies in the gaming industry. However, previous studies have primarily focused on gaming addiction and gambling-related behavior, leaving conceptual, methodological, and empirical gaps in explaining impulsive buying from a digital consumer behavior perspective. This study aims to analyze the influence of monetization mechanisms in digital games specifically gacha, loot boxes, and microtransactions on the impulsive buying behavior of online gamers, taking into account the psychological dynamics involved. This study employs a Systematic Literature Review (SLR) using a bibliometric approach and PRISMA guidelines. Data were obtained from the ScienceDirect and Semantic Scholar databases, covering articles published between 2023 and 2026, with an initial total of 148,869 articles, which were then screened to yield 10 relevant articles for analysis. The findings indicate that probability-based reward mechanisms, immersive gameplay experiences, and psychological factors such as fear of missing out (FOMO), impulsivity, and positive emotions play a significant role in driving impulsive purchases. Additionally, system designs such as probability concealment and selective feedback were found to reinforce cognitive distortions that increase players' willingness to pay. This study contributes theoretically by extending the literature on digital consumer behavior and practically by providing insights for more ethical and sustainable game monetization strategies. Future research is encouraged to develop conceptual models incorporating self-control, social influence, and digital financial literacy.

Keywords: Gacha Mechanism, Loot Box, Impulsive Buying, Digital Consumer Behavior

INTRODUCTION

The online gaming industry has experienced rapid growth over the past two decades, driven by technological advancements and the increasing number of internet users worldwide. Video games have become one of the most popular forms of digital entertainment, with billions of active users globally. Beyond serving as a form of entertainment, the gaming industry has also evolved into a major economic sector, with various new business models continually emerging (González-Cabrera et al., 2023). Video games have garnered increasing attention, both in developed and developing countries, and have now become an integral part of the lives of the millennial generation (Pera & Viglia, 2016; Yuan et al., 2021). Young consumers demonstrate a high degree of autonomy in playing online games and tend to share their experiences with their social circles (Liu & Agur, 2023). Gaming is no longer merely entertainment but has evolved into a means of recreation and social interaction in daily life (Rodrigues et al., 2016).

In line with these developments, the focus in consumer behavior studies has also begun to shift toward hedonistic consumption, which encompasses aesthetic, symbolic, and expressive dimensions (Abbasi et al., 2019; Abbasi et al., 2021). Hedonistic consumption emphasizes emotional experiences such as pleasure, satisfaction, mood, and imagination, which go beyond the mere fulfillment of functional needs (Alba & Williams, 2013). In the context of digital games, immersive and enjoyable gameplay creates intense emotional states, which in turn can influence consumer decision-making processes (Li & Atkinson, 2020; Shahzad et al., 2023).

One of the most widely used monetization strategies by game developers today is microtransactions, which involve purchasing virtual in-game items using real money. Microtransactions allow players to purchase

various digital items such as character costumes, weapons, or additional features that can enhance the gaming experience. As the industry has evolved, more complex forms of microtransactions have emerged, such as loot boxes, a purchasing system that provides random rewards to players after payment. In this mechanism, players do not know exactly which item they will receive because the outcome depends on specific probabilities (Garrett et al., 2023).

Probability-based monetization models like loot boxes are increasingly used because they can significantly boost a game company's revenue. However, this mechanism has also sparked various academic and regulatory debates due to its structural similarities to gambling activities. Several studies indicate that loot box purchases are associated with risky consumption behaviors, including a tendency toward overspending as well as links to gambling behavior and gaming disorder (Raneri et al., 2022).

From a consumer behavior perspective, the presence of loot boxes can trigger impulsive buying. Impulsive buying is a purchasing decision made spontaneously without prior planning and is often triggered by emotional or situational stimuli. In the context of digital games, factors such as the enjoyment of playing, hedonistic motivation, and the desire to obtain rare items can increase players' inclination to make spontaneous purchases (Mahendra et al., 2025).

Previous research also indicates that players' psychological characteristics, such as impulsivity and sensation seeking, positively correlate with spending on loot boxes. Individuals with higher impulsivity are more likely to purchase loot boxes because random reward mechanisms create excitement and expectations of obtaining rare items (Garrett et al., 2023). Despite the growing body of literature on loot boxes and microtransactions, several important research gaps remain. Conceptually, prior studies predominantly examine monetization mechanisms from psychological and gambling-related perspectives, focusing on addiction, gaming disorder, and problematic spending behavior. As a result, limited studies investigate this phenomenon from a marketing management and digital consumer behavior perspective, particularly in explaining impulsive buying as a consumption-driven decision.

Methodologically, previous studies are dominated by cross-sectional survey designs and self-reported data, limiting their ability to explain causal relationships and behavioral dynamics over time. Most studies also focus on isolated variables such as addiction, FoMO, or gambling tendencies, with limited attempts to integrate broader determinants of impulsive buying. Empirically, existing studies are concentrated in specific countries and demographic groups, especially young gamers and university students, which limits the generalizability of findings across broader gaming populations. Furthermore, the moderating role of self-control remains underexplored, despite its theoretical importance in explaining resistance to impulsive purchasing stimuli.

These limitations suggest that existing studies have not yet provided a comprehensive understanding of how monetization mechanisms influence impulsive buying behavior. Therefore, a systematic synthesis is necessary to integrate fragmented findings and identify key determinants shaping digital purchasing behavior in online gaming.

Based on these gaps, this study addresses the following research questions:
RQ1: What factors drive impulsive buying behavior among online gamers in gacha and loot box systems?
RQ2: How do psychological and game design factors interact in influencing impulsive purchasing decisions?
RQ3: What role does self-control play in moderating impulsive buying tendencies among online gamers?

This study contributes theoretically by extending digital consumer behavior literature through a systematic synthesis of the relationship between game monetization mechanisms and impulsive buying behavior. Practically, this study provides insights for game developers and policymakers to design more ethical, transparent, and sustainable monetization strategies.

RESEARCH METHOD

1. Bibliometric Analysis

Journals were obtained from the ScienceDirect and Semantic Scholar databases. The keywords used were *"gacha mechanism," "impulsive buying," and "video games" or "online games."* The database search was conducted in January 2026, covering articles published between 2023 and 2026. A total of 148,608 results were obtained from ScienceDirect and 261 from Semantic Scholar, which were then combined into a total of 148,869 articles.

