



Research article

Determinants of intention to play Pokémon Go

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ABSTRACT

This paper examines the influence of personal and game factors on gamers' perceived values, drawing from the Theory of Consumption Value (TCV), explores the impacts of values on the Pokémon Go (PG) adoption, and identifies differences between two consumer groups. A sample of 474 (215 PG non-players and 259 PG players) was collected and analysed. Game aesthetics increase all perceived values of both groups. Game aesthetics and innovativeness have no direct impact on gamers' intention to play. Emotional value and functional value are crucial for their behavioural intention. Social value is important for non-players, while conditional value influences players' intentions. This study contributes to the expansion of the TCV in mobile location-based AR game adoption and reveals the insights of players' and non-players' value perceptions. It is one of the first studies investigating the TCV factors, antecedents, and consequence in the mobile AR game literature.

1. Introduction

Nowadays, mobile technologies have diffused into whole consumer segments. Emerging mobile technologies such as Location-Based Services (LBSs) and Augmented Reality (AR) create opportunities for various industries (Rauschnabel et al., 2017). LBSs experienced a boom due to the prevalence of mobile devices. They are currently applied in diverse contexts such as geosocial services, information services, health assistant systems, and AR games (Liu et al., 2018). AR systems integrate real and virtual objects into real environments and run them interactively. Examples of AR applications are navigation and projection-based AR on smartphones (Harborth and Pape, 2017). New markets could be created and existing markets could be disrupted by these technologies, including the mobile game industry (Rauschnabel et al., 2017).

Pokémon Go is a location-based AR game, launched in 2016 by Niantic Inc. (Hamari et al., 2019). It introduces a new era of location-based AR games by combining the creature collection

(Pokémon) and monster battling into the game (Liu et al., 2018). The game was downloaded more than 500 million times during the first two months and now is currently available in over 130 countries (Hamari et al., 2019). Pokémon Go attracts worldwide interests in the opportunities of mobile location-based AR games. It is called by media as the biggest mobile game in U.S. history (Rauschnabel et al., 2017).

Location-Based Games (LBGs) and Augmented-Reality Games (ARGs) are a novel and multifaceted development, not only in the gaming space but also in the cultural space (Hamari et al., 2019). Future studies are needed to explore location-based AR games e.g. Pokémon Go because consumer research in this domain remains scarce (Rauschnabel et al., 2017). Research interests in AR¹ have grown in the past, but not many studies investigate why and how consumers play location-based AR games (Rauschnabel et al., 2017). Only a little research has explored technology acceptance factors of Pokémon Go (Harborth and Pape, 2017).

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¹ Augmented Reality (AR).

In former times, the adoption of hedonic technologies was explored using the Technology Acceptance Model (TAM), which might fail to sufficiently explain people's intention to adopt innovative technologies (Spink et al., 2011). Established theories are also limited to apply to location-based AR games (Rauschnabel et al., 2017). An alternative theory to address this weakness is the Theory of Consumption Values (TCV), which has been used in other technological contexts such as Short Messaging Services (SMSs) and ringtone downloading (Spink et al., 2011). Five basic consumption values are functional, emotional, conditional, social, and epistemic values (Djameluddin et al., 2017). Unlike TAM, TCV is relatively new. Its awareness among the researchers of hedonic technology adoption is still limited. Mobile service providers should utilize factors drawn from this theory to help them target their user needs. Since while mobile services fulfill functional needs and provide entertainment values e.g. enjoyment and playfulness for users, social and epistemic values can play a crucial role as well (Spink et al., 2011).

Although there is some research investigating AR, most studies have sample bias towards young males with a high level of education (Harborth and Pape, 2017). The theme 'non-adoption' has not yet been examined extensively (Maier et al., 2011). Previous studies also concentrated on the behavioural intention of adopters or non-adopters only (Li et al., 2011). Different types of respondents such as business people are suggested to be included. Past studies of mobile games applying TCV focused on North American and Australian students (Spink et al., 2011). Additional factors e.g. other influential factors, individual factors are also suggested to be included to expand the mobile game literature (Djameluddin et al., 2017; Spink et al., 2011).

This work addresses the above research gaps by introducing these research questions: (R1) To what extent a game factor (aesthetic) and a personal factor (innovativeness) can predict perceived values of Pokémon Go's players and non-players? (R2) To what extent players' and non-players' perceived values, a game factor, and a personal factor can predict their behavioural outcomes in terms of PG² playing? (R3) Are the importance of a game factor and a personal factor on perceived values the same for PG players and non-players?, and (R4) Are the importance of perceived values, a game factor, and a personal factor on PG playing outcomes the same for PG players and non-players?. Pokémon Go is chosen to overcome the small sample problems in past research because of the limited diffusion of AR technologies in the mass market (Harborth and Pape, 2017).

This paper contributes scarce research on location-based AR games by expanding the application of the theory of consumption values in the context of mobile location-based AR games, adding a new consumption value (convenience value), an individual's factor (innovativeness), and a game-related factor (aesthetics), collecting data from both studying-age and working-age adopters (players) and non-adopters (non-players). The conceptual model is applied to examine both PG players and non-players' adoption to contribute to the mobile location-based AR game literature.

2. Literature review

Serenko et al. (2007) explored the value drivers of a hedonic Information Technology (IT) (mobile phone ringtones). Data collected from 119 ringtone users indicated that the overall value of hedonic IT significantly predicted intention to download ringtones and positive Word of Mouth (WOM). Turel et al. (2010) examined several value motivators of hedonic digital artifacts using TCV. Data gathered from 422 ringtone users confirmed the impact of the overall value of hedonic artifacts on behavioral usage and positive WOM.

Park and Lee (2011a) proposed a Modified Theory of Consumption Values (MTCV) to investigate online gamer perceptions relating to purchasable game items. The MTCV composed of character competency value, enjoyment value, visual authority value, and monetary value.

Results determined that the players of Massive Multiplayer Online Role-Playing Games (MMORPG) gave importance to visual authority value and monetary value more than casual game players. Younger players paid more interest to visual authority, whereas older players tended to care for character competency value. Park and Lee (2011b) modified the TCV³ to explore online gamers' perceived value of purchasable game items. Findings showed that the perceived values of game items by online game users were enjoyment, character competency, visual authority, and monetary values. Spink et al. (2011) applied the Consumption Value Model (CVM) to study the adoption and use of mobile games. Two CVM dimensions i.e. performance/quality value and emotional value were associated with students' intention to download mobile games.

Ho and Wu (2012) empirically investigated the TCV and factors affecting game players' intention to buy virtual goods in online games. The results demonstrated that Role-Playing Game (RPG) players' intention to purchase was impacted by the functional quality, playfulness, and social relationship support, while war-strategy gamers' intention to purchase was affected by price, utility, and playfulness together with game satisfaction and character identification. Hsiao and Chen (2016) proposed a research model based on the value theory and the loyalty literature to specify determinants of in-app purchase intention in the mobile game context. Data from non-paid players and paid players indicated that loyalty to the mobile game significantly influenced their intention to make in-app purchases. Perceived game values (playfulness, connectedness, access flexibility, and reward) directly impacted the loyalty of all gamers but slightly affected the purchase intention of non-paid players.

