Investigation of the influence of in-game banner advertising value on the purchase intention for in-game virtual goods in Thailand

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Abstract

A proliferation of online games has opened up new opportunities for digital advertisers, particularly through the rise of banner advertising. This study examines the impact of in-game advertising in online games on gamers' purchase intentions, using Ducoffe's advertising value model as a theoretical framework. A confirmatory factor analysis was conducted to validate four key advertising value dimensions: Entertainment, Irritation, Credibility and Informativeness. Structural equation modeling was used to analyze data from a survey of 400 online gamers in Thailand. The results show that informativeness, entertainment, and credibility contribute significantly to the perceived value of in-game ads. Furthermore, it was found that this perceived advertising value has a positive effect on gamers' intention to purchase virtual goods. These findings add to the body of knowledge in the advertising and gaming literature, and offer practical implications for digital marketers, game developers and online advertising platforms to improve the effectiveness of in-game ads in the gaming context.

Keywords: Advertising Value, Banner, In-Game Advertising, Online Game, Purchase Intention, Virtual Goods

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Introduction

In recent years, online gaming has become one of the most popular leisure activities worldwide, leading to unprecedented growth in the gaming industry (Ballabio et al., 2017, p.2). The number of players worldwide exceeds 3.3 billion in 2023, a 4.3% increase from the prior year, and these players contributed over $184 billion to the industry, cementing gaming as a dominant leisure activity (Newzoo, 2023). Thailand, in particular, has emerged as the second-fastest growing gaming market in Southeast Asia, with the online gaming sector projected to generate $69.64 million in revenue by 2024 and reach $81.57 million by 2027, an annual growth rate of 17.09% (Statista, 2024a). A significant portion of this revenue is attributed to the purchase of virtual goods within games (Huo, Abas & Waheed, 2024, p.254; Wu & Andrizal, 2021, p.2).

The immense market value and growth potential have prompted game developers to focus on innovation to maintain a competitive edge (Sharma, Tak & Kesharwani, 2020, p.348). In-game transactions for digital assets, such as avatars, skins, and equipment, mirror traditional e-commerce, where players use virtual currency to acquire these virtual goods, even though they have no physical use (Balakrishnan & Griffiths, 2018, p.240; Chernonog, 2020, pp.262; Syahrivar et al., 2022, p.118). However, these virtual goods provide functional, social, and self-expressive value to players (Chen & Chen, 2022, pp.1-6). For example, players buy clothes for their avatar to express their social identity or in- game items to improve their game performance (Syahrizal et al., 2020, pp.203). As such, the sale of virtual goods has become a fundamental business model, especially in free-to-play games (Hamari et al., 2017, p.543; Marder et al., 2019, p.79; Mehrtens et al., 2018, p.101).

Advertising banners are increasingly being used to promote the sale of virtual goods, with global banner ad revenue generated over $162 billion in 2023 and projected to reach $217 billion by 2028 (Statista, 2023). These online banners are diverse in size, shape, and style, and are strategically positioned across websites, platforms, and applications accessed via desktops and mobile devices. Ducoffe's Advertising Value Model and Expectancy Value theory suggest that consumers' perceived value of advertisements can significantly impact their behavioral intentions, including purchase decisions (Ducoffe, 1995, p.1-18; 1996, p.21-36). When audiences encounter some elements in in-game banner advertisements, they often unconsciously evaluate and summate overall impressions of these ads. In turn, this evaluation of perceived value can lead to various consumption behaviors, including purchase intention (Henning, Hennig-Thurau & Feiereisen, 2012, p.23). Therefore, the way audiences process and respond to advertisements can significantly impact their value within the ad environment.

Prior research has highlighted the dual impact of in-game advertisements (IGAs), where they can enhance advertising opportunities and provide valuable game-related information to consumers; however, they may also disrupt the gaming experience and engender negative attitudes (Abbasi et al., 2021, p.2; Hovhannisyan et al., 2021, p.31-32; Malhotra, Mishra & Saxena, 2021, pp.850-851). This underscores the delicate balance between advertising integration and

gamers' value perception, presenting an opportunity for further exploration within the scope of this research (Jain, 2024, p.42). While numerous studies have examined the effects of banner advertising on gamers' attitudes and purchase intentions, most have focused on embedded brand-specific content or real-world product placements through online banners, video ads, or pop-up notifications in game environments, such as the Gucci Garden within Roblox game (Gucci, 2024). Thus, there is a notable research gap in understanding how gamers perceive the value of in-game banner advertising (IGBA) specifically promoting in-game virtual goods (Abbasi et al., 2021, p.11; Chen & Chen, 2020, pp.10-11; De Pelsmacker, Dens & Verberckmoes, 2019, p.67; Hussain, Islam & Rehman, 2023, pp.10; Vashisht, Royne & Sreejesh, 2019, p.608).

A rapid growth of the Thai gaming industry and the prominence of virtual goods as a revenue stream provide a compelling empirical setting (Statista, 2024b). However, consumers in emerging economies may react differently to advertising models established in developed markets (Vashisht, Royne & Sreejesh, 2019, p.625). Therefore, this study seeks to expand the understanding of antecedents affecting perceived advertising value of IGBA within Thai gaming market and their influence on virtual goods purchase intentions. It also extends Ducoffe's advertising value model within the gaming context, offering empirical evidence to enhance theoretical understanding. The findings aim to guide game developers, sponsors, and advertisers in optimizing IGBA strategies to drive in-game transactions while maintaining player satisfaction in interactive gaming environments.

Research Objective

To investigate the relationship between in-game advertising values and purchase intent for in-game virtual goods.

