Exploratory Study on Effect of Brand Experience and Interactivity of Digital Signage using Virtual Reality on Attitude

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Abstract

Objectives: This study provides the experience of digital signage advertising utilizing the 3D virtual reality and investigated the differences in the advertising and brand attitudes according to the levels of interactivity. **Methods/Statistical Analysis:** A two-way MANOVA analysis was performed for hypothesis test in which the brand experience of digital signage (cognitivevs. sensible) and the level of interactivity (low vs. high) were independent variables and the advertising attitude and brand attitude were dependent variables. The field experiment was performed with VR devices where 3D images were inserted. The data from 143 persons except for unreliable responses were used for the analysis. **Findings**: Recognizing the reality, our study made a contribution in that it investigated the difference of advertising attitude and brand attitude according to the brand experience using the 3D virtual reality as well as the levels of interactivity of digital signage. First, it was found from the experiment that the low level of interactivity with smart signage had a positive effect on the advertising attitude and brand attitude than the high level of interactivity. Second, considering the brand experience of digital signage, the advertising attitude was more positive with cognitive experience than with sensible experience, and contrarily, sensible experience was more effect for brand experience than cognitive experience. It is expected that the result of our study will be able to suggest the direction for the strategic evidence concerning the question. **Improvements/Applications:** This study simultaneously considered the quantitative and qualitative levels of interactivity for the establishment of a digital signage advertising strategy.

Keywords: Advertising Effectiveness, Brand Experience, Digital Signage, Interactivity, Virtual Reality

1. Introduction

Digital signage is a communication tool to induce the effects of marketing, advertisement, and training of and customer experience, meaning a digital image display device which provides certain information as well as broadcast programs in public places such as airport, hotel, and hospital. Digital signage media stand at the contact point with consumers, and are perceived as exclusive media that can provide them with interesting experiences. Recently, digital signage is being developed into

various forms that can extend the experience of consumers. Advertising strategies using digital signage offer the advantage of understanding the evolution of consumer responses on the media use by enhancing the interactivity between brands and users and getting them engaged in exploring the advertised information in an active manner¹.

Unlike the expectation of businesses and academia on digital signage advertisements, the responses of citizens turned out to be not so positive. From June 2015 to February 2016, big data from the social media (Facebook,

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blogs, and Tweeter) were analyzed through a big data analysis program 'Tibuzz', and more expressions of negative feelings were observed than positive ones. It is because the general public hardly has any experience about digital signage advertisements and they perceived them as another form of screen ads. However, away from the conventional advertisement effect and objective of 'exposure', digital signage is now shifting to the concept of communication effect in which 'experience' is gained through interactions with consumers and they share the experience themselves. In particular, this effect can be optimized when digital signage is linked with mobile (Seongwon Kim, 2012). In adverting practice, the demand for the effects of experiences caused by digital signage is increasing. This indicates that the need for studies on the brand experience of consumers shaped through digital signage is growing among the businesses as well as in the academia.

The focus of this study is to investigate the potential of digital signage at the level of general experience which influences the advertising attitude and decisionmaking when consumers have a new experience through digital signage. In addition, digital signage enhances the interactivity by engaging consumers to touch the screen themselves or to connect it to their mobile devices including smartphones for information and advertisements. However, if indiscriminately excessive interactivity is forced on customers based on this interactive characteristic of digital signage, it will interrupt them from concentrating on advertised information and it can eventually have a negative influence on the attitude or memory effect.

Therefore, this study provided the experience of digital signage advertisements utilizing the 3D virtual reality technology, and investigated the differences in the advertising attitude and brand attitude according to the various levels of interactivity.

2. Theoretical Background and **Hypothesis**

2.1 Digital Signage

Digital signage is different from the Digital Information Display (DID) which displays simple digital information

with an emphasis on the aspects of hardware. It is often defined as information display media which is built upon a complex combination of a variety of IT technologies including software, hardware, contents, and network². Recently, it evolved into a form that reinforces the interactive functions at points where consumers come in contact with it in combination of various IT media, and now is perceived as the 4th media after TV, internet, and mobile³. Furthermore, it is being perceived as a means to enhance the user experience with its recent convergence with smart technologies. Thus their definition is being extended to media capable not only of securing user engagement but also expanding to new experiences4.

