Augmented Reality Applications: The Impact of Usability and Emotional Perceptions on Tourists' App Experiences

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Abstract

There is a rising amount of research contributing to the knowledgebase of Augmented Reality (AR) application usage. However, up until now there is no sound understanding about how the emotional perception of AR application users impact on different types of experience. This paper aspires to contribute to this gap by analysing the link between usability, emotional perception (i.e. entertainment, playfulness and enjoyment), two types of experience viz. action- and emotional experience and users' intention to use the app in a travel context. 796 questionnaires show that emotional experience is driven by entertainment while action experience is mainly triggered by playfulness. However, only emotional experience impacts on users' intention to use the AR app. Action experience has no significant effect. Findings will be discussed in the light of previous literature and managerial implications will be provided.

Keywords: Augmented reality, experience design, usability, emotional perception, mobile applications

1 Introduction

Emerging technologies are changing consumers' perception of services. Specifically, augmented reality has introduced a new dimension to how services are accessed and consumed in several service sectors [1, 2, 3, 4], including tourism services such as heritage tourism [5], tour guide [6] and hospitality [7]. A market report by [8] holds that currently, there are 1,684 companies in the augmented reality application business with a combined market value of 3.5 Billion US Dollars. Due to increasing consumer interest in AR applications, 67% of media planners are adopting it for their digital campaigns, with users estimated to rise to 1 billion in the year 2020. These statistics consistently stresses the potential effects of AR on tourism fields.

Current knowledge on AR apps has examined consumers' attitude from the viewpoint of the Technology Acceptance Model (TAM) [9], its use in retail frontline operation [10] and positive brand attitude formation [11]. In the tourism domain, it has also been examined as a tool for improving destination engagement and satisfaction [2]. A critical missing link in extant knowledge is how the usability and emotional perception of AR apps impact experience and intention to use. This is particularly important as information system scholars have repeatedly echoed that the success in the diffusion of a piece of information technology is critically anchored on its cognitive (e.g., usability) and affective components [12, 13]. This study therefore adds to this gap by examining the role of usability and affective components (i.e., emotional perception) of AR apps on customer experience and intention to use. In order to address the research purposes,

respondents were asked to experience an AR application (Layer) as a travel information source, containing travel attraction, destination and sports/leisure information. After their actual experiences to Layer, a set of survey was used to measure concepts of usability, enjoyment, entertainment, playfulness, action/emotion experiences and intention to use.

The paper starts with an overview about augmented reality. Next the development of the hypotheses is presented in two chapters. The first is dealing with usability and emotional app perception and the second one with emotional app perception, experience and intention to use. After the methodology the results will be presented. The paper closes with the discussion and managerial implications.

2 Literature Review

2.1 Augmented reality

Increasing scholarly interest in augmented reality (AR) is underpinned by its role in improving customer experience [14]. [15, p.20] defines AR as a "medium in which digital information is overlaid on the physical world that is in both spatial and temporal registration with the physical world and that is interactive in time." The difference between virtual reality (VR) and AR is that with VR, the use of special goggles separates and immerses the user in a virtual world, AR users are still in connection with reality, however, such reality is augmented via virtual information [11]. The use of AR has been applied in fields such as games and sports, education, entertainment, social networking and marketing [9] with different formats such as mirrors, smartphones and wearable devices [11]. With the ubiquity of smartphones present a vast potentials for the adoption of AR apps, however, there is limited understanding on how AR app usability and its emotional perceptions impacts tourists' experiences and intention to use.

2.2 Usability and emotional app perception

Several studies in the domain of information and communications technology have highlighted the importance of usability [16] and emotional components in user experience [17]. Usability implies the physical components of a piece of technology which enhances its use [16] and is for instance measured by efficiency, satisfaction, learnability, memorability and errors [18). In the context of mobile applications, [19] developed and validated various measurements namely application design, application utility, user interface input, user interface output and user interface structure. While the physical features of mobile applications are a prerequisite for the success of an application, another consideration for users is the emotional perception such as fun, pleasure and enjoyment they derive from such applications [20]. Prior research has shown a positive relationship between usability of mobile applications and emotional aspects such as enjoyment [21, 22]. Similarly, [23] found that system quality and perceived playfulness are critical factors that influence consumers' decisions. AR apps contain images, interactive features and gaming functionalities that produce excitement and heightens the pleasure of the user [2]. [24] examined the physical and interactive features of AR apps and found a positive association between the physical properties

and users' emotion (feelings of pleasure, feelings of control and arousal). We thus hypothesize that:

