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Long-term game engagement, well-being, and firm value among Gen Z university students

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ABSTRACT

The digital gaming industry in Indonesia has experienced rapid user growth, yet this expansion has not been consistently accompanied by proportional revenue performance, highlighting the importance of understanding sustainable user engagement. This study investigates the determinants of Sustainable Usage Intention (SUI) and its role in shaping Player Well-Being (PWB) and Firm Value Perception (FVP) within the context of mobile gaming. Drawing on the Technology Acceptance Model (TAM) and Hedonic Information Systems perspective, this research examines the effects of perceived enjoyment, perceived ease of use, and perceived usefulness on SUI, PWB, and FVP. Data were collected from 170 Indonesian Gen Z university students using a cross-sectional survey and analyzed with PLS-SEM. The results demonstrate that perceived usefulness and perceived enjoyment significantly influence SUI, while SUI plays a pivotal mediating role in strengthening both player well-being and firm value perception. The findings contribute to post-adoption literature by emphasizing sustainable engagement rather than mere adoption and offer practical implications for game developers seeking to balance user well-being with long-term value creation in emerging markets.

Keywords: Player Well-Being, Firm Value Perception, Sustainable Usage Intention, University Student

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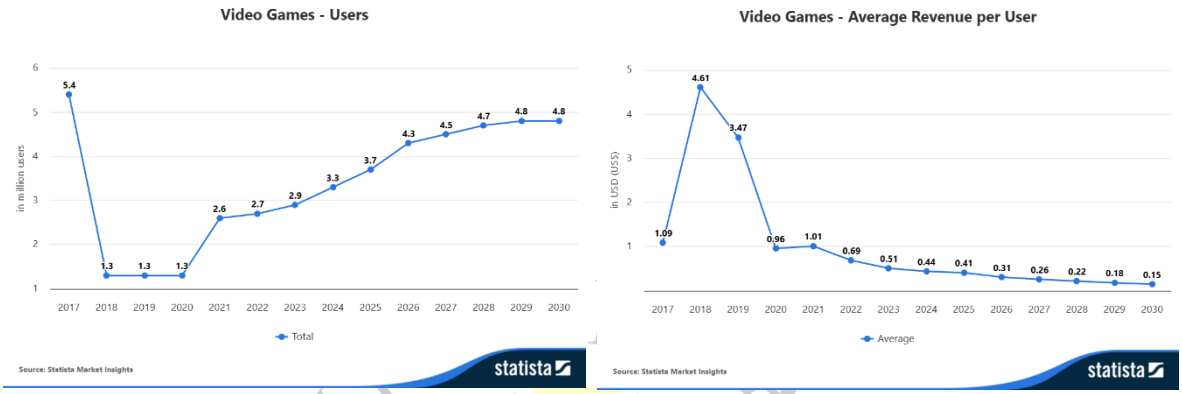
INTRODUCTION

The global media and entertainment industry has undergone a significant transformation driven by the rapid expansion of digital interactive content. PwC (2024) reported among all media sectors, video games have consistently emerged as one of the fastest-growing large sectors within the entertainment and media ecosystem. Global gaming revenue reached approximately USD 227.6 billion in 2023, reflecting an annual growth rate of around 4.6%, and is projected to surpass USD 300 billion by 2027, nearly doubling its market size compared to 2019. This sustained expansion highlights the increasing centrality of gaming within global digital consumption patterns. Regionally, the Asia-Pacific market dominates the global gaming landscape, accounting for approximately 48.1% of total global gaming revenue, and is projected to increase further to around 54.4% (approximately USD 181.8 billion) by 2028. This dominance reflects the rapid digitalization of consumer behavior in emerging economies, where gaming platforms function not only as entertainment channels but also as social, cultural, and interactive digital ecosystems (Bulboacă et al., 2025).

Within this global transformation, Indonesia represents a rapidly growing but structurally unique gaming market. The number of active gaming users has increased steadily from approximately 1.3 million users in 2018 to 3.3 million users in 2024, and is projected to reach nearly 4.8 million users by 2030, indicating stable long-term

market expansion. However, this growth is accompanied by a substantial decline in Average Revenue per User (ARPU), which dropped from USD 4.61 million in 2018 to USD 0.44 million in 2024 and is expected to decrease further to USD 0.15 million by 2030 (Statista, 2026). Prayoga (2025) state this paradox, where user adoption continues to grow while individual revenue contribution declines, creates a critical phenomenon in the Indonesian gaming ecosystem. The market appears to be increasingly dominated by freemium-based participation and low-value microtransactions (Sciglimpaglia & Raafat, 2022; Wang & Chin, 2011), suggesting that market sustainability may rely more on maintaining long-term player engagement rather than maximizing short-term monetization. In parallel, recent device distribution data highlights the growing role of PC-based gaming environments in Indonesia. In 2024, PC gaming accounted for approximately 64.5% of total gaming device usage,



increasing further to around 65.3% in 2025, while smartphone gaming represented approximately 34.5% in 2024 and declined slightly to around 33.8% in 2025 (Statista, 2026). Although mobile platforms remain important for accessibility and mass user acquisition (Mu & Zhang, 2025), the increasing dominance of PC gaming suggests a shift toward more immersive and experience-intensive gaming experiences (Xing et al., 2025). This pattern may indicate a structural differentiation between accessibility-driven adoption and experience-driven long-term engagement, which is particularly relevant when examining sustainable usage intention among digitally native users.

FIGURE 1 & 2. Number of Video Games Users and Average Revenue per User in Indonesia (Statista, 2026).

This phenomenon is particularly relevant among Generation Z university students, who represent one of the most digitally integrated demographic groups. For this population, gaming is not merely a leisure activity but also functions as a space for social interaction, emotional regulation, and identity expression (Simsek, 2025; Zhang et al., 2025). In markets where monetization per user is low, the long-term viability of gaming ecosystems may depend heavily on players' willingness to continue engaging with games over extended periods (Feng et al., 2025). Therefore, understanding whether gaming experiences contribute to players' psychological well-being and whether this well-being fosters long-term loyalty and sustainable usage intention becomes a critical research question. Investigating this relationship is essential not only for advancing theoretical understanding of post-adoption behaviour in hedonic digital systems but also for providing strategic insights into how gaming companies can maintain user retention in high-growth but low-monetization markets.

Generation Z university students constitute a dominant and strategically important segment within the contemporary gaming ecosystem. In Indonesia, this cohort (defined as individuals born between 1997 and 2012) accounts for nearly one-third (1/3) of the total population, highlighting its demographic and economic significance for current and future digital markets (Rainer, 2023). From a socio-technological perspective, Generation Z has been conceptualized as a generation of *mobile natives*, whose formative years were shaped by early and continuous exposure to mobile and digital technologies, fundamentally differentiating them from preceding cohorts in terms of socialization patterns, communication practices, and identity formation (Rosenberg et al., 2025). This prolonged immersion in interactive technologies has fostered high familiarity with gamified systems and a strong orientation toward hedonic digital consumption, where emotional experience and psychological gratification serve as primary sources of value. For university students within this generation, gaming extends beyond entertainment and functions as a coping mechanism for stress, a social interaction space, and a medium for self-expression. As Generation Z increasingly emerges as a core consumer segment and workforce cohort with distinct digital values and behavioral traits, understanding their sustained engagement with digital platforms becomes particularly important (Bhalla et al., 2021). These characteristics make Generation Z especially relevant for examining not merely game adoption, but sustained behavioral engagement over time. Accordingly, focusing on sustainable usage intention provides a more appropriate lens for understanding how gaming-related well-being contributes to long-term loyalty within this core demographic.

