The Relationship among Perceived Innovation Characteristics of Screen Baseball Participants, Sport Commitment and Use Behavior

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Abstract. Screen sport is an innovative product created by fusing sports service products with new technologies such as VR technology. In order to expand the market, it is necessary to confirm what perceived innovation characteristics of screen sport affect the user's behavior. This innovative product differs from other sports fusion products, which are primarily device-based. Screen sport refers to products that provide customers with a sporting environment in which they can engage in physical activity. As a novel type of participating sport, further research is needed from the standpoint of participating sport. The screen sport is limited to screen baseball, and the relationship between perceived innovative characteristics of screen baseball participants, sport commitment, and user's behavior is investigated.

In this study, the questionnaire items were modified and supplemented based on past research to fit the goal of the study. The SPSS 21.0 and AMOS 21.0 programs were used to analyze the data acquired in the study, depending on the goal of the analysis. As a result, the relationship between each factor is shown to be favorable and acceptable.

Keywords: Perceived innovation characteristics, Sport commitment, Use behavior, Screen baseball, Sport industry, Virtual reality

1. Introduction

The development of virtual reality technology has evolved to the point where it can create a true sense of realism. This convergence with virtual reality has made it possible to provide an environment where sport activities can be experienced even in the absence of sufficient sporting facilities. As a result, the convergence of virtual reality technologies is changing the way consumers consume and experience sports (Chang, Han & Kim, 2019). Virtual reality refers to a virtual world created by a computer. As a state-of-the-art technology that helps people to experience reality, it provides experiences that are difficult to obtain in the real world it provides experiences that are difficult to obtain in the real world as well as

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environmental encounters, stimulates the five senses of the body, and enhances reality. According to the 2017 Sport Industry White Paper, the field of virtual reality is listed as one of the hottest fields related to the Fourth Industrial Revolution, and the most representative example is screen sport.

Screen sport is participating sports products newly created through the fusion of sport and ICT technology. Screen sports have the advantage of being less ecologically friendly than traditional sports in that it allows consumers to enjoy their favorite sport whenever and wherever they want. Screen sport initially started in the simulation industry, which has been widely applied in heavy industry fields such as automobiles, aviation, and shipbuilding. Today, it has expanded into various sport fields and is approaching the lives of the masses (Kim, 2016). In fact, various screen sports such as screen golf, screen baseball, screen riding, screen tennis, screen shooting, and screen archery are operated nationwide (An & Kim, 2016). This shows that screen sports have become more accessible, allowing people to experience a wider range of sports (Kim, Jeon & Choi, 2017). Furthermore, screen sport, which had a market value of 10 billion won in 2007, rose to 5 trillion won in 2018, and was discovered to have expanded more than 50 times in ten years (Kim, 2018). Screen sport, which is a representative field of the fourth industrial revolution in sport, can be seen to play an important role in the sport industry in terms of mass production of various screen sports contents, increasing consumer interest, and rapid growth of the market size. This highlights the need for research into screen sport.

Screen baseball is the second largest screen sport in Korea after screen golf. According to the 2018 Sports Indicators in Korea, there are 4,985 Korean baseball clubs and 159,232 members. Baseball is a sport that is loved in Korea. However, despite the fact that many people participate in baseball as a daily sport, the number of baseball stadiums among the public physical education facilities nationwide is only 293. Screen baseball allows many enthusiasts who have difficulty participating in sport activities due to a lack of facilities to participate in sport regardless of location or climate. In addition, screen baseball, which is an experience-based sport game, has a feature that actual movements are embodied in virtual reality and attract users' interest. It has been confirmed that such interests have a positive effect on the joy of sport and the value of experience (Han & Kim, 2019; Hwang & Kim, 2012). Recently, as various safety regulations to prevent the spread of COVID-19 have been applied, screen baseball is attracting attention as an alternative to safe sport activities with small personnel (Lee, 2021).

Figure 1: baseball
(Source: Goyang Urban Management Corporation)

Currently, there are about 500 screen baseball stadiums operating nationwide. Among them, about 15 brands are fiercely fighting (Ministry of Culture, Sports and Tourism, 2020). In the fierce competition of the screen baseball industry, experience factors cannot be overlooked by screen baseball field users who tend to recognize the empirical aspect as more important than the utilitarian aspect. A realistic experience marketing strategy is required to strengthen the experience factors of screen baseball stadium users and lead to continuous profit generation.

Figure 2: Screen baseball
(Source: Newdin Contents)

Screen sport is a form of participating sport newly created by the development of hands-on technology and social changes. South Korea will expand the field of screen sport to various sports, including screen golf. However, other disciplines, including screen baseball, have shorter implementation technology and content development time than screen golf.

Therefore, the variety of sports content that participants can participate in is insufficient.

Screen sport is a new product that combines athletic service items with modern technologies like virtual reality. In order to increase the market, it is vital to confirm how to screen sport's perceived innovation qualities influence user behavior. As a result, the goal of this study is to confirm the viability of sustained dissemination of screen sport, a new type of participatory sport, in the present market and to develop a revitalization plan.