Djameluddin et al. (2017) explored TCV affecting the Dota2 gamers' purchase decision. Findings revealed the significant effects of functional value, social value, and emotional value, satisfaction with the game, and character identification on the purchase decision of virtual goods. Rauschnabel et al. (2017) developed a framework using the Uses and Gratification Theory (UGT), technology risk literature, and the flow theory to explain antecedents of attitudinal and intentional reactions on mobile AR games. Data from Pokémon Go players indicated that hedonic benefits, emotional benefits, and social benefits, and social norms increased consumer reactions, whereas physical risks decreased consumer reactions. Merikivi et al. (2017) examined the influence of enjoyment on continued mobile game usage and its antecedents. Findings revealed the importance of ease of use, novelty, design aesthetic, and design attributes of challenge and the strong impact of enjoyment on the continual mobile game usage. Teng (2018) adopted the TCV to examine the expectancy for character growth and online gamers' loyalty. Results pointed out that learning, novelty, enjoyment, and social values positively influenced online gamers' expectations and loyalty.

Studies in the past applied the TCV and explored the online/mobile game adoption in other contexts such as ringtones, MMORPG⁴, RPG⁵, Multiplayer Online Battle Arena (MOBA) (Dota2), and general online/mobile game context, rather than location-based AR games. Previous research also lacked the drivers of consumer perceived values and generally collected the data from one group of game players, leading to the contributions of this study.

3. Theoretical framework and hypothesis development

3.1. Determinants of perceived value

3.1.1. Game aesthetics

Consumers choose alternatives based on aesthetic value and the distinctiveness of visual design in addition to functional features and

³ Theory of Consumption Value (TCV).

⁴ Massive Multiplayer Online Role-Playing Games (MMORPG).

⁵ Role-Playing Game (RPG).

² Pokémon Go (PG).

characteristics (Jeong et al., 2017; Omigie et al., 2017). Design aesthetics are the balance, emotional appeals, or aesthetics of mobile games. It is also precisely defined as the degree to which an individual believes that something (e.g. a website or a mobile game) is aesthetically pleasing to the eyes (Merikivi et al., 2017). The aesthetic is the feelings of attractions aroused by the visual appeals, artistic designs, and physical attractiveness of a service (Omigie et al., 2017). Game aesthetics (overall attractiveness, layout, and colour) are believed to enable gamers to immerse themselves in mobile games (Merikivi et al., 2017). Two dimensions of aesthetics are visual appearance and entertainment (Maghnati and Ling, 2013). The aesthetic attributes of wearable devices are styling, colours, and materials (Jeong et al., 2017).

The aesthetic value and distinctiveness of visual design affect consumers' adoption and purchase decisions (Jeong et al., 2017). Design aesthetics have a strong influence on the users' enjoyment, positive evaluations, and their perceptions (ease of use, usefulness, and enjoyment) of a mobile system (Merikivi et al., 2017). The design aesthetics significantly improve the perceived enjoyment of mobile gamers (Merikivi et al., 2017). The aesthetic is proposed to positively affect the usage attitude (Maghnati and Ling, 2013). Perceived aesthetics significantly increase customers' intention to purchase wearable devices (Jeong et al., 2017) and gamers' intention to purchase virtual goods in online games (Ho and Wu, 2012). Aesthetic value significantly activates customer pre-adoption choice behaviour to apply mobile financial services (Omigie et al., 2017). Aesthetic formality has a significant and positive impact on pleasure, whereas aesthetic appeal has a significant and positive impact on both pleasure and energetic arousal (Liu et al., 2016).

Visual appeals are significantly and positively related to the perceived enjoyment of online games (Merhi, 2016). The visual/musical appeal value of a hedonic digital artefact significantly positively enhances the overall perceived value, which later impacts intention to use (Serenko et al., 2007; Turel et al., 2010). Audio-visual effects are proposed to be positively related to players' expectations regarding character growth (Teng, 2018). Thus, the following hypotheses are offered:

Hypothesis 1. Players/ non-players' perceived game aesthetics are positively associated with their perceived values of the game (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value).

Hypothesis 2. Players/ non-players' perceived game aesthetics are positively associated with their intention to play a mobile location-based AR game.

3.1.2. Innovativeness of non-players/players

Personal innovativeness with IT⁶ is a person's willingness to try a new technology (Galluch and Thatcher, 2006; Krey et al., 2019). It has been confirmed its relevance to consumer behavior and the acceptance of IT such as 3G mobile value-added services (Cheng and Huang, 2013; Dai et al., 2015). It is a predictor of cognitive absorption in the MIS literature and the Internet in the classroom (Galluch and Thatcher, 2006). Consumer innovativeness refers to the tendency of consumers to have broad technical knowledge and their willingness to understand technology innovations and to try new products/services (Huang, Hsieh and Chang, 2011). Consumer innovativeness describes insights on how consumers perceive new products/services and their following behavior, for instance, the consumers' tendencies to try or adopt technological innovations (Bhattacharjee et al., 2012; Dai et al., 2015; Matute-Vallejo and Melero-Polo, 2019).

Consumers' innovativeness significantly positively impacts their perceived service quality and perceived benefits of services in an electronic mediated environment (Dai et al., 2015). Personal innovativeness tends to positively moderate the relationship between usefulness, ease of use, enjoyment and attitude towards smartwatch usage (Krey et al.,

2019). It could strengthen the positive influence of new IT's relative advantage on IT switching intention (Bhattacharjee et al., 2012). Personal innovativeness significantly influences perceived usefulness and perceived ease of use of mobile access and QR code usage (Cheng and Huang, 2013). If a person is highly innovative, the effect of perceived enjoyment on the formation of his/her attitude will be stronger. Innovativeness is proposed to positively affect the relationship between perceived enjoyment and students' attitude towards Online Business Simulation Games (OBSSGs) (Matute-Vallejo and Melero-Polo, 2019).

Previous research indicates the positive relationship between consumer innovativeness and the adoption of new technology applications such as online shopping (Huang et al., 2011). Consumers with different levels of innovativeness have different levels of intention to adopt LBSs⁷. Consumers' innovativeness towards LBSs has a significant and positive impact on their intention to adopt LBSs (Huang et al., 2011). Personal innovativeness has a strong and positive effect on an individual's intention to adopt mobile wallets (Singh et al., 2018). Personal innovativeness significantly enhances mobile access and QR code adoption (Cheng and Huang, 2013). Based on previous studies, the following hypotheses are formulated:

Hypothesis 3. Players/ non-players' innovativeness is positively associated with their perceived value of a mobile location-based AR game (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value).

Hypothesis 4. Players/ non-players' innovativeness is positively associated with their intention to play a mobile location-based AR game.