H1. AR app usability positively impacts on enjoyment

H2. AR app usability positively impacts on playfulness

H3. AR app usability positively impacts on entertainment

2.2 Emotional app perception, experience and intention to use

Studies have also established a relationship between usability and affective components of mobile applications and their influence on user experience [25]. There are different types of experience. In an offline context, [23] for instance look at emotional experience which is based on emotions and action experience Which is defined as experiences customers gain through participation in activities. Action experience positively influences behavioral intention. For emotional experience no direct link with behavioral intention could be found. In a study of mobile users in Taiwan, [26] found a positive and significant relationship between entertainment and customer experience. Similarly, [22] found a positive relationship between enjoyment and customer experience. The same study also establish a relationship between customer experience and positive emotions. Playfulness was also positively related to enjoyment [27]. Accordingly, we hypothesize that:

H4. AR app entertainment positively impacts emotional experience

H5. AR app enjoyment positively impacts emotional experience

H6. AR app playfulness positively impacts emotional experience

H7. AR app playfulness positively impacts action experience

H8. AR app entertainment positively impacts action experience

H9. AR app entertainment positively impacts action experience

Embedding affective components in mobile applications and its impact on user experience is strongly related to usage intention [28] and actual usage [29]. Pleasurable experiences strongly predict usage intention [30]. [31] found AR positively influences user experience which leads to higher user satisfaction and the willingness to buy more. However, [24] noted that only pleasure and arousal as emotional experiences positively influenced usage behaviour. Thus, we propose the following:

H10. Action experience has a positive impact on the intention to use an AR app

H11. Emotional experience has a positive impact on the intention to use an AR app

Fig. 1 presents the proposed conceptual model reflecting the hypothesized relationships between usability, emotional perception, two types of experiences, and intention to use.

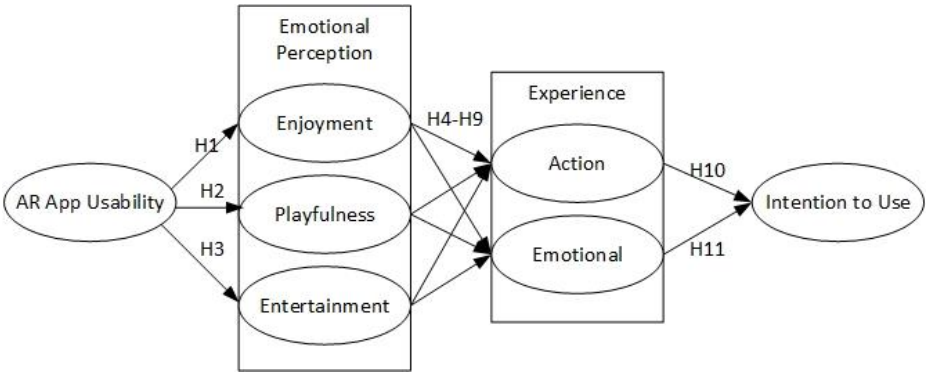

Fig. 1. Conceptual model (Source: authors' own figure)

3 Methodology

3.1 Research context

There are numerous augmented reality app examples. For this research we used Layar. a Dutch organization who was founded in 2009. The Layar app gained international recognition as being one of the first augmented reality browsers. Today Layar is part of the Blippar group (headquarter is in London) with the reputation of being one of the world's leading augmented reality and interactive print apps. Interactive print basically bridges the gap between print media of all form and digital media. One way Layar accomplishes this is by linking flat two-dimensional images or text to videos, 360-degree pictures, audio or social media. Watching encoded print media through the Layar app then augments the printed version. The questionnaire designed for this research comprised examples study participants had to try before answering the survey.

3.2 Questionnaire design and data collection

A questionnaire comprising four sections was designed. The first part comprised questions to reveal previous knowledge concerning augmented reality in general and Layar in particular. Example questions are whether they heard about augmented reality and/or Layar and which information sources they normally use to search for travel information. The second section introduced the app by showing a video about how Layar works (https://www.youtube.com/watch?v=ZR4eSmmPCxg) and it asked people to actually download the app to their phone. Then they had the chance to use Layar and actually experience how it works. They had to try at least one of the examples presented in Fig. 2. The way the examples are designed are all applicable and as such relevant in a tourism context.