Digital signage takes a variety of forms ranging from the large-scale display installed on the external wall of big buildings and the signboards and kiosks installed and managed inside buildings to small display devices on the streets, elevators, subway, supermarkets or banks. In general, the types of digital signage can be divided into two types - simple exposure type and interactive type - according to the place of installation, form of exposure, and communication method of the medium⁵. The simple touch type digital signage has the limitation that the medium simply exposes the advertisement to communicate information. The second one, 'interactive' type engages consumers to participate in person and experience the brand in combination with the touch pad technology, high-speed internet, and mobile technologies, fulfilling the role of exposing simple information or advertisement.

2.2 Brand Experience

Recently, digital signage is developing into a form of providing more varied consumer experience as it became connected to digital devices such as users' personal smart media, and allows them to experience the interaction. This is related to the strategic approaches to enhance the user experience in terms of advertisement effect of digital signage. It raises the interest by providing contents in various forms and attracts the attention at the points of contact with consumers⁶.

The perspectives on brand experience implemented in previous studies were approaches of four different levels (experiential brand perspective, attitude perspective,

sensibility-centered attitude perspective, and general experience perspective). The experiential brand perspective puts an emphasis on the dimension of sensibility, recognition, and attitude, and views experience as a type of brand image^Z. The perspective which views experience as sensibility-centered attitude emphasizes the sensibility and behavior, thus gives importance to the experience as pleasure, touching memories, and enjoyment8. It has been researched most in terms of marketing strategy and execution. Based on these perspectives, brand experience is not a short-term result by consumers and brand but is shaped through long-term and continued interaction. Thus it is most reasonable to understand it as experience shaped through the comprehensive experience of senses, sensitivity, cognition, behavior and relationship related to the brand⁹.

2.3 Virtual Reality and Interactivity

The current digital technology market is focused on developing a variety of 3D contents and interface. Contents based on the 3D Virtual Environment (VE) technology are casting a great influence in the game and mobile sectors as well as the film and animation industry. 3D image possesses the capacity to represent the reality in a precise and sophisticated manner and various factors that fix the attention 10, and these factors allow users to have an experience that feels as real as the reality11. Inside the virtual reality, a natural feedback can be given that is closest to the reality¹². There exist various platforms as a method to realize the virtual reality through 3D inside games¹³.

Digital signage offers the advantage of putting up various information and advertisements at the same time, allowing users to selectively receive this information and increasing the interactivity with them in connection with digital media which they own. The recent advance of new media based on the internet and mobile environment is shifting the paradigm from the dimension of marketing communication to the interactive media-centered one. In this regard, a higher level of interactivity means higher acceptance of information, which has a positive effect on memory and attitude14. Studies on the effect of interactivity have been conducted along the studies on the internet advertisement effects, and the result has been consistent that the effects of this interactivity and internet advertisement are positive¹⁵. However, digital signage is media that communicate contents in a direct way such as sensibility, behavior, cognition, and relationship, and it is not possible to affirm that high interactivity always guarantees a positive communication effect. For this reason, it is necessary to find a way to maximize the communication effect which is most appropriate taking the quantity and quality of the interactive levels into account. Unfortunately, the truth is that there are hardly any studies available on the interactivity of digital advertisement, as only the online effect of interactivity is considered. Furthermore, the media industry itself that implements digital advertising neglects the strategic perspectives, blinded by the expectation that unconditional increase of interactivity will be ever more effective. Indiscriminate reinforcement of interactivity will disturb users from concentrating on the advertised information affecting the attitude and memory effect16.

This study organized previous studies and made a comprehensive analysis. Hypotheses were generated through conceptualization on what effects the experience and interactivity of digital signage using 3D virtual reality have on brand experience and attitude, the study subject of this investigation-

- Hypothesis 1: According to the level of interactivity of digital signage using VR, there will be a difference in advertising attitude.
- Hypothesis 2: According to the level of interactivity of digital signage using VR, there will be a difference in brand attitude.
- Hypothesis 3: According to brand experience of digital signage using VR, there will be a difference in advertising attitude.
- Hypothesis 4: According to brand experience of digital signage using VR, there will be a difference in brand attitude.

3. Research Method

3.1 Manipulation of Experiment Object

In order to manipulate the experiment object, the New York time square was recorded with a 3D camcorder, and it was designed and modified into 4 different dimensions according to the levels of brand experience (cognitive experience and sensible experience) and interactivity (low interactivity and high interactivity) of specific digital signage.