Scope of the Research

A scope of this study encompasses gamers in Thailand aged 18 and above who have participated in online gaming and encountered in-game advertisements. According to the National Policy and Ethical Guidelines for Research Involving Humans by the National Research Council of Thailand (2024), individuals under 18 cannot provide informed consent for research participation. The data collection period spans approximately two months.

Conceptual Framework

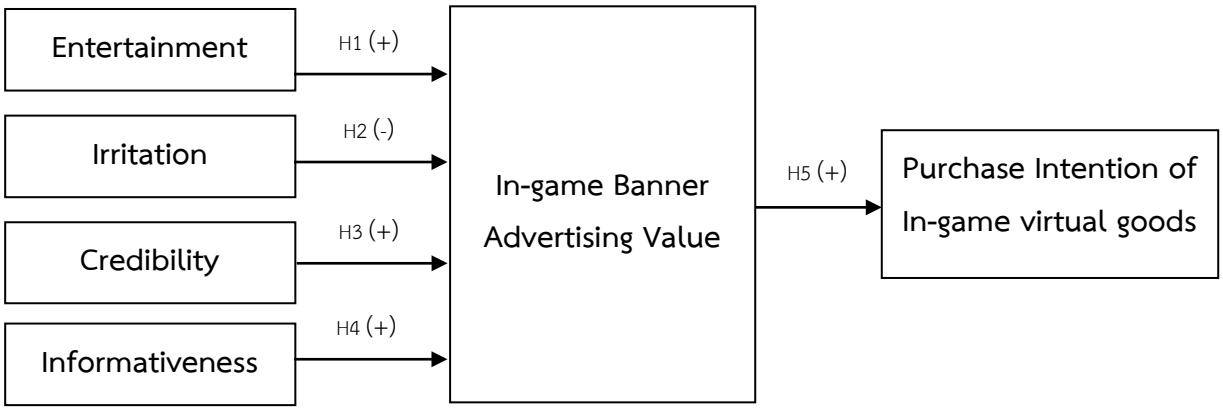

Figure 1. Research framework and proposed hypotheses.

Literature review

Ducoffe's advertising value model

In evaluating the value of certain advertisements, Ducoffe (1995, pp.1-18). originally proposed the Advertising Value Model to define the subjective relative utility of advertising to consumers in total, rooted in the Uses and Gratifications Theory (UGT) (Blumler & Katz, 1974, p.19). Advertising value is considered an insightful attribute of advertisements, assessing whether they meet customer expectations, (Ducoffe, 1996, p.21-36). The original model proposed three critical factors: informativeness, entertainment, and irritation that influence how audiences perceive the value of advertisement. However, subsequent critiques highlighted the omission of consumer trust, leading to an incorporation of the credibility factor (Haghirian, Madlberger & Tanuskova, 2005, p.5). According to Expectancy Value (EV) theory, individuals will unconsciously evaluate attributes of a certain object, whereby correlating with these attributes as they become conditioned to the object (Smith & Swinyard, 1982, p.83). Similarly, Ducoffe's Advertising Value Model suggests that individual audiences evaluate ads values differently based on their beliefs and perceived benefits.

Ducoffe's model has since been extensively utilized to assess advertising value across various contexts, including social media platforms such as Facebook (Hamouda, 2018, p.432; Yassin, 2021, p.404), YouTube (Acikgoz & Burnaz, 2021, p.206), Twitter (Murillo, Merino & Núñez, 2016, p.443), as well as in mobile advertising (Hashim, Normalini, & Sajali, 2018, p.1192). Recently, online gaming has become a popular media consumption choice for leisure and personal satisfaction (Dholakia, Bagozzi & Pearo, 2004, p.7). As such, the in-game advertising has a potential to stimulate gamer needs and enhance engagement (Abbasi et al., 2021, p.2). Given this context, this research adopts Ducoffe's model as its theoretical framework to examine how the entertainment, irritation, credibility, and informativeness in IGBA influence gamers' perceptions of ads value and their subsequent intentions to purchase in-game virtual goods.

In-game banner advertising (IGBA)

In-game advertising refers to an incorporation of advertisement or branded elements—such as brand names, logos, and characters—into digital games. A placement often manifests in the form of banners, billboard-like ads, or virtual product placements within a realistic gaming environment (Terlutter & Capella, 2013, p.95). The first known in-game advert was introduced in the 1978 computer game "Adventureland", which featured an in-game self-promotional advertisement for its next game "Pirate Adventure". In-game ads are incorporated into games either in an overt or a subtle manner. Ghirvu (2013, p.642). distinguished in-game advertising into two forms: static and dynamic. Static in-game advertising involves fixed, unalterable advert placements. In contrast, dynamic in-game advertising offers flexible slots accommodating customized content from various brands, allowing for adaptable strategies.

Early in-game advertising was used to enhance the realism of gaming experiences. Over time, it evolved to focus on paid placements for implementing persuasive marketing strategies. Contemporary marketing practices have recognized the potential of in-game advertising as a powerful tool to elevate perceived values of advertised content among gamers (Rauschnabel, Felix, & Hinsch, 2019, p.44). As a comprehensive promotional tool, in-game advertising can facilitate product tie-ins, promotions, direct marketing initiatives, and sponsorships. Previous research has indicated that effective in-game advertising can foster active brand engagement and familiarity (Martí-Parreño, Bermejo-Berros & Aldás-Manzano, 2017, p.60), strengthen consumer relationships, and influence purchasing decisions among gamers (De Pelsmacker, Dens & Verberckmoes, 2019, p.67).