3.2. Determinants of behavioral intention

Consumers' purchase decisions depend on the perceived values embedded in a product or service (Cheng and Huang, 2013; Krey et al., 2019; Thye Goh et al., 2014). Perceived value is the overall assessment of a product or service by consumers based on their perceptions (Hsiao and Chen, 2016; Serenko et al., 2007; Thye Goh et al., 2014). It influences consumers' adoption of both behaviour and provision e.g. repurchase intention, WOM⁸, and usage intention. Perceived values could guide practical suggestions for a product or service's developers (Cheng and Huang, 2013; Park and Lee, 2011b; Serenko et al., 2007). It is a useful way to understand customers' choice behaviour, decision-making processes, purchase behaviour, use behaviour, and adoption behaviour. Providing better consumption values arouse the interest of potential customers to use products or services (Omigie et al., 2017). The TCV posits that functional, emotional, epistemic, social, and conditional values drive consumers' behaviours (Djamaluddin et al., 2017; Thye Goh et al., 2014; Zhang and Mao, 2013). The TCV has been applied to explore which consumption values support consumers to adopt Information Systems (IS) e.g. e-government IS, mobile commerce, and mobile auctions and to buy digital products e.g. mobile Internet services, MP3 files, LBSs, mobile phone ringtones, and wearable devices (Cheng and Huang, 2013; Omigie et al., 2017; Park and Lee, 2011a, 2011b; Thye Goh et al., 2014). The TCV is also suitable to explain the adoption of hedonic digital artefacts (Turel et al., 2010). However, in the online game contexts, many studies investigate why game players intend to pay for game items, but only a study of Park and Lee (2011b) refers to the TCV. The integrated consumption values of online game items significantly increase gamers' intention to purchase items in their study. The overall perceived value of a hedonic IT is significantly related to a user's behavioural intention to use it (Serenko et al., 2007). However, the relative importance of these values could vary from one context to another (Hsiao and Chen, 2016; Turel et al., 2010). Thus, the influence of these values should be explored further in the mobile location-based AR games context.

⁷ Location-Based Services (LBSs).

⁸ Word of Mouth (WOM).

⁶ Information Technology (IT).

3.2.1. Functional value

Functional value is perceived usefulness representing perceived functional attributes or benefits of a product or service (Zhang and Mao, 2013). It is the perceived utility received from an alternative (a product or service) in terms of its functional, utilitarian, and physical performances (Park and Lee, 2011a, 2011b; Thye Goh et al., 2014). A product's functional value is related to the expected usefulness or its utilitarian function (Krey et al., 2019).

Perceived values in terms of performance and quality significantly positively affect a user's intention to download mobile games (Spink et al., 2011). Functional value is proposed to impact customers' purchase of virtual goods (Djamaluddin et al., 2017). It significantly increases customers' behavioral intention to use Islamic mobile banking (Thye Goh et al., 2014). Functional values (character competency and price utility) significantly enhance gamers' intention to purchase virtual goods (Ho and Wu, 2012).

Expected usefulness significantly positively impacts attitude towards smartwatch uses, which positively affects an individual's intention to adopt smartwatches (Krey et al., 2019). Perceived usefulness significantly increases the overall value that influences behavioural intention to adopt LBSs (Zhang and Mao, 2013). Utilitarian outcomes have a significant and positive effect on elders' intention to adopt Social Networking Sites (SNS) (Maier et al., 2011). A customer with high utilitarian motivation significantly has more willingness to use LBSs, compared to other customers with low utilitarian motivation (Yoon et al., 2018).

3.2.2. Convenience value

Convenience value is the ease and speed of mobile services to perform its functions or tasks effectively, efficiently, and conveniently. It helps saving time and efforts used in a process. Convenience value is one of the main reasons why customers accept mobile services. It is one of the perceived benefits, which significantly increases customers' pre-adoption choice behaviour to use mobile financial services (Omigie et al., 2017).

Expected ease of use is an ergonomic value received from a product. It significantly improves attitude towards smartwatches, which impacts the intention to adopt smartwatches (Krey et al., 2019). Perceived ease of use has a significant and positive effect on elder people's intention to adopt SNS (Maier et al., 2011). It also significantly impacts the overall value of LBSs that affects behavioral intention.

3.2.3. Social value

Social interactions develop gamers' positive attitude towards a game, affect their intention to play, and thus help to retain players. Social influence such as the influence of friends could lead to gamers' decision to adopt online games and predict their spending on games. Online game platforms could help users engage in social activities in virtual communities, providing them high social value (Teng, 2018). Social value is perceived utility received from a product or service associating with one or more distinctive social groups (Omigie et al., 2017; Thye Goh et al., 2014). It enables an individual to develop close associations with a group or community that he/she wishes to be a part of. Social value can be acquired when an individual feels connected to a social group when using a system (Thye Goh et al., 2014). Social value is one of customers' perceived values that connotes social acceptance, social relationships, and social image of those who use a product or service (Omigie et al., 2017). In terms of mobile financial services, if the services give better images to users, increase their recognition among others, and improve their social relationships with friends, family, or specific groups, this will stimulate the service usage in the pre-adoption choice behaviors of prospective users (Omigie et al., 2017). In terms of games, social value represents a player's believe that downloading games would increase his/her social status or approval (Spink et al., 2011).

Social value significantly impacts the overall value of LBSs driving behavioral intention (Zhang and Mao, 2013). Social value significantly increases the users' expectancy for character growth, which is significantly related to online gamer loyalty (Teng, 2018). Social value

significantly affects users' intention to use Islamic mobile banking (Thye Goh et al., 2014). Students' perceived value tends to positively affect their intention to download mobile games (Spink et al., 2011). Perceived connectedness as a social value is a positive driver of loyalty to a mobile game both in the paid-player and unpaid-player groups (Hsiao and Chen, 2016). Social relationship significantly increases a player's intention to purchase virtual goods in online games (Ho and Wu, 2012). Social norms/subjective norms significantly influence the behavioural intention of SNS users (Hwang and Lee, 2013; Maier et al., 2011). Social interaction significantly positively influences the intention to play online games (Merhi, 2016). A customer with high social motivation significantly has more willingness to use LBSs at a hotel/resort (Yoon et al., 2018).

3.2.4. Emotional value

Emotional value is consumers' arousal feelings or moods such as the joy of using mobile apps (Zhang and Mao, 2013). It is perceived utility received from a product or service's capacity to arouse feelings or affective states (Park and Lee, 2011a, 2011b; Thye Goh et al., 2014). Emotional value is also defined as a customer's level of enjoyment, pleasure, and anxiety when he/she download mobile games (Spink et al., 2011). Emotional value is proposed to influence the customer's purchase of virtual goods (Djamaluddin et al., 2017). It significantly affects the overall value of LBSs, which significantly impacts behavioural intention (Zhang and Mao, 2013). Emotional value significantly affects a person's intention to download games that significantly drive the actual use of game services (Spink et al., 2011). It is also significantly related to Muslim users' behavioural intention to use Islamic mobile banking (Thye Goh et al., 2014).

Hedonic value is the expected enjoyment, fun, or pleasure received from technology usage. Expected enjoyment significantly improves attitude towards smartwatches that later impacts the intention to adopt smartwatches (Krey et al., 2019). Perceived entertainment is fun or pleasure during playing games. It is an intrinsic reward received from using technology or service. It drives the intention to use online games and mobile services. Perceived entertainment significantly positively affects intention to use mobile SNS (Hwang and Lee, 2013). Perceived enjoyment has a significant and positive impact on students' attitudes toward the OBSG⁹ (Matute-Vallejo and Melero-Polo, 2019). Enjoyment significantly increases users' positive attitude towards AR games, which enhances their intention to continue playing the games (Rauschnabel et al., 2017). Enjoyment significantly positively influences the intention to play online games (Merhi, 2016) and the expectancy of character growth and online gamer loyalty (Teng, 2018). The overall perceived value of a hedonic digital artefact, which associates with playfulness and enjoyment values, significantly increases users' intention to use it (Turel et al., 2010).

Playfulness is a pleasure or enjoyment derived by a person's assessment of a product or service (Maghnati and Ling, 2013). It is a gamer's feeling of immersion or enjoyment from the game (Park and Lee, 2011b). The playfulness value of a hedonic IT significantly increases its overall perceived value (Serenko et al., 2007). Playfulness is significantly related to users' attitudes toward mobile apps (Maghnati and Ling, 2013). Emotional value in terms of perceived playfulness significantly increases players' loyalty to a mobile game. It also significantly raises the in-app purchase intention of the paid-player group (Hsiao and Chen, 2016).

