

Gamer engagement, game-product congruence and online gamers' purchase intention: A study of interactivity

Pruthvi Brahmabhatt, Dr. Jayesh Patel & Dr. Subrat Sahu
Ganpat University, Mehsana, GJ, India

Abstract

Through the concept of online games, gamification on mobile platforms has the potential to produce customer engagement that has never been seen before. As the number of mobile devices and internet users' increases, the gamification industry has emerged as a viable means of reaching and influencing younger consumers who are heavy gamers and spend significant time on their phones. This study concentrated on unconventional marketing (in-game advertising) to determine their purchase intentions. Specifically, this study aims to explore the role of in-game interactivity on purchase intention with mediator like gamer engagement and moderator like game-product congruence.

Date of Submission: 25-05-2025

Date of acceptance: 06-06-2025

I. Introduction

It is quite challenging for marketers to attract consumers for brand message and maintain their engagement for extended periods of time due to competition and advertising clutter. Particularly, consumers are overly exposed to traditional media methods, such as communication channels including: TV, print, and radio (Dix & Phau, 2017). These behaviours have pushed marketers to come up with new ways to convince consumers. For instance, gamification of advertising enables marketers to use entertainment media, such as digital games, to promote brands as brief message which provides important details to customer is essential to a successful brand communication (Peters & Leshner, 2013).

By 2024, it is anticipated that the worldwide gaming sector would bring in around 455 billion US dollars, of which 98.7 billion will come from mobile gaming (Statista, 2024). Growing trends of gaming industry encourages companies to invest more into alternative marketing methods. By 2025, in-game advertising is predicted to generate \$124.40 billion in revenue worldwide (Statista, 2025). Such trend also helps marketers to believe that gamification can potentially increase customers' engagement and awareness for the brand (Xi & Hamari, 2019).

To learn more about how IGA's environment and workings impact on consumers' reactions to brands, more research is required (Vashisht & Chauhan, 2017). Interactivity has supplanted traditional advertising in modern unconventional media (Hu and Wise, 2021). Vashisht (2017) suggests that integrating brands into games may increase the effectiveness of advertising and attract customers by including brand messaging (Yoo & Eastin 2016). According (Vashisht, 2021), because advergames allow customers to interact with integrated brands, they are more successful than traditional media channels. Also, there is a positive correlation between purchase intention and engagement (Jiménez-Castillo & Sánchez-Fernández, 2019).

II. Literature review and Hypotheses

2.1 Theory of vividness effects

According to the theory of vividness effects, information that is specific, emotionally impactful, vivid and interactive has a greater chance of influencing attitudes and intention than information that is neutral or abstract. Vibrant details draw our attention, improve memory recall, and elicit more intense emotional reactions. According to Collins et al. (1988) the message is vivid if it draws our attention, provokes some amount of thought, incredibly inspiring, genuine or third-dimensional. Information must appeal to all senses and be sensory-rich in order to qualify as dynamic in-game advertising.

Internet ad formats come in two varieties: dynamic and static. Static advertisements consist of text, images, and graphic elements, whereas dynamic advertisements include sounds and videos (Abitbol & Lee, 2017). Namin, Hamilton & Rohm (2020) stated that video advertisings are more vibrant than image ads and the ads with more vividness have a higher click-through rate. In addition, the interactivity generated by video ads provides useful value to young users (Kim, Chung & Fiore, 2023).

2.2 In-game interactivity and Purchase intention

Interactivity refers to a user's real-time influence over the content of a mediated environment. In simpler words, the capacity of user to communicate with machine (Steuer, 1992). Players are able to modify, control, and influence the course of events in digital games because to interactivity (Herrewijn & Poels 2014). Driving a sponsored car in a racing game, customizing and wearing branded sportswear in a soccer game or the ability to change the course of game based on user choice are the examples of interactive in-game ads (Herrewijn, 2015). Conversely, passive billboards and posters that the player is unable to interact with are known as non-interactive in-game advertisements (e.g., billboards or posters around a soccer stadium or racetrack). By utilizing their gaming avatars to experience, control, and/or interact with a brand or product in a realistic and immersive setting, interactive IGA enables players to take an active role in advertising which helps them to build a positive purchase intention towards the displayed brand (Nelson et al., 2004).