In-game advertising frequently employs banners to benefit gamers by disseminating information about existing or new games, fostering an informed community. Furthermore, these in-game banner ads (IGBA) can redirect users to advertisers' websites, where they can access detailed content tailored to their interests (Abbasi et al., 2021, p.6). Gamers may perceive advertising value in IGBA when they feel it provides subjective and relative worth within the gaming experience. IGBA can offer audiences the latest or useful information, contributing to a positive perception of its value (Satria & Pandjaitan, 2020, p.58). Certain instances of IGBA may enable gamers to mentally associate themselves with a sense of credibility and confidence as pioneers or first movers in the advertised content (Shi et al., 2019, p.292). Positive emotional effects can arise through the perception of entertaining IGBA (Kaur et al., 2020, p. 101321). However, the integration of IGBA must be carefully balanced, as excessive advertising can cause audience irritation and detract from the overall user experience (Abbasi et al., 2021, p.11). Consequently, understanding gamers' perceived value of IGBA and its impact on in-game purchase intentions is crucial within the online gaming landscape (Rauschnabel, Felix & Hinsch, 2019, p.50).

In-game virtual goods

The online virtual world of gaming has established an artificial economy that facilitates the exchange of virtual good or item using the real-world currency. This system heavily relies on robust information technology infrastructure, such as high-speed internet services and effective wireless networks, to connect large user bases and ensure prompt communication. Digital commerce within these virtual economies is conducted through online intermediary platforms that facilitate transactions between sellers and buyers (Vyshnevskyi, 2019, p.9). A virtual economy in games significantly differs from the physical economy, particularly regarding product characteristics, as goods and services are entirely digital in nature. A unique attribute of virtual goods is its potential for infinite reproducibility, allowing producers to launch and distribute digital goods at minimal marginal cost (Hamari & Keronen, 2017, p.60).

The existence of virtual goods within digital gaming economies has given rise to a diverse array of in-game items, encompassing elements such as avatar characters, clothing, weapons, furnishings, and tokens (Hamari & Keronen, 2017, p.61). These in-game virtual goods can be categorized based on functionality, including functional, ornamental, and probability-based goods, wherein the perceived value of probability-based items may exceed or fall short of the purchase price (Lee et al., 2018, p.12426). This emerging phenomenon has presented new opportunities within online gaming communities for game publishers to attract and retain gamers, securing competitive advantages. To enhance the desirability of in-game virtual goods, publishers often create artificial scarcity by limiting their availability, thus enabling revenue generation under controlled conditions (Hamari & Lehdonvirta, 2010, p.22). Understanding the dynamics of virtual economies in online gaming is crucial for advertisers seeking to leverage these opportunities and capitalizing on the in-game advertising of gaming virtual goods. Such a comprehension can foster favorable value perception among gamers and generate viable revenue streams.

Hypotheses Development

Based on Ducoffe's advertising value model (1995, pp.1-18), this study will examine how entertainment, irritation, credibility, and informativeness shape audience perceptions of IGBA.

Entertainment. Advertising has the potential to evoke satisfaction, fun and pleasure, which makes it attractive to audiences (Martins et al., 2019, p.383). Online advertising has been shown to positively influence audience attitudes (Arora & Agarwal, 2019, p.65). Research shows that viewers attribute entertainment value to advertising as it can satisfy their need for escapism by appealing to their emotions. Thus, entertainment is perceived to enhance the value to digital advertising (Hamouda, 2018, p.436; Lee et al, 2018, p.12427). Similarly, online game is a form of digital media that provide entertainment, suggesting that IGBA could also provide hedonic value and pleasure (Abbasi et al., 2021, p.11). Based on these findings, we hypothesize:

H1: Entertainment positively influences the IGBA value of online games.

Irritation. Audiences' negative feelings and reactions to advertisements can stem from factors such as propaganda, insulting content, or unattractive ad characters (Aaker & Bruzzone, 1985, p.47). Irritation refers to audiences' feeling of annoyance, disruption, impatience, or frustration when encountering adverts (Tefertiller, 2020, p.2). However, when ads are informative and resourceful, audiences tend to perceive them as more valuable and less irritating (Aktan, Aydogan & Aysuna, 2016, p.94). In gaming contexts, IGBA can interrupt gameplay flow and divert players' attention, particularly through forced pop-up ads displays. Such interruptions may generate negative advertising value perceptions among players (Jeon et al., 2019, p.155). Therefore, we propose the following hypothesis:

H2: Irritation negatively influences the IGBA value of online games.

Credibility. Credibility refers to the perception of accuracy, precision, and reliability in advertising content (Xu, 2016, p.11). When audiences discern the content and information in ads as true and trustworthy, credibility is established (Martins et al., 2019, p.383). Credible adverts can enhance their effectiveness and reliability, assuring consumers that the advertised products will meet their needs. Existing research supports the notion that credibility significantly impacts advertising value (Arora & Agarwal, 2019, p.65). In the context of online games, credibility becomes especially crucial as gamers will encounter an abundance of ads messages across gaming platforms. Additionally, a study by Abbasi et al. (2021, p.11) confirms a positive impact of credibility on pop-up advertising value in gaming environments. Thus, we hypothesize:

H3: Credibility positively influences the IGBA value of online games.

Informativeness. Informativeness in advertising is defined by an effective conveyance of information to target audiences (Ducoffe, 1996, p.21-36) Consumers tend to respond more favorably to resourceful adverts, making the informativeness significantly influences advertising value (Arli, 2017, p.531; Lee & Hong, 2016, p.370). Previous research suggests that when audiences consider advertising as sources of knowledge providing useful information, it is more likely to engage them, fulfill their needs, and result in consumer satisfaction (Aziza & Astuti, 2018, p.96). Accordingly, if gamers perceive IGBA as informative, they are likely to develop positive advertising value, leading to favorable behaviors. Therefore, we hypothesize:

H4: Informativeness positively influences the IGBA value of online games.