From these 148,869 articles, only 200 of the most relevant articles based on database relevance ranking were selected for download in RIS (*Research Information System*) format due to database export limitations and to ensure manageable bibliometric mapping. The RIS files were imported into the Mendeley Reference Manager application for reference organization and duplicate checking. After importing, the RIS files for each journal were converted (exported) into a single consolidated RIS file for the entire dataset. Next, the combined journal RIS file was imported into the VOSviewer software to generate a graphical representation of the bibliometric map. Citation analysis is a summary of journals cited by authors or researchers in the preparation of scientific works and is useful for identifying research trends and relationships among keywords, authors, and research themes (Saputro, 2022).

2. PRISMA

This study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a systematic and transparent article selection process (Page et al., 2021). Articles were selected based on the following inclusion criteria: (1) articles published in peer-reviewed journals, (2) articles published between 2023 and 2026, (3) articles written in English, (4) articles focusing on gacha mechanisms, loot boxes, or microtransactions, and (5) articles discussing impulsive buying or digital consumer behavior. Articles were excluded if they were conference papers, book chapters, non-English publications, or lacked full-text access.

A total of 148,869 articles were identified using the keywords *"gacha mechanism AND impulsive buying AND video games OR online games"* in the ScienceDirect and Semantic Scholar databases. Before entering the screening stage, 145,000 articles were removed; of these, 20,000 were duplicates and 125,000 were removed for other reasons, leaving 3,869 articles for further screening. During the screening stage, 3,500 of the 3,869 articles were eliminated for failing to meet the criteria, specifically based on their titles and abstracts. Subsequently, 369 articles advanced to the full-text retrieval stage. However, 19 of these could not be located, leaving only 350 articles for evaluation.

During the eligibility phase, these 350 articles were thoroughly assessed; 300 were deemed irrelevant to the research topic, while the remaining 40 lacked full-text access and thus could not be evaluated. In the final stage, only 10 articles met all inclusion criteria and quality assessment standards and were selected for analysis. The selected articles were evaluated using three quality assessment criteria: (1) clarity of research objectives, (2) methodological rigor, and (3) relevance of findings to the research questions. Only articles that fully satisfied all inclusion and quality assessment criteria were retained, resulting in the final 10 articles for review.

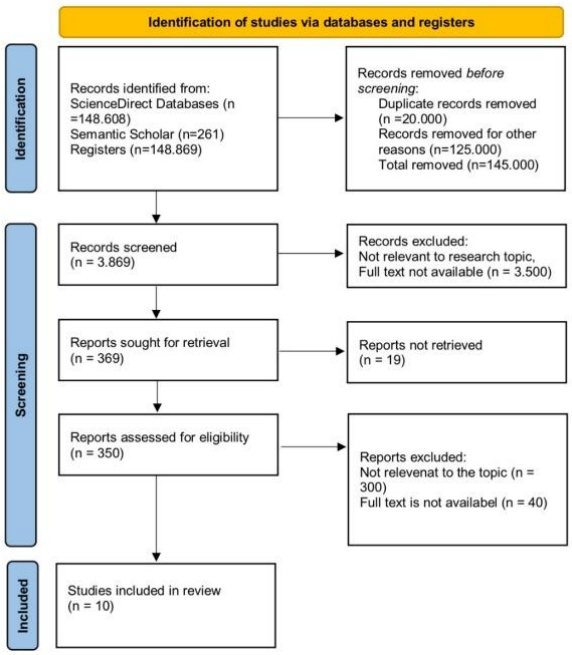

Figure 1. PRISMA Diagram

RESULT AND DISCUSSION

Bibliometrik Analysis

Network Visualization

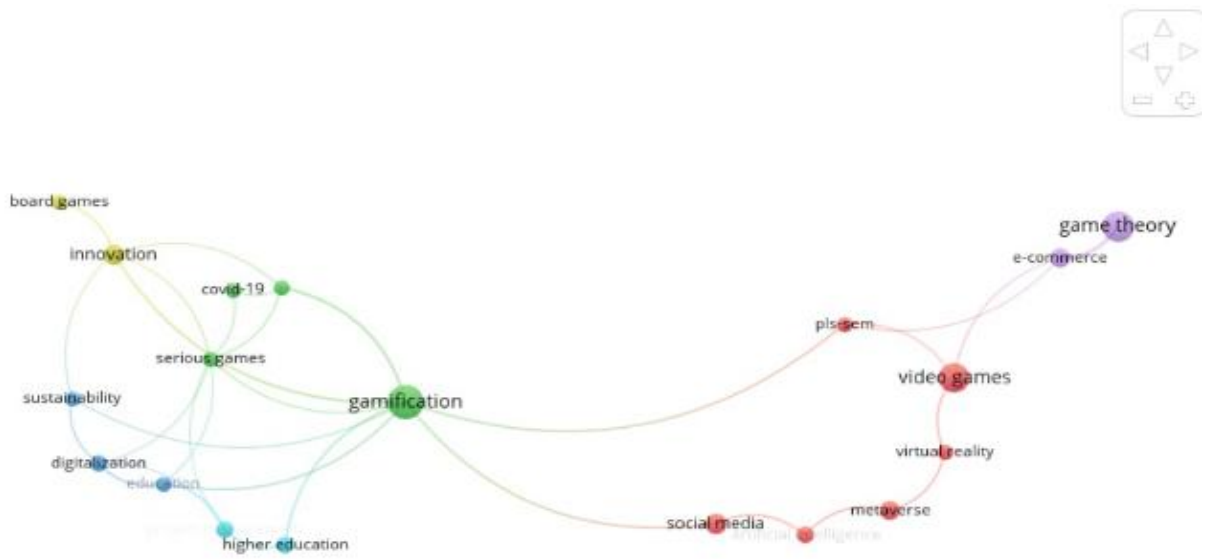

Figure 2. Network Visualization

Based on the results of the network visualization using VOSviewer software, it is evident that research on gacha mechanisms, impulsive buying, and consumer behavior in video games exhibits extensive interconnections among these topics. The visualization reveals several clusters interconnected through key terms such as gamification, video games, social media, and game theory. In the network visualization figure, the keyword “gamification” appears to be one of the largest central nodes in the research. This indicates that gamification is the topic most frequently associated with various other concepts, such as higher education, serious games, innovation, digitalization, and even COVID-19. The large size of the “gamification” node indicates that this topic has a higher frequency of occurrence compared to other keywords. Additionally, the lines connecting the nodes show that gamification is widely used across various research fields, not only in entertainment games but also in education and digital transformation. Methodologically, this mapping uses association normalization techniques to group topics that frequently appear together into different colored clusters, representing specific research subfields (Van Eck & Waltman, 2010).