3.2.5. Epistemic value

Epistemic value is consumers' needs for novelty and curiosity for knowledge relating to new products or services (Zhang and Mao, 2013). It is acquired from an alternative to arouse curiosity, provide novelty, or fulfil a need to learn (Omigie et al., 2017; Park and Lee, 2011a, 2011b; Thye Goh et al., 2014). Epistemic value is also defined as consumers' variety-seeking and novelty-seeking behaviours (Thye Goh et al., 2014).

⁹ Online Business Simulation Games (OBSGs).

It efficiently determines the pre-adoption choice behaviour of customers who use or not use a service (Omigie et al., 2017).

Epistemic value significantly affects the overall value of LBSs, which influences behavioral intention (Zhang and Mao, 2013). It also significantly increases users' intention to use Islamic mobile banking (Thye Goh et al., 2014). Epistemic value significantly enhances customers' pre-adoption choice behaviours to apply mobile financial services (Omigie et al., 2017).

3.2.6. Conditional value

Conditional value refers to a particular context or situational factors prompting the use of a product or service (Thye Goh et al., 2014; Zhang and Mao, 2013). It is perceived value received from a decision maker's choice as the result of the specific situation or circumstance (Park and Lee, 2011a, 2011b; Thye Goh et al., 2014). Conditional value could raise or hinder a consumer's decision (Thye Goh et al., 2014). In mobile services, it is important to offer customers the conditional value (Hwang and Lee, 2013).

Conditional value significantly expands non-Muslim users' intention to use Islamic mobile banking (Thye Goh et al., 2014). Conditional value significantly promotes the intention to use mobile SNS (Hwang and Lee, 2013). It significantly positively increases the overall value of LBSs (Zhang and Mao, 2013). Moreover, a conditional value significantly improves the pre-adoption choice behaviours of customers who use mobile financial services (Omigie et al., 2017). Therefore, the following hypotheses are set forth:

Hypothesis 5. Players/ non-players' perceived game values (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value) are positively associated with their intention to play a mobile location-based AR game.

3.3. The effects of playing status

Playing experience and gameplay influence perceptions. In the study of Christou (2013), playing experience affects the perceived appeal and usability of video game players, whereas gameplay influences all aspects of their perceptions. Inexperienced players also have lower levels of appeal and usability, compared to experienced players (Christou, 2013). Prior experience could differ IT behavioural intention of pre- and post-adopters. In SNS¹⁰, post-adopters may have stronger perceived values such as the unique features of SNSs and motives to connect with old friends. The determinants of behavioural intention to use SNS are not the same between pre- and post-adopters (Chang and Zhu, 2011). Online game players significantly have higher openness, conscientiousness, and extraversion than non-players (Teng, 2008). The antecedents (intrinsic motivation and extrinsic motivation) of Open Source Software (OSS) adoption are different among adopters and non-adopters (Li et al., 2011). The relationships between users' perceptions and attitudes toward SMS-based e-government services are different between adopters and non-adopters (Susanto and Goodwin, 2013). Accordingly, the following hypotheses are encountered:

Hypothesis 6a. The relationships between perceived values and their determinants (game aesthetics and innovativeness) will be different across user groups (non-players and players).

Hypothesis 6b. The relative importance of antecedents in determining the perceived values of a mobile location-based AR game is different between non-players and players.

Hypothesis 7a. The relationships between behavioural intention and its determinants (game aesthetics, innovativeness, functional value, convenience value, social value, emotional value, epistemic value, and conditional value) will be different across user groups (non-players and players).

Hypothesis 7b. The relative importance of antecedents in determining behavioural intention on a mobile location-based AR game is different between non-players and players.

The theoretical framework of this study according to the proposes of hypotheses are illustrated in Figure 1.

4. Method

4.1. Samples and procedure

This study is a sub-project of a project titled POKÉMON GO. This study examined two sample groups: 215 Pokémon Go non-players and 259 Pokémon Go players. People in both groups hold different employment statuses: 108 students and 107 employees as non-players and 134 students and 125 employees as players. Genders were almost equally dispersed among both groups: 93 males and 122 females as non-players and 144 males and 115 females as players. A non-probability quota sampling and survey method were applied to gather data. The Google forms were opened for individuals who currently played or did not play Pokémon Go. The questionnaires were distributed by the research assistant team. Four hundred seventy-four respondents completed the survey over six-month period approximately. All of them were valid and ready for statistical analyses in the next phase. Identical records and careless responses (no variance among answers) were removed during the data collection phase.

4.2. Measures and statistical analysis

The questionnaire composed of a section describing about the target samples and the definitions of LBSs and the description about Pokémon Go, a section exploring players' and non-players' perceptions, a section investigating a respondent's behavioural intention, and a section about participants' demographic characteristics, their perceived innovativeness, the frequency of using mobile Internet/playing games, and game preferences. The measures used in this study were adapted from items of literature studies as shown in Table 1.

For each sample group, descriptive statistical analysis and Confirmatory Factor Analysis (CFA) were applied to sum up the data and to assess the measurement models. Two structural models for non-players and players were then tested using Structural Equation Modeling (SEM). Finally, invariance across the subsamples was inspected using multiple group analysis.

5. Results

5.1. Descriptive analysis

As shown in Table 2, there were 474 samples in this study, 45.36% (n = 215) of them were non-players and 54.64% (n = 259) were players. The majority of non-players were females (56.7%), while the majority of players were males (55.6%). However, the ratios presented only slight differences between genders among both groups. The average age of non-players was 26 years old, whereas the average age of players was 25 years old. Most of the respondents studied or received a Bachelor's degree (74.9% of non-players and 71.0% of players). The samples consisted not only respondents in studying age but also included those who were in working age. This study decreased the drawback of AR past studies. Their samples normally mainly included students or young males with a high level of education, which could limit the validity of findings (Harborth and Pape, 2017).

Non-players averagely used mobile Internet 8 h per day and 7 days per week. Players played Pokémon Go 3 h per day and 5 days per week on average. Top-three most frequently played game types for non-players were 1) Action/Adventure/Arcade, 2) Role Playing/Simulation/Strategy, and 3) Educational/Sports/Racing, while to-three most frequently

¹⁰ Social Networking Sites (SNS).

