Empirical Study About the PokémonGo Game and Destination Engagement

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Abstract. This research will take PokemonGo, as a case of a location-based augmented reality (AR) mobile game, and explore the existence of its links to tourism. By illuminating the aspect of AR mobile games which wholly immerse with the real geographic space, the study attempts to categorize the immersion environment into two constructs, reality (offline) and virtual (online). In addition, based on balance theory the study model examines the relationship between destination satisfaction and game play satisfaction. The hypotheses were tested using 228 Korean PokemonGo players who had experience in visiting a location to play the game. The findings show AR immersion can be a combination of two dimensions and game play satisfaction has a positive effect on destination satisfaction. Thus identifying AR mobile game's potentially influence tourism behaviour.

Keywords: Augmented reality (AR) · Mobile game · PokémonGo
Immersion satisfaction · Balance theory

1 Introduction

Last year a software development company Niantic, Inc. and the affiliate of Nintendo, Pokemon Co., in which Nintendo owns a share of 32%, produced "PokemonGo". By March 2017, Nintendo scored 20 billion JPY (Japanese Yen) worth of profit and the company is preparing more videogame franchises for the mobile app game market. Evidently the mobile app versions of the existing Nintendo games account for the company's revenue boost, exposing them to a mass market of casual game players unlike before (Mochizuki, 2017). Nonetheless, Pokemon Co. is coming up with another mobile game app of the already existing physical Pokemon card game.

The limitless possibilities of mobile app games are getting acknowledged with the addition of Augmented Reality (AR) features in the designing of games. Azuma et al. (2001, p. 34) defines AR as "a system which supplements the reality with virtual (computer-generated) objects that appear to coexist in the same space as the real world". The characteristics of AR is categorized to be a mix of real and virtual items parallel or coexisting on a reality setting, and being interactive as in real live. Due to the advancement in geo-tracking and computer power, the development of the 'mobile' category of AR applications is accelerating (Azuma et al., 2001).

AR mobile games, such as PokemonGo, go by a game design where users (players) engage in actual physical activities to visit specific places in reality, breaking down the barriers of conventional game environment. Owing to the location based gameplay of PokemonGo and an unexpected glitch in the mapping system, Sokcho province in South Korea, experienced a rapid rise in the number of tourists before the game's official release in the country. All transportation to Sokcho and accommodation were fully booked on the weekends and tour buses packed with pokemon trainers rolled into the city which was before a quiet beach getaway. The serendipity of PokemonGo and its effect on the tourism of Sokcho gives perspective into the field of tourism research. Nevertheless, despite the significant relationship between games and tourism, as shown in the Sokcho example, research focusing on this issue is scarce.

Thus, the purpose of this study is to examine the relationship between destination and game experience by applying the PokemonGo case. Moreover, the construct of mixed (physical and digital) environment via AR characteristics are examined. Conclusively leading to whether an AR game with the feature of 'location based and mobile' has the potential of influencing a destination to be perceived as a tour destination.

AR mobile games are leading the trend of evolution with location based services thus, proposing a new spectrum in destination marketing, tourism behaviour, and motives. This study points out that the start of the mobile AR game era does not end after finishing off the boss at the last stage of the game, but rather expands to recreating and nourishing tourism and leisure in the real world.

2 Literature Review

2.1 PokemonGo

PokemonGo is a mobile online game, featuring Location Based Service (LBS) and AR technology. The player, referred to as Pokemon trainer, is given a mission to catch and collect fictional monsters which are characters in the animation 'Pokemon'. The unique game layout, due to AR and LBS, amuses players and encourages them to physically participate in playing the game which creates a vague boundary between the real world and the virtual world.

To catch the 'Pokemon' monsters, players must go to certain locations by foot. At the location the Pokemon would appear on their mobile screens. Depending on the location, certain types of Pokemon would appear more than elsewhere or have a higher distribution of pokestops, which are item distributing places that exist on AR and overlap real landmarks. Stadiums are another AR site situated on landmarks where players can battle with other player's Pokemon and mark their territory. With regards to the game features, players put emphasis on the location for gaming and information about game play locations are the main topic in gamer communities.

Clark and Clark (2016) describe PokemonGo as 'the first mass market app that fully transcends the virtual, the spatial, the social, and the physical.' Within this context the study seeks to examine the multiple dimensions of AR mobile games from a tourism perspective.