The experiment object was manipulated to allow users to virtually experience the functions of a virtual camera brand for the cognitive experience of digital signage. For the sensible experience, an image was inserted which gives the experience of the love of family and couple through a camera, which users could control themselves.

For the manipulation of the low interactivity of digital signage, it was manipulated into two interactivity factors. In the first interactivity, the experiment subject approaches the smart screen device and when the screen is touched, the exposure of an advertisement of 'smart P' is forced on play for 30 seconds and it ends with an image of a tablet PC appearing in the center of the screen. In the manipulation of the second interactivity, the camera installed on a smart signage is operated, and users can take pictures with it. For the manipulation of high interactivity, 5 elements were assigned. When the screen is touched, users are exposed to an advertisement, and then an image appears which introduces the information about the 5 main properties (portability, design, CPU, camera functions, and resolution) of the tablet PC. When the subject touches a related image, the image gives an introduction about the corresponding point on the screen. Later, the camera installed on the smart site signage is turned on, and the subject can take pictures of them and send them to their own camera. They uploaded them on their Facebook account, and were asked to write some comments on the experience.

3.2 Experiment Process

The field experiment was performed at certain spots on a university campus with VR devices where 3D images were inserted. They were designed to allow subjects to have a virtual brand experience of digital signage. After completing the experience which lasted for about 5 minutes, the subjects answered the survey. When the entire experiment was complete, a mobile coupon was given as gift. The data from 143 persons except for unreliable responses were used for the analysis.

4. Research Result

A two-Way MANOVA analysis was performed for hypothesis test in which the brand experience of digital signage (cognitive experience vs. sensible experience) and the level of interactivity (low vs. high) were independent variables and the advertising attitude and brand attitude were dependent variables.

In the MANOVA analysis result as shown in Table 1, Table 2, the major effect on the brand experience (cognitive experience vs. sensible experience) had .44 (F = 86.61, df = 2, p<.01) for a Wilks' Lambda value, and the difference was statistically significant. The major effect on the level of interactivity (low vs. high) had .51 (F = 63.99, df = 2 p<.01) for a Wilks' Lambda value, and the difference was statistically significant. Lastly, the effect of interactivity on the two independent variables also showed a difference with a statistical significance with its Wilks' Lambda value of .81 (F = 16.10, df = 2, p<.01).

Next, the statistical difference in significance was tested through post hoc ANOVA analysis. First, the dependent variable brand attitude (F = 22.15, p<.01) showed a statistically significant difference in the post hoc ANOVA analysis on brand experience (cognitive experience vs. sensible experience). Moreover, brand attitude (F = 157.49, p<.01) also showed a significant difference. In the post hoc ANOVA analysis on the level of interactivity (low vs. high), the dependent variable advertising attitude (F = 102.85, p<.01) had a statistically significant difference as well as brand attitude (F = 21.37, p<.01). Lastly, in the post hoc ANOVA analysis on the effect of interactivity in relation to brand experience and interactivity, both advertising attitude (F = 12.70, p<.01) and brand attitude (F = 21.19, p<.01) had a significant difference.

Based on these results, a comprehensive analysis was conducted on the hypotheses as below (Figure 1, 2).

Hypothesis 1 anticipated that the advertising attitude will differ according to the level of interactivity of digital signage using VR. In the experiment result, it was found that the advertising attitude was higher in the condition of low interactivity (M = 5.48, SD = 1.16) than in that of high interactivity (M = 3.56, SD = 1.20). The hypothesis 1 was supported.

Table 1. Mean and std deviation

Dependent	Interactivity	Brand Experience	Mean	Std.Deviation	N
Aad	Low	cognitive	5.59	1.119	29
		sensible	5.38	1.206	34
		Total	5.48	1.162	63
	High	cognitive	4.41	.925	34
		sensible	2.93	.975	46
		Total	3.56	1.200	80
	Total	cognitive	4.95	1.170	63
		sensible	3.98	1.622	80
		Total	4.41	1.516	143
Ab	Low	cognitive	4.17	1.104	29
		sensible	5.76	1.017	34
		Total	5.03	1.319	63
	High	cognitive	2.32	1.296	34
		sensible	5.76	1.251	46
		Total	4.30	2.125	80
	Total	cognitive	3.17	1.519	63
		sensible	5.76	1.150	80
		Total	4.62	1.845	143

Table 2. Results of ANOVA

M · FC ·	MANOVA		ANOVA(F)		
Main Effect	Wilks' Lambda	F	df	Aad	Ab
A:Brand Experience	.44	86.61**	2	22.15**	157.49**
B: Interactivity	.51	63.99**	2	102.85**	21.37**
A X B	.81	16.19**	2	12.70*	21.19**

Note: *p<.05, **p<.01

Hypothesis 2 anticipated that the brand attitude will differ according to the level of interactivity of digital signage using VR. In the experiment, it was found that the condition of low interactivity ($M=5.03,\,\mathrm{SD}=1.31$) had a higher brand attitude than that of high level interactivity ($M=4.30,\,\mathrm{SD}=2.12$). Thus the hypothesis 2 was supported.