Watch a video | Complete league tables | Slide through pictures

Fig. 2. Augmented print examples study participants experienced (Source: **https://www.layar.com/)**

Then, the third part of the questionnaire asked respondents about their experience with Layar and if they would like to use augmented reality sources such as the ones they just experienced in order to search for travel related information. They were asked about cognitive aspects looking at the augmented application usability, i.e. application design, application utility, interface in- and output and interface structure [19], affective aspects, i.e. enjoyment [32], playfulness [33], and entertainment [34]. Further, people responded concerning their experience with regards to action and emotional responsiveness [35]. Finally, they expressed their intention to use an augmented reality app in the future [36]. Table 1 provides an overview of all the items used. As an answer scale for all those items a 6-points Likert Scale from 1 (strongly agree) to 6 (strongly disagree) was used. The fourth and final part was about demographics.

Table 1. Constructs and measurement scales (Source: see sources added in Table 1)

Construct	***Items***
Augmented Reality Application Usability [19] (i.e. design, utility, interface input, interface output, interface structure)	- Overall, I think the Layar is designed well. - In general, I believe that Layar has a great design. - To me, Layar is very functional. - Generally speaking, Layar serves its purpose well. - In general, Layar allows me to scan print material easily. - Overall, the user input mechanisms are designed effectively on Layar. - In general, the multimedia content of the scanned print material is presented effectively. - Overall, I believe that Layar presents the multimedia content of the scanned print material very well. - Overall, I think Layar structures information effectively. - In general, Layar is structured very well.
Affective components - **Enjoyment** [32]	- I find Layar an entertaining app. - Using Layar is an agreeable way of passing time. - Overall, I find Layar enjoyable.

- **Entertainment** [34] - **Playfulness** [33]	- Layar was lots of fun to use. - I thought Layar was clever and quite entertaining. - Please indicate how much Layar added to the following: - Happiness, excitement, satisfaction, amusement
Experience [35] - **Action Experience** - **Emotional Experience**	- Using the app makes me think about my search behaviour. - Using the app influences my activities. - Using the app makes me think about my usage of my mobile phone. - The app makes me feel more engaged in my search. - The app is an emotional experience.
Intention to use [36]	- I think I will use Layar in the future. - I recommend that others use Layar. - I intend to use brands that offer Layar in the future.

The questionnaire was pre-tested among 43 people not only to reveal odds in terms of questions, spelling errors and language issues but also to check the feasibility of the actual usage of the augmented reality app with regard to the examples provided. Besides various typos and language issues the questionnaire turned out to be ready for the field. In order to control for confounding effects, the data was collected from a large student group from a UK university. That is, the researchers should be able to monitor the actual experiences of Layer by subjects and minimize any other environmental factors. Thus, the students registered a technology-related class are suitable to address the research questions. As a result, all of subjects have participated in the research as well as responded the survey. A convenience sample of 796 fully completed and usable questionnaires was collected.

3.3 Data analyses

In order to analyse the Sructural Equation Model (SEM) the second generation software Mplus [37] was used. An advantage of the tool is that it provides estimators for data which is not normally distributed. For this study the robust estimator MLM was used [38]. First, one has to examine the measurement model with regard to discriminant validity and convergent validity [39]. Second, the evaluation of the structural model follows. In order to evaluate the structural model in a second step it is suggested to use a combination of stand-alone and incremental fit indices. We used the Satorra-Bentler scaled chi-sqaure and the Root Mean Squared Error of Approximation (RMSEA) as stand-alone indices and the Tucker-Lewis Index (TLI) and the Comparative Fit Index (CFI) as incremental ones. Standardized solutions are reported.

4 Results

4.1 Sample description

The data comprises 59.4% female and 40.6% male participants with an average age of 25.70 (STD=11.44). 58.9% of the participants most of the time use an iOS system followed by 35.8% Android users. 49.9% have heard about augmented reality and

26.4% of Layar. On average people spend 5.68 hours online (STD=4.02) of which 5.63 hours are on their smartphone (STD=4.27).

