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GaaS-Based Virtual Pets for Engaging Generation Z in Borneo Wildlife Conservation: A Preliminary Research

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ABSTRACT
This preliminary research investigates the potential of a Game as a Service (GaaS)-based virtual pet game to enhance Generation Z's engagement in wildlife conservation efforts for endangered species in Borneo. Employing a Design Research approach and the Double Diamond Framework (Discover and Define phases), the study analyzes data from semi-structured interviews with ten Generation Z respondents to examine in-app purchase motivations (IAP), gameplay preferences, and design considerations. The results identify five key game pillars: (1) empathy-building through character personalization and anthropomorphism; (2) a progression system linking in-game achievements to real-world conservation actions; (3) layered monetization strategies leveraging fear of missing out (FOMO) and aesthetic appeals; (4) social mechanics integrating collaborative and competitive elements; and (5) adaptive educational narratives tailored to player types. These findings delineate an emotionally engaging game design framework that responds to the discourse on creative conservation funding while enabling potential partnerships with conservation organizations. This study contributes to virtual pet design exploration and offers an adaptable framework for addressing wildlife conservation challenges in other regions.
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KEYWORDS

Virtual Pet, Game as a Service, Wildlife Concervation, Generation Z, Preliminary Research.

INTRODUCTION

Borneo Island, one of Southeast Asia's richest biodiversity hotspots (De Bruyn et al., 2014), faces severe threats to its endemic species, such as Bornean orangutans, proboscis monkeys, and Irrawaddy dolphins (IUCN, 2025; Merritt et al., 2019). Preserving these species is critical for maintaining ecological balance and addressing broader climate change challenges (National Geographic Society, 2024). Despite growing conservation urgency, funding constraints remain a key barrier, forcing conservation organizations to seek more innovative and sustainable fundraising models (Echols et al., 2019; Kubo et al., 2023). Generation Z, recognized as digital natives (Afif & Grahita, 2024) with high ecological awareness (Ribeiro et al., 2023), is identified as a promising demographic for environmental advocacy. However, empirical studies in Indonesia reveal a gap between Generation Z's ecological values and tangible conservation actions, particularly in donations and engagement (Putriastuti et al., 2022; Sunkar et al., 2021).

To address this, the authors propose leveraging digital media, specifically a Game as a Service (GaaS)-based virtual pet video game. This proposal is grounded in three rationales. First, there is underexplored potential in video games for wildlife conservation themes (Salvador, 2017), despite their proven ability to showcase local heritage, such as culture, history, and mythology, and serve as efficient tools for social campaigns (Adila et al., 2014; Agung et al., 2021). Second, virtual pet games

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simulate digital companion animals for entertainment and emotional bonding (Rollings & Adams, 2003), centering animals as core figures within the genre. Third, GaaS represents the dominant contemporary gaming model, employing periodic updates, live events, and monetization strategies to enhance player retention (Bagga, 2011; Guiney & Xu, 2019). Thus, this proposal aligns with NGOs' need for sustainable fundraising.

Prior studies have examined virtual pets as persuasive tools for promoting healthy eating, physical activity, prosocial behavior, and even travel motivation (Ahn et al., 2015, 2016; Johnsen et al., 2014; Thirumaran et al., 2021; Zhou et al., 2024). However, research on applying virtual pets—and GaaS—to wildlife conservation remains scarce. This literature gap warrants investigation, positioning the present study to expand discourse on virtual pets and GaaS applications.

As a fragment of a broader practice-based research project culminating in a virtual pet game design, this article focuses solely on preliminary design requirements to ensure a GaaS-based virtual pet game can galvanize Generation Z's engagement in Bornean wildlife conservation. It prioritizes problem identification, user insight analysis, and conservation education integration with game mechanics, delaying prototyping. The outcome is a set of empirically and contextually grounded design requirements, reflecting contemporary design research's view of early-phase design as a valid scholarly contribution (Creswell & Creswell, 2018). This article is intended to serve as a foundation for subsequent prototyping and as a guide for academics and practitioners designing virtual pet games for other conservation regions or social issues.