Regarding the unique new paradigm of integrative gaming technology, research on the effects of a mobile AR game, such as PokemonGo, is currently available in the fields of medical science, (cyber) psychology, geography, and education. Yet studies of LBS AR applications in the tourism and leisure field is rare. Existing literature focuses on tour guide AR applications (Chou & ChanLin, 2012; Casella & Coelho, 2013; Han et al., 2013; Aluri, 2017; Chung et al., 2017). Zach and Tussyadiah (2017) examined the effects of PokemonGo on the players from a tourism perspective and found the game affects travel motives.

2.2   Immersion Satisfaction

The development of technology has brought a shift in the gaming industry with augmented reality as one of the major game design changing catalysts. McMahan (2003) spotted the trend of virtual reality in video games and noticed the need to reconsider the concept of immersion that has become more vague and comprehensive. As for many online game players the motivation for playing was found to be due to enjoyment through immersion in the fantasy world provided by the game (Yee, 2006).

The term to define the game player's sensed presence in an AR game environment has not yet been independently established. Therefore in this study, the concept of spatial presence and the extent to perceiving the presence, in other words 'immersion', are derived from prior literature that addresses presence theory (Wirth et al., 2007; Lombard & Ditton, 1997).

In the technical literature field, papers about the application of science in virtual reality employ the term "presence" (McMahan, 2003). Heeter (1992) and Shim et al. (2003) introduce the definition of immersion, presence, or telepresence as the extent of a user's perception of "being there". Immersion satisfaction means the degree to how much the gamer is satisfied with the feeling of immersion. Parallel environments and activities between the virtual and reality world are conditions found to generate immersion or presence for game players (McMahan, 2003).

Drawn up from satisfaction and enjoyment literature, Teng (2010) defines that the needs of immersion satisfaction is different from the needs of overall satisfaction and enjoyment. Teng (2010) constructs a new reference for immersion satisfaction as the user's extent of satisfaction when the need for immersion is accomplished. Therefore, the need for immersion differs within individual users due to subjective standards. For some users a weak presence feeling could still be satisfying while a strong presence feeling is not sufficient enough to be satisfying. Festinger's (1957) cognitive dissonance theory explains the strong tendency of game users identifying oneself in the virtual game environment. Teng (2010) explained this tendency shows in behaviours such as avatar customization. In line with the notion that customizing contributes to immersion, this study examines the physical involvement of the game user in an AR based game set as the customization function.

2.3   Balance Theory

Heider (1958) introduces the balance theory to explain the human tendency to maintain balance between elements. The POX model (Heider, 1946) and ABX model

(Newcomb, 1953) extended to social groups, defines the structural arrangements of balance theory which is supported by the cognitive dissonance theory (Festinger, 1957). To elaborate the POX model, P is the main target to analyze, O is the one in comparison, and X is the third party. Hummon and Doreian (2003) visualized the balance theory model and categorized them into balanced groups and imbalanced groups. In the case of balanced arrangement, the relationships between each element satisfies the balance theory. On the contrary, the imbalanced arrangement scenario elements will encounter dissonance and therefore people will be stressed to alter the negative or positive attitude.

The field of tourism overlaps with many of the theories in consumer behavior studies and balance theory is one of the many. Interestingly, despite the strong alikeness there are not many studies in the tourism field applying the theory of balance (Chung et al., 2017). Chung et al. (2017) gives an overview of four researches in relation to balance theory regarding tourism and all are looking into destination concepts (Niininen et al., 2004; Woodside et al., 2007; Hsu et al., 2009; Su et al., 2011). This study will utilize the balance theory to look into the destination concept as well.

Based on the premise of the balance theory, the POX model adequately describes the relationship between immersion and the cognitive and effective components of an AR game environment. Theoretically when the gamer is satisfied with the gaming experience, it will lead to satisfaction of the game site destination as well as immersion in the game environment. Resulting in high satisfaction with the destination that leads to positive immersion in order to avoid dissonance.

If game play satisfaction (P) has a positive relation with immersion (X) and game site destination satisfaction (O); naturally the game site destination satisfaction (O) has a positive relationship with immersion (X).

