

A study on the influence of interaction of virtual reality consumption pattern on consumers' purchase intention under the background of VR technology

Xiao-Yin Liu*, Jia-Yu Liu*, Zi-yang Liu*

*Student, Dept. of Global Business, Graduate School, Kyonggi University, Suwon, Korea

*Student, Dept. of Global Business, Graduate School, Kyonggi University, Suwon, Korea

*Professor, Dept. of Global Business, Graduate School, Kyonggi University, Suwon, Korea

[Abstract]

The purpose of this study is to explore the interaction of virtual reality consumption pattern under the background of virtual reality, and the influence of such interaction on consumers' purchase intention. In this paper, we selected three independent variables (including content interaction, function interaction and service interaction) and two mediating variables (including perceived quality and perceived value) to explore the relationship between them and consumers' purchase intention, used SPSS24.0 and AMOS24.0, made the analysis of reliability and validity, constructed the structural equation model, and tested the hypotheses. The findings show that: fourteen hypotheses are all true, and the perceived value of virtual reality has a positive influence on consumers' purchase intention. In addition, we find that the perceived value has a mediating effect in this study.

▶ **Key words:** Virtual reality consumption pattern, Interactivity, Perceived quality, Perceived value, Purchase intention

[요 약]

본 연구의 목적은 VR 기술을 토대로 하는 가상현실 소비 패턴의 상호작용 및 소비자의 구매 의도에 미치는 영향을 연구하고자 하는 것입니다. 본 연구의 3개 독립변수는 콘텐츠 상호 작용, 기능적 상호 작용, 서비스 상호 작용이고 2개의 매개 변수는 지각된 품질과 지각된 가치이며 이들 소비자의 구매 의도 간의 관계를 분석하고자 한다. 연구 과정에서는 SPSS24.0 및 AMOS24.0 소프트웨어를 사용하였으며, 신뢰성과 타당성 분석, 그리고 구조 방정식 모델을 통해 가설 검증을 수행하였다. 연구 결과에 따르면 14개의 가설이 모두 성립되며 VR 기술의 지각된 가치가 소비자의 구매 의도에 긍정적인 영향을 미친다. 또한 분석을 통해 지각된 가치가 매개 효과가 있는 것으로 확인할 수 있다.

▶ **주제어:** 가상현실 소비모델, 상호 작용성, 감지품질, 감지가치, 구매의향

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- First Author: Xiao-Yin Liu, Corresponding Author: Zi-yang Liu
 - *Xiao-Yin Liu (liuxiaoyin@naver.com), Dept. of Global Business, Graduate School, Kyonggi University
 - *Jia-Yu Liu (304725427@qq.com), Dept. of Global Business, Graduate School, Kyonggi University
 - *Zi-yang Liu (victor@kgu.ac.kr), Dept. of Global Business, Graduate School, Kyonggi University
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I. Introduction

1.1 Research background

Virtual Reality, as a new comprehensive information technology, sprung up at the end of the 20th century, is a computer simulation system that can create virtual space, and uses computer technology to generate simulation environment, namely, multi-source information fusion, interactive 3D visual scene and dynamic behavior system simulation [1]. By applying virtual reality technology to online shopping and creating a real three-dimensional shopping scene, consumers can get a new experience in physiological perception (such as in visual sensation, auditory sensation, tactile sensation and so on) through VR devices, and then further realize rational perception (such as personality, creativity, novelty and initiative) in their online shopping. It can be seen that VR technology affects consumers' shopping perception and will ultimately affect their shopping decisions. Because consumers can achieve fully autonomous shopping to meet their own needs without leaving home by using VR technology, how to make consumers comfortable shopping in the VR world, obtain and study consumers' shopping perception process, and ultimately improve the VR shopping standards of enterprises and consumers has become the core of common concern to enterprises and academic circles, and is a new and important topic.

1.2 Research Significance

From the theoretical perspective, this study has supplemented that lack that most current studies are focusing on the enterprise side and mainly targeting at "to Business". This study is carried out from the consumers' perspective to study the influence of VR technology on their online shopping behavior and how to improve their shopping experience. This study has built up a impact model of human-machine interaction under VR technology on the purchasing willingness, and tested the influence

of interactive variables and the two intermediate variables of perceived quality and perceived value on consumers' perception of shopping, and enriched the relevant theories of consumer psychological studies under new technologies.

From the practical perspective, a study on consumers' intention is helpful to (1) fully understand and know about future demand of online consumers so as to improve satisfaction and loyalty, (2) complete the relevant functions of VR technology on e-commerce platforms, enhance enterprise influence, and improve its adaptability and development potential in the economic environment in the future, (3) effectively promote the development of VR technology in other relevant aspects such as tourism, training, education, health, etc. As there's market, there will be demand. Enterprise should provide consumers with satisfying goods and shopping environment, and technology will promote economic development.