Furthermore, on the right side of the visualization, a group of keywords related to video games is visible. These keywords are connected to several other terms such as virtual reality, the metaverse, social media, artificial intelligence, and PLS-SEM. These connections indicate that current research on video games is no longer limited to the games themselves but is expanding into modern digital technologies and user behavior on social media. The connection to virtual reality and the metaverse indicates that the development of immersive technologies is becoming an integral part of the modern gaming industry.

Additionally, the keyword “game theory” is also shown to be linked to e-commerce. This suggests that some studies are beginning to associate game mechanics with digital economic strategies and online transaction behavior. In the context of this study, these connections are relevant because gacha and microtransaction mechanisms in online games are essentially part of digital monetization strategies that leverage player consumption behavior. This structure validates that the current literature is transforming from merely game mechanics to a more complex ecosystem involving artificial intelligence and the metaverse. The existence of these clusters provides a roadmap for researchers to identify research gaps, particularly in the weak connections (thin lines) between emerging concepts (Donthu et al., 2021).

Therefore, this network visualization demonstrates that research on online games and impulsive buying is evolving in a multidisciplinary manner. Research is no longer limited to entertainment aspects but is increasingly intertwined with technology, social media, education, and digital economic behavior. This confirms that the topics of gacha mechanisms and impulsive buying have broad connections with various other research fields.

Overlay Visualization

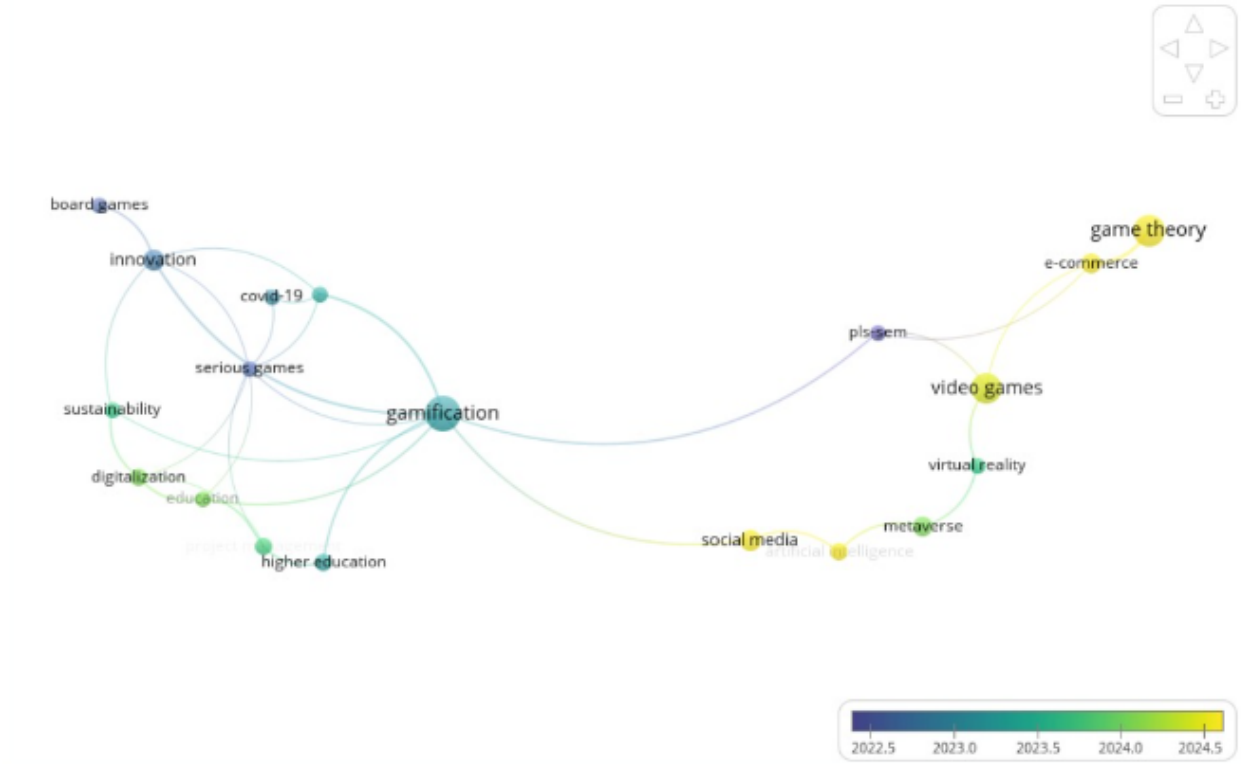

Figure 3. Overlay Visualization

Based on the results of the overlay visualization, the evolution of research trends over the years is evident through the color differences in each node. Blue indicates topics that have been studied for a longer period, while yellow indicates newer and emerging topics. In this visualization, several keywords such as board games, innovation, sustainability, and digitalization tend to be colored blue to bluish-green. This indicates that these topics emerged earlier in research related to gamification and video games. Early-stage research focused more on the use of games in the contexts of education, innovation, and digital transformation.

Meanwhile, keywords such as gamification, social media, metaverse, video games, and game theory appear in shades of yellow. These colors indicate that these topics represent newer research trends that have gained increasing attention in recent years. Specifically regarding video games and the metaverse, advancements in digital technology and the growing use of virtual platforms have driven the expansion of research on player behavior. Additionally, the emergence of the terms “social media” and “artificial intelligence” indicates that recent research is beginning to link gaming behavior with other digital activities. This relates to the increasing interaction of gamers through social media as well as the use of artificial intelligence in the development of modern gaming systems.