3   Research Model and Hypotheses Development

Base on the literature mentioned above the empirical model of the research is presented in Fig. 1 and three hypothesis are proposed. This paper pursues to find the composition of immersion in an AR environment as well as the relationship of AR mobile games and a destination from a tourism perspective.
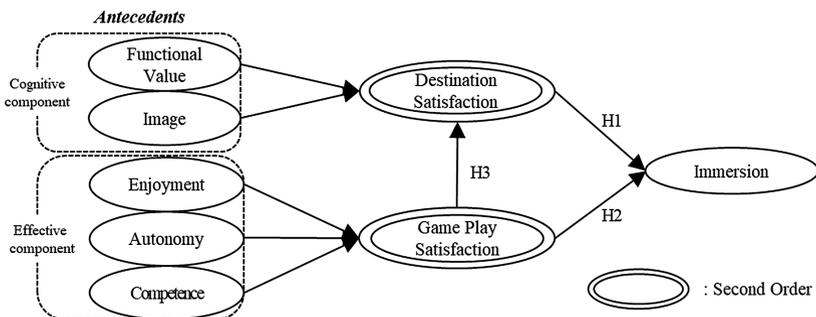

Fig. 1. Empirical model

In order to examine immersion in the concept of AR, attitude theory provides the basis for the model. The study structures immersion satisfaction as a merged concept of both cognitive and affective evaluation, to symbolize the concept of environment is comprised of reality and virtual environment. The meaning of affective is the assessment of environment's emotional quality while cognitive (perceptual) means assesses the environment's physical features (Hanyu, 1993). In other words, cognitive and affective is applied in order to classify the human interpretations that form immersion.

Destination satisfaction, the cognitive component, and game play satisfaction, the affective component, are examined to draw on immersion, the notion of place which integrates reality and virtuality.

Based on the finding that the cognitive component encompasses aspects of tourist destination resources (Stabler, 1995) and place satisfaction is accepted as a significant antecedent of perceiving place dependence and bond which in other words is place attachment (Prayag & Ryan, 2012; Ramkissoon & Mavondo, 2015), the research identifies destination satisfaction as the cognitive component. Image and functional value of a destination consists in order to examine the cognitive component of immersion in the virtual and reality merged environment.

When measuring the subjective satisfaction of game play experience, research in the game industry uses the measurement 'Game play questionnaire (GPQ)'. Online gaming's hedonic characteristic is universal and individuals would invest time and energy to gain enjoyment (Holbrook et al., 1984). Juul (2003) found game players are assigned to emotional attachment of the game and its outcomes. Furthermore, Rauschnabel et al., (2017) studied the motivation for experiencing AR mobile games including hedonic factors. Based on the findings, game play satisfaction is identified as the affective component of immersion which leads to the following two hypotheses:

H1: Destination satisfaction of the PokemonGo game environment will positively affect immersion satisfaction of the PokemonGo game play.
H2: Game play satisfaction of the PokemonGo game will positively affect immersion satisfaction of the PokemonGo game play.

A place can compass multiple meanings because of the diversity of individuals' experiences (Stedman, 2003). Accordingly, meaning is constructed through the actions that can be enabled by the characteristics of the place. In the case of PokemonGo, the virtual characteristic of the game divides the environment into two segments, offline/reality and online/AR. The game play satisfaction is derived from the online environment and destination satisfaction from the offline environment. Klopfer and Squire (2008) found that through playing games and experiencing immersion, tourists establish emotional attachment to the destination. In accordance with the balance theory the remaining hypothesis is the following:

H3: Game play satisfaction will positively affect destination satisfaction.

4 Method and Procedure

4.1 Questionnaire Design

The questionnaire was originally compiled in English and translated into Korean. Each variable is measured on a seven-point Likert scale (1 = strongly disagree to 7 = strongly agree). The measurement items and operational definitions for each variable are adopted from existing literature (Table 1).

Table 1. Operational definitions of constructs

Variables	Operational definition	References
Enjoyment	The degree to how much players enjoy the game	Kim and Shute (2015)
Autonomy	The player's perceived degree of freedom or number of choices in the game	
Competence	The degree of player's feelings being capable of solving problems within the game	
Functional value	The visitor's perceived value of visiting the destinations (in reality not in AR)	Lee, Yoon, and Lee (2007)
Image	The visitor's interactive system of cognition toward a visiting destination (in reality not in AR)	Prayag and Ryan (2012)
Immersion	The player's engagement satisfaction, in reality and virtual, derived from LBS and AR immersing functions of the game	Teng (2010)

4.2 Data Collection

The survey was conducted online via an online research company (EMBRAIN) with PokemonGo gamers in Korea, during the promotion of the PokemonGo's game update (18–25 September 2017). To validate whether the respondents had PokemonGo game experience, only the surveys that went through the screening questions were used. Thus, out of 962 responses, 228 were used for analysis (Table 2).