We focused our investigation on screen baseball because it has the most sales floors and content outside of screen golf in South Korea.

2.   Method

2.1.   Research Model and Hypothesis

The key variables in this study were perceived innovation characteristics, sport commitment, use behavior for innovation, and diffusion research of Korean screen baseball. The subfactors that indicate the perceived innovation characteristics consist of relative advantage, compatibility, complexity, trialability, and observability. The commitment and use behavior of sport consisted of a single variable. The research model that schematizes this is shown in Fig. 3 below.

The research hypothesis is as follows.

H1: Perceived innovation characteristics of Korean screen baseball will have a positive impact on sport commitment.

H2: Sport commitment will have a positive impact on use behavior.

H3: Perceived innovation characteristics of Korean screen baseball will have a positive impact on use behavior.
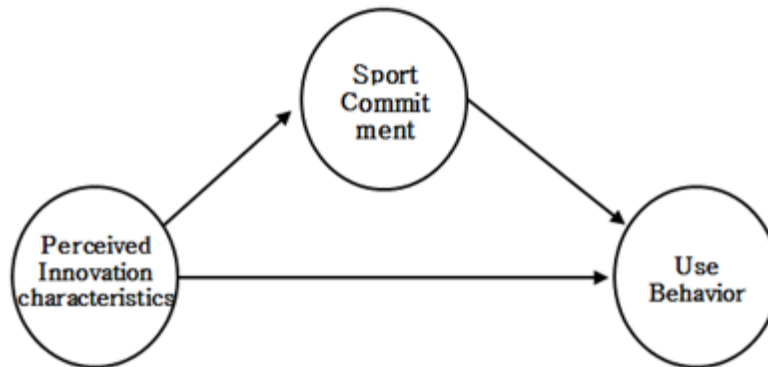

Figure 3: Research model

2.2.   Data Analysis

In this study, screen baseball is described as a participating sport product that uses virtual reality technology to provide sport participants with a new type of sport environment. The research method of this research is as follows: First, related previous studies were analyzed through literature study and official statistical data. Second, based on previous research, the questionnaire items for the empirical research were revised and supplemented to fit the goal

of this study. Third, the data collected in the research were analyzed by the SPSS 21.0 and AMOS 21.0 programs, depending on the purpose of the data analysis.

In order to derive results suitable for the purpose of this study, we selected adult men and women who have experience in both baseball and screen baseball. In light of the unprecedented events brought about by COVID-19, the questionnaire survey was moved to an online format. In this survey, 250 questionnaires were distributed. Of the collected questionnaires, the remaining 238 were used for the final analysis, excluding 12 of the respondents who did not fill in specific items or were dishonest. The questionnaire used as a measurement tool consisted of factors that could be measured by the self-administration method. Each factor was modified and reconstructed with security based on previous studies, and each factor was constructed on a Likert 5-point scale.

3. Results

The demographic characteristics of the subjects of this study are as follows <Table 1>.

<Table 1> Demographic characteristics (N=238)

	Demographic	N	%
Gender	Male	170	71.4
	Female	68	28.6
Age	20s	37	15.5
	30s	58	24.4
	40s	57	23.9
	50s	54	22.6
	60s	32	13.5
Occupations	Students	14	5.9
	Workers	164	68.9
	Self-employed	27	11.3
	Professional	22	9.2
	Others	11	4.6
Types of partner	Alone	16	6.7
	Couple/Family/Relative	50	21.0
	Friend/Senior and Junior	131	55.0
	Organization (company)	35	14.7
	Club	6	2.5

The scale used in this study has already been sufficiently verified for its constitutive validity through previous studies (Kline, 2005). Therefore, exploratory factor analysis to confirm the validity of the measurement tool was omitted. A confirmatory factor analysis was performed on this to confirm the stability, configuration validity, and goodness of fit of the inner product structure of the measurement tool. The conformance index was confirmed by

TLI and CFI, and the absolute conformity index was confirmed by RMSEA. RMSEA is recommended at an appropriate level when the TLI and CFI index is .9 or higher and when the RMSEA is .08 or lower (Bentler & Bonett, 1980; Bentler, 1990; Hu & Bentler, 1999). Based on confirmatory factor analysis, centralized validity was verified through the calculation of Concept Reliability (CR) and Average Variance Extract (AVE). The consistency index of centralized validity is judged to be okay when the CR and AVE values exceed .7 and .5, respectively.

In order to proceed with smooth research, ensuring the reliability of measurement tools must be prioritized. The Cronbach's α coefficient was used for the reliability analysis of this study. Used to check the internal consistency of factor questions. If Cronbach's α coefficient value is .6 or more, it is judged that there is no problem with reliability as a measurement tool (Nunnally, 1978). As a result of analyzing the reliability of the measurement tool, it is the same as <Table 2>. It was found that the reliability of the measurement tool was not a problem.