The impact of IGA interaction on customer purchase intention is still a neglected topic, despite research showing that it is positively effects brand attitudes and brand recall. Thus, Vashisht and Chauhan (2017) suggested, to fully understand how IGA interaction influences customers' behavior, particularly their propensity to purchase, more research is required. Since IGA interactivity affects players' intents and makes them targets for marketers, purchase intentions are seen to be one of the indicators of IGA interactivity (Lee and Hong, 2016). It also indicates that in-game interactivity significantly increases the engagement of players for game as it makes game more enjoyable. Because of the interactive nature of the ads, players emotional reactions are getting triggered such as satisfaction and joy (Vashisht et al., 2020), then eventually it influences their attitude favorably towards the brand and players would like to make a purchase. Thus, it was hypothesized that:

H₁: In-game interactivity results favorable purchase intentions with presence of high interactivity than otherwise.

2.3 Mediating role of gamer engagement

When players feel high interactivity in a game, they are inclined to spend more time, have great experiences, and want to share same with other people. Customers are more likely to spread the word if they had a positive experience. (Fetscherin et al., 2019), including by suggesting game and displayed products to others. Players feel more motivated and engaged in the game as a result of strong interactive brand elements, such as getting more leads and getting frequent feedback in the game, which greatly increases player engagement. As a result, having a highly interactive in-game advertising can creates both, enduring representations of the brand that is ingrained in the game and extremely favourable emotional responses. Positive attitude from a good experience will then lead to intent of purchase of advertised brand. (Jiang et al., 2010).

In the gaming environment, engagement has been assessed by players' enthusiasm and commitment to the game (Schaufeli et al., 2002). Therefore, playing online games encourages positive gaming behaviors like purchase intent (Malthouse et al., 2016). The level of involvement and enjoyment that the player (consumer) feels while playing, it influences their purchase intentions even more (Lee et al., 2017). In other words, a player who is more connected or engaged and has an ideal experience will eventually show an increased propensity to purchase the advertised brand (Martins et al., 2019) Thus, it was hypothesized that:

H₂: The mediation of gamer engagement results favorably between in-game interactivity and purchase intentions with presence of high interactivity than otherwise.

2.4 Moderating role of game-product congruence (GPC)

The product category and the game subject may be incongruent (opposite) or similar (congruent). Game-product congruence is the degree to which the product category of the embedded brand is similar to or associated with the game theme (Lee and Faber, 2007). A game-product congruence is another department that increases purchase intention (Hofman-Kohlmeyer, 2018). The product placed in game has to be in sync with the theme of the game to provide seamless experience for the players. As player who is more engaged in a game will have more favourable attitude for the brand compared to less engaged. Thus, it is important for advertisers to place such in-game advertisements in game that helps players to maintain their engagement for effective brand communication that leads to purchase intention (Wise et al., 2008).

Modern researchers (Hussain, Islam & Rehman, 2022) have established the fact that high game-product congruence have significant edge over the products which has less relevance to the game theme. Thus, this research will only focus on the moderating impact of GPC between in-game interactivity and gamer engagement by having only one brand for the experiment (see pre-test). Lee et al., (2017) suggested that the design components of advergames, such as interactivity of the advertising and GPC, may have an impact on the level of engagement and enjoyment that players (customers) have while playing, which in turn to influence their intent to make a purchase. Thus, it was hypothesized that:

H₃: The moderation of game-product congruence results favorably between in-game interactivity and purchase intention.

III. Research Methodology

Experimental research design was used to investigate the relation between the variables, the hypotheses were tested using two experiments. In the first experiment participants (n= 103) were asked to respond on low interactivity stimuli (see Figure 2). In the second experiment participants (n=134) were asked to respond on high interactivity stimuli. Active gamers were selected as target population for this study. There are two main parts to the survey questionnaire. The first section answered broad questions concerning demographics and mobile gaming. The questionnaire's other component asks about In-game interactivity, Gamer engagement, Game-product congruence and Purchase intention. The scale was developed by the study using previously validated assessments from the literature. A Seven-point Likert scale, with 1 denoting "strongly disagree" and 7 denoting "strongly agree," was used to rate each question. The study had 237 participants in total. Males with 75.1 percent of all responses, while females with 24.9%. The majority of the sample audience, 45.1% of the total sample size, was between the ages of 16 and 30. All respondents were informed and given the assurance of complete confidentiality and anonymity; there were neither right nor wrong answers.