Table 2. Demographic information

Demographic variables		N	%	Demographic variables		N	%
Gender	Male	117	51.3	Occupation	Student	64	28.1
	Female	111	48.7		Office worker	91	39.9
Age	10s	12	5.3		Sales and service	12	5.3
	20s	119	52.2		Technician	11	4.8
	30s	67	29.4		Labour worker	1	0.4
	40s	23	10.1		Professional	18	7.9
	50s	5	2.2		Business owner	10	4.4
	60s	2	0.9		Civil servant	3	1.3

Table 2. (*continued*)

Demographic variables		N	%	Demographic variables		N	%
Period of PokemonGo game experience (months)	Less than 1	2	0.9		Homemaker	11	4.8
	1–4	77	33.8		Other	7	3.1
	5–8	94	41.2	Frequency of PokemonGo game play (times a month)	1–3	56	24.6
	9–12	41	18.0		4–8	66	28.9
	13–16	11	4.8		9–16	40	17.5
	17–24	3	1.3		17–25	27	11.8
					More than 26	39	17.1
Most memorable location for PokemonGo game play	Sokcho	46	20.2	Other activities at the destination to play PokemonGo	Only PokemonGo	67	29.4
	Park	46	20.2		Travel	67	29.4
	Region	34	14.9		Daytrip	40	17.5
	Attraction	34	14.9		Eat	20	8.8
	District	33	14.5		Exercise	15	6.6
	Station	12	5.3		Nothing special	6	2.6
	Abroad	12	5.3		Family/friends	5	2.2
	Other	11	4.8		Other	8	3.5
Total		228	100	Total		228	100

4.3   Data Analysis

To determine the relationship between the variables Structural Equation Modeling (SEM) using Smart PLS version 3.0 was conducted. Confirmatory factor analysis (Table 3) shows all factor loadings are higher than the value of 0.7 (Chin, 1998) with the composite reliability values, satisfying the requirements for each construct (Bagozzi, Yi, & Phillips, 1991). Moreover, all AVE values are higher than the recommended value of 0.5 (Hair, Ringle, & Sarstedt, 2011). Discriminant validity (Table 4) are all lower than the square root of the AVE for each construct, showing acceptance (Fornell & Larker, 1981).

Table 3. Analysis of reliability and convergent validity

Variables		Items	Factor loadings	Cronbach's alpha	Composite reliabiltiy	AVE
Destination satisfaction	Functional value	VAL1	0.918	0.917	0.947	0.857
		VAL2	0.932			
		VAL3	0.928			
	Image	IMG1	0.897	0.925	0.947	0.816
		IMG2	0.934			
		IMG3	0.881			
		IMG4	0.901			

(*continued*)

Table 3. (*continued*)

Variables		Items	Factor loadings	Cronbach's alpha	Composite reliabiltiy	AVE
Game play satisfaction	Enjoyment	EN1	0.962	0.923	0.963	0.928
		EN2	0.966			
	Autonomy	AU1	0.847	0.875	0.915	0.728
		AU2	0.851			
		AU3	0.880			
		AU4	0.835			
	Competence	CO1	0.827	0.904	0.933	0.777
		CO2	0.908			
		CO3	0.890			
		CO4	0.899			
Immersion		IMM2	0.859	0.928	0.945	0.776
		IMM3	0.859			
		IMM4	0.896			
		IMM5	0.879			
		IMM6	0.910			

Table 4. Analysis of discriminant validity

Constructs	VAL	IMG	EN	AU	CO	IMM
VAL	**0.926**					
IMG	0.762	**0.903**				
EN	0.603	0.568	**0.964**			
AU	0.598	0.603	0.647	**0.853**		
CO	0.587	0.577	0.577	0.631	**0.882**	
IMM	0.684	0.639	0.601	0.661	0.734	**0.881**

Note: The diagonal elements in **bold** are square roots of the average variance extracted (AVE)