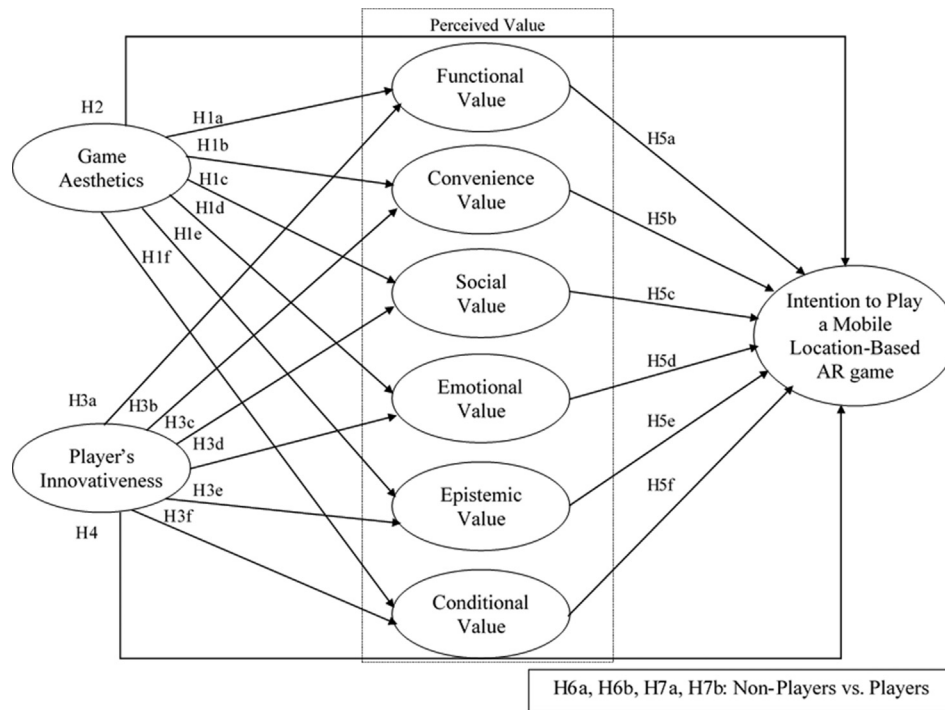


Figure 1. The research model.

Table 1. The example of measures and their references.

Construct	An Example Question	Adapted from
Game aesthetics (AESTHE)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): This game has visually pleasing graphics."	Shchiglik et al. (2016) and Huang and Liao (2015)
Innovativeness (INNO)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): I am usually among the first to try new products."	Roehrich (2004), Xu et al. (2005), and Jung et al. (2015)
Functional value (FUNC)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): I would find this game useful in my life."	Wang et al. (2013), Chong (2013), Oghuma et al. (2016), and Huang and Liao (2015)
Convenience value (CONV)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): I would find it easy to control this game to do what I want it to do, not require a lot of effort."	Sun et al. (2015a), Huang and Liao (2015), and Sun et al. (2015b)
Social value (SOCIAL)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): Playing this game would make a good impression on other people."	Chang et al. (2014), Kang and Johnson (2015), Pihlström (2008), Wang et al. (2013), and Hsu et al. (2015)
Emotional value (EMO)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): I have fun playing this game."	Chong (2013), Turel et al. (2010), Wang et al. (2013), and Hsu et al. (2015)
Epistemic value (EPIST)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): This game enables me to test the new technologies such as AR."	Wang et al. (2013) and Pihlström (2008)
Conditional value (COND)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): When in an unfamiliar environment of getting lost, a map in this game can help me to identify my current location and further direction."	Wang et al. (2013) and Pihlström (2008)
Intention to play a mobile location-based AR game (INT_PLAY)	"Please rate your perceptions regarding these sentences (1 – strongly disagreed 5 – strongly agreed): I predict I will (continue to) use this game in the future."	Turel et al. (2010), Pihlström (2008), Ho et al. (2015), and Oghuma et al. (2016)

Table 2. The summary of demographic characteristics of respondents, both non-players and players.

Demographic Characteristics	Non-Players	Players
	N (%)	N (%)
Gender:		
Male	93 (43.3%)	144 (55.6%)
Female	122 (56.7%)	115 (44.4%)
Total	215 (100.0%)	259 (100.0%)
Average Age	26	25
Education (Studying/Received):		
Lower than Bachelor Degree	14 (6.5%)	26 (10.0%)
Bachelor's Degree	161 (74.9%)	184 (71.0%)
Master's Degree	39 (18.1%)	46 (17.8%)
Doctoral Degree	1 (0.5%)	3 (1.2%)
Total	215 (100.0%)	259 (100.0%)
Average Amount of Using Mobile Internet (hours/day)	8	-
Average amount of Using Mobile Internet (days/week)	7	-
Average Amount of Playing Pokémon Go (hours/day)	-	3
Average amount of Playing Pokémon Go (days/week)	-	5
Other Game Types Playing:		
Action/Adventure/Arcade	88 (40.9%)	179 (69.1%)
Board/Card/Casino	28 (13.0%)	49 (18.9%)
Educational	58 (27.0%)	35 (13.5%)
Music	27 (12.6%)	65 (25.1%)
Sports/Racing	58 (27.0%)	68 (26.3%)
Role Playing/Simulation/Strategy	71 (33.0%)	107 (41.3%)
Trivia/Word/Puzzle	55 (25.6%)	57 (22.0%)
Total	215 (100.0%)	259 (100.0%)

Table 3. Descriptive statistics of the constructs, construct reliability, and convergent validity for each group.

Construct	Non-Players (N = 215)				Players (N = 259)				t-test
	Mean (SD)	CR	AVE	α	Mean (SD)	CR	AVE	α	
AESTHE	3.18 (1.14)	0.870	0.722	0.857	3.84 (0.86)	0.732	0.580	0.721	-7.035***
INNO	3.11 (1.17)	0.860	0.755	0.855	3.54 (1.07)	0.819	0.695	0.817	-4.189***
FUNC	2.08 (0.96)	0.827	0.705	0.818	3.32 (1.01)	0.827	0.705	0.826	-13.649***
CONV	2.90 (1.14)	0.853	0.744	0.853	3.79 (0.92)	0.793	0.660	0.784	-9.100***
SOCIAL	2.50 (1.23)	0.870	0.771	0.862	3.53 (0.92)	0.817	0.697	0.791	-10.161***
EMO	2.28 (1.16)	0.934	0.876	0.932	3.95 (0.95)	0.924	0.859	0.924	-16.963***
EPIST	2.88 (1.30)	0.936	0.880	0.936	3.78 (0.94)	0.802	0.674	0.789	-8.439***
COND	2.48 (1.12)	0.887	0.797	0.885	3.13 (1.18)	0.885	0.794	0.884	-6.088***
INT_PLAY	1.87 (1.07)	0.940	0.887	0.939	3.50 (1.18)	0.961	0.926	0.961	-15.687***

***p < 0.001; **p < 0.01; *p < 0.05.

Note: Game Aesthetics (AESTHE), Players' Innovativeness (INNO), Functional Value (FUNC), Convenience Value (CONV), Social Value (SOCIAL), Emotional Value (EMO), Epistemic Value (EPIST), Conditional Value (COND), and Intention to Play (INT_PLAY).

Table 4. Discriminant validity for non-players.

	AESTHE	INNO	FUNC	CONV	SOCIAL	EMO	EPIST	COND	INT_PLAY
AESTHE	0.850								
INNO	0.439	0.869							
FUNC	0.567	0.244	0.840						
CONV	0.657	0.399	0.613	0.863					
SOCIAL	0.452	0.368	0.568	0.574	0.878				
EMO	0.560	0.281	0.728	0.622	0.540	0.936			
EPIST	0.565	0.309	0.591	0.593	0.526	0.638	0.938		
COND	0.400	0.318	0.567	0.576	0.546	0.563	0.668	0.893	
INT_PLAY	0.399	0.225	0.671	0.474	0.548	0.720	0.422	0.463	0.942

Note: Factor Correlation Matrix with the Square Roots of the AVEs on the diagonal.

Table 5. Discriminant validity for players.