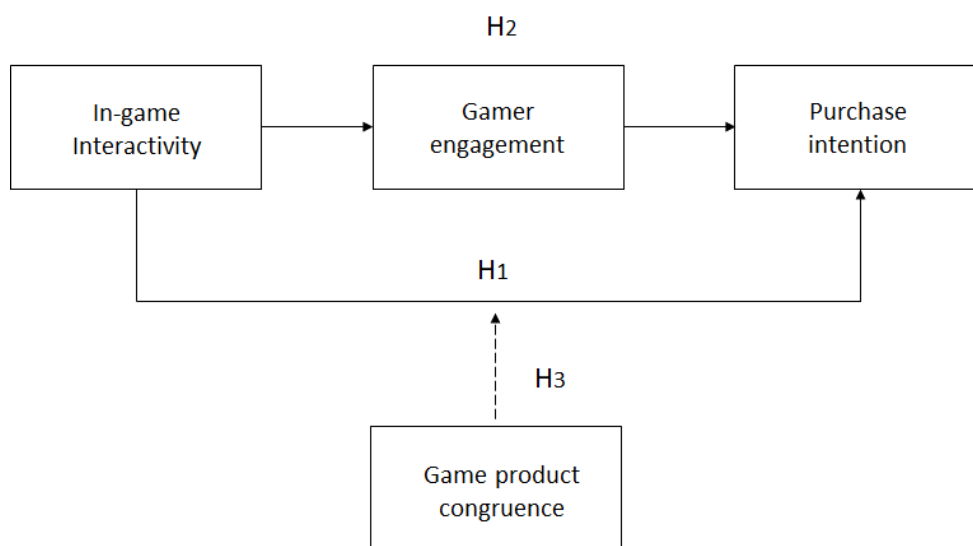


Figure 1. Research Model to investigate the relationship between In-game interactivity (independent variable), Purchase intonation (dependent variables) with mediation of Gamer engagement and moderation of Game-product congruence (designed by authors).

3.1 Brand selection

Battlegrounds Mobile India (BGMI) earlier known as PlayerUnknown's Battlegrounds (PUBG), a winner-take-all team game based on the Japanese movie Battle Royale, is now the most played game. In BGMI, teams of 100 players are formed on a virtual island. Only one squad survives after four teams battle to the death. The game, which was released in December 2017, works with both smartphones and game consoles. BGMI has become a popular research and analytical topic as well as a game for both players and viewers since developers often offers new updates and innovations to keep gamers on their toes (Chakarverti, Sharma & Divivedi, 2019).

In December 2024, 8.14 million people downloaded the BGMI Mobile app worldwide per month. With over 57 million US dollars in global mobile player spending in the recent month, BGMI Mobile is among the highest-grossing mobile game worldwide (Statista, 2025). The graphics, players' engagement and money are associated with the game makes it ideal choice for the study.

3.2 Pretest

Pretest method was adopted from Ghosh (2016). All the participants were informed that BGMI was selected as game for the study and they were requested to provide response by keeping this in mind. Two pretests were conducted to develop the stimuli for the experiment. The purpose of the first pretest is to select product for the game. This pretest was conducted in two stages. In a first stage we interviewed university students (n=26) and asked them to provide frequently used product categories, soft drink was selected based on majority of votes. On the second stage, we asked students (n=32) to provide brand to be featured in the advertising, "Coca Cola" was selected based on highest response. The image of "Coca Cola" and their target audience is very similar to the game as both are targeting teenagers and mid-aged adults. Thus, authors also find brand a good fit for the study to get featured in advertising.