With regards to their last holiday on average people stayed for 6.98 days (min=1, max=58, STD=5.48). 8.5% travelled by themselves, 20.9% with their partner, 29.9% with their family (including child/ren), 32.3% with friends and the rest with others. The most important information sources used to search for travel information for that last trip are websites (81.0%), followed by travel guide books (32.8%), mobile applications (27.1%), online ads (25.4%), magazines/newspaper ads (21.0%), and brochures (20.9%). Only 2.6% used augmented reality applications.

4.2 Model testing

The assessment of the measurement model reveals that the factor loadings are between 0.727 and 0.910 and as such they are well above the recommended threshold of 0.7 As all squared correlations between construct and its indicators are above 0.5 item reliability is achieved. The third column of Table 2 shows that Convergent Validity (CR) measures exceed the suggested threshold of 0.7 [39]. The [40] criterion requires all Average Variance Extracted (AVE) values to exceed 0.5. The diagonal in Table 2 shows that this criterion is met as the values range from 0.625 to 0.728. The comparison of the constructs' correlations and the AVE allows to further assess discriminant validity. As required all AVE values are higher than the squared correlations. All seven constructs the model comprises discriminate well from each other. Furthermore, the measurements of all the constructs proof to be unidimensional which is a requirement determined by various researchers [41, 42, 43].

Table 2. Discriminant validity and convergent validity (Source: compiled by authors)

				Affective Components			*Experience*		
		CR	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1	Usability	0.948	**0.648**						
2	Enjoyment	0.842	0.539	**0.728**					
3	Playfulness	0.896	0.284	0.432	**0.684**				
4	Entertainm.	0.832	0.332	0.452	0.561	**0.713**			
5	Action	0.856	0.310	0.317	0.406	0.276	**0.665**		
6	Emotional	0.768	0.448	0.464	0.531	0.487	0.781	**0.625**	
7	Use Intent	0.869	0.296	0.384	0.561	0.684	0.412	0.516	**0.689**

Based on a significant Satorra-Bentler scaled chi-square (χ^2= 1380.45, p<0.001) we examined the modification indices. However, no paths was added as there was no theoretical ground for it. An inspection of the fit indicators shows that all of them meet the essential level. With values of 0.905 and 0.916 respectively, both the TLI and CFI are above the required threshold of 0.9 [44]. RMSEA is at a satisfying level of 0.065.

Table 3 shows the details of the structural model results. The β-values show that Usability has the strongest impact on Enjoyment followed by Entertainment and then Playfulness. The Emotional Experience is driven by Entertainment and Playfulness. Enjoyment has a lower but also a significant impact. The main trigger for Action Experience is Playfulness followed by Enjoyment. Entertainment has the least impact. A striking insight is that Intention to Use is only driven by augmented reality users'

Emotional Experience. Action Experience has no effect. So, we can confirm ten postulated hypotheses. The only one we must reject is that there is an impact of action experience on the intention to use an AR app.

Table 3. Standardized path estimates and significances (Source: compiled by authors)

Endogenous variable	Exogenous variable	R^2	β	p-value
Usability	Entertainment	0.390	0.625	<0.001
	Playfulness	0.331	0.576	<0.001
	Enjoyment	0.571	0.756	<0.001
Entertainment	Emotional Experience	0.900	0.505	<0.001
Playfulness			0.495	<0.001
Enjoyment			0.199	<0.001
Entertainment	Action Experience	0.461	0.172	<0.001
Playfulness			0.460	<0.001
Enjoyment			0.210	<0.001
Emotional Experience	Intention to Use	0.710	0.810	<0.001
Action Experience			0.051	0.212

5 Discussion

5.1 Theoretical contribution

This paper makes an effort to contribute to literature by examining the relationships between usability, emotional perception (i.e. playfulness, enjoyment and entertainment), action- and emotional experience and the intention to use an AR app in the future in a travel context. Previous literature suggests that usability is a crucial antecedent for the positive emotional perception of a technology [20, 21, 22, 23]. Our results confirm that in the context of AR applications. Most of the previous studies looked at experience of a technology in general. We followed what [23] did in an offline context and analysed different types of experience namely action- and emotional experience. Action experience is mainly driven by playfulness while emotional experience is triggered by entertainment. In terms of the impact of action- and emotional experience on intentional behaviour our results contract with [23] findings. In an AR application context action experience has no significant impact on intention to use the AR app but it is all about the emotional experience that makes users want to use the app again.