Purchase Intention of In-game virtual goods. An intention to purchase virtual goods pertains to the extent to which gamers express their inclination to engage in exchanging real money for in-game virtual items (Salehudin & Alpert, 2022, p.1999). Players exhibit willingness, ability, and intention to purchase virtual goods when they perceive both functional and hedonic value (Limanto et al., 2018, p.51; Prakosa & Sumantika, 2022, p. 869-871; Purnami & Agus, 2020, p.228). This perception can also be used to predict their future repurchase behaviors (Kaur et al., 2020, p. 101321). The understanding of both functional and hedonic value in in-game virtual goods can be framed within the context of IGBA value. For instance, the informativeness of

advertisements can underscore the functional attributes of these in-game items, while the entertainment value of the ads can elicit hedonic feelings and aesthetic appreciation for in-game costumes, ultimately influencing gamers' intentions to purchase the advertised products. Prior research indicates that digital advertising value positively influences consumers' behavioral intentions (Herrando & Martín-De Hoyos, 2022, pp.2295; Lee, Lee & Yang, 2017, pp.1027; Martins et al., 2019, p.383). However, the relationship between IGBA value and the purchase intention of in-game virtual goods in online games remains under-examined. Considering the potential for an enhanced understanding of Ducoffe's advertising value model, we propose that.

H5: IGBA value positively influences the purchase intention of in-game virtual goods.

Methodology

Adopting a positivist perspective, this study observed and gathered data from the social reality that shapes certain behaviors. The deductive approach was applied to test the theory based on reviewed academic literatures. To examine the hypotheses, a quantitative research method was employed, enabling the expression of facts and the discovery of patterns.

Data Collection

The study population comprised gamers aged 18 and above, residing in Thailand, who regularly engage with online games and have encountered IGBA for virtual goods on gaming platforms. Ethical approval was obtained from the NRRU Research and Development Institute, ensuring participant anonymity and confidentiality. According to the Department of Provincial Administration (2023a), Thai population aged 18 and above is recorded at 53,043,979. Given the unknown prevalence of frequent gamers encountering IGBA in Thailand, the population is considered infinite. Sample size determination for Structural Equation Model analysis adhered to Marsh et al.'s (1998, pp.181-220) principle. This approach examines relationships between indicators per latent factor (p/f) in Confirmatory Factor Analysis (CFA) across varying sample sizes (N), ranging from 50 to 1,000. When p/f is 3-4 indicators per latent variable, a sample size exceeding 400 is necessary to avoid non-convergence and analytical errors. This study comprises 18 indicators and 6 latent factors, yielding a p/f ratio of 3.00. Therefore, a sample size of 400 was deemed appropriate to meet the established criteria.

A multi-stage random sampling approach was adopted. Initially, major cities in each Thai region were selected using purposive sampling, based on high internet penetration rates facilitating online game accessibility (Soodmee & Jaroenwiriyakul, 2021, p.1420). Thereafter, purposive sampling recruited participants who recently played online games and encountered IGBA. The proportions of the adult population in selected cities (Department of Provincial Administration, 2023b), along with the corresponding sample sizes, are presented in Table 1.

Table 1 Research sample size

Region	City	Population aged 18 and over (N)	Sample size (n)
Central	Bangkok	4,492,448	33
	Nonthaburi	1,071,720	8
Northern	Chiangmai	1,341,587	10
	Phitsanulok	689,485	5
Northeastern	Khonkaen	1,457,504	11
	Ubonratchathani	1,485,580	11
Southern	Phuket	318,487	2
	Suratthani	835,399	6
Eastern	Chonburi	1,257,122	9
	Rayong	599,340	4

The online questionnaires, hosted on Google Forms, were distributed to participants through communication platforms widely used by the Thailand's gaming community. These included Discord, a platform for gamers to connect, Steam, a prominent digital distribution service with gaming communities, relevant Facebook, as well as the live-streaming platform Twitch. This multi-channel approach facilitated access to the target sample of active gamers. Participants were screened to verify their engagement with online gaming and familiarity with IGBA for virtual goods prior to questionnaire completion. Of the 500 questionnaires distributed, 400 usable responses were retained after data cleaning, representing an 80% response rate.

Measurement

Factors in the research framework were measured using adapted scales from established theories and prior studies, as detailed in Table 2. A five-Likert scale was employed, ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). The questionnaire underwent expert review and a pilot test with 30 participants to ensure clarity and interpretability. Pre-testing revealed an overall Cronbach's alpha (α) of .83, indicating good reliability. Content validity was assessed using the Item Objective Congruence (IOC) index. Five marketing research experts rated items on a three-point scale: 1 (not congruent), 2 (partially congruent), and 3 (congruent). All items achieved an IOC score of 0.70 or above, supporting the instrument's content validity.