The keyword “game theory” stands out as one of the brightest nodes. This indicates that game theory approaches are increasingly being employed in recent research to explain digital consumer behavior, including impulsive purchasing behavior in online games. In the context of this study, this suggests that the gacha mechanism is no longer viewed merely as an entertainment feature but also as a digital economic strategy influencing players’ purchasing decisions. Studies show that digital environments such as social media and online gaming platforms can reinforce the impulse to make purchases, especially when combined with low self-control in individuals (Al-Fisyahri & Muhid, 2022; Gowhar et al., 2023). In general, the overlay visualization indicates that the direction of research continues to evolve in line with changes in digital technology and consumer behavior. The research focus, which previously centered more on gamification in education, is now

shifting toward game monetization, social media, virtual reality, and impulsive buying behavior on digital platforms.

Density Visualization

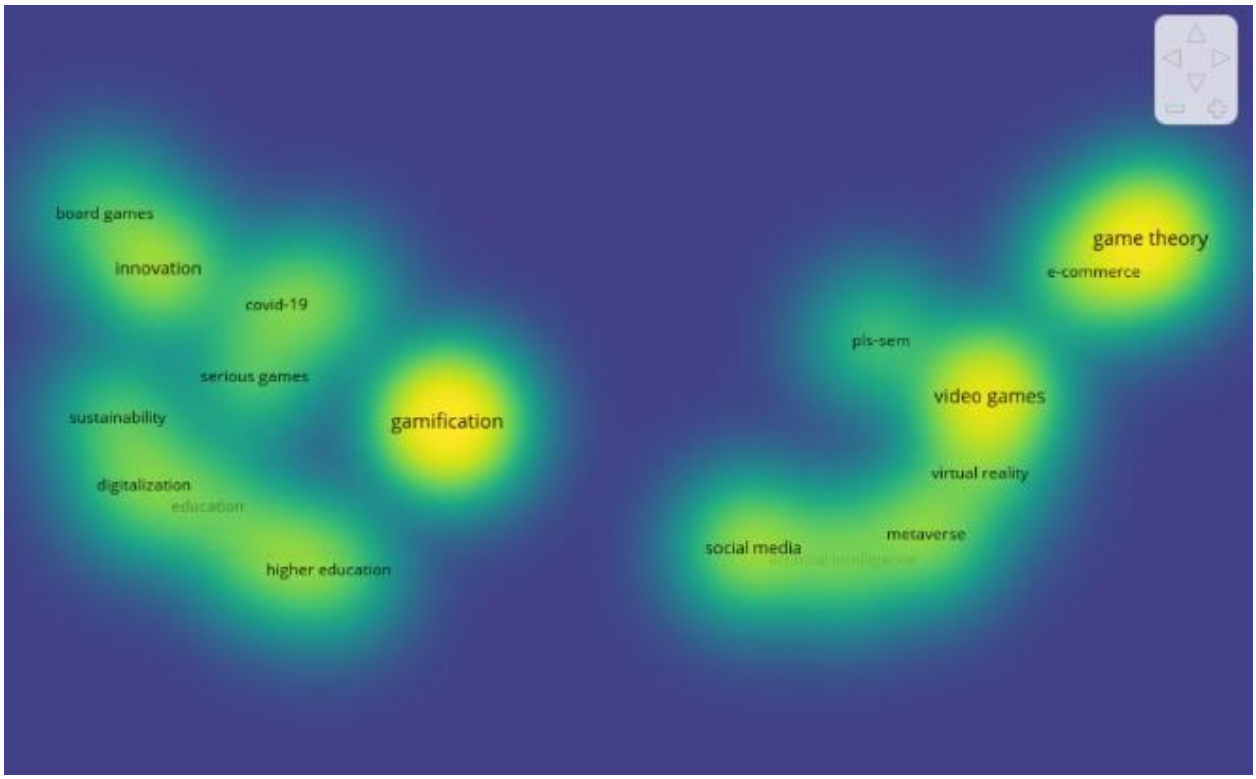

Figure 4. Density Visualization

Based on the results of the density visualization, the density of research on certain keywords is evident. In this visualization, bright yellow indicates topics with the highest frequency of occurrence and connectivity, while green and blue indicate lower levels of density. The keyword “gamification” appears to be the area with the highest density. This indicates that gamification is the most dominant and most frequently discussed topic in research related to video games and digital consumer behavior. The high density of this term suggests that many studies use gamification as a central concept in developing user experiences and enhancing player engagement.

Additionally, the keywords “video games” and “game theory” also have fairly high density levels. This indicates that both topics are the focus of an evolving research field, particularly in explaining online game user behavior and digital monetization strategies. The high density of “video games” demonstrates that the gaming industry is becoming an increasingly important subject of research in the fields of technology and consumer behavior. On the other hand, several keywords such as metaverse, virtual reality, social media, and artificial intelligence have moderate density levels. This indicates that these topics are beginning to develop and hold significant potential for further research in the future. Although the number of studies on them is not yet as numerous as those on gamification, the interconnections between these topics suggest that advancements in digital technology are beginning to influence the behavioral patterns of online gamers. According to Van Eck & Waltman, 2010, density visualizations in VOSviewer are indeed designed to highlight the most dominant research areas through item density levels and inter-term relationships within a bibliometric map.

Meanwhile, keywords such as board games, COVID-19, and higher education have lower density levels. This indicates that these topics remain supporting and have not yet become the primary focus in research related to impulsive buying and online gaming. Therefore, the density visualization shows that research on online gaming is dominated by the topics of gamification and video games. However, technological advancements such as virtual reality, artificial intelligence, and the metaverse are beginning to open up new

research opportunities, particularly in understanding impulsive buying behavior among online gamers through gacha mechanisms and microtransactions.

The presence of terms like “metaverse” and “virtual reality” also indicates a shift in research focus toward immersive digital environments, which are becoming increasingly relevant in the modern gaming and digital marketing industries. Overall, this density map demonstrates that gamification research is not only focused on education but is also expanding into interconnected digital entertainment ecosystems, social media, and virtual economies (González-Limón & Rodríguez-Ramos, 2022; Sun et al., 2024).

PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis)

The following are the results of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Table 1. List of Journal Names Based on the PRISMA Methodology

Authors & Yeas	Journal	Article Title	Variabel	Methodology
Tariq et al., (2024)	European Research on Management and Business Economics (Q1)	Understanding the moderating role of chronotypes for online mobile gaming in-app purchase intention	Addiction (stimulus), Loyalty (mediator), In-App Purchase Intention (response), Chronotype (moderator: morning type vs evening type)	Quantitative; a survey of 345 university students in Pakistan; analysis using PLS-SEM and Multi-Group Analysis (MGA) based on chronotype.
Hussain et al., (2025)	Information & Management (Q1)	In-game content purchase motivations (IGCPMs): Conceptualization, scale development, and validation	Autonomy (creativity, choice, uniqueness); Competence (dominance, achievement, skillfulness); Relatedness (social interaction, social affiliation). Consequence variables tested: purchase intention, positive word-of-mouth, and recruitment intention.	In-depth interviews with 15 gamers to generate items, exploratory Factor Analysis (n=209, confirmatory factor Analysis, scale validation with a new sample (n=325), and testing of nomological validity using PLS-SEM (n=416).
Hartanto & Kasturiratna., (2024)	Computers in Human Behavior Reports (Q1)	Longitudinal bidirectional relation between fear of missing out and risky loot box consumption: Evidence for FoMO-Driven loot boxes spiral hypothesis	Fear of Missing Out (FoMO) dan Risky Loot Box Consumption	A 13-week longitudinal study of 252 university students in Singapore. The analysis used a Random-Intercept Cross-Lagged Panel Model (RI-CLPM) to examine the reciprocal relationships among the variables.
Chung et al., (2024)	Engineering Proceedings (Q3)	Factors Influencing Consumer Impulsive Buying	Involvement, comprising time, energy, and interest; positive	The quantitative study utilized a survey of 389 college students in Taiwan

Authors & Yeas	Journal	Article Title	Variabel	Methodology
		Behavior regarding Mobile Game Purchase Intention	emotions, comprising positive behavior and positive feelings; and impulsive purchasing behavior, comprising the glad type, conflict type, and uncontrollable type, in the purchase of mobile games.	using stratified random sampling. The data were analyzed using factor analysis (KMO) and Pearson's correlation.
Arnedo-Moreno, et al., (2026)	Entertainment Computing (Q2)	The impact of video game use of dark patterns and random reward mechanisms on the youth: A systematic literature review	Dark patterns dalam video game (loot boxes, gacha, microtransactions, battle pass, FOMO, random reward mechanisms), problem gaming, gambling harm, gambling behavior.	A Systematic Literature Review (SLR) following the PRISMA guidelines; an analysis of 15 empirical articles published between 2013 and 2025.
Cordes et al., (2024)	Journal of Economic Behavior and Organization (Q1)	What drives demand for loot boxes? An experimental study	Censored Odds, Selected Feedback, Willingness-to-Pay (WTP), Beliefs about Winning.	A laboratory experiment with a between-subjects design (Control, Censored, Sample, Joint). A sample of 617 respondents from the UK recruited via Prolific. Analysis was conducted using OLS, with mediation via the variable "beliefs."
Garea et al., (2023)	Journal of Behavioral Addictions (Q1)	The potential relationship between loot box spending, problem gambling, and obsessive-compulsive gamers	Loot box spending, Problem gambling (PGSI), OCD symptomatology (OCI-R), Hoarding, Consumer regret, Non-randomized reward spending.	Cross-sectional quantitative survey (N=1,049), correlation analysis (Spearman) & moderation analysis.
Rita et al., (2024)	Entertainment Computing (Q2)	The role of microtransactions in impulse buying and purchase intention in the video game market	Performance, Functionality, Hedonic Content, Social Content, Flow Experience, Impulse Buying Tendency (IBT), Purchase Intention.	Quantitative; online survey (n=301); PLS-SEM analysis.

Authors & Yeas	Journal	Article Title	Variabel	Methodology
Smith et al., (2025)	International Journal of Research in Marketing (Q1)	Missing the forest for the trees: Does collective brand engagement help or hurt consumption for video games?	Collective Brand Engagement Breadth, Collective Brand Engagement Intensity, Collective Brand Consumption. Social In-Use Features. Game popularity, game rating, game age, cross-platform play, sales promotion, new content release.	The PVAR-based quantitative longitudinal data from the Steam platform covers 34 games over 83 days at 15-minute intervals (7,968 observations per game) and was analyzed using Granger Causality, IRF, and FEVD.
Ungurea nu et al., (2025)	International Journal of Research in Marketing (Q1)	Add on or move on: Do in-game purchases help or hurt upgrading to newer game versions?	In-game item inventory (accumulated in-game item purchases), game usage (frequency of play), upgrade decision (decision to switch to the latest game version), recency of game purchases, and pre-launch buzz.	The quantitative data from a global game publisher (2011–2016) included 49,123 players with approximately 5 million weekly observations. The analysis utilized binary logistic regression, negative binomial regression, fixed effects, counterfactual analysis, and online experiments for robustness testing.

The first article is a journal written by Tariq et al., (2024). This journal states that in the highly dynamic and rapidly growing online mobile gaming industry, revenue streams are of utmost importance to game developers; however, strategies to drive in-app purchases have not been able to deliver the desired results optimally without understanding the behavioral characteristics and psychological conditions of the players. This article also explains the Stimulus-Organism-Response (SOR) framework, the variables of addiction and loyalty, and the biological aspect of chronotypes—or an individual's biological sleep rhythm (Mehrabian & Russell, 1974). The study conducted by Tariq et al., (2024) found that players with an evening chronotype exhibited a stronger relationship between addiction and loyalty compared to morning-type players, indicating that gaming addiction is more likely to develop into loyalty within that group. These characteristics are also associated with a higher tendency to make in-app purchases, while loyalty was found to act as a mediator explaining the influence of addiction on in-app purchase intention. This study makes an important contribution as it is one of the first to integrate chronotype as a moderator variable and loyalty as a mediator variable within the Stimulus–Organism–Response (SOR) framework to explain in-app purchasing behavior in mobile games. Nevertheless, the research findings should be interpreted with caution given that the sample only included students in Pakistan selected via convenience sampling, the use of self-report data that may introduce bias, and a cross-sectional design that does not yet allow for causal conclusions. To strengthen future findings, further research is recommended to use a longitudinal design, involve a larger and more diverse sample from various countries or populations, and include additional variables that can enhance the model's ability to explain in-app purchase intention.