5.2 Managerial implications

From a management perspective the results show that usability of an AR app basically is the very basic requirement for positive emotional perceptions. While usability is crucial the app must comprise features that users find enjoyable, entertaining and playful. In order to succeed in terms of travellers' willing to use the app in the future the focus must be on the emotional experience of users. Indeed, this insight should be useful for mobile technology designers who create the contents for mobile users. With the advancement of mobile technology, the smartphones can be a catalyst for travellers to easily use an AR application. In this sense, the AR content that can induce emotional aspects can not only motivate adoption behaviours but also enhance the influences of

AR on their user experiences for travel. Action Experience can be ignored. The most crucial design factor to focus on with an AR app to make its usage an emotional experience is entertainment followed by playfulness. So, depending on the context of the AR app relevant features must be identified and implemented.

5.3 Limitations and future research

This study is cross-sectional and focused on one AR app only. Future studies should examine different types of AR apps and examine effects over time. Further, it is worthwhile to look at differences regarding what service augmented reality provides. In our study this would be differences between using the AR app to watch videos, slide through pictures, or complete league tables. Other aspects such as looking at 360-degree pictures or showing versions of a place of different times in history should be considered too. Finally, it is suggested to add other potential emotional perceptions of an app and different types of experiences app users can have.

References

[1] Chang, S. C., & Hwang, G. J. (2018). Impacts of an augmented reality-based flipped learning guiding approach on students' scientific project performance and perceptions. *Computers & Education*, *125*, 226-239.

[2] Koo, C., Choi, K., Ham, J., & Chung, N. (2018). Empirical study about the pokémonGo game and destination engagement. In *Information and Communication Technologies in Tourism 2018* (pp. 16-28). Springer, Cham.

[3] Cruz, E., Orts-Escolano, S., Gomez-Donoso, F., Rizo, C., Rangel, J. C., Mora, H., & Cazorla, M. (2018). An augmented reality application for improving shopping experience in large retail stores. *Virtual Reality*, 1-11.

[4] Errichiello, L., Micera, R., Atzeni, M., & Del Chiappa, G. (2019). Exploring the implications of wearable virtual reality technology for museum visitors' experience: A cluster analysis. *International Journal of Tourism Research*.

[5] Bec, A., Moyle, B., Timms, K., Schaffer, V., Skavronskaya, L., & Little, C. (2019). Management of immersive heritage tourism experiencs: A conceptual model. *Tourism Management*, *72*, 117-120.

[6] Aluri, A. (2017). Mobile augmented reality (MAR) game as a travel guide: insights from Pokémon GO. *Journal of Hospitality and Tourism Technology*, *8*(1), 55-72.

[7] Ajibola, D., Shafombabi, V., Petrus, P., Shilongo, N., Thielen, E., & Sieck, J. (2018, December). Using augmented reality to enhance printed magazine articles about Namibian lodges. In *Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities* (p. 57). ACM.

[8] Techjury (2019). 20 Augmented Reality Stats to Keep You Sharp in 2019. Available

[9] Rese, A., Baier, D., Geyer-Schulz, A., & Schreiber, S. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change*, *124*, 306-319.

[10] Heller, J., Chylinski, M., de Ruyter, K., Mahr, D., & Keeling, D. I. (2019). Let me imagine that for you: transforming the retail frontline through augmenting customer mental imagery ability. *Journal of Retailing*.

[11] Rauschnabel, P. A., Felix, R., & Hinsch, C. (2019). Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, *49*, 43-53.

[12] Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems*, *19*(4), 9-30.

[13] Tam, C., & Oliveira, T. (2016). Understanding the impact of m-banking on individual performance: DeLone & McLean and TTF perspective. *Computers in Human Behavior*, *61*, 233-244.

[14] Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, *100*, 547-560.

[15] Craig, A. B. (2013). *Understanding augmented reality: Concepts and applications*. Newnes.

[16] Nayebi, F., Desharnais, J. M., & Abran, A. (2012). The state of the art of mobile application usability evaluation. In *2012 25th IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)* (pp. 1-4). IEEE.

[17] Cyr, D., Head, M., & Ivanov, A. (2009). Perceived interactivity leading to e-loyalty: Development of a model for cognitive–affective user responses. *International Journal of Human-computer studies*, *67*(10), 850-869.

[18] Nielsen, J. (1994). *Usability engineering*. Elsevier.

[19] Hoehle, H., & Venkatesh, V. (2015). Mobile application usability: conceptualization and instrument development. *MIS Quarterly*, *39*(2), 435-472.