Digital games are increasingly conceptualized as hedonic information systems, where value is derived primarily from affective and experiential outcomes rather than purely instrumental utility. From the perspective of Hedonic Information System theory by van der Heijden (2004), perceived enjoyment plays a central role in activating intrinsic motivation, which in turn drives deeper engagement and prolonged interaction with the system. Prior research in gamification, serious games, virtual reality games, and exergaming consistently demonstrates that enjoyment functions as a key psychological stimulus shaping user engagement across diverse digital contexts (Bao et al., 2025; Kesuma & Princes, 2024; Lee et al., 2025; Qiu et al., 2024; Tur et al., 2025). Beyond engagement, a growing body of literature frames game playing as a contributor to psychological well-being, highlighting its role in mood regulation, stress relief, cognitive escape, and social connectedness. Drawing from positive psychology, well-being-oriented frameworks such as the PERMA model emphasize that digital leisure activities, including gaming, can enhance life satisfaction and emotional balance when designed responsibly (Richard et al., 2025; Wagener & Melzer, 2023). At the same time, ethical discussions surrounding dark patterns in game design underline that well-being outcomes are contingent on how game mechanics support autonomy and intrinsic motivation rather than exploitative engagement (Darin & Carneiro, 2026). Collectively, these perspectives suggest that well-being represents a meaningful psychological outcome of game experience and may act as an internal mechanism linking enjoyment and motivation to sustained engagement behaviour.

While traditional Technology Acceptance Model (TAM) constructs (perceived usefulness (PU) and perceived ease of use (PEOU)) have proven robust in explaining initial adoption of digital systems by Davis & Granić (2024), their explanatory power diminishes when the research focus shifts to long-term behavioural persistence. Extended acceptance models in gamification and gaming contexts have therefore increasingly incorporated perceived enjoyment and motivational constructs to better capture post-adoption dynamics (Saleem et al., 2024; Shahzad et al., 2023). In this study, Sustainable Usage Intention (SUI) is conceptualized as the intention to continuously and repeatedly engage with the same digital game over time, aligning with continuance intention and habitual digital engagement literature (Kim & Lee, 2021). Importantly, sustained engagement in digital entertainment does not equate solely to repeated usage but reflects a deeper form of loyalty, characterized by psychological commitment, emotional attachment, and behavioral persistence. From a value-based perspective, this loyalty can be interpreted as a form of firm value perception (FVP), where users attribute emotional and experiential value to a digital product over time, analogous to how markets evaluate strategic decisions based on perceived long-term value rather than short-term outcomes (Mattig, 2008; Narang & Pradhan, 2021). In line with socio-emotional value perspectives (Stübner & Jarchow, 2023), well-being experiences generated through gaming may strengthen emotional value and attachment, thereby fostering loyalty and reinforcing sustainable usage intention. This framework positions well-being as a critical mediating mechanism connecting game experience to long-term loyalty in digital entertainment systems.

Existing research on gaming, gamification, and digital systems has predominantly advanced along three major streams. First, a substantial body of studies has focused on technology acceptance and adoption, relying heavily on TAM, UTAUT, and their extensions to explain users' initial behavioural intention through constructs such as perceived usefulness, perceived ease of use, and perceived enjoyment (Kesuma & Princes, 2024; Lee et al., 2025; Qiu et al., 2024; Saleem et al., 2024). Second, another stream has examined experiential and psychological outcomes of gaming, emphasizing enjoyment, motivation, learning outcomes, or performance effects across contexts such as education, health, sports, and serious games, often employing experimental or quasi-experimental designs with narrowly defined samples (Béraud-Peigné et al., 2025; Chintavalakorn et al., 2025; Farhani et al., 2024; Tan et al., 2025). Third, several studies have explored continuance intention or repeated usage, typically treating it as a direct extension of adoption intention and modelling it primarily as a behavioural outcome rather than a strategic or value-based construct (Bao et al., 2025; Qiu et al., 2024; Roslan et al., 2023). While these studies collectively confirm the importance of enjoyment and perceived value, they tend to (1) privilege short-term adoption or task-specific outcomes, (2) under-theorize psychological well-being as a central explanatory mechanism, and (3) rarely connect sustained gaming behaviour to broader notions of value perception or loyalty. Moreover, although research in finance and strategic management demonstrates that long-term value is often evaluated through perceived commitment, emotional value, and signalling rather than immediate outcomes (Mattig, 2008, 2009; Narang & Pradhan, 2021), such value-based perspectives remain largely absent from the gaming and gamification literature.

Against this backdrop, the central research question of this study is formulated as follows: *How do game-related experiences influence psychological well-being and sustainable usage intention, and how do these mechanisms translate into long-term loyalty and firm value perception among Generation Z university students in an emerging market context?*

This study addresses the identified gaps by offering several key contributions. First, it shifts the analytical focus from adoption or episodic use toward sustainable usage intention, conceptualized as the intention to continuously and repeatedly engage with the same digital game over time, thereby capturing post-adoption persistence rather than short-term engagement. Second, it explicitly positions psychological well-being as a core outcome and mediating mechanism linking game experience (perceived enjoyment, perceived usefulness, and

perceived ease of use) to sustained behavioural engagement, extending conventional TAM-based explanations. Third, the study introduces firm value perception (FVP) as a representation of loyalty in the digital entertainment context, framing loyalty not merely as repeat usage but as a combination of emotional value, experiential satisfaction, and long-term attachment, conceptually aligned with socio-emotional value perspectives (Stübner & Jarchow, 2023) and market-based evaluations of strategic value (Mattig, 2009). Empirically, the study contributes by focusing on Indonesia as an emerging market, examining Generation Z university students across disciplines and institutions, with a sample dominated by mobile game users, a segment that remains underrepresented in prior research. Beyond theoretical advancement, the findings are expected to offer practical insights for society by clarifying how gaming can contribute to psychological well-being rather than merely consumption, for researchers by integrating well-being, post-adoption behaviour, and value perception within a unified framework, and for the gaming industry by informing strategies to foster long-term loyalty and sustainable engagement in high-growth but low-monetization markets.

LITERATURE REVIEWS

Theoretical Approach

The theoretical foundation of this study is primarily grounded in the Technology Acceptance Model (TAM), one of the most influential and extensively validated frameworks for explaining user acceptance of technology. Originally proposed by Davis & Granić (2024), TAM posits that perceived usefulness (PU) and perceived ease of use (PEOU) are the key determinants shaping users' behavioural intentions and subsequent system usage. Over more than three decades, TAM has demonstrated strong explanatory power across a wide range of technological contexts, including digital platforms, information systems, mobile applications, and interactive technologies. Subsequent research has expanded the original model through numerous extensions ("TAM++"), incorporating additional determinants to better capture evolving technological environments and post-adoption behaviours. Empirical studies have consistently shown TAM's adaptability and robustness when integrated with complementary theories and domain-specific variables, particularly in digital and game-based systems (Hu et al., 2025; Keller et al., 2025). Recent applications of extended TAM in gaming and gamification contexts further highlight its relevance beyond initial adoption, linking PU and PEOU not only to behavioural intention but also to downstream outcomes such as engagement and loyalty-related perceptions (Wu et al., 2025). Accordingly, TAM provides a parsimonious yet flexible theoretical lens for examining how functional evaluations of game systems influence sustainable usage intention and perceived long-term value.

However, digital games are not purely utilitarian systems; rather, they are fundamentally hedonic information systems, designed to deliver intrinsic pleasure, affective stimulation, and experiential value. Drawing on the hedonic information systems perspective articulated by van der Heijden (2004), such systems prioritize enjoyment over productivity and encourage prolonged, voluntary use rather than task efficiency. In hedonic contexts, perceived enjoyment (PE) emerges as a central determinant of continued usage, often exerting a stronger influence on behavioural intention than perceived usefulness. This distinction is particularly salient in gaming environments, where emotional gratification, immersion, and fun constitute the primary sources of value. Prior research integrating perceived enjoyment into TAM-based frameworks demonstrates that PE significantly enhances engagement, brand attitudes, and continuance intention across entertainment, gamification, and digital leisure domains (Bao et al., 2025; Lee et al., 2025; Tomić & Miric, 2024). Moreover, perceived enjoyment has been shown to operate not only as a direct predictor but also as a mediating mechanism linking system characteristics to sustained behavioural outcomes (Shahzad et al., 2023). By combining TAM with the hedonic information systems perspective, this study adopts an integrative theoretical approach capable of capturing both instrumental evaluations (PU, PEOU) and affective experiences (PE), thereby offering a more comprehensive explanation of sustainable usage intention, psychological well-being, and loyalty formation in digital gaming contexts.