METHOD

This study uses the Double Diamond Framework by Design Council (n.d.), focusing on the first two stages: Discover and Define. In the Discover phase, the authors explored player behaviors and emotional drivers through primary data from respondents. In the Define phase, the authors integrated these insights with conservation education elements to synthesize preliminary design requirements.

The primary data were collected through semi-structured interviews with ten respondents, examining motivations for in-app purchases (IAP), emotional attachment to games, and gaming history. The data were analyzed using thematic analysis (Braun & Clarke, 2006) to identify key themes such as strategic spending, fear of missing out (FOMO), and aesthetic satisfaction. Researchers triangulated the results with Gamer Motivation Survey profiles to enhance reliability and correlation between personal motivations and design elements.

The respondents were selected from early Generation Z (born 1996–2000) residing in Bandung, representing both genders. This selection was predicated on the predominance of female players aged 25 and above in virtual pet and similar game genres in Indonesia (data.ai, 2024). However, the inclusion of male participants was strategically designed to diversify the player demographics and anticipated social impact. The selection of Bandung as the study location was predicated on its representation of a 10% gamer population in Indonesia (Putra, 2022), thereby substantiating its status as an adequate research locus. The respondents were selected based on their interest in animals, gaming habits, and middle-to-upper socioeconomic status. To ensure a diverse array of user insights, respondents were broadly categorized into three groups: (1) virtual pet players with IAP, (2) virtual pet players without IAP, and (3) non-virtual pet players with IAP.

RESULT AND DISCUSSION

Tables 1 and 2 present the data on spending motivation and player profile. The heatmap in Table 2 uses percentiles to compare the respondent's performance with other participants in the Quantic Foundry database (n.d.). An 80% percentile means the respondent's score exceeds 80% of the participants, while a score of 50% represents average performance. This approach helps categorize respondents based on preferences and motivations.

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Table 1. Interview result matrix and player profile keywords

	Key Purchase Motivation	Indicative Codes	Code Themes	Expenditure (Rupiah)	Player Profile	Keywords Profile
R1 (F)	Gameplay acceleration, stress relief	Discount-based purchases, ad removal	[1] [2]	5.000–35.000 (irregular exp.)	Gladiator & Architect	Aggresive, Independent, Expresive
R2 (F)	Visual modification, social signaling	Outfit purchases, event-driven gacha	[3] [4]	200.000–300.000 (irregular exp.)	Gladiator & Ninja	Action, Proficient, Driven
R3 (F)	Exclusive item acquisition, FOMO, unique visual	Limited-edition items, urgency	[1] [3] [5]	5.000–50.000 (irregular exp.)	Gardener & Gladiator	Calm, Completion, Social
R4 (F)	Narrative expansion, peer influence	Expansion packs, comparison with friends' progress	[6] [7]	10.000–400.000 (irregular exp.)	Architect	Driven, Independent, Grounded
R5 (F)	Nostalgia only, no purchases	Non-engagement with monetization	[8]	None	Bard	Spontaneous, Relaxed, Creative
R6 (F)	Aesthetic gratification, social status	Esthetic furniture, status trading	[3] [4]	100.000–1.000.000 (irregular exp.)	Bard	Gregarious, Story-Based, Creative
R7 (F)	Character acquisition, situational spending	Battle pass, attractive characters	[1] [2]	60.000–300.000 (irregular exp.)	Gardener & Architect	Relaxed, Spontaneous, Immersed
R8 (M)	Game progress, gacha, peer competition	Performance boost, regular spending	[1] [7]	15.000–450.000 (per 2 months)	Gladiator	Proficient, Social, Practical
R9 (M)	Visual appeal, social pressure	Rare items, anti-beginner stigma	[3] [4] [5] [7]	12.000–200.000 (irregular exp.)	Gladiator & Skirmisher	Aggresive, Persistent, Social
R10 (M)	Narrative attachment, peer competition	Unlocking stories, winning competition	[2] [6] [7]	50.000–100.000 (irregular exp.)	Architect & Gladiator	Fast-Paced, Proficient, Competitive

Code Themes Category

[1] Strategic Spending
[2] Emotional Investment
[3] Aesthetic Gratification
[4] Social Signaling
[5] FOMO
[6] Narrative Attachment
[7] Peer Pressure
[8] Non-Spender