	AESTHE	INNO	FUNC	CONV	SOCIAL	EMO	EPIST	COND	INT_PLAY
AESTHE	0.762								
INNO	0.364	0.834							
FUNC	0.558	0.453	0.840						
CONV	0.552	0.375	0.552	0.812					
SOCIAL	0.344	0.292	0.483	0.455	0.835				
EMO	0.603	0.393	0.706	0.588	0.420	0.927			
EPIST	0.437	0.329	0.690	0.517	0.407	0.632	0.821		
COND	0.424	0.286	0.530	0.280	0.304	0.446	0.506	0.891	
INT_PLAY	0.468	0.364	0.710	0.368	0.406	0.723	0.510	0.517	0.962

Note: Factor Correlation Matrix with the Square Roots of the AVEs on the diagonal.

Table 6. The results of the measurement model and structural model.

Fit Index	Acceptable Fit Criteria (Parry, 2017; Schermelleh-Engel et al., 2003)	Measurement Model (Non-Players)	Measurement Model (Players)	Structural Model (Non-Players)	Structural Model (Players)
χ^2/df	$\chi^2/df \leq 3$	1.722	1.394	1.818	1.445
GFI	GFI ≥ 0.90	0.924	0.945	0.910	0.935
AGFI	AGFI ≥ 0.85	0.868	0.905	0.864	0.901
NFI	NFI ≥ 0.90	0.945	0.954	0.934	0.946
NNFI	NNFI ≥ 0.95	0.963	0.979	0.958	0.976
CFI	CFI ≥ 0.90	0.976	0.986	0.969	0.982
RMSEA	RMSEA ≤ 0.08	0.058	0.039	0.062	0.042
SRMR	SRMR ≤ 0.08	0.0324	0.0314	0.0403	0.0366

Note: Chi-Square/Degrees of Freedom (χ^2/df) Goodness of Fit (GFI), Adjusted Goodness of Fit (AGFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

played game types of players were 1) Action/Adventure/Arcade, 2) Role Playing/Simulation/Strategy, and 3) Sports/Racing respectively. Pokémon Go was classified as a Strategy game in the Apple App Store and was categorized as an Adventure game in the Google Play Store.

5.2. Measurement model

Confirmatory Factor Analyses were conducted to assess the properties of measurements for both non-players and players. Table 6 presents the fit indices of the measurement models. The result of CFAs¹¹ showed the acceptable measurement model fits for both groups. Reliability was evaluated using Cronbach's alpha and Composite Reliability (CR). The CR was applied to evaluate each construct's reliability based on standardized loadings and measurement errors for each item (Corsini et al., 2019). The acceptable threshold was the value of Cronbach's alpha and CR above 0.7 (Fornell and Larcker, 1981; Jum, 1978; Lo, 2010). The Average Variance Extracted (AVE) was applied to check convergent validity. The convergent validity assessed if the items of a construct were theoretically and effectively related. The AVE greater than 0.5 indicated an acceptable convergent validity (Hair et al., 2016; Hanus and Wu, 2016; Lo, 2010). Convergent validity was supported if loadings of the items to their respective constructs were greater than 0.6 (Bagozzi and Yi, 1988; Kline, 2015). The range of loadings for all constructs was between 0.691 and 0.938 thus establishing convergent validity. All Cronbach's alphas, CRs, and AVEs of measurements for both non-players and players were passed the acceptable values, as shown in Table 3. Therefore, internal consistency and convergent validity were evinced.

Discriminant validity checked that the items of a construct were not correlated with other constructs (Corsini et al., 2019). It was tested by comparing the correlations of inter-constructs with the square roots of the AVE for each latent variable (Alzahrani et al., 2017). Discriminant

validity of items was also achieved if the correlations between any latent constructs were significantly less than 1.0 (Sekaran and Bougie, 2016; Wang, 2010). As shown in Table 4 and Table 5, the square roots of the AVEs¹², presented in the bold fonts, of all constructs were greater than any correlations relating to each construct (Fornell and Larcker, 1981), showing that the discriminant validity of latent variables was satisfied.

5.3. Structural model

Based on subsamples of 215 non-players and 259 players, SEMs¹³ were calculated. Similar criteria using in the measurement models were applied in order to evaluate the goodness-of-fit for the structural models. The results indicated good fits of the structural models with the data, as presented in Table 6. The results of the path coefficients of the structural models were shown in Figure 2 and Figure 3. In the group of non-players, game aesthetics were found to have significant and positive effects on functional value, emotional value, epistemic value, convenience value, conditional value, and social value ($\beta = 0.988, \beta = 0.973, \beta = 0.911, \beta = 0.857, \beta = 0.827, \text{ and } \beta = 0.745$ respectively). Non-players innovativeness had significant and negative impacts on functional value, emotional value, and epistemic value ($\beta = -0.353, \beta = -0.312, \text{ and } \beta = -0.238$ respectively). Emotional value, functional value, and social value significantly increased non-players' intention to play a mobile-location based AR game ($\beta = 0.674, \beta = 0.425, \text{ and } \beta = 0.269$ respectively). Sixty-two percent of variance of non-players' intention to play Pokémon Go could be explained by perceived values, whereas 67.2%, 67.0%, 63.0%, 61.9%, 52.6%, and 48.3% of perceived values (functional value, emotional value, convenience value, epistemic value, conditional value, and social value respectively) could be explained by game aesthetics and non-players' innovativeness.

¹² Average Variance Extracted (AVE).
¹³ Structural Equation Modeling (SEM).

¹¹ Confirmatory Factor Analysis (CFA).

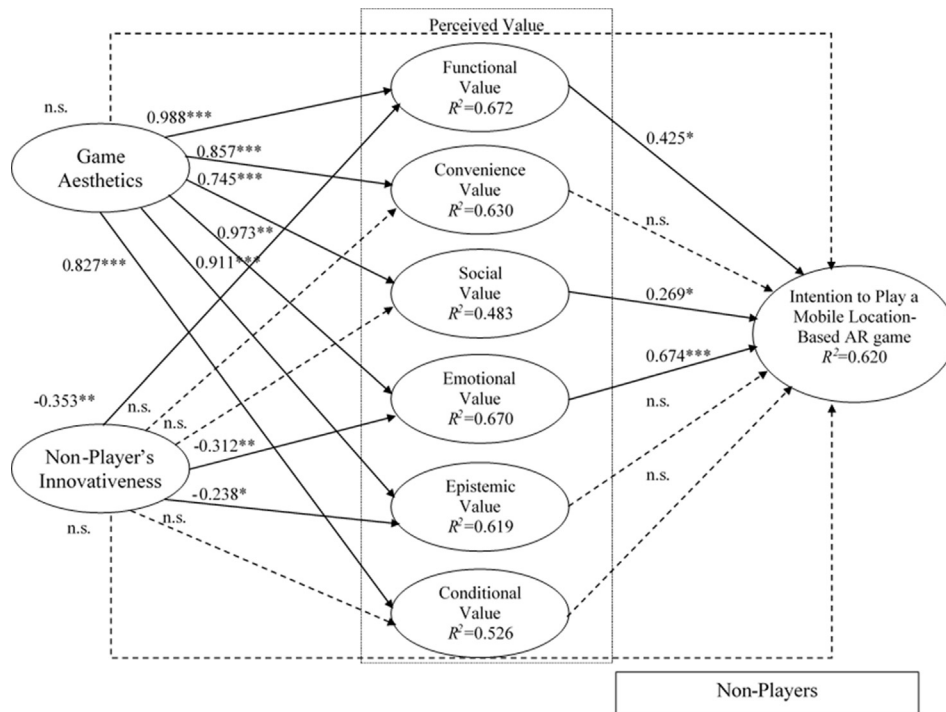


Figure 2. Structural model and R² values for non-players. ***p < 0.001; **p < 0.01; *p < 0.05.