The second entry is a journal article by Hussain et al., (2025). This article notes that while the growth of virtual content purchases in online games has surged in recent years, game developers' strategies to drive these purchases have not yet optimally achieved the desired outcomes due to a significant lack of understanding regarding the measurement tools for players' psychological motivations. This article also explains the self-determination theory approach, the variables of autonomy motivation, competence motivation, and relatedness motivation (Ballou et al., 2024). The research results indicate that motivation to purchase virtual content in games has a positive effect on purchase intention, word-of-mouth, and recruitment intention, suggesting that purchasing decisions are driven not only by the need for competence but also by the needs for autonomy and social relatedness. The main contribution of this study lies in the development of a specialized instrument to measure motivation for purchasing virtual content in online games, while also expanding Self-Determination Theory (SDT) by modeling the dimensions of autonomy, competence, and relatedness as multidimensional constructs, differing from the unidimensional approach widely used in previous research. Nevertheless, the study's findings have limitations because data were collected exclusively from gamers in Malaysia, limiting generalizability to other cultural contexts, and the use of snowball sampling and non-probability sampling may introduce representativeness bias. To strengthen these findings, future research could validate the scale across various countries and cultures using probability sampling, test the research framework against alternative theories such as Social Identity Theory or the Theory of Planned Behavior, explore the relationship between IGCPM and variables such as engagement, loyalty, and experiential value, compare motivations for pay-to-win purchases and cosmetic-only purchases, and identify the most dominant motivational dimensions driving virtual content purchases.

Third on the list is an article written by Hartanto & Kasturiratna (2024). This article notes that loot boxes in online games have become a major source of revenue for the gaming industry, but they have also fueled risky spending habits among players. This occurs due to a psychological factor known as the fear of missing out (FOMO), where players worry about missing out on what other players might obtain, leading them to keep purchasing loot boxes. This study also demonstrates a bidirectional relationship between FOMO and loot box purchases. In other words, FOMO can drive someone to buy more, which in turn reinforces that fear of missing out, creating a self-perpetuating cycle. This article links this behavior to specific psychological needs individuals experience while gaming, such as a sense of connection, competence, and self-control in gameplay (Przybylski et al., 2013). Research conducted by Hartanto & Kasturiratna (2024) demonstrates a significant reciprocal relationship between fear of missing out (FOMO) and risky loot box consumption. Individuals with higher levels of FoMO tend to increase their purchases of risky loot boxes in subsequent periods, while engagement in risky loot box purchases also contributes to increased FoMO in the future. These findings indicate the presence of a mutually reinforcing and ongoing mechanism. The primary contribution of this study lies in the development and empirical testing of the FoMO-Driven Loot Boxes Spiral Hypothesis, a model explaining how FoMO and risky loot box purchasing behavior can form a recurring cycle over time. The study's strength is further evident in its use of a multi-wave longitudinal design with 13 measurement waves, an approach still rarely applied in similar studies. Nevertheless, the sample's limited scope to university students in Singapore necessitates further testing of these findings across different populations and cultural contexts. Another limitation relates to the exclusion of information regarding game type and frequency of play, as well as the use of self-report data, which may introduce social bias and recall errors. To strengthen the validity of the findings, future research should involve cross-cultural samples and various game genres, while also considering gaming intensity variables and utilizing actual behavioral data on loot box purchases to more accurately elucidate the relationship between FoMO and loot box consumption behavior.

The fourth entry is a journal article by Chung et al., (2024). This article notes that in the rapidly growing digital entertainment industry, players' impulsive purchasing behavior has become a primary focus for game developers aiming to increase revenue; however, the implementation of effective marketing strategies has not yet kept pace with this trend and cannot optimally deliver the desired results without a comprehensive understanding of external factors and consumer engagement. This article also discusses the concepts of positive emotions, fashion involvement, game involvement, and hedonic shopping motivation (Mittal & Lee, 1989). The findings of Chung et al., (2024) indicate that player engagement in mobile games has a strong relationship with the emergence of positive emotions and the tendency to make impulsive purchases. The more time, energy, and money players devote to gaming activities, the higher the level of positive emotions they experience and

the stronger the urge to make spontaneous purchases. This finding is reinforced by the highest correlation between the positive feelings dimension and the "glad" type of impulsive purchasing. One of the main contributions of this study is the categorization of impulsive purchasing behavior into three categories—glad, conflict, and uncontrollable—while integrating player engagement, positive emotions, and impulsive purchasing behavior into a single analytical framework within the mobile gaming industry. Nevertheless, the scope of the study remains limited as it involved respondents from a single university in Taiwan and employed a cross-sectional design, which can only explain relationships between variables without identifying the direction of causality. Several other factors that could potentially influence impulsive purchasing have also not been explored. To enrich our understanding of this phenomenon, future research could involve a more diverse sample across different age groups and regions, adopt a longitudinal approach or causal models such as SEM, and include additional variables such as game addiction, social influence, in-game promotions, hedonistic motivation, and game design characteristics.

Fifth on the list is a journal article by Arnedo-Moreno et al., (2026). This article explains that modern game design not only focuses on entertainment but also employs strategies such as dark patterns and random reward systems to increase player engagement, particularly among young people. However, these mechanisms tend to encourage excessive gaming behavior and increase the risk of developing habits resembling gambling. The reviewed literature indicates a fairly consistent association between the use of loot boxes, gacha, and various random reward mechanisms and an increased risk of problem gambling, the normalization of gambling behavior, higher spending, and excessive gaming engagement among adolescents and young adults. Several studies even suggest that loot boxes may serve as an initial step leading individuals toward more conventional gambling activities. This study offers an important contribution as it is among the first systematic reviews to specifically examine the impact of dark patterns and random reward mechanisms on the 15–24 age group, with a scope that extends beyond loot boxes to include various forms of design manipulation in video games. Nevertheless, existing findings are still dominated by cross-sectional studies with voluntary samples, self-report instruments, and an unbalanced gender representation, thus limiting the ability to establish causal relationships. To strengthen the empirical evidence, future research should adopt longitudinal designs, involve more diverse cultural contexts, expand the scope to other forms of dark patterns, and assess the effectiveness of implemented regulatory policies and prevention strategies.