Table 2. Heatmap of respondents' motivation for gaming

Resp't	Action	Social	Mastery	Achievem.	Creativity	Immersion	Pctl. (%)
R1	48	30	42	84	42	66	100
R2	97	64	90	77	41	42	
R3	14	86	32	57	75	36	80
R4	19	5	32	78	53	21	
R5	34	51	27	27	66	43	60
R6	32	62	25	66	73	43	
R7	5	17	10	32	37	34	40
R8	57	90	90	94	31	35	
R9	57	77	60	80	39	21	20
R10	34	45	90	90	51	50	

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Note: A full explanation of the type of player profile and the aspects of playing motivation referred to in these tables is provided in the following references: Yee (2019) and Quantic Foundry (n.d.).

1. In-App Purchase Motivation Analysis

Based on the classification outlined in the methodology, respondents were grouped into three clusters reflecting distinct engagement patterns with virtual pet games and in-app purchase behaviors. This typology served as the foundation for analyzing diverse spending motivations within mobile gaming ecosystems. Using the Thematic Analysis Matrix (Braun & Clarke, 2006), the authors identified primary spending motivations among respondents, which were then linked to specific in-game features. The matrix presented in Table 1 captures key spending behaviors and motivations across player profiles:

1) **Expenditure Variability:** Purchases ranged from casual expenditures (Rp5.000–Rp35.000) to larger investments in premium content (Rp100.000–Rp1,000,000). To accommodate this, the virtual pet game should offer tiered pricing structures—from microtransactions to premium subscriptions—providing players with stratified options aligned with their preferences.
2) **Game Progression & Stress Reduction:** Players frequently spent on virtual currency (e.g., diamonds, coins, or subscription packages) to accelerate progress, such as bypassing wait times or enhancing gameplay advancement. This suggests the need for booster systems that reward players for purchasing virtual currency.
3) **Aesthetic Satisfaction & Social Status:** Four respondents (R2, R4, R6, R9) allocated funds to visual modifications (e.g., skins, outfits) and exclusive cosmetic items—a trend prominent in games like Roblox. This spending pattern can be leveraged by offering customizable items that still maintain authenticity with conservation themes, balancing aesthetic appeal with educational messaging.
4) ***Fear of Missing Out*** **(FOMO):** All respondents were motivated by time-limited exclusive rewards (e.g., seasonal items, gacha mechanics). Nine exhibited irregular spending patterns, triggered only by in-game promotions or events. This behavior presents an opportunity to integrate limited-time rewards tied to real-world conservation actions—for instance, week-long events featuring rare species campaigns, where players unlock exclusive items linked to conservation initiatives.
5) **Social Influence & Peer Pressure:** Four respondents (R4, R8, R9, R10) made purchases influenced by peers, aiming to elevate their social rank in competitive/cooperative modes. The game could incorporate social features like multiplayer conservation events, where collective efforts unlock themed rewards, alongside leaderboards highlighting contributions to real-world causes—channeling peer pressure into prosocial behavior.
6) **Narrative & Meaningful Goals:** Four respondents (R3, R4, R6, R10) reported deeper engagement with games featuring rich narratives and purpose-driven characters. This game could offer branching storylines aligned with player interests—for example, species-specific survival arcs where mission completion yields rewards, fostering emotional investment.
7) **Non-Spender Profile:** Respondent R5 preferred gameplay without IAP. While not directly revenue-generating, such players contribute to retention and can serve as conservation advocates, underscoring the balancing monetization importance with accessible engagement.

2. Players Profile Analysis

As outlined in the introduction, this game aims to engage a broad spectrum of players by leveraging insights from Quantic Foundry's three core player profiles—The Gardener, The Architect, and The Bard—each uniquely suited to the virtual pet genre:

1) The Gardener thrives in relaxed, achievement-focused gameplay;
2) The Architect excels in strategic and methodical interactions; and
3) The Bard flourishes in narrative-driven social experiences.