Table 2. Questionnaire items and sources

Constructs	Items	Source
Entertainment	ENT1 In-game banner advertising is interesting. ENT2 In-game banner advertising is entertaining. ENT3 In-game banner advertising is enjoyable.	Ducoffe (1996, pp.21-36)
Irritation	IRR1 In-game banner advertising is annoying. IRR2 In-game banner advertising is boring. IRR3 In-game banner advertising is intrusive.	Ducoffe (1996, pp.21-36)
Credibility	CRE1 In-game banner advertising is believable. CRE2 In-game banner advertising is convincing. CRE3 In-game banner advertising is credible.	Martins et al. (2019, p.385)
Informativeness	INF1 In-game banner advertising provides timely information on in-game virtual goods. INF2 In-game banner advertising supplies relevant information on in-game virtual goods. INF3 In-game banner advertising is a good source of up-to-date information on in-game virtual goods.	Abbasi et al. (2021, p.13)
In-game banner advertising value	BAV1 I feel that in-game banner advertising is useful. BAV2 I feel that in-game banner advertising is valuable. BAV3 I feel that in-game banner advertising is important.	Abbasi et al. (2021, p.13)
Purchase intention of in-game virtual goods	PI1 There is a high probability that I will purchase in-game virtual goods later on. PI2 My readiness to purchase the upcoming in-game virtual goods is high. PI3 The likelihood that I will purchase the upcoming in-game virtual goods is high.	Prakosa & Sumantika, (2022, p.873)

Data Analysis

The measurement model was analysed using Confirmatory Factor Analysis (CFA), while Structural Equation Modeling (SEM) tested hypotheses using LISREL (8.53). Descriptive statistics evaluated demographic data, followed by Inferential statistics to assess model fit. Convergent validity was examined utilizing Standardized Factor Loadings (SFL), Average Variance Extracted (AVE), and Composite Reliability (CR). Cronbach's alpha coefficient (α) established reliability, and discriminant validity was assessed. As well, Path Analysis (PA) was conducted to investigate the influence of causal variables on the effect variable. An array of indices used to examine the fitness of model are listed in Table 3.

Table 3. Model fit indices and their criterion

Fit index	Fit Criteria	Reference
Relative chi-square: χ^2 /df	< 2.00	Schumacker & Lomax (2010, p.85)
Goodness of Fit Index: GFI	>= 0.90	Kelloway (2015, p.69)
Adjusted Goodness of Fit Index: AGFI	>= 0.90	Kelloway (2015, p.69)
Comparative Fit Index: CFI	>= 0.95	Schumacker & Lomax (2010, p.88)
Standardized Root Mean Square Residual: SRMR	< 0.05	Schumacker & Lomax (2010, p.87)
Root Mean Square Error of Approximation: RMSEA	< 0.05	Kelloway (2015, p.69)

Results

Sample characteristics

The samples' demographic profiles revealed that participants comprised 246 females (61.5%) and 154 males (38.5%). The majority were aged between 18 and 25 (61%) and held a bachelor's degree (62.3%). Most participants were students (51.3%) with a monthly income of less than 10,000 Baht (52.5%).

Assessment of the measurement model

Results from Confirmatory Factor Analysis (CFA) (Table 4 and Figure 2) indicated that measurement model relationships aligned with theoretical expectations and collected data. The relative chi-square (χ^2/df) was 1.79, with satisfactory model fit indices: GFI = 0.94, AGFI = 0.92, CFI = 0.99, SRMR = 0.030, and RMSEA = 0.045. Convergent validity was assessed using three criteria (Hair et al., 2014, p.603). 1) Standardized Factor Loadings (SFL) > 0.50, 2) Average Variance Extracted (AVE) ≥ 0.50, and 3) Construct Reliability (CR) ≥ 0.70. All indicators and constructs met established criterion, confirming convergent validity. Moreover, Cronbach's alpha coefficients exceeded 0.7 for all constructs, establishing reliability (Cortina, 1993, pp.98-104).

Table 4 Descriptive statistics, Distribution, Convergent validity, and Reliability

Constructs	Items	Mean	SD	Distribution		SFL	CR	AVE	α
				Skewness	Kurtosis		Value		test
Entertainment	ENT1	3.41	0.984	- 0.255	- 0.165	.86**	.923	.799	.922
	ENT2	3.36	1.025	- 0.333	- 0.287	.91**			
	ENT3	3.27	1.037	- 0.185	- 0.344	.91**			
Irritation	IRR1	3.87	0.916	- 0.217	- 0.986	.78**	.843	.644	.838
	IRR2	3.81	0.928	- 0.181	- 0.883	.89**			
	IRR3	3.68	0.998	- 0.268	- 0.601	.73**			
Credibility	CRE1	3.15	0.956	0.093	- 0.089	.73**	.771	.531	.768
	CRE2	3.55	0.872	- 0.101	- 0.237	.66**			
	CRE3	3.48	0.928	- 0.097	- 0.367	.79**			

Table 4 (per)

Constructs	Items	Mean	SD	Distribution		SFL	CR	AVE	α
				Skewness	Kurtosis		Value		test
Informativeness	INF1	3.27	0.959	- 0.031	- 0.153	.88**	.871	.729	.887
	INF2	3.38	0.963	- 0.319	0.034	.84**			
	INF3	3.28	0.936	- 0.187	0.030	.84**			
In-game Banner	BAV1	3.25	0.999	- 0.143	- 0.331	.89**	.927	.810	.927
Advertising Value	BAV2	3.20	0.997	- 0.171	- 0.280	.90**			
	BAV3	3.20	1.049	- 0.187	- 0.372	.91**			
Purchase Intention of	PI1	3.39	0.962	- 0.294	- 0.055	.84**	.907	.770	.906
In-game Virtual Goods	PI2	3.24	1.026	- 0.218	- 0.337	.92**			
	PI3	3.35	0.985	- 0.185	- 0.234	.87**			

χ^2 =215.04, df=120, χ^2/df=1.79, GFI=0.94, AGFI=0.92, CFI=0.99, SRMR=0.030, RMSEA=0.045

Significance level: ** p < .01.