Sustainable Usage Intention, Player Well-Being, and Firm Value Perception

In this study, Sustainable Usage Intention (SUI) is conceptualized as a player's intention to continue engaging with the same digital game over time in a regular, long-term, and balanced manner (Kim & Lee, 2021). This perspective emphasizes continuity driven by positive experience rather than compulsive or excessive use, consistent with indicators such as long-term intention, repeated usage, and low intention to discontinue. Prior research indicates that player well-being is not merely a function of play duration but is closely related to the *quality and motivation* underlying sustained engagement. Ballou et al. (2024) shows that objectively tracked playtime alone does not significantly predict well-being, highlighting the importance of experiential and motivational dimensions of continued play. In contrast, Richard et al. (2025) demonstrates that intrinsically motivated and enjoyable gaming experiences are positively associated with psychological outcomes such as relaxation, positive mood, and emotional balance. This aligns with the concept of harmonious engagement proposed by Przybylski et al. (2009), where voluntary and self-endorsed sustained play enhances well-being rather than undermining it. Supporting evidence from digital therapy and leisure studies further suggests that intention-driven continuance contributes to mood regulation and psychological comfort (Hammami et al., 2023; Rizzato et

al., 2023). Accordingly, when SUI reflects balanced and self-determined engagement, it is expected to positively influence Player Well-Being (PWB), as reflected in relaxation, mood improvement, positive social experience, and the absence of perceived stress.

Beyond individual outcomes, Sustainable Usage Intention also plays a central role in shaping Firm Value Perception (FVP) in digital gaming contexts. In freemium and service-based game models, firm value is increasingly embedded in long-term trust, emotional attachment, and loyalty rather than immediate monetary transactions. Kim & Lee (2021) demonstrates that sustainable use intention strengthens brand loyalty by reinforcing positive attitudes and commitment over time. Similarly, Nguyen et al. (2021) show that continuance intention reflects accumulated satisfaction and trust, which subsequently enhance perceived value toward digital service providers. In hedonic consumption settings, repeated engagement reinforces emotional value and brand attachment, ultimately contributing to brand equity (Alanadoly & Salem, 2024). Empirical studies in gamification further indicate that sustained engagement intentions enhance brand attitude and perceived value through ongoing positive interaction (Lee et al., 2025; Roslan et al., 2023; Saleem et al., 2024). Taken together, these findings support the view that SUI functions as a behavioural retention mechanism through which continuous gameplay experience is translated into stronger perceptions of firm value.

H1 : *Sustainable Usage Intention (SUI) positively influences Player Well-Being (PWB).*
H2 : *Sustainable Usage Intention (SUI) positively influences Firm Value Perception (FVP).*

Perceived Ease of Use, Player Well-Being, and Firm Value Perception

Perceived Ease of Use (PEOU) reflects the degree to which a game is perceived as easy to learn, intuitive, and effortless to operate. In digital gaming contexts, high PEOU reduces cognitive load and frustration, enabling players to focus on the experiential and affective aspects of gameplay. Empirical evidence from game-based and gamified systems shows that ease of use enhances engagement and positive user experience by lowering mental effort (Hu et al., 2025; Keller et al., 2025). Supporting studies further indicate that system usability is closely associated with enjoyment, compliance, and positive psychological outcomes (Rizzato et al., 2023; Zhou et al., 2023). These findings suggest that when players perceive a game as easy to use, they are more likely to experience comfort, enjoyment, and reduced stress, which constitute key dimensions of Player Well-Being (PWB).

Beyond psychological outcomes, PEOU also plays a critical role in shaping Firm Value Perception (FVP) through both direct and indirect mechanisms. Directly, ease of use enhances user trust, satisfaction, and loyalty, as demonstrated in extended TAM studies where PEOU significantly predicts user loyalty and favourable brand evaluations (Saleem et al., 2024; Wu et al., 2025). Indirectly, PEOU encourages Sustainable Usage Intention (SUI) by lowering barriers to repeated and long-term engagement. Prior research shows that PEOU positively influences continuance intention, which in turn strengthens users' positive evaluations and attachment to digital platforms (Kim & Lee, 2021; Roslan et al., 2023). As sustained and frictionless interaction accumulates over time, players are more likely to perceive both personal well-being benefits and greater value attributed to the game provider. Accordingly, SUI functions as a key mediating mechanism through which PEOU enhances both PWB and FVP.

H3 : *Perceived Ease of Use (PEOU) positively influences Player Well-Being (PWB).*
H4 : *Perceived Ease of Use (PEOU) positively influences Firm Value Perception (FVP).*
H5 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Ease of Use (PEOU) and Player Well-Being (PWB).*
H6 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Ease of Use (PEOU) and Firm Value Perception (FVP).*

Perceived Enjoyment, Player Well-Being, and Firm Value Perception

Perceived Enjoyment (PE) represents the extent to which playing a game is experienced as fun, pleasurable, and emotionally rewarding. From a digital well-being perspective, enjoyment constitutes a core affective mechanism through which games contribute to positive psychological outcomes. Drawing on positive psychology, Wagener & Melzer (2023) applies Seligman's PERMA model to video games and demonstrates that positive emotions (such as enjoyment) are fundamental drivers of player well-being. Empirical studies further show that immersive and enjoyable gameplay facilitates relaxation, cognitive escapism, and mood regulation, which collectively enhance mental well-being (Anto et al., 2024; Hammami et al., 2023). Supporting evidence from sports and educational game contexts similarly positions enjoyment as a key psychological outcome that fosters positive affect and motivation (Palao et al., 2023). These findings consistently suggest that higher perceived enjoyment directly enhances Player Well-Being (PWB) by promoting positive emotions, stress relief, and psychological balance.

Beyond individual well-being, PE also plays a critical role in shaping Firm Value Perception (FVP) through both direct and indirect pathways. In consumer and gamification research, perceived enjoyment has been shown to increase purchase intention and perceived value by strengthening emotional attachment to digital products

(Prachayanant et al., 2023). Indirectly, enjoyment stimulates sustained engagement and continuance intention, which are central to long-term loyalty and customer lifetime value (Kesuma & Princes, 2024; Kongrit & Kiattisin, 2023). Prior studies further indicate that enjoyment operates as a key antecedent of continuance usage intention, functioning as an affective driver of repeated and voluntary engagement (Roslan et al., 2023; Shahzad et al., 2023). As sustained and enjoyable gameplay accumulates over time, players are more likely to develop favourable psychological evaluations of both the game and its provider. Accordingly, Sustainable Usage Intention (SUI) is expected to mediate the relationship between PE and both PWB and FVP, translating hedonic experience into long-term psychological and value-based outcomes (Nguyen et al., 2021).

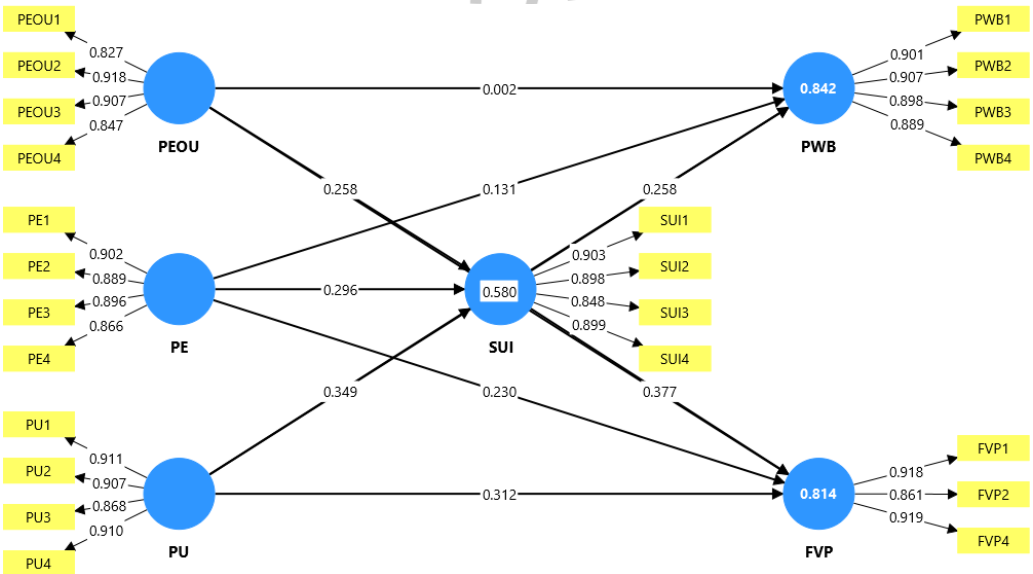
H7 : *Perceived Enjoyment (PE) positively influences Player Well-Being (PWB).*
H8 : *Perceived Enjoyment (PE) positively influences Firm Value Perception (FVP).*
H9 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Enjoyment (PE) and Player Well-Being (PWB).*
H10 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Enjoyment (PE) and Firm Value Perception (FVP).*