In terms of players, game aesthetics significantly enhanced functional value, emotional value, epistemic value, convenience value, conditional value, and social value ($\beta = 0.868, \beta = 0.692, \beta = 0.858, \beta = 0.692, \beta = 0.596, \text{ and } \beta = 0.547$ respectively). Players' innovativeness insignificantly affected their perceived values. Emotional value, functional value, and conditional value had significant and positive influences on intention to play Pokémon Go ($\beta = 0.566, \beta = 0.473, \text{ and } \beta = 0.184$ respectively). A total of 65.3 percent of intention

to play Pokémon Go's variance could be explained by players' perceived values, while 74.1%, 68.0%, 61.8%, 48.4%, 32.9%, and 29.9% of the variances of players' perceived values (functional value, emotional value, epistemic value, convenience value, conditional value, and social value respectively) could be explained by game aesthetics. Hence, there were enough evidence to support H1a – H1f, H5a, and partially support H3a, H3d, H3d, H5c, and H5f, as summarized in Table 7.

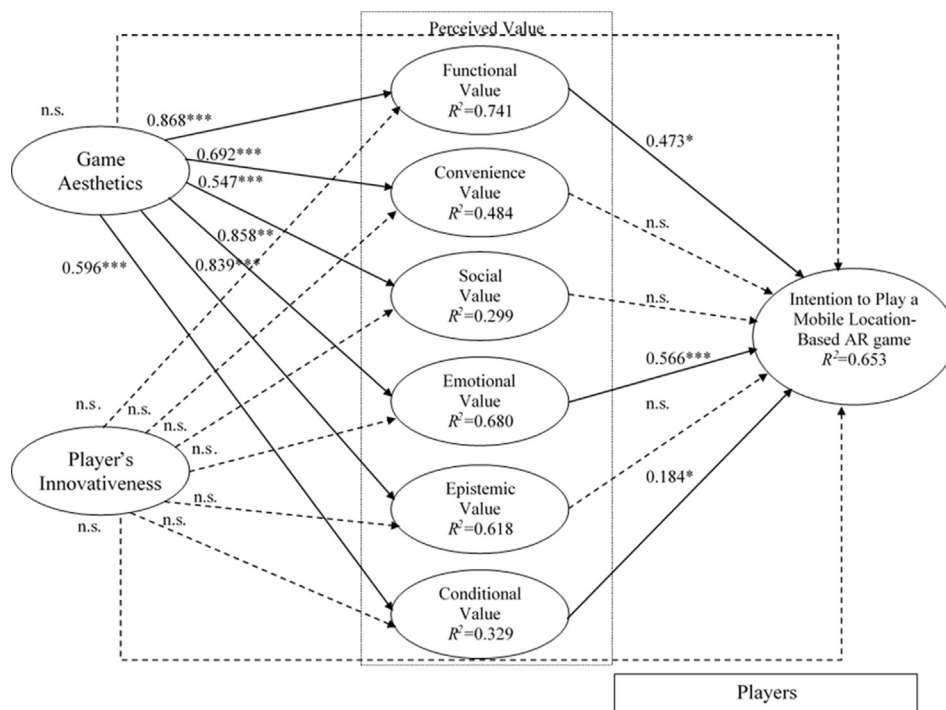


Figure 3. Structural model and R² values for players. ***p < 0.001; **p < 0.01; *p < 0.05.

Table 7. Summary of results.

Research Question/Hypothesis	Support (Non-Players)	Support (Players)
Research Question 1: To what extent a game factor (aesthetic) and a personal factor (innovativeness) can predict perceived values of Pokémon Go's players and non-players?		
Hypothesis 1: Players'/non-players' perceived game aesthetics are positively associated with their perceived values of the game (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value).	Yes (H1a – H1f)	Yes (H1a – H1f)
Hypothesis 3: Players'/non-players' innovativeness is positively associated with their perceived value of a mobile location-based AR game (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value).	Yes, but in negative ways (H3a, H3d, H 3e)	No
Research Question 2: To what extent players' and non-players' perceived values, a game factor, and a personal factor can predict their behavioural outcomes in terms of PG playing?		
Hypothesis 2: Players'/non-players' perceived game aesthetics are positively associated with their intention to play a mobile location-based AR game.	No	No
Hypothesis 4: Players'/non-players' innovativeness is positively associated with their intention to play a mobile location-based AR game.	No	No
Hypothesis 5: Players/non-players' perceived game values (a) functional value, b) convenience value, c) social value, d) emotional value, e) epistemic value, and f) conditional value) are positively associated with their intention to play a mobile location-based AR game.	Yes (H5a, H5c, H5d)	Yes (H5a, H5d, H5f)
Research Question 3: Are the importance of a game factor and a personal factor on perceived values the same for PG players and non-players?		
Hypothesis 6a: The relationships between perceived values and their determinants (game aesthetics and innovativeness) will be different across user groups (non-players and players).	Yes (INNO → FUNC, INNO → EMO, INNO → EPIST)	
Hypothesis 6b: The relative importance of antecedents in determining the perceived values of a mobile location-based AR game is different between non-players and players.	Yes (AESTHE → FUNC)	
Research Question 4: Are the importance of perceived values, a game factor, and a personal factor on PG playing outcomes the same for PG players and non-players?		
Hypothesis 7a: The relationships between behavioral intention and its determinants (game aesthetics, innovativeness, functional value, convenience value, social value, emotional value, epistemic value, and conditional value) will be different across user groups (non-players and players).	Yes (SOCIAL → INT_PLAY, COND → INT_PLAY)	
Hypothesis 7b: The relative importance of antecedents in determining behavioral intention on a mobile location-based AR game is different between non-players and players.	No	

5.4. Comparisons of non-players and players

This work also performed the Multigroup analysis to explore the moderating effects of playing status on the relationships among constructs in the research model. The data was divided into subsamples (non-players and players). Then, similar structural models were run for both groups at the same time. The result showed a significant difference between the structural weights model and the unconstrained model (X^2 difference = 63.774, df difference = 29, $p = 0.000$), suggesting the further comparison of path coefficients. Pairwise comparisons revealed that the strength of the path coefficients between game aesthetics to perceived functional value ($p < 0.1$) were significantly different between non-players and players. The result indicated that the positive effect of game aesthetics on perceived functional value was stronger for non-players than for players, supporting *H6b*. There were no significant differences between the other paths.

6. Discussion

All relationships between game aesthetics and consumers' perceived values were confirmed. Some relationships between perceived innovativeness and perceived values and a part of relationships between perceived values and intention to play Pokémon Go were supported, conforming to the literature studies specified in the section *Theoretical framework*. Game aesthetics and innovativeness did not directly impact the intention to play a mobile location-based AR game. Non-players' innovativeness impacted only on some perceived values i.e. functional value, emotional value, and epistemic value. On the contrary, players' innovativeness did not affect any of the players' perceived values. The relationship between social value and intention was significant in the non-player group but not for the player group, while conditional value significantly influenced the intention to play of players but not non-players. Functional value and emotional value significantly influenced the intention to play Pokémon Go in both groups.