Hypothesis 3 anticipated that the advertising attitude will differ according to the brand experience of digital signage using VR. It was found that the advertising attitude was higher with the condition of cognitive experience (M = 4.95, SD = 1.17) than with that of sensible experience (M = 3.98, SD = 1.621). The hypothesis 3 was supported.

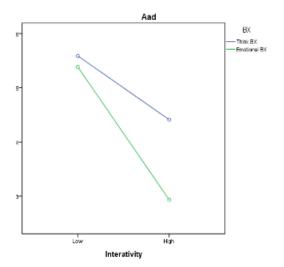


Figure 1. BX x interactivity in Aad.

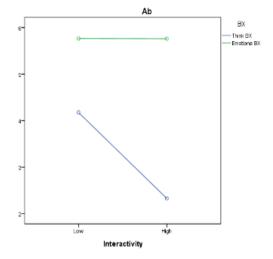


Figure 2. BX x interactivity in Ab.

Hypothesis 4 anticipated that the brand attitude will differ according to the brand experience of digital signage using VR. Through the experiment, it was found that the brand attitude was higher with the condition of sensible experience (M = 5.76, SD = 1.15) than with that of cognitive experience (M = 3.17, SD = 1.51). The hypothesis 4 was supported.

5. Conclusion

Digital signage advertisement market is expected to create totally different types of media, continuing to compete with conventional billboard ads and complement each other at times. The situation of the advertising market is changing at a revolutionary speed due to the changes of social trends following the expansion of smart media devices and the advancement of social network services and IT technologies. Along with these tides, the role and diffusion of digital signage is gaining an ever increasing importance in our time. Despite this trend in our generation, very little has been studied about the effect of digital signage. Recognizing the reality, our study made a contribution in that it investigated the difference of advertising attitude and brand attitude according to the brand experience using the 3D virtual reality as well as the levels of interactivity of digital signage. The important points regarding the study result and practical implications are as follows:

First, it was found from the experiment that the low level of interactivity with smart signage had a positive effect on the advertising attitude and brand attitude than the high level of interactivity. Technologies that enhance the interactivity through the convergence with smart phone and SNS are being developed as digital signage is advancing dramatically. It is an important finding of this study that unconditional enhancement of interactivity of smart signage, however, also raises the avoidance against the increase, having a negative effect on attitude and memory. Thus, it is highly necessary to maintain a strategic perspective that can incorporate technology and contents together by providing the property information of products rather than information in the form of images at a most appropriate level of interactivity.

Second, considering the brand experience of digital signage, the advertising attitude was more positive with cognitive experience than with sensible experience, and contrarily, sensible experience was more effect for brand experience than cognitive experience. This differs from the process of attitude formation towards the conventional media. In case of ads on TV or printed media, if the advertising attitude is first of all positive, it influences the brand attitude positively in general. In case of new media ads such as digital signage, the trend is that the users have an increased desire for the experience of new media which had been never seen before through the use of media. As the engagement grows thereby, there is a tendency of increasing media engagement. Therefore, certain advertising strategies should be considered primarily in which digital media ads such as digital signage can provide reasonable cognitive experience and convey the functional experience of media and ads. The cognitive experience through digital signage enhances the curiosity. This is effective for advertising attitude; however, the effect may be only temporary. In order to maintain a consistent attitude towards ads and brand, a strategic direction should be considered that can convey sensible experience.

The recent advent of smart media has sparked the practical question of what kind of design is most appropriate as a strategy for the level of interactivity and content composition. It is expected that the result of our study will be able to suggest the direction for the strategic evidence concerning the question. In addition, this study simultaneously considered the quantitative and qualitative levels of interactivity for the establishment of a digital signage advertisement strategy, thus it will offer a direction for finding the point where the most suitable communicate effect can be maximized.

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