Perceived Usefulness, Player Well-Being, and Firm Value Perception

Perceived Usefulness (PU) refers to the extent to which players believe that playing a game provides meaningful benefits, such as cognitive stimulation, stress relief, skill development, or social value. Within digital leisure and gamified systems, usefulness extends beyond productivity and encompasses experiential and psychological utility. Prior TAM-based studies in game-based learning and simulation environments consistently demonstrate that PU enhances positive user outcomes by increasing perceived relevance and value of continued use (Bačnar et al., 2025; Keller et al., 2025). When players perceive that a game contributes positively to their daily functioning (such as improving mood, focus, or social connectedness) they are more likely to experience satisfaction and psychological fulfilment. Empirical evidence further indicates that perceived usefulness supports learning outcomes, self-efficacy, and health-related benefits, all of which are closely linked to Player Well-Being (PWB) (Bacus, 2025; Tian et al., 2025). Accordingly, PU can be conceptualized as a cognitive evaluation that reinforces players' sense of purpose and positive functioning during gameplay.

In addition to well-being, PU is a key antecedent of Firm Value Perception (FVP), particularly in post-adoption contexts. Extended TAM and continuance models show that perceived usefulness strengthens positive attitudes, satisfaction, and loyalty toward digital platforms (Saleem et al., 2024; Wu et al., 2025). When players perceive a game as useful, they are more likely to justify continued engagement, recommend the game, and attribute higher value to the developer. Moreover, PU has been shown to significantly predict continuance intention, which subsequently reinforces long-term attachment and loyalty (Qiu et al., 2024; Roslan et al., 2023). In this sense, Sustainable Usage Intention (SUI) operates as a behavioural mechanism through which perceived usefulness translates into enduring value perceptions. As sustained use accumulates, the functional and experiential benefits of the game become internalized, strengthening both PWB and FVP over time. Thus, PU is expected to exert both direct effects and indirect effects, via SUI, on player well-being and firm value perception.

H11 : *Perceived Usefulness (PU) positively influences Player Well-Being (PWB).*
H12 : *Perceived Usefulness (PU) positively influences Firm Value Perception (FVP).*



H13 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Usefulness (PU) and Player Well-Being (PWB).*

H14 : *Sustainable Usage Intention (SUI) mediates the relationship between Perceived Usefulness (PU) and Firm Value Perception (FVP).*

FIGURE 3. Research Framework & Outer Loadings

METHODS

This study adopts a quantitative, explanatory research design to examine the relationships among perceived enjoyment, perceived ease of use, perceived usefulness, sustainable usage intention, player well-being, and firm value perception in the context of digital gaming. A cross-sectional survey approach was employed to capture players' perceptions and behavioral intentions at a single point in time. The proposed conceptual model and hypotheses were tested using structural equation modeling (SEM), which is appropriate for simultaneously estimating complex relationships involving multiple direct and mediating effects.

The target population of this study consists of Gen Z university students (born between 1997 and 2012) in Indonesia who actively play digital games. Respondents were drawn from multiple universities and academic disciplines, ensuring heterogeneity in educational background. A non-probability purposive sampling strategy was applied, with eligibility criteria requiring respondents to be current university students and active game players.

The minimum required sample size was determined using the inverse square root method (Kock & Hadaya, 2018), which is suitable for SEM-based analysis and provides robust statistical power for models with multiple constructs and mediation paths. Based on this approach, the final valid sample consisted of 170 respondents after collecting responses by Google Form within 17 December 2025 – 19 Januari 2026 period, which exceeds the minimum threshold required to ensure model stability and reliable parameter estimation.

All constructs were measured using multi-item scales adapted from established studies and tailored to the gaming context. Perceived Enjoyment (PE), Perceived Ease of Use (PEOU), and Perceived Usefulness (PU) were measured following the Technology Acceptance Model and hedonic information system literature. Sustainable Usage Intention (SUI) captured respondents' intention to continuously and repeatedly engage with the same game over time. Player Well-Being (PWB) was assessed through indicators reflecting positive emotions, relaxation, and psychological comfort, while Firm Value Perception (FVP) captured perceived emotional, experiential, and long-term value attributed to the game provider. All items were rated on a Likert-type scale, and the measurement model was evaluated for reliability and validity prior to hypothesis testing.

RESULTS AND DISCUSSION

Results

The study involved 170 Gen Z university students in Indonesia drawn from a wide range of public, private, and Islamic higher education institutions. In terms of gender, the sample was male-dominated (approximately 65%), with female respondents accounting for around 35%, reflecting common participation patterns in digital and mobile gaming contexts. Regarding gaming experience, the majority of respondents were long-term players, with around 60% reporting more than three years of online gaming experience, followed by approximately 30% with one to three years, and about 10% who had been playing for less than one year. This composition indicates that the sample largely represents experienced users, which is appropriate for examining post-adoption behavior and sustainable usage intention.

With respect to daily playing duration, most respondents reported moderate engagement, where around 50% played between one and two hours per day, approximately 30% played more than two hours, and about 20% played less than one hour daily. In terms of game preference, the data clearly show a strong dominance of mobile games, accounting for more than 70% of the most frequently mentioned titles. *Mobile Legends* emerged as the most popular game, followed by *PUBG Mobile*, *Genshin Impact*, *Roblox*, *Free Fire*, and *eFootball*. This distribution confirms that the sample is predominantly composed of mobile game users, reinforcing the relevance of positioning mobile games as hedonic information systems and supporting the study's focus on sustainable usage intention, player well-being, and firm value perception within an emerging market context.

The descriptive statistics (Table 1) indicate that all constructs exhibit mean values above the scale midpoint, suggesting generally positive perceptions among Gen Z university student gamers. Perceived Ease of Use and Perceived Enjoyment demonstrate the highest mean scores, reflecting the importance of usability and hedonic experience in shaping gaming engagement. Sustainable Usage Intention and Player Well-Being also show relatively high mean values, supporting the relevance of long-term engagement and psychological outcomes. Skewness values across constructs are negative and within acceptable thresholds, indicating a concentration of favorable responses, while kurtosis values suggest no severe deviation from normality. Overall, the data distribution is suitable for subsequent structural equation modeling analysis.

TABLE 1. Descriptive Statistics Results

Variable	Indicators	Mean (≈)	Std. Dev (≈)	Skewness (Range)	Kurtosis (Range)
Perceived Ease of Use (PEOU)	4	4.09	1.09	−1.41 to −1.13	0.33 to 1.36
Perceived Enjoyment (PE)	4	4.04	1.02	−1.35 to −1.09	0.78 to 1.48
Perceived Usefulness (PU)	4	3.90	1.17	−1.15 to −1.08	0.41 to 0.75
Sustainable Usage Intention (SUI)	4	3.90	1.15	−1.20 to −0.85	−0.05 to 0.71
Player Well-Being (PWB)	4	3.75	1.12	−0.89 to −0.79	0.04 to 0.47
Firm Value Perception (FVP)	4	3.70	1.21	−1.08 to −0.57	−0.10 to 0.99

The measurement model (Table 2) demonstrates strong indicator reliability and internal consistency across all constructs. All outer loadings exceed the recommended threshold of 0.70, indicating that each indicator contributes substantially to its respective latent variable. In addition, all Variance Inflation Factor (VIF) values remain below the critical value of 5, suggesting that multicollinearity is not a concern. Internal consistency is further supported by high Cronbach's Alpha values (0.882–0.921) and Composite Reliability coefficients (ρa and ρc), all of which surpass the acceptable threshold of 0.70. These results confirm that the indicators within each construct are consistent and measure the same underlying concept reliably.