The sixth entry is a journal article by Cordes et al., (2024). This paper explains that loot box designs in online games, such as the concealment of probabilities (censored odds) and the presentation of selective feedback, can significantly increase players' willingness to pay. These two mechanisms can even drive excessive spending because players tend to overestimate their chances of obtaining high-value rewards. This article also discusses how belief serves as the primary mediating factor in this behavior, where distorted perceptions of probability lead players to make less rational decisions, consistent with previous findings on biases in information processing (Barron et al., 2024). Research results by Cordes et al., (2024)show that both the censored odds mechanism and selected feedback each increase willingness to pay (WTP) by approximately 45%, while the combination of both drives an increase of up to twofold. This increase does not solely reflect rational preferences but is triggered by belief distortions that lead individuals to overestimate the probability of obtaining favorable outcomes. Interestingly, although providing additional information was shown to reduce belief bias, this was not accompanied by a significant decrease in WTP, indicating the strong influence of the system's design itself. These findings provide causal evidence that loot box design characteristics play a direct role in driving overspending behavior through cognitive mechanisms. However, the interpretation of results must account for the study's limitations, such as experimental conditions that do not fully represent real-world gaming experiences, the lack of explicit consideration of corporate profit motives, and the sample's narrow scope, which is limited to respondents in the UK. Moving forward, research could focus on testing in real-world contexts, developing more effective regulatory designs, and exploring other psychological factors such as impulsivity and emotional responses in influencing purchasing decisions.

The seventh entry is a journal article written by Garea et al., (2023). This journal article notes that while random loot boxes in video games have recently become commonplace, efforts to regulate and protect players have not been fully effective or provided adequate safeguards, largely because few people realize that this random purchasing system has tangible negative effects on users' psychological well-being. This article also discusses symptoms of obsessive-compulsive disorder (OCD), hoarding tendencies, and problem gambling

(Zendle & Cairns, 2019). Research findings by Garea et al., (2023) indicate a positive correlation between spending on loot boxes and symptoms of obsessive-compulsive disorder (OCD) as well as hoarding, which aligns with the relationship between loot box spending and problem gambling as well as consumer regret. These findings suggest that individuals with compulsive tendencies not only engage in more intense purchasing behavior but are also more likely to experience regret afterward. Furthermore, OCD and hoarding were found to strengthen the relationship between problem gambling and such spending behavior, while similar patterns were also observed in purchases of non-randomized rewards. This study offers a new contribution by expanding the research focus to psychological aspects such as OCD/hoarding and incorporating the variable of consumer regret into the analysis, while also testing the moderating role of these two variables. However, the use of a cross-sectional design limits the ability to draw causal conclusions, compounded by potential biases from self-report data and the sample's limited scope, which covers only a few countries. For future development, longitudinal research is needed to understand the direction of the relationship more clearly, deeper exploration of the phenomenon of digital hoarding in games, cross-cultural testing and diverse gaming contexts, as well as an approach with stricter control of clinical variables.

The eighth entry is a journal article by Rita et al., (2024). This journal notes that microtransaction systems in the gaming industry are growing rapidly as a promising business model; however, developers' strategies to trigger players' purchasing desires have not yet been fully optimized or provided adequate results, as there is still a lack of research on the psychological processes players undergo before deciding to purchase these features. This article also discusses the impulse buying tendency, purchase intention, emotional satisfaction, and the influence of the in-game environment (Yang et al., 2021). The findings of Rita et al., (2024) indicate that flow experience is the most dominant factor influencing impulse buying tendency (IBT), followed by social, hedonic, and performance aspects, while functionality does not have a significant influence. On the other hand, IBT has been shown to play a strong role in driving purchase intention. This study offers a contribution by integrating distinctive video game characteristics—such as flow, social interaction, and performance—into a model of impulsive purchasing behavior regarding microtransactions, an approach that has not been extensively discussed in detail previously. Nevertheless, this research has limitations, primarily due to its use of cross-sectional data, its focus on respondents' perceptions of their favorite games, and its failure to account for variations in game types or gameplay contexts. Moving forward, future research could adopt a longitudinal design to capture behavioral dynamics more deeply, while also testing the role of game type and player demographic characteristics as moderating variables.

The ninth entry is a journal article by Smith et al., (2025). The article notes that many game companies now employ business models that generate revenue after a game is purchased; however, developers' strategies for encouraging players to engage in community activities have not yet been fully effective or yielded the desired results, as these group activities can actually take away from the time players have to actually play the game. This article also explains the concepts of collective brand engagement, engagement breadth, engagement intensity, and collective consumption (Vivek et al., 2012). The findings of Smith et al., (2025) indicate that consumer engagement and consumption have a mutually reinforcing relationship. Engagement characterized by a high number of participating users (engagement breadth) has been shown to increase consumption both in the short and long term. Meanwhile, engagement intensity tends to reduce consumption in the early stages because users' attention is diverted to interactive activities; however, this effect turns positive over time. The presence of social in-use features also strengthens the relationship between engagement and consumption. From a theoretical contribution perspective, this study offers an empirical distinction between engagement breadth and engagement intensity, examines the impact of engagement across different time frames, and expands the research focus from the individual level to collective engagement. Nevertheless, these findings are still limited by the use of data exclusively from the Steam platform, engagement measurements focused on forum activities, and an analysis unit at the brand level. Future research could enrich our understanding of collective engagement by developing more comprehensive measures of engagement intensity, incorporating various digital platforms, combining aggregate and individual data, and examining the long-term effects of more specific social features on consumer behavior.

The tenth entry is a journal article by Ungureanu et al., (2025). This paper notes that the video game industry often faces a dilemma when releasing newer game versions, as strategies to encourage players to switch or upgrade games have not yet been fully effective or provided adequate returns due to players'

concerns about losing all the virtual items they have already purchased in the older game version. This article also explains the concepts of in-game purchases, upgrade decision variables, product cannibalization effects, and game usage levels (Wang et al., 2022). The findings of Ungureanu et al., (2025) indicate that in-game item purchases influence players' decisions to switch to a newer game version through two distinct mechanisms. On one hand, the accumulation of owned items increases players' attachment to the game they are currently playing, thereby reducing the likelihood of upgrading. On the other hand, in-game purchases also drive higher play intensity, which ultimately increases interest in trying the latest version. Although both effects occur simultaneously, the effect that inhibits upgrades proves to be stronger, so in-game purchases tend to reduce sales of the next game version. Interestingly, high player enthusiasm ahead of a new game launch can weaken this barrier while simultaneously strengthening the positive influence of increased play activity. This study enriches the literature by demonstrating the relationship between digital item purchases, product usage, and upgrade decisions within a game series—a topic previously rarely discussed. Nevertheless, these findings should be interpreted with caution since the data comes from only one publisher and one game series and does not include information on player spending amounts. To broaden our understanding of this phenomenon, future research could test similar models across different genres and platforms, compare the impacts of functional and non-functional items, and incorporate psychological factors such as brand loyalty, psychological ownership, and fear of missing out (FOMO) as predictors of upgrade decisions.