5 Results

The results reveal all three hypotheses are positively supported (Fig. 2). Destination satisfaction (H1: $\beta = 0.288$, $t = 3.868$) and game play satisfaction (H2: $\beta = 0.573$, $t = 8.267$) are found to have high association with immersion, while game play satisfaction shows a stronger connection. Lastly, game play satisfaction shows the strongest positive impact on destination satisfaction (H3: $\beta = 0.722$, $t = 19.687$).
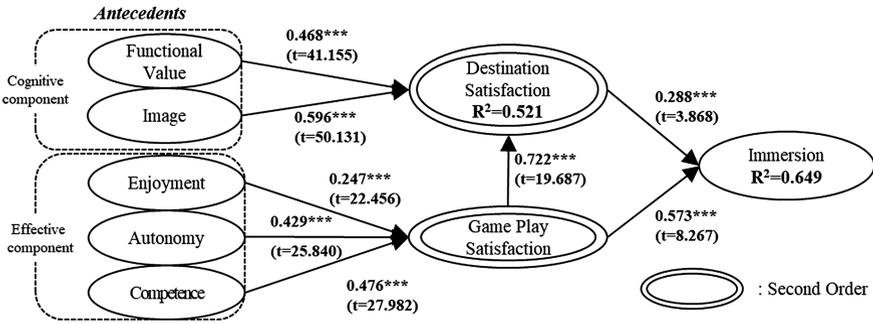
Fig. 2. Structural model results

6   Conclusion

6.1   Discussion

This study is conducted to empirically examine whether the relationship between LBS AR mobile games and destination satisfaction exist. Moreover, the unexpected, irrational, and spontaneous decision of choosing to go to a place, with motives apart from tourism, and eventually recognizing the place as a potential tour destination is the kind of transformation the study aims to bring into questioning. Predicting that the PokemonGo game will give players a new perspective of a place through the AR lenses is the underlying view of the research motives. The notion that consistent daily life weakens the recognition of a place and only through misplace of it does one come to acknowledge the value and meaning of the place (Relph, 1976; Fried, 1963), matches the concept of this study.

Through hypothesis verification, the study found that phenomenon of AR, within the tourism perspective, has the capability of influencing destination satisfaction and alter the sense of presence in a merged environment. This goes in line with the assertion of Ballagas et al. (2008) that serious omnipresent games have the capability to change our life and behaviour while concluding that a game is an effective informative tool for the needs of tourists.

To the author's knowledge, this empirical study is participating in the pioneer efforts of identifying the dimensions of LBS AR mobile games and its relations with tourism. Due to these circumstances, the conceptualization and measurement of the place comprising the real and the AR world, immersion, was analysed based on the attitude theory. In the context of marketing people put more importance on the perception of reality than the actual reality when it comes to the image of a brand (Dobni & Zinkhan, 1990). Perception of a place or environment can be established in one's mind even in the absence of the physical environment (Tuan 1977). This leads to speculations whether the existence of a non-physical, virtual environment leads to the perception of an AR inspired spatial presence. Hence, this study aims to contribute to the building of a more robust theory on how space or place is understood and utilized with AR software (Klopfer & Squire, 2008).

Looking into the model of immersion and the cognitive and affective components, the affective component seems to have higher association with immersion than the cognitive. Previous literature identified the emotional connection to a place is stronger than the cognitive knowledge in forming engagement with the environment. Provision in tourism is well known for being experientially-demanding (Bei et al., 2004; Dolnicar, 2005) and with regards to that King (2002) found that in a travel context, more emphasis is put on experiences and emotion than tangible materials and geographical elements such as the destination. Accordingly, the study shows that the spatial presence merged with reality and virtual is more influenced by affective, emotional, and intangible bonds compared to cognitive, objective and physical features.

6.2 Implications

Through this empirical study, using PokemonGo as an example, we expected to determine if an AR mobile game has influence in transforming a destination into a potential tourist destination and widen the perspectives of the use of technology and games in tourism. Xu et al. (2016) contends the game field supplies destination marketers and tourism organizations with a new creative channel for marketing. Middleton (1994) describes both formal and informal communication settings perform stimulus inputs in the decision-making of tourists which confirms that gaming is an effective communication tool. In conclusion, the multifaceted potential of AR mobile games should be taken into consideration for destination and tourism marketing.

Although this research is focusing on one example of AR mobile game, it addresses the need to clarify the understudied association between AR mobile games and destination in the tourism context. Hopefully it should offer an insight to how the development of AR can affect aspects of real life. Likewise, the findings in this study aim to provide researchers a utile empirical structure to stay in touch with the rapid evolution of the technology and game field.

6.3 Limitations

As much as the success of PokemonGo has channelled the attention towards AR and location-based game design, there should not be oblivion towards the strong cultural and brand power of 'Pokemon' franchise itself (Keogh, 2016). Niantic already had a location-based game before called 'Ingress', which is actually the origin on which the geographical database PokemonGo is built on. Why was it not the most downloaded app in history despite the same technical elements? Perhaps this phenomenon of an AR mobile game influencing myriads of people to travel domestically to certain destinations is only the case for PokemonGo. After all it is always the story that sells not the product. Therefore, there should be caution in generalization.

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