Furthermore, the model exhibits strong convergent validity, as evidenced by Average Variance Extracted (AVE) values ranging from 0.767 to 0.809, well above the minimum criterion of 0.50. This indicates that each construct explains a substantial proportion of variance in its indicators. Overall, the measurement model satisfies the key reliability and validity requirements, supporting its adequacy for subsequent structural model analysis and hypothesis testing involving perceived enjoyment, perceived ease of use, perceived usefulness, sustainable usage intention, player well-being, and firm value perception.

TABLE 2. The Measurement Model Results

	Outer loadings	VIF	CA	CR (rho_a)	CR (rho_c)	AVE
FVP1 <- FVP	0.918	2.978	0.882	0.886	0.927	0.809
FVP2 <- FVP	0.861	2.022				
FVP4 <- FVP	0.919	2.995				
PE1 <- PE	0.902	3.149	0.911	0.912	0.937	0.789
PE2 <- PE	0.889	2.811				
PE3 <- PE	0.896	2.856				
PE4 <- PE	0.866	2.397				
PEOU1 <- PEOU	0.827	2.174	0.898	0.907	0.929	0.767
PEOU2 <- PEOU	0.918	3.35				
PEOU3 <- PEOU	0.907	3.326				
PEOU4 <- PEOU	0.847	2.429				
PU1 <- PU	0.911	3.454	0.921	0.922	0.944	0.809
PU2 <- PU	0.907	3.203				
PU3 <- PU	0.868	2.443				
PU4 <- PU	0.91	3.389				
PWB1 <- PWB	0.901	3.209	0.921	0.921	0.944	0.808
PWB2 <- PWB	0.907	3.447				
PWB3 <- PWB	0.898	3.004				
PWB4 <- PWB	0.889	2.782				
SUI1 <- SUI	0.903	3.67	0.91	0.91	0.937	0.787
SUI2 <- SUI	0.898	3.376				
SUI3 <- SUI	0.848	2.257				
SUI4 <- SUI	0.899	3.036				

The HTMT results (Table 3) indicate that discriminant validity is well established across all constructs in the model. All HTMT values are below the conservative threshold of 0.90, suggesting that each construct is empirically distinct from the others. This implies that although the constructs (such as perceived enjoyr perceived ease of use, perceived usefulness, sustainable usage intention, player well-being, and firm v perception) are theoretically related, they do not excessively overlap in their measurement.

Notably, the highest HTMT values are observed between PE–FVP (0.846), PWB–PU (0.836), and PWB–SUI (0.837), which reflects strong but acceptable conceptual proximity, consistent with the theoretical framework linking hedonic experience, well-being, loyalty-related perceptions, and sustained engagement. Since none of the HTMT ratios exceed the recommended cut-off, the measurement model satisfies discriminant validity requirements, supporting the robustness of the constructs for structural relationship testing.

TABLE 3. The HTMT results

	FVP	PE	PEOU	PU	PWB	SUI
FVP						
PE	**0.846**					
PEOU	0.834	**0.841**				
PU	0.734	0.738	**0.84**			
PWB	0.757	0.708	0.794	**0.836**		
SUI	0.746	0.836	0.825	0.822	**0.837**	

The bootstrapping results (Table 4) indicate that not all direct paths are statistically significant, yet the overall pattern of relationships aligns well with a post-adoption and experiential gaming perspective. Perceived Enjoyment (PE) has a significant positive effect on Sustainable Usage Intention (SUI) ($\beta = 0.296$; $p = 0.016$; $f^2 = 0.062$), but it does not directly influence Player Well-Being (PWB) or Firm Value Perception (FVP). This suggests that enjoyment derived from gameplay does not automatically translate into psychological well-being or firm-related value perceptions, but rather operates through sustained engagement over time. A similar pattern is observed for Perceived Ease of Use (PEOU), which shows no significant direct effect on PWB or FVP, while exerting a significant positive influence on SUI ($\beta = 0.258$; $p = 0.021$; $f^2 = 0.079$). These findings imply that ease of use primarily functions as an enabling condition for long-term usage, rather than as a direct driver of psychological or loyalty-related outcomes.

In contrast, Perceived Usefulness (PU) emerges as the most influential construct in the model. PU significantly affects PWB ($\beta = 0.580$; $p < 0.001$; $f^2 = 0.509$), FVP ($\beta = 0.312$; $p = 0.001$; $f^2 = 0.126$), and SUI ($\beta = 0.349$; $p = 0.002$; $f^2 = 0.110$), indicating that the functional and instrumental value of games, such as stress relief, mood regulation, and perceived cognitive benefits, plays a dominant role in shaping psychological well-being, sustainable usage intentions, and long-term value perceptions toward the firm. Furthermore, SUI exerts strong and significant effects on both PWB ($\beta = 0.258$; $p = 0.001$; $f^2 = 0.124$) and FVP ($\beta = 0.377$; $p < 0.001$; $f^2 = 0.226$), confirming its central role as a behavioural and psychological retention mechanism. Overall, the findings reinforce the argument that, in the Gen Z gaming context, well-being and loyalty are not driven by momentary experiences alone, but are cultivated through meaningful and sustained engagement that is perceived as useful over time.

TABLE 4. The Direct Effect Bootstrap Results

	Original sample	Sample mean	Standard deviation	T statistics	P values	f-square
PE -> FVP	0.23	0.22	0.129	1.78	0.075	0.056
PE -> PWB	0.131	0.13	0.08	1.639	0.101	0.021
PE -> SUI	0.296	0.295	0.123	2.404	0.016	0.062
PEOU -> FVP	0.052	0.059	0.083	0.623	0.533	0.005
PEOU -> PWB	0.002	0.003	0.053	0.036	0.971	0.000
PEOU -> SUI	0.258	0.256	0.112	2.3	0.021	0.079
PU -> FVP	0.312	0.314	0.096	3.248	0.001	0.126
PU -> PWB	0.58	0.576	0.088	6.594	0.000	0.509
PU -> SUI	0.349	0.352	0.11	3.165	0.002	0.110
SUI -> FVP	0.377	0.38	0.068	5.585	0.000	0.226

SUI -> PWB	0.258	0.263	0.076	3.384	0.001	0.124

The indirect effect analysis (Table 5) further clarifies the mediating role of Sustainable Usage Intention (SUI) in linking game-related perceptions to psychological and firm-level outcomes. The pathway PU → SUI → PWB is statistically significant (β = 0.090; p = 0.045), indicating that when players perceive games as useful, this perception enhances their intention to engage sustainably, which in turn contributes positively to player well-being. This finding reinforces the notion that functional value translates into psychological benefits primarily through sustained and intentional engagement, rather than through immediate or short-term use. In contrast, the indirect effects of PEOU → SUI → PWB (β = 0.066; p = 0.051) and PE → SUI → PWB (β = 0.076; p = 0.055) are marginally significant, suggesting a weaker but still meaningful tendency for usability and enjoyment to influence well-being via sustainable usage, particularly at a 10% significance level. These results imply that ease and enjoyment alone are insufficient to robustly enhance well-being unless they are internalized into stable usage intentions.

With respect to Firm Value Perception (FVP), all mediated paths through SUI are statistically significant. The indirect effects of PE → SUI → FVP (β = 0.112; p = 0.033), PEOU → SUI → FVP (β = 0.097; p = 0.021), and PU → SUI → FVP (β = 0.132; p = 0.014) confirm that hedonic enjoyment, ease of use, and perceived usefulness enhance firm-related value perceptions primarily by fostering long-term engagement. Notably, the strongest indirect effect emerges from PU, highlighting that instrumental value plays a central role in converting sustained gameplay into brand loyalty and perceived firm value. Overall, these findings substantiate SUI as a critical post-adoption mechanism that channels experiential and technological evaluations into both player well-being and durable firm-level outcomes, thereby supporting the study's conceptual positioning of sustainable usage intention as a pivotal mediator.