Table 2. Article Publish by Year

Year	Number of Article Published	Publication
2026	1	Entertainment Computing
2025	3	Information & Management, International Journal of Research in Marketing
2024	5	European Reseatch on Management and Business Economics, Computer in Human Behavior Reports, Engineering Proceedings, Journal of Economic Behavior and Organization, Entertainment Computing
2023	1	Journal of Behavioral Addictions
Total	10	

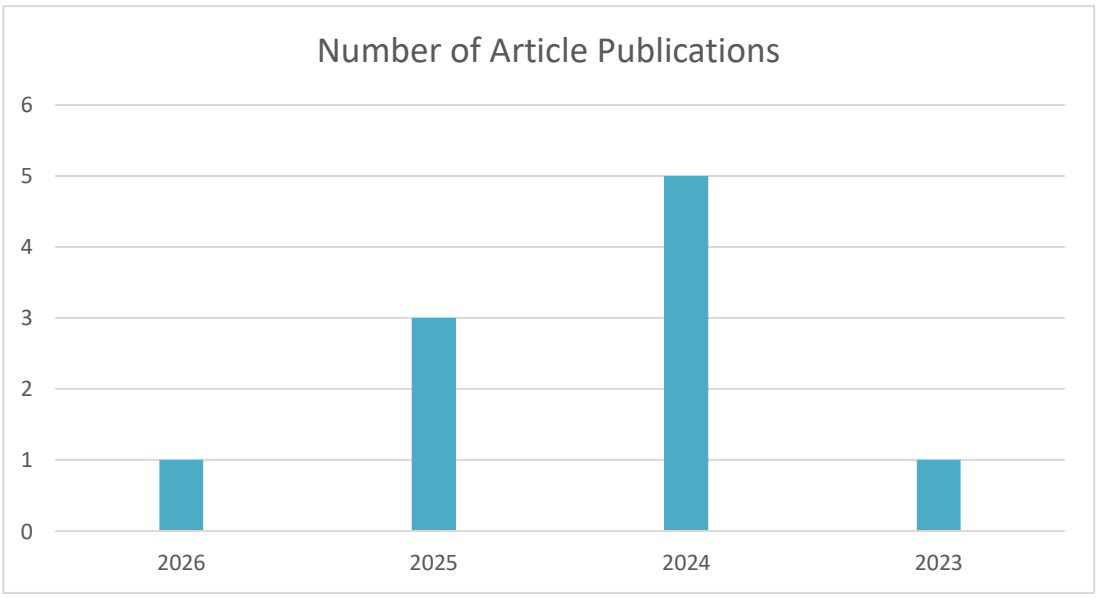

Figure 5. Graph of Article Publications by Year

Based on the data in the table and graph showing the number of articles published per year, there is a fairly clear trend in the development of publications over time. The emerging pattern indicates that the number

of articles does not remain stable but undergoes significant changes in certain periods. In the early stages, specifically in 2023, the number of publications was still relatively low, with only one article published in the *Journal of Behavioral Addictions*. This situation changed drastically in 2024, when the number of publications surged sharply to five articles. The articles published that year appeared in various journals, such as European Research on Management and Business Economics, Computer in Human Behavior Reports, Engineering Proceedings, Journal of Economic Behavior and Organization, and Entertainment Computing. This achievement made 2024 the period with the highest number of publications within the observed data range.

However, this increase did not continue in the following years. In 2025, the number of publications dropped to three articles published in *Information & Management*, *International Journal of Research in Marketing*, and *European Research on Management and Business Economics*. A further decline occurred in 2026 with only one article published, namely in the journal Entertainment Computing. Thus, 2023 and 2026 became the periods with the lowest number of publications. When viewed from the overall pattern, the emerging trend shows a fluctuating character, starting from a low level, then surging quite sharply, and finally declining gradually. This pattern indicates that the increase in publications did not occur consistently from year to year. This data shows that article publication productivity is not linear but follows a specific cycle. The peak occurred in 2024, while the lowest points were in 2023 and 2026, reflecting variations in the rhythm of research and the publication process.

CONCLUSION

Overall, this study shows that probability-based monetization mechanisms in digital games, such as gacha and loot boxes, have a strong influence on the emergence of impulsive buying behavior among players. This impulse is not only triggered by the functional aspects of the game but is largely influenced by emotional and psychological factors, such as enjoyment, FOMO, and distorted perceptions of the odds of receiving a reward. Furthermore, game system designs that utilize random elements and information manipulation have been shown to significantly increase player spending. These findings confirm that consumption behavior in digital games is not entirely rational but rather shaped by a complex interplay between gameplay experiences, individual characteristics, and monetization design strategies. Consequently, game developers must consider ethical and sustainability aspects when designing monetization systems, while researchers in consumer behavior can leverage these findings to expand studies within the rapidly evolving digital economy context.

This study has limitations regarding its literature scope, which is derived from only two databases and resulted in 10 selected articles. Most of the reviewed studies used cross-sectional designs, self-report instruments, and samples dominated by students or gamers from specific countries, thus limiting the ability to explain causal relationships and generalize the results. Furthermore, previous research has primarily focused on specific psychological factors, while the influence of other variables and actual player behavior data remains underexplored.

Based on the review results, this study proposes a new research agenda through a conceptual model that explains impulsive buying behavior in digital gaming. The proposed model suggests that game monetization mechanisms, including gacha systems, loot boxes, probability concealment, and selective feedback, influence players' psychological responses such as enjoyment, fear of missing out (FOMO), reward anticipation, and cognitive distortions, which subsequently drive impulsive buying behavior. This relationship may be moderated by self-control, social influence, and digital financial literacy, which can strengthen or weaken impulsive purchasing tendencies.

Future research is encouraged to empirically test this conceptual model using longitudinal or experimental designs to better explain causal relationships between monetization systems and consumer behavior. Additionally, the use of actual behavioral data, cross-cultural studies, and evaluations of regulatory effectiveness and loot box transparency are essential for strengthening the theoretical robustness and practical relevance of future research.

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