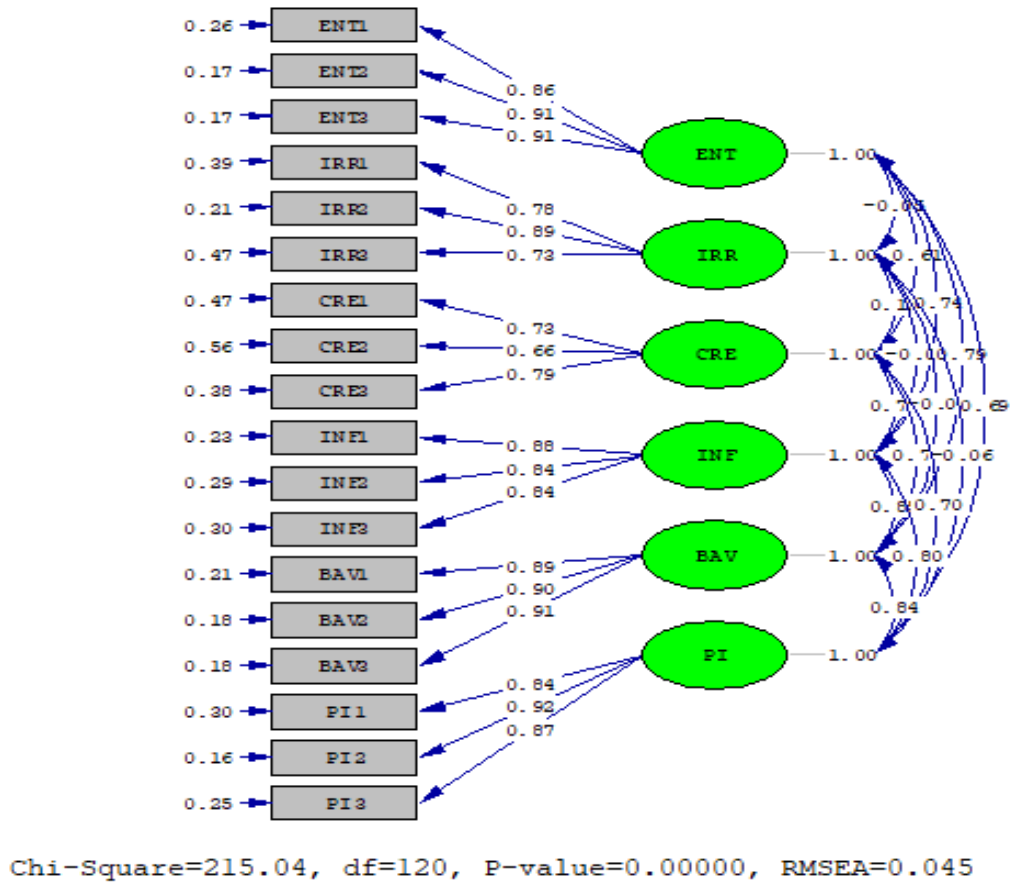

Figure 2. Confirmatory Factor Analysis (CFA).

Discriminant validity implies the differences in each research construct. To examine the discriminant validity, AVE should be more than the square of the correlation coefficient between all constructs (Hair et al., 2014, p.603). All constructs follow the criterion's standard. (Table 5)

Table 5 Discriminant validity

Squared correlations between the constructs						
	ENT	IRR	CRE	INF	BAV	PI
Entertainment	**.799**					
Irritation	.002	**.644**				
Credibility	.265	.013	**.531**			
Informativeness	.450	.001	.397	**.729**		
In-game Banner Advertising Value	.529	.003	.354	.602	**.810**	
Purchase Intention of In-game Virtual Goods	.403	.002	.353	.527	.593	**.770**

Note: AVEs in the main diagonal.

Structural model

After achieving a favorable measurement model result, structural model analysis was conducted to test hypotheses (Figure 3). Model fit was assessed using several indices: Normed Chi-square (χ^2/df) < 2.00 (Diamantopoulos & Siguaw, 2000, pp.82; Schumacker & Lomax, 2010, pp.85), Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) > 0.90 (Diamantopoulos & Siguaw, 2000, pp.82; Kelloway, 2015, pp.69), Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) < 0.05 (Diamantopoulos & Siguaw, 2000, pp.82), and Comparative Fit Index (CFI) > 0.95 (Tabachnick & Fidell, 2019, pp.721). Results indicated satisfactory model fit: χ^2/df = 1.93, GFI = 0.94, AGFI = 0.91, SRMR = 0.035, RMSEA = 0.048, and CFI = 0.99, demonstrating consistency between the model and empirical data evidence.

Hypothesized effects

Path analysis results (Table 6) demonstrate that In-game Banner Advertising Value (BAV) is significantly influenced by Informativeness (INF) (0.53, p < 0.01), Entertainment (ENT) (0.32, p < 0.01), and Credibility (CRE) (0.32, p < 0.05), respectively. However, the Irritation (IRR), does not significantly affect BAV. The causal variables (ENT, IRR, CRE, INF) explain 81% of the variance in the effect variable (BAV) (R^2 = 0.81). Moreover, the In-game Banner Advertising Value (BAV) has a significant positive effect on the Purchase Intention of in-game virtual goods (PI) (0.86, P < 0.01), with BAV explaining 74% of the variance in PI (R^2 = 0.74).

Table 6 Proposed effect results.

Effect variables	R^2	Effects	Causal variables				
			ENT	IRR	CRE	INF	BAV
BAV	0.81	DE	0.32**	-0.06	0.13*	0.53**	-
		IE	-	-	-	-	-
		TE	0.32**	-0.06	0.13*	0.53**	-
PI	0.74	DE	-	-	-	-	0.86**
		IE	0.27**	-0.05	0.11*	0.46**	-
		TE	0.27**	-0.05	0.11*	0.46**	0.86**
χ^2=239.38 df=124 χ^2/df=1.93 GFI=0.94 AGFI=0.91 CFI=0.99 SRMR=0.035 RMSEA=0.048							

Note: DE = Direct Effect, IE = Indirect Effect, TE = Total Effect. Significance levels: ** p < .01, * p < .05.