TABLE 5. The Indirect Effect Bootstrap Results

	Original sample	Sample mean	Standard deviation	T statistics	P values
PEOU -> SUI -> PWB	0.066	0.066	0.034	1.954	0.051
PU -> SUI -> PWB	0.09	0.095	0.045	2.007	0.045
PE -> SUI -> FVP	0.112	0.112	0.052	2.13	0.033
PEOU -> SUI -> FVP	0.097	0.095	0.042	2.318	0.021
PU -> SUI -> FVP	0.132	0.135	0.053	2.47	0.014
PE -> SUI -> PWB	0.076	0.077	0.04	1.92	0.055

The R-square values indicate strong explanatory power of the proposed model across all endogenous constructs. Firm Value Perception (FVP) shows an R^2 of 0.814 (adjusted R^2 = 0.810), suggesting that the model explains over 81% of the variance in players' perceived firm value, which reflects a very high level of predictive accuracy for loyalty-related outcomes. Player Well-Being (PWB) demonstrates the highest explanatory power with an R^2 of 0.842 (adjusted R^2 = 0.838), indicating that experiential, technological, and behavioral factors jointly provide a robust explanation of psychological outcomes derived from gameplay. Finally, Sustainable Usage Intention (SUI) yields an R^2 of 0.705 (adjusted R^2 = 0.700), implying that more than 70% of the variance in long-term engagement intention is accounted for by perceived enjoyment, ease of use, and usefulness. Collectively, these results confirm that the structural model possesses substantial predictive relevance, particularly in explaining sustained engagement and its downstream psychological and firm-level consequences.

TABLE 6. R-Squared and Adjusted R-Squared Results

	R-square	R-square adjusted
FVP	0.814	0.81
PWB	0.842	0.838
SUI	0.705	0.7

The PLS-Predict results demonstrate that the proposed model exhibits strong out-of-sample predictive power, particularly for Firm Value Perception (FVP) and Player Well-Being (PWB) indicators. All indicators report positive Q^2predict values, ranging from 0.471 to 0.699, which confirms that the model provides predictive relevance beyond mere in-sample explanation. The highest Q^2predict values are observed for PWB3 (0.699) and FVP1 (0.697), indicating that the model is especially effective in predicting psychological well-being and perceived firm value outcomes derived from sustained game engagement. In terms of prediction error, the PLS-SEM model generally outperforms the linear model (LM), as indicated by lower or comparable RMSE and MAE

values across most indicators, particularly for FVP and PWB. Although minor exceptions exist (e.g., FVP4), the differences are marginal and do not undermine overall predictive superiority. Importantly, the PLS-SEM model consistently performs substantially better than the naïve indicator average (IA) benchmark, evidenced by markedly lower RMSE and MAE values for all constructs. Taken together, these findings support the conclusion that the model achieves medium-to-high predictive accuracy, reinforcing its robustness not only for theory testing but also for practical prediction of sustainable usage intention, player well-being, and firm value perception in the gaming context.

TABLE 7. PLS-Predict Results

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE	IA_RMSE	IA_MAE
FVP1	0.697	0.633	0.502	0.664	0.517	1.15	0.87
FVP2	0.471	0.882	0.682	0.897	0.688	1.212	0.982
FVP4	0.658	0.647	0.521	0.645	0.512	1.107	0.865
PWB1	0.652	0.676	0.528	0.696	0.541	1.145	0.923
PWB2	0.606	0.641	0.473	0.667	0.474	1.022	0.795
PWB3	0.699	0.628	0.511	0.659	0.524	1.144	0.87
PWB4	0.657	0.698	0.527	0.737	0.556	1.191	0.952
SUI1	0.476	0.91	0.655	0.875	0.629	1.257	1.019
SUI2	0.543	0.785	0.6	0.801	0.608	1.162	0.921
SUI3	0.584	0.741	0.602	0.783	0.587	1.149	0.831
SUI4	0.528	0.803	0.63	0.81	0.619	1.169	0.914

Discussion

Hedonic and Utilitarian Drivers of Sustainable Game Engagement

The findings confirm that perceived enjoyment (PE) and perceived usefulness (PU) are the primary antecedents of sustainable usage intention (SUI) among Gen Z university students, while perceived ease of use (PEOU) functions as an enabling factor rather than a direct source of value. This pattern aligns with the theoretical distinction proposed by van der Heijden (2004), who argues that in hedonic information systems, enjoyment outweighs instrumental utility in predicting continued use. Empirical studies in gamification and digital entertainment contexts similarly demonstrate that PE is a dominant predictor of engagement and continuance intention (Bao et al., 2025; Lee et al., 2025; Tomić & Miric, 2024).

At the same time, the strong effect of PU on SUI indicates that Gen Z players do not perceive games merely as sources of pleasure, but also as tools that provide meaningful benefits, such as stress relief, cognitive engagement, or social value. This finding is consistent with extended TAM studies in gaming and gamified systems, which show that PU remains salient in post-adoption contexts when digital products are embedded in daily routines (Hu et al., 2025; Wu et al., 2025). The insignificant direct effects of PEOU on well-being and firm value perception further support the argument that usability alone does not generate value, but facilitates sustained engagement, which then produces downstream outcomes (Roslan et al., 2023; Saleem et al., 2024).

Sustainable Usage Intention as a Mechanism Linking Games to Well-Being

This study positions SUI as a central psychological–behavioural mechanism through which game experiences translate into player well-being (PWB). The significant effect of SUI on PWB supports prior research emphasizing that well-being outcomes depend on the quality and intentionality of engagement, rather than mere playtime. Ballou et al. (2024) demonstrates that objectively measured playtime alone does not predict well-being, thereby reinforcing the relevance of sustainable and self-regulated engagement. In line with this, Richard et al. (2025) shows that motivational and experiential factors are key predictors of player well-being, suggesting that SUI reflects a positive motivational state.

Conceptually, SUI aligns with the notion of harmonious engagement, which has been shown to enhance well-being by supporting autonomy and enjoyment without compulsion (Przybylski et al., 2009). The significant indirect effects from PE, PU, and PEOU to PWB via SUI further corroborate this mechanism, indicating that well-being benefits emerge when enjoyable and useful games are used in a sustained but balanced manner. This interpretation is consistent with studies in digital therapy and serious games, where continued intention and compliance mediate the relationship between system experience and psychological outcomes (Hammami et al., 2023; Rizzato et al., 2023).

From Sustainable Usage to Firm Value Perception in Digital Games

The results also demonstrate that SUI is a strong predictor of firm value perception (FVP), confirming that loyalty in digital entertainment extends beyond repeat transactions to include emotional attachment and long-term commitment. This finding is consistent with prior studies showing that continuance intention strengthens brand loyalty and perceived value in digital services (Kim & Lee, 2021; Nguyen et al., 2021). In gaming contexts, sustained engagement reflects trust, satisfaction, and psychological investment, which are core components of firm value perception (Lee et al., 2025; Wu et al., 2025).

Moreover, the significant indirect effects of PE, PU, and PEOU on FVP through SUI indicate that firm value is not created directly by system attributes, but through prolonged experiential relationships. This aligns with research demonstrating that enjoyment-driven engagement enhances brand attitude and equity over time (Alanadoly & Salem, 2024). For the Indonesian gaming market, these findings help explain why user numbers continue to grow despite declining revenue: players may exhibit high loyalty and engagement without immediate monetary conversion. Thus, SUI represents a critical bridge between player experience and long-term firm value, emphasizing the strategic importance of retention-oriented design rather than short-term monetization.

CONCLUSIONS AND SUGGESTION

Conclusions

This study investigates sustainable gaming behavior among Gen Z university students by integrating Technology Acceptance Model, Hedonic Information Systems, and digital well-being perspectives. The results demonstrate that perceived enjoyment, usefulness, and ease of use significantly influence sustainable usage intention, which in turn plays a pivotal role in enhancing both player well-being and firm value perception. Rather than being direct outcomes of gameplay, well-being and loyalty emerge through sustained, intentional engagement.

By empirically validating SUI as a central behavioral mechanism, this research extends post-adoption technology literature into the gaming domain and reframes gaming not merely as entertainment, but as a digital leisure system capable of generating psychological and relational value. The findings contribute to a more balanced understanding of gaming, emphasizing its potential for positive outcomes when engagement is sustainable and self-directed.

Suggestion

Implications for Industry

Game developers and publishers should prioritize design strategies that foster sustainable engagement, such as adaptive difficulty, meaningful progression systems, and socially supportive features. Rather than focusing solely on aggressive monetization, firms should invest in player well-being as a long-term value strategy, as loyalty and firm value perception are strongly shaped by sustained positive experiences.