II. Literature review

2.1 Content interaction

By experiments, Nguyen (2019) has proved that: by using VR technology, students can not only successfully create rich and robust VR content on the web, but also execute these projects in a short time, and rich and robust project content can better stimulate consumers' purchase intention [2]. In the study of the influence of the screen size of mobile devices on the experience effect of 3D content in the form of AR/VR technology, Zhang (2020) has also pointed out that participants tend to use larger screen mobile devices for interactive experiences, and the larger the screen of mobile devices is used, the richer the content of goods is displayed, and the stronger the consumption intention of participants is, which also confirms the rich content interaction can be more attractive to consumers to consume [3]. At the same time, Lee (2020) has pointed out that it is necessary for users

to know VR game content to provide reference for VR game content development [4]. Content interaction refers to the amount and value of information that the website conveys to customers through the network, and is the fundamental purpose and value embodiment of the interaction between human and machine.

2.2 Functional interaction

Lipton (2017) has pointed out that people can experience the virtual environment in a vivid way and move naturally after wearing VR devices and playing the role of virtual robot or human [5]. Cha (2017) also believes that VR enables people to have immersive experience in a simulated virtual environment [6]. Through VR technology, consumers can choose the shopping scene to enter a virtual environment for simulated immersive shopping, which is the function of VR shopping to replace the physical shopping. Function interaction refers to the function and value of the website used by customers in online shopping, and is reflected by the experience of human-computer interaction.

2.3 Service interaction

Bitner (1990) has pointed out that service interaction is a process in which customers interact with service staffs, physical facilities and other tangible elements [7]. The role of VR technology in online shopping is more like an embodiment of service interaction interface, which is the media or means to realize service interaction. Because of its physical existence and some attributions (such as exhibition, intelligence, interactivity, sociality, efficiency and emotional attraction), service interaction interface has become a platform for customers to obtain experience value. In essence, online shopping is a kind of service experience mode, and service interaction reflects the service value and aims at the service between human and computer and the interaction between people.

2.4 Perceived quality

Perceived quality is consumers' subjective evaluation in purchasing activities based on sensory experience (such as brand, quality, price and packaging), while consumers' virtual experience given by VR technology often has deep subjectivity. Tsotsou, R. (2006) has pointed out that consumers' perception of product quality is the core of perceived quality [8]. Golder and Mitra (2012) think that perceived quality is not the consumers' experience after they have used the product really - which makes the virtuality of VR technology closely related to the perceived quality [9]. Zhang Jingmin (2017) has also pointed out that subjectivity, abstraction, relativity and limitation are the characteristics of perceived quality [10]. Therefore, in VR shopping, consumers' perceived quality refers to the comprehensive shopping evaluation and judgment of commodities, environment and process by using VR technology.

2.5 Perceived value

Sweeney (2001) has proposed that quality factor, price factor, social value and emotional value together constitute perceived value, and consumers' perceived value will directly affect the willingness to buy goods [11]. Zeithaml (1988) has proved from the perspective of consumers' psychology that the level of perceived value directly affects consumers' purchase intention [12]. Vishwakarma (2020) has found that perceived value is one of the most important predictors of VR [13]. In VR shopping, consumers' perceived value is not only the direct judgment of goods and shopping environment, but also the first step of VR influencing consumers' psychology, and is the basic judgment of online consumers on specific websites or forms.

2.6 Purchase intention

Shank (2017) has found that users' positive emotions and attitudes towards products, services and customized experience stores will affect their

purchase intention [14]. Martínez-Navarro (2019) have proved that the dual channels of the influence of VR technology on consumers' purchase intention are the influence caused by emotion and sense of existence, as well as the influence caused by virtual environment and brand recall [15]. In the comparative study of ordinary advertising and VR advertising, Leung (2020) has also pointed out that VR technology has an important influence on consumers' purchase intention [16]. Van (2017) has proposed that vividness of VR technology is more than that of traditional purchase modes, and vividness has more positive influence on brand attitude, thus stimulating consumers' purchase intention [17]. Purchase intention is the possibility that consumers will purchase products.

III. Research Model and Hypothesis

3.1 model construction

Based on the study of VR shopping platform technology and consumers' shopping psychology, and combined with consumers' VR online shopping process to make analysis, this paper constructs its interaction variables (including content interaction, function interaction and service interaction) and VR consumers' perception variables (including perceived quality and perceived value), and studies the influencing factors of consumers' purchase intention. The study model is shown in Fig. 1.