3.3 Stimulus Development

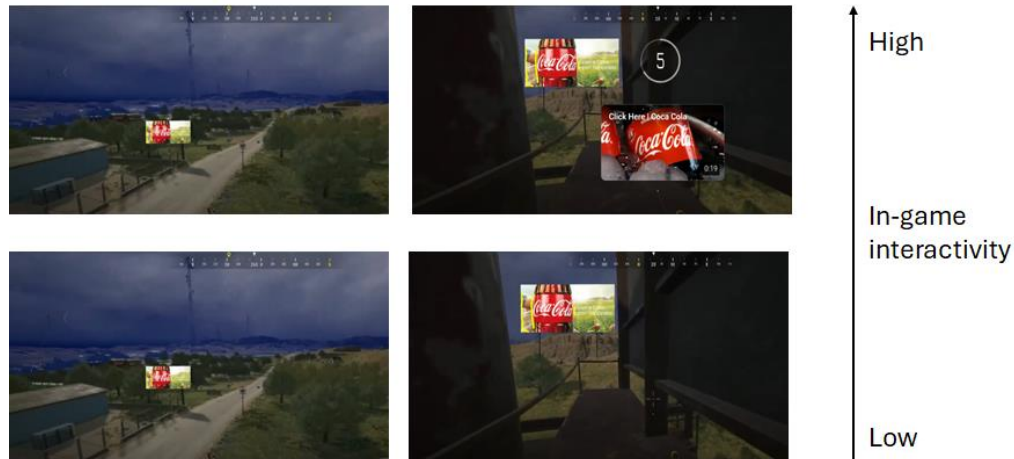


Figure 2. Stimuli-Edited gameplay

YouTube was selected to present the gameplay to respondents. YouTube interactivity feature was used to create high/low interactivity gameplay, on high interactivity gameplay video viewers has an option to click on brand advertising (within 5 second window) to interact with the ad. In 2024, over 2.5 billion people reported frequent YouTube users globally. With over 476 million members, India had by far the most YouTube audience in January 2024. The platform is perfect for the study because of its interactive features and widespread use.

IV. Analysis and Results

4.1 Manipulation check

Using the respondents' answers to the questionnaire, we verified the manipulation of the independent variable. Significant differences in the means for the various treatment levels were found using simple t-tests on the independent variable's levels. As a result, the manipulation check was successful.

Table 1: Manipulation check

Independent variable	Levels	N	Mean	Std. dev.	p value
Interactivity	High	134	6.75	0.49	0.00
	Low	103	2.14	0.69	0.00

Table 3: Hypotheses results of structural model

Path	High In-game interactivity			Low In-game interactivity		
	Beta	t	p-value	Beta	t	p-value
In-game interactivity → Gamer engagement	0.32	4.44	***	0.29	3.11	0.001*
Gamer engagement → Purchase intention	0.52	6.10	***	0.31	4.56	0.001*
In-game interactivity → Purchase intention (Introducing: Gamer engagement)	0.45	6.16	***	0.41	7.04	***

Note: * $p < 0.05$; *** < 0.001

To test H1 and H2, as shown in table 3, where β value of In-game interactivity to Gamer engagement is 0.32 and 0.29 for high and low interactivity respectively with significant p-value. Gamer engagement to Purchase intention β value is 0.52 and 0.31 respectively for high and low interactivity. Lastly, In-game interactivity to Purchase intention has ($\beta = 0.45$) and ($\beta = 0.41$) for high and low interactivity respectively introducing Gamer engagement. Whereas p-value for both shows significant results. Thus, it can be concluded that In-game interactivity results favourable purchase intentions with presence of high interactivity than otherwise. It also concludes that mediation

of gamer engagement results favorably between in-game interactivity and purchase intentions with presence of high interactivity than otherwise. As both paths are statistically significant, it will be considered as partial mediation.

Table 4: Results of moderating effect of game-product congruence

Interaction	coeff	SE	t	p-value	LLCL	ULCL
In-game interactivity → Purchase intention	0.2347	0.0733	3.202	0.001*	0.0903	0.3790

Note: *p<0.05

To test H3, results (Table 4) support the moderating role of game-product congruence on the relationship between in-game interactivity and purchase intention (coeff = 0.2347; p = 0.001; 95% CI [0.0903; 0.3790]).