Implications for Policymakers and Society

The findings suggest that games can function as legitimate digital leisure spaces that support psychological well-being among young adults. Educational institutions and policymakers should move beyond risk-centric narratives and consider how games can be leveraged responsibly for stress management, social connection, and personal development.

Directions for Future Research

Future studies could employ longitudinal designs to better capture the dynamic relationship between sustainable usage intention and well-being over time. Additionally, incorporating objective behavioral data or comparing different game genres may further refine understanding of how sustainable engagement translates into value for both players and firms.

REFERENCES

[1] Alanadoly, A. B., & Salem, S. F. (2024). Branding fashion through gameplay: the branded gaming and the cool dynamics in the fashion markets. A game-theory approach. *European Journal of Management and Business Economics*, *33*(4), 394–410. https://doi.org/10.1108/EJMBE-06-2023-0179

[2] Anto, A., Basu, A., Selim, R., Foscht, T., & Eisingerich, A. B. (2024). Open-World Games' Affordance of Cognitive Escapism, Relaxation, and Mental Well-Being Among Postgraduate Students: Mixed Methods Study. *Journal of Medical Internet Research*, *26*. https://doi.org/10.2196/63760

[3] Bačnar, D., Barić, D., & Ogrizović, D. (2025). Charting the Future of Maritime Education and Training: A Technology-Acceptance-Model-Based Pilot Study on Students' Behavioural Intention to Use a Fully Immersive VR Engine Room Simulator. *Applied System Innovation*, *8*(3). https://doi.org/10.3390/asi8030084

[4] Bacus, J. A. (2025). Disaster-Based Mobile Learning System Using Technology Acceptance Model †. *Engineering Proceedings*, *103*(1). https://doi.org/10.3390/engproc2025103005

[5] Ballou, N., Sewall, C. J. R., Ratcliffe, J., Zendle, D., Tokarchuk, L., & Deterding, S. (2024). Registered report evidence suggests no relationship between objectively tracked video game playtime and well-being over 3 months. *Technology, Mind, and Behavior*. https://doi.org/10.1037/tmb0000124
[6] Bao, Q., Wang, S., Nah, K., & Guo, W. (2025). Exploring the Key Factors Influencing the Plays' Continuous Intention of Ancient Architectural Cultural Heritage Serious Games: An SEM–ANN–NCA Approach. *Buildings*, *15*(15). https://doi.org/10.3390/buildings15152648
[7] Béraud-Peigné, N., Perrot, A., & Maillot, P. (2025). Active Video Games Training for Older Adults: Comparative Study of User Experience, Workload, Pleasure, and Intensity. *JMIR Serious Games*, *13*. https://doi.org/10.2196/67314
[8] Bhalla, R., Tiwari, P., & Chowdhary, N. (2021). Digital Natives Leading the World: Paragons and Values of Generation Z. In *Generation Z Marketing and Management in Tourism and Hospitality* (pp. 3–23). Springer International Publishing. https://doi.org/10.1007/978-3-030-70695-1_1
[9] Bulboacă, Ștefan, Brătucu, G., Ciobanu, E., Chițu, I. B., Constantin, C. P., & Lixăndroiu, R. C. (2025). Uncovering Emotional and Identity-Driven Dimensions of Entertainment Consumption in a Transitional Digital Culture. *Behavioral Sciences*, *15*(8), 1049. https://doi.org/10.3390/bs15081049
[10] Chintavalakorn, R., Chanwanichkulchai, C., Buranasing, N., Parivisutt, N., Patchasri, N., & Sipiyaruk, K. (2025). Development and Evaluation of a Case-Based Serious Game for Diagnosis and Treatment Planning in Orthodontic Education: Quasi-Experimental Study. *JMIR Serious Games*, *13*. https://doi.org/10.2196/73956
[11] Darin, T., & Carneiro, N. (2026). From Understanding to Intervention: Towards an Agenda for Countering Dark Patterns in Games. In T. Darin, G. Cruz, D. Ricca, K. Rios, & L. Tórtoro (Eds.), *Communications in Computer and Information Science: 2623 CCIS* (pp. 87–101). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-3-032-01426-9_6
[12] Davis, F. D., & Granić, A. (2024). Evolution of TAM. In *The Technology Acceptance Model 30 Years of TAM* (pp. 19–57). Human–Computer Interaction Series. https://doi.org/10.1007/978-3-030-45274-2_2
[13] Farhani, Z., Amara, S., Ben Aissa, M. B., Guelmami, N., Bouassida, A., & Dergaa, I. (2024). The variability of physical enjoyment, physiological responses, and technical-tactical performance according to the bout duration of small-sided games: a comparative study between female and male soccer players. *BMC Sports Science, Medicine and Rehabilitation*, *16*(1). https://doi.org/10.1186/s13102-023-00794-1
[14] Feng, Z., Luo, N., Wu, S., & Yan, Z. J. (2025). Trade-in marketing strategies in gaming industry: The effect of digital transformation. *Electronic Markets*, *35*(1), 58. https://doi.org/10.1007/s12525-025-00800-z
[15] Hammami, A., Kasmi, S., Ben Saad, H., Bouhlel, E., Krustrup, P., & Chamari, K. (2023). It Is Time to Play: Acute Effects of Soccer and Sprint Exercise on Attentional Performance, Mood, and Enjoyment in Untrained Male Adolescents. *American Journal of Men's Health*, *17*(5). https://doi.org/10.1177/15579883231209202
[16] Hu, B., Li, K., & Zhang, Y. (2025). Gamification of Anti-Telecom Network Fraud Education Based on the Technology Acceptance Model: A Study on the Acceptance of University Students. *SAGE Open*, *15*(3). https://doi.org/10.1177/21582440251363689
[17] Keller, T., Guggemos, J., & Warwas, J. (2025). Digital educational escape rooms as a novel approach to cybersecurity education: An empirical study on learner perceptions of usefulness and usability. *Computers in Human Behavior Reports*, *20*. https://doi.org/10.1016/j.chbr.2025.100785
[18] Kesuma, A. E., & Princes, E. (2024). Antecedents of Gacha gaming intention: Extending UTAUT2 with structural video game characteristics. *Computers in Human Behavior Reports*, *14*. https://doi.org/10.1016/j.chbr.2024.100405
[19] Kim, Y., & Lee, H. (2021). Motivation and Reuse: How Does Motivation Affect Sustainable Use Intention for Brand Webtoons? *Sustainability*, *13*(4), 1620. https://doi.org/10.3390/su13041620
[20] Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information Systems Journal*, *28*(1), 227–261. https://doi.org/10.1111/isj.12131
[21] Kongrit, T., & Kiattisin, S. (2023). Live Streaming Contents Influencing Game Playing Behavior Among Thailand Gamers. *Journal of Mobile Multimedia*, *19*(4), 1031–1048. https://doi.org/10.13052/jmm1550-4646.1946
[22] Lee, C. W., Rabago, A. R. A., & Ilham, R. (2025). Gamification and Consumer Engagement in Indonesia's Smart Ring Market. *International Research Journal of Multidisciplinary Scope*, *6*(4), 260–272. https://doi.org/10.47857/irjms.2025.v06i04.05450
[23] Mattig, A. (2008). Modes of Governance in Business Process Outsourcing: Executive versus Market's Perspective. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*, 375–375. https://doi.org/10.1109/HICSS.2008.321
[24] Mattig, A. (2009). Operational Risk Perspective: Governance Across the Widening Disintermediation Gap. In *Industrial Dynamics and the Evolution of Markets in the Mutual Fund Industry* (pp. 187–208). Gabler. https://doi.org/10.1007/978-3-8349-8351-0_8