[20] Merikivi, J., Tuunainen, V., & Nguyen, D. (2017). What makes continued mobile gaming enjoyable?. *Computers in Human Behavior*, *68*, 411-421.

[21] Lu, J., Liu, C., & Wei, J. (2017). How important are enjoyment and mobility for mobile applications?. *Journal of Computer Information Systems*, *57*(1), 1-12.

[22] McLean, G., Al-Nabhani, K., & Wilson, A. (2018). Developing a mobile applications customer experience model (MACE)-implications for retailers. *Journal of Business Research*, *85*, 325-336.

[23] Wang, K., & Lin, C. L. (2012). The adoption of mobile value-added services: Investigating the influence of IS quality and perceived playfulness. *Managing Service Quality: An International Journal*, *22*(2), 184-208.

[24] Kourouthanassis, P., Boletsis, C., Bardaki, C., & Chasanidou, D. (2015). Tourists responses to mobile augmented reality travel guides: The role of emotions on adoption behavior. *Pervasive and Mobile Computing*, *18*, 71-87.

[25] Wilmer, H. H., Sherman, L. E., & Chein, J. M. (2017). Smartphones and cognition: A review of research exploring the links between mobile technology habits and cognitive functioning. *Frontiers in psychology*, *8*, 605.

[26] Sheng, M. L., & Teo, T. S. (2012). Product attributes and brand equity in the mobile domain: The mediating role of customer experience. *International Journal of Information Management*, *32*(2), 139-146.

[27] Hung, S. Y., Tsai, J. C. A., & Chou, S. T. (2016). Decomposing perceived playfulness: A contextual examination of two social networking sites. *Information & management*, *53*(6), 698-716.

[28] Hur, H. J., Lee, H. K., & Choo, H. J. (2017). Understanding usage intention in innovative mobile app service: Comparison between millennial and mature consumers. *Computers in Human Behavior*, *73*, 353-361.

[29] Yang, S., Jiang, H., Yao, J., Chen, Y., & Wei, J. (2018). Perceived values on mobile GMS continuance: A perspective from perceived integration and interactivity. *Computers in Human Behavior*, *89*, 16-26.

[30] Hsu, C. L., Chang, K. C., & Chen, M. C. (2012). The impact of website quality on customer satisfaction and purchase intention: perceived playfulness and perceived flow as mediators. *Information Systems and e-Business Management*, *10*(4), 549-570.

[31] Poushneh, A., & Vasquez-Parraga, A. Z. (2017). Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy. *Journal of Retailing and Consumer Services*, *34*, 229-234.

[32] Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS quarterly*, 695-704.

[33] Holbrook, M. B., Chestnut, R. W., Oliva, T. A., & Greenleaf, E. A. (1984). Play as a consumption experience: The roles of emotions, performance, and personality in the enjoyment of games. *Journal of consumer research*, *11*(2), 728-739.

[34] Lastovicka, J. L. (1983). Convergent and Discriminant Validity of Television Commercial Rating Scales. *Journal of Advertising, 12*(2), 14-52. doi:10.1080/00913367.1983.10672836

[35] Wang, W., Chen, J. S., Fan, L., & Lu, J. (2012). Tourist experience and wetland parks: A case of Zhejiang, China. *Annals of Tourism Research*, *39*(4), 1763-1778.

[36] Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *The Management Information Systems Quarterly, 13*(3), 319-340

[37] Muthén, L., & Muthén, B. (2007). *Mplus User's Guide. Statistical Analysis with Latent Variables.* Los Angeles: Muthén & Muthén.

[38] Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in covariance structure analysis. In A. Eye & C. C. Clogg (Eds.), *Latent variables analysis: Applications for developmental research.* CA, US: Thousand Oaks: Sage Publications.

[39] Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, *56*, 81-105

[40] Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50

[41] Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*, 411-423.

[42] Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and ist assessment. *Journal of Marketing Research, 25*(2), 186-192.

[43] Hattie, J. A. (1985). Methodology review: Assessing unidimensionality of tests and items. *Applied Psychological Measurement, 9*(2), 351-362.

[44] Hu, L. T., & Bentler, P. M. (1995). Evaluating Model Fit. In R. H. Hoyle (Ed.), *Structural Equation Modeling: Concepts, Issues and Applications* (pp. 76-99). Thousand Oaks: Sage Publications.