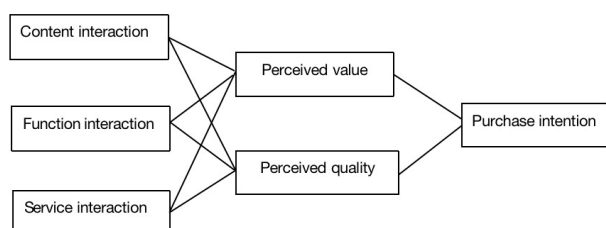


Fig. 1. Model of influencing online consumers' purchase intention under VR technology

3.2 research hypothesis

The following core assumptions are put forward for the interaction variables and perception variables:

H1: Content interaction has a positive influence on the perceived quality of VR shopping mode

H2: Function interaction has a positive influence on the perceived quality of VR shopping mode

H3: Service interaction has a positive influence on the perceived quality of VR shopping mode

H4: Content interaction has a positive influence on the perceived value of VR shopping mode

H5: Function interaction has a positive influence on the perceived value of VR shopping mode

H6: Service interaction has a positive influence on the perceived value of VR shopping mode

The following hypotheses are put forward for perception variables and purchase intention:

H7: Perceived quality of VR shopping mode has a positive influence on purchase intention

H8: Perceived value of VR shopping mode has a positive influence on purchase intention.

The following hypotheses are put forward for the perception variables' mediating effect between interaction variables and purchase intention:

H9: Perceived quality has a mediating effect between content interaction and purchase intention

H10: Perceived quality has a mediating effect between function interaction and purchase intention

H11: Perceived quality has a mediating effect between service interaction and purchase intention

H12: Perceived value has a mediating effect between content interaction and purchase intention

H13: Perceived value has a mediating effect between function interaction and purchase intention

H14: Perceived value has a mediating effect between service interaction and purchase intention.

3.3 data analysis method

This study took online shopping group as the research objects, published the questionnaire on

www.wjx.cn, and spread it through Wechat and other social means. After the respondents filled out the questionnaire, the data were collected. A total of 368 questionnaires were collected, 16 questionnaires were invalid, 352 questionnaires were valid, and the effective rate was 95.7%. SPSS24.0 and AMOS24.0 were used to analyze the data.

IV. authentic proof analysis

4.1 reliability analysis

Based on the above table, it can be seen that Cronbach's α of each variable in this study is 0.821-0.917, which indicates that each latent variable has good reliability, the overall reliability of the questionnaire is also good, and the requirements of empirical analysis are met.

Table 1. Reliability analysis results

| research variable | Number of topics | Cronbach's α |
|-------------------------------|------------------|---------------------|
| content interaction (CI) | 3 | 0.875 |
| functional interaction (FI) | 3 | 0.833 |
| service interaction (SI) | 4 | 0.877 |
| perceived quality (PQ) | 3 | 0.877 |
| perceived value(PV) | 3 | 0.869 |
| purchase intention(PI) | 4 | 0.917 |

Table 2. Exploratory factor analysis results

| | Rotated Component Matrixa | | | | | |
|-----|---------------------------|--------|--------|--------|-------|--------|
| | Component | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| PI4 | 0.777 | 0.126 | 0.15 | 0.299 | 0.195 | 0.193 |
| PI3 | 0.763 | 0.237 | 0.229 | 0.166 | 0.179 | 0.203 |
| PI1 | 0.763 | 0.175 | 0.164 | 0.208 | 0.212 | 0.279 |
| PI2 | 0.742 | 0.198 | 0.12 | 0.313 | 0.252 | 0.262 |
| SI1 | 0.185 | 0.804 | 0.114 | 0 | 0.187 | -0.064 |
| SI4 | 0.202 | 0.771 | 0.287 | -0.022 | 0.162 | 0.215 |
| SI3 | 0.084 | 0.721 | 0.398 | 0.012 | 0.199 | 0.215 |
| SI2 | 0.182 | 0.68 | 0.347 | 0.071 | 0.162 | 0.339 |
| CI3 | 0.196 | 0.198 | 0.845 | 0.078 | 0.262 | 0.139 |
| CI1 | 0.174 | 0.275 | 0.802 | 0.064 | 0.183 | 0.111 |
| CI2 | 0.125 | 0.338 | 0.768 | -0.068 | 0.067 | 0.144 |
| FI3 | 0.239 | -0.024 | 0.051 | 0.854 | 0.082 | 0.065 |
| FI1 | 0.181 | -0.012 | -0.011 | 0.837 | 0.138 | 0.164 |
| FI2 | 0.217 | 0.052 | 0.017 | 0.737 | 0.192 | 0.296 |
| PV1 | 0.223 | 0.118 | 0.203 | 0.141 | 0.821 | 0.193 |
| PV2 | 0.202 | 0.274 | 0.205 | 0.201 | 0.751 | 0.193 |
| PV3 | 0.251 | 0.282 | 0.149 | 0.16 | 0.747 | 0.146 |
| PQ1 | 0.34 | 0.155 | 0.12 | 0.272 | 0.179 | 0.736 |
| PQ3 | 0.327 | 0.21 | 0.164 | 0.263 | 0.222 | 0.727 |
| PQ2 | 0.308 | 0.175 | 0.305 | 0.218 | 0.262 | 0.65 |