Consequently, the hypothesis testing of the proposed research framework, as shown in Figure 3, revealed that H1, H3, H4, and H5 are accepted, while H2 is rejected. The detailed testing results of Structural Equation Modeling Path analysis is illustrated in Table 7.

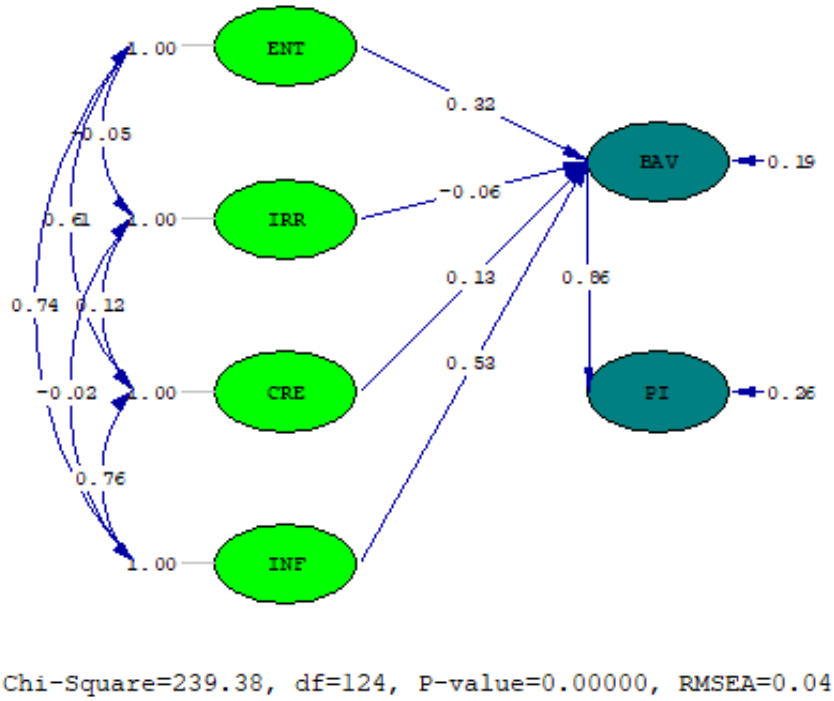

Figure 3. Research framework, proposed hypotheses, and direct relationship results.

Table 7 Testing results of Structural Equation Modeling Path.

Research hypotheses	Path relations	Effects	Path coefficient	Relationship direction	Hypothesis validity
H1	ENT → BAV	DE	0.32*	Positive (+)	Support
H2	IRR → BAV	DE	-0.06	Negative (-)	Not support
H3	CRE → BAV	DE	0.13*	Positive (+)	Support
H4	INF → BAV	DE	0.53**	Positive (+)	Support
H5	BAV → PI	DE	0.86**	Positive (+)	Support

Note: DE = Direct Effect. Significance levels: ** p < .01, * p < .05.

Conclusion

This study statistically confirms the influence of informativeness, entertainment and credibility on the value of IGBA and the purchase intention for in-game virtual goods and thus supports the advertising value model of Ducoffe (1995, pp.1-18). In particular, it was found that irritation has no significant influence on IGBA value, which is a deviation from previous studies. IGBAs that provide useful information and trustworthy contents can increase the

perceived advertising value. Furthermore, the entertainment factor plays a crucial role. If IGBAs are designed to be attractive and entertaining, the perceived advertising value is likely to increase, which in turn leads to increased purchase intent for in-game virtual goods. Overall, this study highlights the importance of strategic IGBA approaches to the gaming industry.

Discussion

This study provides theoretical contributions to the existing literature on advertising and consumer behavior, specifically within the growing online gaming industry. First, it extends the application of Ducoffe's advertising value model to the domain of IGBA. The findings confirmed the positive influences of advertising informativeness, entertainment, and credibility on gamers' perceived value of IGBA. However, the effect of ad irritation was found to be non-significant.

The study found that informativeness is the most influential factor contributing to IGBA value, aligning with previous research (Acikgoz & Burnazz, 2021, p.212). Highly engaged gamers are typically immersed not only in gameplay but also in game-related content that captures their interest. In competitive gaming environments, gamers often feel compelled to invest in functional virtual items to maintain their position, ranking, or reputation (Prakosa & Sumantika, 2022, p.871). These instrumental props, such as weapons and power-ups, motivate gamers to invest in performance-enhancing products that improve their avatars' attributes (Gawron & Strzelecki, 2021, p.1267). Consequently, gamers generally require detailed information about virtual goods before the purchase. Informative IGBA content assists gamers in understanding product benefits for their gameplay. Moreover, engaged gamers profiting from virtual item trading are drawn to informative IGBAs highlighting products with potential future value. This information enables them to make informed decisions regarding pricing and promotions for anticipated profitable resale opportunities (Salehudin & Alpert, 2022, p.2002). This underscores the significant contribution of informativeness to advertising value in the gaming context.

Ad-related entertainment is one important driver to the gamer-perceived IGBA value which is in line with other studies (Abbasi et al., 2021, p.11, Hussain et al., 2022, p.406, Martins et al., 2019, p.383). It can be discussed that gamers primarily play online games to fulfill hedonic needs, such as escapism, aesthetic enjoyment, and emotional release. In this context, IGBAs perceived as entertaining and visually appealing are likely to be regarded as valuable. IGBAs incorporating elements like appealing visual effects, artistic designs, animations, and appropriate audio cues may effectively capture and maintain the gamers' attention (Reza et al., 2022, p.1622).