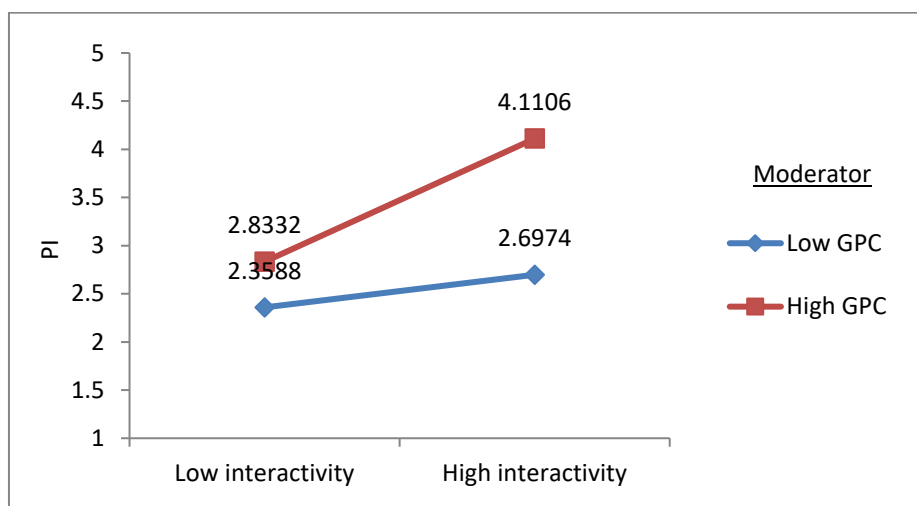


Figure 3. Moderating effect of game-product congruence

As results (Figure 3) shows game-product congruence strengthens the relationship of in-game interactivity and purchase intention. The value of coeff (0.2347) indicates positive moderation. In other words, the higher game-product congruence the better in-game interactivity impact on purchase intention.

V. Discussion and implications

5.1 Theoretical implications

Using vividness effects theory, this experimental study examines how interactivity affects gamer engagement and purchase intention in an emerging market, like India. There hasn't been much study on how important interactivity is for marketers when positioning their brand as in-game advertising in high and low situations, despite the growing popularity of interactive media like the internet and branded entertainment. The purpose of this study was to thoroughly examine these areas.

In contrast to a low-interactivity scenario, the results showed that greater interaction led to higher levels of player engagement and purchase intention. The study also looks into the effects of in-game advertising in an industry that is still emerging. Since the combined GDP of emerging markets and developing nations was around 42.52 trillion US dollars in 2022 (Statista, 2025), this area cannot be unstudied when examining the effects of advertising. Therefore, by examining the effects of in-game advertising in a developing country like India, this study aims to close the aforementioned research gap. Additionally, by using an "experimental methodology" to examine the causal relationship between interactivity, gamer engagement, and purchase intention, the study contributes to the body of research on advertising.

5.2 Managerial implications

The conclusions of study have captivating results for the practice of in-game advertising, showing that while choosing which game or game category to advertise the brand, in-activity and game-product congruence are important factors to take into consideration. This study also offers detailed insights for marketers and game developer to make/choose game in such a manner that syncs well with advertised brand. Based on advertiser's goals, they may create or select games that best fit their promoted brands to optimize the effect of advertisement. The results suggest that high interactivity results into grater gamer engagement and purchase

intention. In addition to that, study also suggests that game-product congruence positively moderates the relations between in-game interactivity and purchase intention. That means marketers must make sure that advertising is in highly interactive environment and the promoted brand is must be suitable with the theme of game. When gamers find more interactive advertising and game itself, it results in favourable purchase intention especially when advertised product is related to game.

The study has implications not only for marketers/game developers but also for organizations that regulate advertising and policy makers. For instance, by increasing interaction and congruence elements in the games, educational games or any specific theme-game that conveys a social message can be created by influencing their engagement and attitudes. Advertisers sometimes utilize damaging and non-social elements that are inappropriate for consumers in their rush to sell products, which is not right especially for young customers. Therefore, this seems to be a better alternative to catch young customers attention.

VI. Limitations and future research

Even though this study provides meaningful insights on in-game advertising and the impact of in-game interactivity in different conditions, there are some limitations that needs to be taken under consideration. First, we have only tested only two laves of interactivity (high and low) however, in future study moderating level also can be studied. Secondly, future research can be conducted by adding more game related variables such as game type, gamers' brand recall and gamers' attitude towards ad/game. Thirdly, this study used real brand to conduct the experiment however, in future study fictitious brand also can be used. Lastly, cross-cultural study can be conducted, this study targets all active gamers without breaking them into any age group but for future the effect of in-game advertising can be tested on young, mid-age and old-age gamers.