However, despite these profiles forming the foundational design framework, the Gladiator profile—characterized by competitive, skill-based gameplay—emerged as the most dominant among respondents. Four participants (R1, R2, R8, an R9) identified it as their primary profile, while two

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others (R3 and R10) ranked it secondary. This dominance offers critical insights for game design and monetization strategies.

While the core design will prioritize the three original profiles, to balancing competiting priorities, the Gladiator's influence will be incorporated through supplemental mechanics. For instance:

1) **Achievement & Mastery:** Gladiator respondents scored highest in Achievement and Mastery, suggesting the need for progression systems that reward skill (e.g., timed challenges or goals).
2) **Social-Competitive Hybrid:** To reconcile the Gladiator's peer-driven competitiveness (evident in games like Mobile Legends) with the virtual pet genre's nurturing ethos, the design will integrate collaborative competitions—such as team-based conservation milestones or creativity-driven leaderboards—aligning with the Bard's social and creative scores.

This synthesis aims to create an inclusive experience that respects the Gladiator's drive while preserving the genre's core themes of care and conservation.

3. Game-Based Strategies for Conservation Education

This study integrates evidence-based strategies for fostering human-wildlife empathy (Akerman, 2019), into game design through five core principles: (1) the *individualization of animals* ensures each species exhibits unique traits, cultivating personal attachment; (2) *perspective-taking* mechanics allow players to adopt an animal's viewpoint, deepening empathy through experiential engagement; (3) gameplay *models caring* behaviors by teaching conservation practices via virtual caretaking tasks, such as habitat restoration or feeding routines; (4) sensible *anthropomorphism* balances human-like characteristics with scientific accuracy to strengthen emotional connections; and (5) *transparency of intentions ensures* players explicitly understand the game's conservation goals, aligning their actions with real-world ecological impact.

This virtual pet game, centered on Borneo's endemic species, also employs a four-criteria framework to guide species selection: (1) prioritizing ecological representation (e.g. habitat types, dietary needs, and vertebrate classes); (2) assessing IUCN Red List status (focusing on *Vulnerable* to *Critically Endangered* species); (3) ensuring taxonomic diversity across both iconic and lesser-known taxa; (4) evaluating partnership potential with conservation NGOs. While research confirms the fundraising advantage of charismatic megafauna like orangutans and proboscis monkeys (Sunkar et al., 2021), the design intentionally incorporates lesser-known species such as the earless monitor lizard and sundanese clouded leopard. This approach not only balances player engagement but also underscores Borneo's full biodiversity spectrum, fostering awareness of overlooked species alongside conservation priorities.

The gameplay employs a progressive unlocking system where initial interactions focus on flagship species, with more obscure taxa becoming available as players complete conservation quests or trigger real-world donation milestones. This tiered approach creates a tangible link between virtual achievements and concrete conservation impacts, while addressing the "celebrity species" bias in environmental funding. For instance, players might first nurture a Bornean orangutan through habitat restoration tasks, later unlocking the Sunda clouded leopard by participating in time-limited events tied to actual wildlife protection campaigns. The design carefully balances entertainment value with ecological accuracy, using anthropomorphism strategically to enhance engagement without compromising scientific integrity. Through this framework, the game transforms traditional virtual pet mechanics into a platform for conservation education, leveraging gameplay progression to foster both emotional connections with wildlife and understanding of ecosystem interdependencies.

The model's educational efficacy stems from its dual focus on immediate gameplay rewards and sustain conservation outcomes, creating a feedback loop where in-game actions support real-world preservation efforts while maintaining player motivation through narrative-driven challenges and social collaboration features. This approach not only advances game-based environmental education methodologies but also offers conservation organizations a novel public engagement tool grounded in behavioral science and interactive media principles.

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4. Design Requirements Synthesis

Emerging from the analysis of player motivations and conservation design frameworks, this study formulates five foundational game pillars for a GaaS-based virtual pet game focused on Bornean wildlife conservation as follows.