[25] Mu, J., & Zhang, J. Z. (2025). Artificial intelligence marketing usage and firm performance. *Journal of the Academy of Marketing Science*, *53*(4), 1081–1134. https://doi.org/10.1007/s11747-024-01076-z
[26] Narang, S., & Pradhan, R. P. (2021). IPO lock-up: a review and assessment. *DECISION*, *48*(3), 343–369. https://doi.org/10.1007/s40622-021-00286-6
[27] Nguyen, D. M., Chiu, Y.-T. H., & Le, H. D. (2021). Determinants of Continuance Intention towards Banks' Chatbot Services in Vietnam: A Necessity for Sustainable Development. *Sustainability*, *13*(14), 7625. https://doi.org/10.3390/su13147625
[28] Palao, J. M., Ureña Espá, A., Moreno, M. P., & Ortega-Toro, E. (2023). Effect of changes in the net height, court size, and serve limitations on technical-tactical, physical, and psychological aspects of U-14 female volleyball matches. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1341297
[29] Prachayanant, P., Kraiwanit, T., & Chutipat, V. (2023). CRYPTOCURRENCY GAMIFICATION: HAVING FUN OR MAKING MONEY. *Journal of Governance and Regulation*, *12*(2), 184–193. https://doi.org/10.22495/jgrv12i2art17
[30] Prayoga, R. A. (2025). Unleashing Gamification's Potential: How Reward, Competition, and Cooperation Drive User Retention in Indonesian Mobile Payments. *Open Access Indonesia Journal of Social Sciences*, *8*(2). https://doi.org/https://doi.org/10.37275/oaijss.v8i2.287
[31] Przybylski, A. K., Weinstein, N., Ryan, R. M., & Rigby, C. S. (2009). Having to versus wanting to play: Background and consequences of harmonious versus obsessive engagement in video games. *Cyberpsychology and Behavior*, *12*(5), 485–492. https://doi.org/10.1089/cpb.2009.0083
[32] PwC. (2024, July 22). *Indonesia is projected to be the third fastest growing video game market in the world, according to PwC Global Entertainment & Media Outlook 2024-2028*. Https://Www.Pwc.Com/Id/En/Media-Centre/Press-Release/2024/English/Pwc-Global-Entertainment-Media-Outlook-2024-2028.Html.
[33] Qiu, T., Li, H., Chen, Y., Zeng, H., & Qian, S. (2024). Continuance intention toward VR games of intangible cultural heritage: A stimulus-organism-response perspective. *Virtual Reality*, *28*(3). https://doi.org/10.1007/s10055-024-01043-7
[34] Rainer, P. (2023). *Sensus BPS: Saat Ini Indonesia Didominasi Oleh Gen Z*.
[35] Richard, A., Plante, C. N., & Dionne, F. (2025). Why We Play: Motivational and Experiential Aspects of Video Gaming as Predictors of Player Well-Being. *Psychology of Popular Media*. https://doi.org/10.1037/ppm0000604
[36] Rizzato, A., Pizzichemi, M., Gobbi, E., Gerardi, A., Fortin, C., Copcia, A., Paoli, A., & Marcolin, G. (2023). Effectiveness and therapeutic compliance of digital therapy in shoulder rehabilitation: a randomized controlled trial. *Journal of NeuroEngineering and Rehabilitation*, *20*(1). https://doi.org/10.1186/s12984-023-01188-7
[37] Rosenberg, H., Blondheim, M., & Sabag-Ben Porat, C. (2025). Who in the World Is Generation Z? The Rise of Mobile Natives and Their Socio-Technological Identity. *Societies*, *15*(11), 314. https://doi.org/10.3390/soc15110314
[38] Roslan, R., Mohd Ayub, A. F. M., Ghazali, N., Zulkifli, N. N., Latip, S. N. H. M., & Hanifah, S. S. A. (2023). Predictive Model for Factors Influencing Students' Continuance Usage Intention on a Gamified Formative Assessment Application. *Journal of Technical Education and Training*, *15*(3), 12–24. https://doi.org/10.30880/jtet.2023.15.03.002
[39] Saleem, A., Mirza, B., Ahmed, M., & Fülöp, T. (2024). Students' and faculty continuous intention to use gamification in higher education: A structural analysis. *Journal of Infrastructure, Policy and Development*, *8*(11). https://doi.org/10.24294/jipd.v8i11.4609
[40] Sciglimpaglia, D., & Raafat, F. (2022). Freemium marketing: use of demand-side research in market segmentation strategy. *Journal of Strategic Marketing*, *30*(7), 667–690. https://doi.org/10.1080/0965254X.2020.1824013
[41] Shahzad, M. F., Xu, S., Rehman, O., & Javed, I. (2023). Impact of gamification on green consumption behavior integrating technological awareness, motivation, enjoyment and virtual CSR. *Scientific Reports*, *13*(1). https://doi.org/10.1038/s41598-023-48835-6
[42] Simsek, K. Y. (2025). Leisure time internet usage habits: generational and country comparison. *Managing Sport and Leisure*, 1–16. https://doi.org/10.1080/23750472.2025.2466457
[43] Statista. (2026). *Media - Indonesia. Statista.* Https://Www.Statista.Com/Outlook/Emo/Media/Indonesia.
[44] Stübner, A., & Jarchow, S. (2023). Family oblige: the link between CSR and succession intention in small and medium family firms. *Journal of Business Economics*, *93*(3), 389–431. https://doi.org/10.1007/s11573-022-01113-9
[45] Tan, K., Autry, A. K., Oginni, J., Tao, K., & Gao, Z. (2025). Efficacy of exergaming dance and aerobic dance on young adults' enjoyment, situational motivation, self-efficacy, and steps. *Frontiers in Psychology*, *16*. https://doi.org/10.3389/fpsyg.2025.1573954
[46] Tian, M., Xie, L., Wei, W., Chen, Y., & Tang, J. (2025). User Experience and Acceptability of a Digital

Educational Game for Self-Management Health Education Among People Living with HIV. *Patient Preference and Adherence*, *19*, 2593–2608. https://doi.org/10.2147/PPA.S538527

[47] Tomić, N., & Miric, M. (2024). AN ANALYSIS OF THE ACCEPTANCE OF LOOT BOXES USING THE MODIFIED TECHNOLOGY ACCEPTANCE MODEL: THE EMPIRICAL EVIDENCE FROM VIDEO GAME PLAYERS IN SERBIA. *Economic Horizons*, *26*(1), 59–73. https://doi.org/10.5937/ekonhor2401063T

[48] Tur, G., de-Benito, B., Arnab, S., Castaneda, L., Lameras, P., Bedenlier, S., & Wasson, B. (2025). Data literacy for citizenry through game-based learning: Adult perceptions of fun and learning with the DALI Toolkit. *First Monday*, *30*(9). https://doi.org/10.5210/fm.v30i9.13792

[49] van der Heijden, H. (2004). User Acceptance of Hedonic Information Systems1. *MIS Quarterly*, *28*(4), 695–704. https://doi.org/10.2307/25148660

[50] Wagener, G. L., & Melzer, A. (2023). Seligman's PERMA Model in Video Games – The Positive Influence of Video Games on Well-Being. In P. Ciancarini, A. Di Iorio, H. Hlavacs, & F. Poggi (Eds.), *Lecture Notes in Computer Science: 14455 LNCS* (pp. 43–58). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-981-99-8248-6_4

[51] Wang, H., & Chin, A. (2011). Social Influence on Being a Pay User in Freemium-based Social Networks. *2011 IEEE International Conference on Advanced Information Networking and Applications*, 526–533. https://doi.org/10.1109/AINA.2011.35

[52] Wu, H., Tao, Y., & Huang, M. (2025). The factors influencing user loyalty in virtual green games: An empirical study based on ant forest. *Sustainable Futures*, *10*. https://doi.org/10.1016/j.sftr.2025.101009

[53] Xing, Y., Ma, W., You, Q., & Li, J. (2025). Modeling Affective Mechanisms in Relaxing Video Games: Sentiment and Topic Analysis of User Reviews. *Systems*, *13*(7), 540. https://doi.org/10.3390/systems13070540

[54] Zhang, S., Li, Z., & Chen, X. (2025). Cultural Identity and Virtual Consumption in the Mimetic Homeland: A Case Study of Chinese Generation Z Mobile Game Players. *Social Sciences*, *14*(6), 362. https://doi.org/10.3390/socsci14060362

[55] Zhou, Y.-L., Chen, C.-L., Chang, S.-J., & Wu, B.-S. (2023). Home-Based Intelligent Exercise System for Seniors' Healthcare: The Example of Golf Croquet. *Sports*, *11*(11). https://doi.org/10.3390/sports11110207