APPENDIX A

Variables	Measurement items	Original scales	Alpha α
In-game Interactivity	I think I had interacted with the brand information in this Battlegrounds Mobile India (BGMI) in-game advertising.	Vashisht & Chauhan (2017)	0.959
	I think I had interactive exposure to the brand information in this in-game advertising.		
	I think I had interactive experience with the brand information in this in-game advertising.		
Gamer Engagement	I intend to play BGMI again.	Yang, Asaad, & Dwivedi (2017)	0.959
	I intend to play BGMI frequently in the future.		
	I intend to continue playing BGMI because it is fun.		
Game-product congruence	The images I associate with the brand (Coca Cola) are related to the visuals I associate with advergaming context (PUBG/BGMI mobile).	Lee & Faber (2007)	0.936
	Shown product category (Coca Cola) is an object that is relevant to the game (PUBG mobile) context.		
	Brand (Coca Cola) represents a lifestyle associated with the advergaming context (PUBG/BGMI mobile).		
	The advertised brand (Coca Cola) is a good fit for the advergaming context (PUBG/BGMI mobile)		
Purchase intention	In the future, I am very likely to purchase Coca Cola.	Souiden, Pons, & Mayrand (2011)	0.975
	Coca Cola appeal to me.		
	I would be very satisfied to have Coca Cola.		
	I am very impressed by Coca Cola.		
	I recommend Coca Cola to others.		
	I think my surrounding people love Coca Cola.		

Reference:

- [1]. Abitbol, A., & Lee, S. Y. (2017). Messages on CSR-dedicated Facebook pages: What works and what doesn't. *Public relations review*, 43(4), 796-808.
- [2]. Chakarverti, M., Sharma, N., & Divivedi, R. R. (2019, March). Prediction analysis techniques of data mining: a review. In *Proceedings of 2nd International Conference on Advanced Computing and Software Engineering (ICACSE)*.
- [3]. Collins, R. L., Taylor, S. E., Wood, J. V., & Thompson, S. C. (1988). The vividness effect: Elusive or illusory?. *Journal of Experimental Social Psychology*, 24(1), 1-18.
- [4]. Dix, S. R., & Phau, I. (2017). Predictors of commercial zapping during live prime-time television: An observation-based study identifies factors that drive TV channel switching. *Journal of Advertising Research*, 57(1), 15-27.