<Table 2> Confirmatory factor analysis & Reliability coefficient of each factors

Factor		Items	Estimate	S.E.	CR	AVE	Cronbach's α
Perceived innovation characteristics	Relative advantage	A1-1	.723	.235	.809	.587	.677
		A1-2	.615	.340			
		A1-3	.614	.324			
	Compatibility	A2-1	.635	.233	.823	.609	.676
		A2-2	.589	.341			
		A2-3	.715	.236			
	Complexity	A3-1	.785	.261	.914	.781	.878
		A3-2	.886	.135			
		A3-3	.855	.203			
	Trialability	A4-1	.701	.196	.897	.744	.778
		A4-2	.750	.155			

	A4-3	.767	.215			
Observability	A5-1	.780	.215	.927	.809	.870
	A5-2	.882	.128			
	A5-3	.840	.150			
	B1	.751	.273			
Sport commitment	B2	.840	.228	.899	.690	.854
	B3	.773	.244			
	B4	.727	.329			
	C1	.887	.143			
Use behavior	C2	.863	.181	.921	.796	.881
	C3	.782	.224			

x^2=338.051, df=188, CFI=.945, TLI=.932, RMSEA=.058

After that, the correlation analysis between the measured variables was performed. Correlation analysis is an analysis that examines how much there is a relationship between variables that are expected to be related to each other. Correlation coefficient values are expressed as values between -1 and 1. If both variables increase at the same time, correlation coefficient value will be displayed close to 1. When one variable decreases and another variable increases, the value of the correlation coefficient appears to be close to -1. A correlation coefficient of 0 indicates no correlation. It calculated Pearson's proportion correlation coefficient for correlation analysis. The analysis showed statistically significant correlations between all factors. In addition, the correlation between all variables was lower than .8. This can confirm that there is no problem with the multicollinearity between the factors. The results of the correlation analysis are shown in <Table 3> below.

<Table 3> Correlations between factors

	Perceived innovation characteristics	Sport commitment	Use behavior

Perceived innovation characteristics	1		
Sport commitment	.353***	1	
Use behavior	.558***	.673***	1
Mean	3.716	3.379	3.573
Standard deviation	0.436	0.688	0.727

***$p<.001$

In general, x^2 validation to see if a research model is appropriate has the drawback of being sensitive to sample size (Hong, 2000). Using the values of TLI, CFI, and RMSEA, which are absolute and incremental goodness-of-fit indexes designed to solve these problems. If both the TLI and CFI values are .9 or higher, it is considered to meet model suitability (Tucker & Lewis, 1973; Bentler, 1990). RMSEA, where 0 indicates maximum goodness of fit, determines that the higher the number, the less suitable the model (Hu & Bentler, 1999). The calculation results of the conformity index for this research model are shown in <Table 4> below. The TLI value (.937), CFI value (.951), and RMSEA value (.076) all satisfy the reference points of the goodness-of-fit index. And it is judged that it is not unreasonable to proceed with the research.

<Table 4> Result of research model's suitability

	x^2	df	p	TLI	CFI	RMSEA
Research model	121.553	51	.000	.937	.951	.076

A total of three hypotheses were set to confirm the perceived innovation characteristics of Korean screen baseball participants, the sport commitment, and the structural relationships between use behavior. The results of the path analysis for hypothesis verification are shown in <Table 5> below. First, the path coefficient between the perceived innovation characteristics of Hypothesis 1 and sport immersion was .634 (t = 5.700). Hypothesis 2 the path coefficient value between sport commitment and use behavior was confirmed to be .725 (t = 8.363). The path coefficient value between the perceived innovation characteristics and utilization behavior of Hypothesis 3 was .605 (t = 5.692). As a result of the path analysis between each factor, it was shown that the path coefficient value had a statistically significant positive (+) effect in the 95% confidence interval, and all hypotheses 1, 2 and 3 were accepted.

<Table 5> Results of direct effects

	Path	Estimate	*S.E*	*t*-value	
H1	Perceived innovation characteristics → Sport commitment	.634	.111	5.700[***]	Accepted
H2	Sport commitment→ Use behavior	.725	.087	8.363[***]	Accepted
H3	Perceived innovation characteristics → Use behavior	.605	.106	5.692[***]	Accepted

[***]$p<.001$

4. Conclusion

The purpose of the study is to see whether Korean screen baseball innovation characteristics may be accepted and propagated in the role of participating sport. The conclusion is as follows: First, perceived innovation characteristics of screen baseball participant are found to have a positive impact on the sport commitment. Second, it is found that sport commitment of screen baseball participant has a positive effect on use behavior. Third, perceived innovation characteristics of screen baseball participant is shown to have a positive impact on use behavior.

The sport activity environment combined with virtual reality technology has innovative characteristics that are different from the conventional ones. It was confirmed that the user had an immersive sport experience in the sport activity environment, which reflected this innovative feature. Such commitment in sport ultimately resulted in end-use behavior. There are also results that the perceived innovation characteristics felt by users directly affect their behavior. After all, even if new products are constantly being developed through the application of advanced technologies, it is critical in the sports industry to be accompanied by the experiential activities that customers have previously experienced.

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