Consistent with previous studies, the credibility of IGBA content is found to influence the perceived IGBA value (Martins et al., 2019, p.383). Attributes including trustworthiness, expertise, accuracy, and fairness contained in IGBA content help establish trust and elicit gamers' favorable responses (Tomlinson et al., 2020, p.545). Moreover, the credibility of IGBAs may also depend on factors related to the game platform, operator, and publisher (e.g., game

reputation, publisher image, platform stability) (Hussain et al., 2022, p.406; Mumuni et al., 2020, p.21). The prevalence of negative issues like item duplication, or "bugging," can lead to fluctuations in the monetary value of gamers' legitimate in-game virtual goods (Maj, 2022, p.61). Consequently, for gamers who purchase virtual goods for investment or future trade, credibility may be a paramount consideration in assessing the value of IGBAs.

Contrary to expectations, the irritation factor did not significantly negatively influence IGBA value. This finding, however, was not entirely unexpected, as some previous research has shown irritation had no significant negative relationships with ads value (Herrando & Martín-De Hoyos, 2022, p.2295; Voorveld et al., 2018, p.50). This divergence suggests that gamers may be less annoyed by IGBA if the ads are more informative, resourceful, and do not disrupt their gameplay experience, aligning with Aktan, Aydogan & Aysuna, (2016, p.94). Additionally, Abbasi et al. (2021, p.11). suggest that incentives in gaming ads can mitigate negative impacts and prevent them from being perceived as interruptions. This implies that providing gamers with promotional incentives or special freemium content associated with IGBA may make them more receptive to and appreciative of such advertising.

Furthermore, in line with prior study of De Pelsmacker, Dens & Verberckmoes (2019, pp.67). this study empirically confirms a positive relationship between IGBA value and purchase intention for in-game virtual goods. Currently, game developers, particularly in the free-to-play segment, increasingly view IGBAs as integral components of gaming graphic design to stimulate players' purchase intentions (Martí-Parreño, Bermejo-Berros & Aldás-Manzano, 2017, p.60). Advertising value functions as a subjective measure of utility for audiences, suggesting that perceived ad usefulness may elicit positive responses to advertised products. When audiencess derive positive utilities from advertisements, such as informative content or credibility, they tend to exhibit higher purchase intentions for the advertised items (Charoensereechai, 2022, p.9). Accordingly, IGBAs designed to enhance gaming experiences tend to foster positive attitudes toward the game, potentially increasing purchase intentions for in-game virtual goods. This approach strategically aligns advertising value with user experience and commercial objectives.

Recommendations

Managerial Implication

As new forms of economic value creation arise, it is imperative for consumer research to evolve frameworks to explain behaviors driving virtual marketplaces. This study contributes to the academic understanding of unique dynamics and implications of virtual consumption practices within the context of online game advertising. First, to engage gamers, developers and platform providers should design IGBAs with relevant, helpful information. AI-based personalization can tailor content to individual interests. Clear pricing and promotion details are crucial for eliciting responses. IGBA content should be concise and easily digestible,

allowing gamers to quickly glean key information. This approach maximizes the effectiveness of IGBA while respecting gamers' time and attention.

Second, game developers and publishers should prioritize the credibile content of IGBA. Enhancing source credibility through strategic placement and timing of advertisements is crucial for maximizing value perceptions while maintaining gamer immersion and avoiding oversaturation. Transparency is key to increasing credibility; advertisers should be forthright with their offerings and advertising messages. Terms, conditions, and warnings should be clearly communicated to the audiences. This can foster trust and ensures ethical advertising practices within the gaming environment.

Third, IGBA creative teams should develop entertaining, captivating executions that integrate messages with gratifying content, such as high-quality graphics, engaging visuals, compelling narratives, humor, animated characters, or interactive elements. Dynamic ads tailored to player behaviors and game progression are more attractive and memorable than static advertisements. These implications can maintain gamer attention, increase perceived advertising value, and lead to subsequent positive bavioural response.

Finally, these findings offer actionable implications for online game brand managers, advertisers, and developers to effectively leverage in-game banner advertisements (IGBAs) and drive in-game virtual goods purchases. As perceived IGBA value contributes to purchase intention, continuous innovation in creative strategies aligned with evolving value propositions will be crucial for sustaining advertising effectiveness within dynamic virtual ecosystems. As the gaming landscape rapidly evolves, emerging technologies such as eye-tracking, VR/AR, and the metaverse may optimize IGBA relevance and receptivity. Moreover, IGBAs with high perceived value can leverage quick-response campaigns and one-click purchasing to facilitate seamless in-game transactions. These technological enablers can provide gamers with more a convenient and compelling impetus to make actual purchases.

Limitations and future research

This study is under two constraints. First, the sample, primarily consisting of Generation Z gamers in Thailand, may not be fully representative, potentially affecting generalizability. Second, the study focuses on a limited set of variables influencing advertising value. Future research could explore additional factors such as customization, promotional incentives, and content design. Moreover, further research could explore potential moderating and mediating effects of perceived in-game advertising value on purchase intention, considering factors like attitudes, technology, and privacy concerns. Investigating the collaborations between tangible product brands and in-game virtual goods offers another promising avenue. Furthernore, future studies might employ diverse research methodologies, including experiments, observation, in-depth interviews, web analytics, and eye-tracking method, to validate and extend the findings.

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