- [5]. Fetscherin, M., Guzman, F., Veloutsou, C., & Cayolla, R. R. (2019). Latest research on brand relationships: introduction to the special issue. *Journal of Product & Brand Management*, 28(2), 133-139.
- [6]. Ghosh, T. (2016). Winning versus not losing: Exploring the effects of in-game advertising outcome on its effectiveness. *Journal of Interactive Marketing*, 36(1), 134-147.
- [7]. Herrewijn, L. (2015). *The effectiveness of in-game advertising: The role of ad format, game context and player involvement* (Doctoral dissertation, Universiteit Antwerpen (Belgium)).
- [8]. Herrewijn, L., & Poels, K. (2014). Rated A for Advertising: A Critical Reflection on In-Game Advertising. *Handbook of digital games*, 305-335.
- [9]. Hofman-Kohlmeyer, M. H. K. (2018, September). Determinants Of Effective Product Placement In Computer Games—Literature Review. In *CBU International Conference Proceedings* (Vol. 6, pp. 181-186).
- [10]. Hu, X., & Wise, K. (2021). How playable ads influence consumer attitude: exploring the mediation effects of perceived control and freedom threat. *Journal of Research in Interactive Marketing*, 15(2), 295-315.
- [11]. Hussain, M., Islam, T., & Rehman, S. U. (2022). What you see is what you get: assessing in-game advertising effectiveness. *Journal of Research in Interactive Marketing*, 17(4), 527-543.
- [12]. Jiang, Z., Chan, J., Tan, B. C., & Chua, W. S. (2010). Effects of interactivity on website involvement and purchase intention. *Journal of the Association of Information Systems*.
- [13]. Jiménez-Castillo, D., & Sánchez-Fernández, R. (2019). The role of digital influencers in brand recommendation: Examining their impact on engagement, expected value and purchase intention. *International journal of information management*, 49, 366-376.
- [14]. Kim, K., Chung, T. L. D., & Fiore, A. M. (2023). The role of interactivity from Instagram advertisements in shaping young female fashion consumers' perceived value and behavioral intentions. *Journal of Retailing and Consumer Services*, 70, 103159.
- [15]. Lee, H. C., Huang, C. L., Ho, S. H., & Sung, W. H. (2017). The effect of a virtual reality game intervention on balance for patients with stroke: a randomized controlled trial. *Games for health journal*, 6(5), 303-311.
- [16]. Lee, J., & Hong, I. B. (2016). Predicting positive user responses to social media advertising: The roles of emotional appeal, informativeness, and creativity. *International Journal of Information Management*, 36(3), 360-373.
- [17]. Lee, M., & Faber, R. J. (2007). Effects of product placement in on-line games on brand memory: A perspective of the limited-capacity model of attention. *Journal of advertising*, 36(4), 75-90.
- [18]. Lee, W. I., Cheng, S. Y., & Shih, Y. T. (2017). Effects among product attributes, involvement, word-of-mouth, and purchase intention in online shopping. *Asia Pacific Management Review*, 22(4), 223-229.
- [19]. Malthouse, E. C., Calder, B. J., Kim, S. J., & Vandenbosch, M. (2016). Evidence that user-generated content that produces engagement increases purchase behaviours. *Journal of Marketing Management*, 32(5-6), 427-444.
- [20]. Martins, J., Costa, C., Oliveira, T., Gonçalves, R., & Branco, F. (2019). How smartphone advertising influences consumers' purchase intention. *Journal of Business Research*, 94, 378-387.
- [21]. Namin, A., Hamilton, M. L., & Rohm, A. J. (2020). Impact of message design on banner advertising involvement and effectiveness: An empirical investigation. *Journal of Marketing Communications*, 26(2), 115-129.
- [22]. Nelson, M. R., Keum, H., & Yaros, R. A. (2004). Advertainment or adcreep game players' attitudes toward advertising and product placements in computer games. *Journal of interactive advertising*, 5(1), 3-21.
- [23]. Peters, S., & Leshner, G. (2013). Get in the game: The effects of game-product congruity and product placement proximity on game players' processing of brands embedded in advergames. *Journal of Advertising*, 42(2-3), 113-130.
- [24]. Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness studies*, 3, 71-92.
- [25]. Statista (2024). Video game industry - Statistics & Facts:
- [26]. <https://www.statista.com/topics/868/video-games/#topicOverview>
- [27]. Statista (2025). Emerging market and developing economies: Gross domestic product (GDP) in current prices from 2019 to 2029:
- [28]. <https://www.statista.com/statistics/805546/gross-domestic-product-gdp-in-the-emerging-market-and-developing-economies/#:~:text=GDP%20is%20an%20important%20indicator,around%2042.52%20trillion%20U.S.%20dollars>.
- [29]. Statista (2025). In-game Advertising – Worldwide:
- [30]. <https://www.statista.com/outlook/amo/media/games/in-game-advertising/worldwide>
- [31]. Statista (2025). Number of PUBG Mobile app downloads worldwide from April 2018 to December 2024:
- [32]. <https://www.statista.com/statistics/1351199/pubg-mobile-number-of-downloads-worldwide/>
- [33]. Statista (2025). YouTube - statistics & facts: <https://www.statista.com/topics/2019/youtube/#topicOverview>
- [34]. Steuer, R. E. (1992). On the academic exchange of research software: an opportunity for MCDM leadership. *Computers & operations research*, 19(7), 553-557.
- [35]. Vashisht, D. (2017). How gamers process in-game brand placements under different game-involvement conditions. *Management Research Review*, 40(4), 471-490.
- [36]. Vashisht, D., & Chauhan, A. (2017). Effect of game-interactivity and congruence on presence and brand attitude. *Marketing Intelligence & Planning*, 35(6), 789-804.
- [37]. Vashisht, D., & Chauhan, A. (2017). Effect of game-interactivity and congruence on presence and brand attitude. *Marketing Intelligence & Planning*, 35(6), 789-804.
- [38]. Vashisht, D., Mohan, H. S., & Chauhan, A. (2020). In-game advertising: the role of newness congruence and interactivity. *Spanish Journal of Marketing-ESIC*, 24(2), 213-230.
- [39]. Wise, K., Bolls, P. D., Kim, H., Venkataraman, A., & Meyer, R. (2008). Enjoyment of advergames and brand attitudes: The impact of thematic relevance. *Journal of Interactive Advertising*, 9(1), 27-36.
- [40]. Xi, N., & Hamari, J. (2019). Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction. *International Journal of Information Management*, 46, 210-221.
- [41]. Yoo, S. C., & Eastin, M. S. (2017). Contextual advertising in games: Impacts of game context on a player's memory and evaluation of brands in video games. *Journal of Marketing Communications*, 23(6), 614-631.