The insignificant relationships between a part of perceived values and respondents' intention to play could be explained by past studies. In terms of social value, there were insignificant influences of social outcomes and subjective norms on elder people's intention (Maier et al., 2011), an insignificant association between social value and a user's intention to download mobile games (Spink et al., 2011), insignificant relationships between perceived connectedness as perceived value and in-app purchase intention of paid-player group and unpaid-player group (Hsiao and Chen, 2016), an insignificant impact of social value on customers' pre-adoption choice behaviours to use mobile financial services (Omigie et al., 2017), an insignificant relationship between socializing and users' intention to continue playing mobile AR games (Rauschnabel et al., 2017), and an insignificant link between social value (social self-image expression) and intention to purchase virtual goods in online games (Ho and Wu, 2012). Perceived ease of use insignificantly influenced intention in the study of Maier et al. (2011) and Hwang and Lee (2013), whereas conditional value was not a significant driver of users' behavioural intention to use Islamic mobile banking (Thye Goh et al., 2014). The insignificant influence of epistemic value on the intention to play could be explained by that AR games might not provide knowledge or fulfilled a user's need to learn directly. Moreover, the normal gameplay mode of Pokémon Go game playing was not AR, so the game possibly did not arouse curiosity or provide novelty to players and potential players much.

The insignificant influences of innovativeness on perceived values, negative impacts of innovativeness on perceived values, and insignificant effects of innovativeness on the intention to play were supported by the study of Matute-Vallejo and Melero-Polo (2019). They pointed out that highly innovative people might not concern about the ease of use of technologies, thus the impact of perceived value on technology evaluation was not relevant. Personal innovativeness also significantly negatively influenced the relationship between perceived ease of use and students' attitudes toward the OBG. The influence of enjoyment on attitudes was not strengthened by individuals' innovativeness because

innovative people might have more experience in using diverse technologies. The study of Galluch and Thatcher (2006) proposed that personal innovativeness negatively affected subjective norms because high-innovativeness people were less likely to listen to others, compared to low-innovativeness people. People's innovativeness also negatively moderated the relationships between functional value/expected usefulness and their attitudes. Highly innovative individuals required a lower level of positive perceptions. Besides, there were insignificant moderating impacts of personal innovativeness on the expected ease of use-attitude relationship and the enjoyment-attitude relationship (Krey et al., 2019). According to the descriptive statistics of constructs in Table 3, both non-players and players in this study reported their innovativeness quite high.

7. Implications

For theoretical contributions, this study extends the generalization of the Theory of Consumption Value to the hedonic technology context and proposes a comprehensive model that integrates the TCV factors and their antecedents. The characteristics of each game type are unique and different, for instance, social games and other online games (Hasan et al., 2016). Therefore, the research relating to specific game type like mobile location-based AR games is needed. The application of the TCV to the Pokémon Go context highlights its explanatory power to the mobile location-based AR game adoption. This has been rarely investigated in previous studies. Game aesthetics and innovativeness as antecedents could also explain substantial variations in consumers' perceived values, particularly in the non-player group. The results reveal the role of personal-related and game-related factors on the TCV. The comparison between non-adopters and adopters of mobile games in the existing literature is still limited. This study advances this knowledge in the context of a popular mobile location-based AR game and presents a useful framework for future explorations.

For practical contributions, the results of this study provide the game designers, developers, marketers, and providers of mobile location-based AR games insights into consumers' perceived values that link to their intention to adopt the games in the future. Findings expand the understanding of mobile location-based AR games in the viewpoints of players and non-players. Both groups have similar backgrounds, the same dispersion of genders, and the similar proportion of working statuses. This research design could improve the generalization of research results. Other location-based AR games are Let's Hunt Monsters, Jurassic Park Alive, The Walking Dead Our World, Harry Potter Wizards Unite, and Ghostbusters World. These games could carefully apply the research findings. According to Table 3, all perceptions (game aesthetics, innovativeness, functional value, convenience value, social value, emotional value, epistemic value, conditional value, and intention to play) of Pokémon Go's non-players are significantly lower than players, showing the room to enhance potential players' perceptions.

Intention to play/continue to play a mobile location-based AR game of both players and non-players is mainly driven by their perceived emotional value and functional value. Non-players' intention to play is also motivated by their perceived social value, while players' intention to play is increased by their perceived conditional value. Hence, game designers should incorporate features that improve the game flows and enjoyment. Achievement component, social component, and immersion component such as challenges, group achievements, or fantasy could be added to raise the game enjoyment (Yee, 2006). The game should give target users not only a suitable user interface but also a quality user experience. The game usefulness, for instance, promoting physical and emotional well-being, should be advertised to target users. In terms of non-players, they could be influenced by their surrounding people or peers, so game providers should induce existing players to invite non-players to join and give them some rewards such as a free/special game creature (Pokémon). Game features should allow players to easily and publicly share their success or enjoyment received from the game to others on social media. Players also appreciate if the game could help or

facilitate them in some circumstances. For example, when they get lost in unfamiliar environments or when they need more information about a specific location. Thus, game developers should expand these features and game marketers should promote the game usefulness to target users, especially players.

Both non-players' and players' perceived values (functional value, emotional value, epistemic value, convenience value, conditional value, and social value) could be enhanced by game aesthetics. So, the game should be designed using visually pleasing graphics such as comforting objects and colorful objects. Characters in the game should be attractive, for instance, cute/lovely creatures. However, the innovativeness of non-players possibly lowers their perceived values of the game. Therefore, game designers should mainly focus on the improvement of game aesthetics, but the game marketers should promote the game attractiveness to target users rather than emphasizing the game's newness.

8. Conclusions

This study analyses the impacts of the game-related and personal-related factors on Pokémon Go players' and non-players' perceived values and the effects of these perceived values on their intention to play a mobile location-based AR game. Using the data of 215 PG non-players and 259 PG players, it can be shown that game aesthetics influence all consumption values, but personal innovativeness may negatively affect some perceived values of the non-playing group. Emotional value, functional value, and social value/conditional value later drives non-players'/players' intention to play the game in the future. Although, all players' perceptions are higher than non-players' perceptions. The positive impact of game aesthetics on functional value is stronger for non-players than for players.

8.1. Limitations and future studies

The limitations of this research are as follows. First, according to the Diffusion of Innovations (DoI) (Rogers, 1995), users could be classified as innovators, early adopters, early majority, late majority, and laggards. Besides, innovation adopters could also be categorized as voluntary adopters, involuntary adopters, potential adopters, and rejecters (Vasseur, 2012). Caird and Roy (2008) also identified consumers as potential adopters, adopter-users, non-adopters, and reject-users. These classifications may not be captured in this study, so future research should replicate this study to separately explore these groups. Second, this study investigates only one player-related factor and one game-related factor. The results show the importance of the game-related factor but do not support or negatively support the importance of the player-related factor. Thus, future research should apply the qualitative study to ascertain the reason why a person's innovativeness does not affect his/her perceptions. Other game-related and personal-related factors should be added to expand the knowledge of what drives consumers' perceived values.

Third, this work employs nonprobability sampling, so future studies could apply systematic sampling methods to collect data from diverse groups described above. Fourth, this study focuses only on one mobile location-based AR game. Although Pokémon Go is currently the most popular mobile location-based AR game. Other games such as Jurassic Park Alive or Harry Potter Wizards Unite should be also investigated to compare the research results. Last, all respondents are target users in Thailand. Therefore, samples should be gathered from other Southeast Asian countries to expand findings to the Southeast Asian perspective.

Declarations

Author contribution statement

M. Thongmak: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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