1) **Empathy Through Personalization and Anthropomorphism:** The game cultivates emotional bonds by featuring virtual animals with distinct life histories, facial expressions, and behaviors. Each species incorporates backstories about real-world threats (e.g., orangutans facing habitat loss), gradually revealed through gameplay. Perspective-taking mechanics immerse players in survival mini-games simulating species-specific challenges, while measured anthropomorphism enhances connection through human-like responses to care (visual/auditory feedback). Iconic species serve as entry points, with lesser-known species (e.g., earless monitor lizards) unlockable at premium values – their higher acquisition cost reinforcing conservation worth through tiered narrative depth.
2) **Meaningful Progression Linked to Real-World Impact:** A reward system ties in-game achievements to tangible conservation outcomes. Players unlock new species or exclusive skins by completing NGO-backed campaigns (e.g., donating Rp50.000 grants access to an Irrawaddy dolphin). Community progress bars display collective contributions toward real-world targets (e.g., 1000 trees planted), with milestone badges and NGO impact reports validating achievements. This pillar operationalizes conservation psychology by making abstract threats actionable through tiered participation.
3) **Layered Monetization Leveraging FOMO & Aesthetics:** A multi-tiered monetization framework accommodates diverse spending preferences including
   - Microtransactions for cosmetic items (species-specific skins);
   - Limited-time events offering exclusive content tied to environmental dates;
   - Premium subscriptions providing recurring donations to partnered NGOs, such as automated donation rounding (e.g., upspending to nearest Rp10.000) embeds philanthropy into standard purchases without disrupting gameplay flow.
4) **Hybrid Social Mechanics & Collaborative Competition:** Social features merge cooperation and gentle rivalry through these strategies as follows
   - Guild-style challenges where teams pool resources to adopt real-world wildlife conservation projects;
   - Leaderboards ranking players by measurable impact (donations and educational shares on social media); and
   - Social media integration that transforms in-game achievements into shareable infographics tournaments frame fundraising as competitive quests (e.g., earning virtual points convertible to donations), balancing communal goals with Gladiator-type players' achievement drives.
5) **Adaptive Educational Storytelling:** Branching narratives cater to player psychographics. For instance, Gladiator-type players engage in rescue missions (e.g., intercepting poachers), while Gardener-type players restore degraded habitats through nurturing gameplay. Dynamic environmental storytelling reflects these choices visually, such as showing habitats degrading or recovering based on player actions, contextual pop-ups—like deforestation stats when virtual trees are cut—deliver punctual education without disrupting immersion, and optional deep-dive materials cater to intrinsically motivated players who seek expanded knowledge.

This game pillars offer a replicable framework for prosocial game initiatives, particularly in emerging markets where mobile gaming intersects with urgent biodiversity crises. By embedding conservation elements into core gameplay loops rather than ancillary features, the model transforms players from passive donors to invested stakeholders in Borneo's wildlife conservation.

CONCLUSIONS

This study synthesizes preliminary design requirements in the form of game pillars for a GaaS-based virtual pet game, aiming to bridge the gap between Generation Z's ecological values and tangible conservation actions. By integrating empathy-driven design principles and strategic behavioral incentives, the game seeks to foster emotional connections with endangered species while

motivating real-world wildlife conservation engagement.

Through the Double Diamond framework's Discover and Define phases, a combination of qualitative methods and thematic analysis revealed three key design strategies: anthropomorphism and perspective-taking simulations to strengthen player empathy, layered monetization systems connecting in-app purchases to conservation donations, and adaptive narratives that align gameplay objectives with environmental missions. These findings offer a framework for converting ecological awareness into action while establishing sustainable funding potential through NGO collaborations.

Future research should progress toward prototyping, user experience evaluation, and assessment of long-term behavioral impacts. Comparative studies examining player profiles across different conservation contexts would further refine player retention strategies. Practitioners in game design, game studies, and conservation fields are encouraged to strengthen multidisciplinary collaboration by designing campaigns linked to real-world events and ensuring donation impact transparency to maintain player trust.

The study ultimately affirms video games' potential as catalysts for socio-ecological transformation. As digital entertainment platforms, video games can transcend mere amusement to foster collective environmental consciousness through ethical design—converting virtual empathy into real-world conservation action. In addressing Borneo's intensifying biodiversity crisis, creating systems for sustainable impact has become not just an opportunity but an urgent necessity for game developers and conservationists alike.

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