Six common factors that can be extracted from the above table are the same as that of the original questionnaire, load coefficients are all above 0.6, the total variance explained by the common factors is 78.777%, and most of the information of the original variables are reflected, which proves that the scale has good validity.

4.2 hypothesis verification

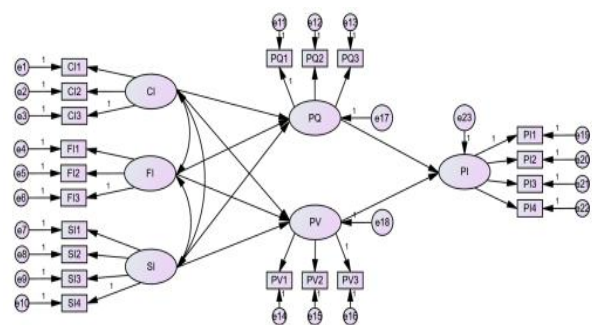


Fig. 2. Structural Equation Model Diagram

In terms of the test of the basic fitness indexes of the model, according to the test methods of Bogozzi (1988) and other scholars, based on the results (that is, CMIN/DF = 1.814 < 3, GFI = 0.925, AGFI = 0.901, RMSEA = 0.048 < 0.08), we are sure that the model fitness is good according to criteria.

Table 3. Model Path Test Results

| Path relationship | Estimate | S.E. | P | Hypothesis test result |
|-------------------|----------|-------|-------|------------------------|
| PQ ← CI | 0.148 | 0.061 | 0.016 | pass |
| PQ ← FI | 0.718 | 0.068 | *** | pass |
| PQ ← SI | 0.618 | 0.11 | *** | pass |
| PV ← CI | 0.206 | 0.067 | 0.002 | pass |
| PV ← FI | 0.486 | 0.065 | *** | pass |
| PV ← SI | 0.599 | 0.117 | *** | pass |
| PI ← PV | 0.272 | 0.064 | *** | pass |
| PI ← PQ | 0.712 | 0.07 | *** | pass |

The evaluation indexes of hypothesis test results are sorted out, as shown in Table 3. According to the hypothesis test results of the structural equation, we can get the following results:

Content interaction, function interaction, and service interaction have a positive influence on the

perceived quality of VR shopping mode; perceived quality and perceived value of VR shopping mode have a positive influence on purchase intention.

4.3 Analysis of mediating effect

For the mediating effects of perceived value and perceived quality, this study continued to use Bootstrap Method to repeatedly sample the original data to form a new sample with a capacity of 5000. The results are as follows:

Table 4. Results of mediating effect analysis

| Effect Path | Estimate | SE | Lower | Upper | P |
|-------------|----------|-------|-------|-------|-------|
| CI→PQ→PI | 0.147 | 0.073 | 0.008 | 0.293 | 0.039 |
| FI→PQ→PI | 0.646 | 0.069 | 0.514 | 0.783 | 0 |
| SI→PQ→PI | 0.567 | 0.013 | 0.322 | 0.829 | 0.001 |
| CI→PV→PI | 0.175 | 0.072 | 0.037 | 0.323 | 0.016 |
| FI→PV→PI | 0.428 | 0.085 | 0.274 | 0.607 | 0 |
| SI→PV→PI | 0.512 | 0.133 | 0.259 | 0.792 | 0.001 |

From the mediating effect test table, we can draw the following conclusions:

Perceived quality has a significant mediating effect between content interaction, function interaction, and service interaction and purchase intention; perceived value has a significant mediating effect between content interaction, function interaction, and service interaction and purchase intention.

V. Conclusion

5.1 Conclusions and limitations

From the abovementioned study, this paper draws the following conclusions:

(1) Content interaction, function interaction, and service interaction have a positive influence on perceived value and perceived quality.

Based on a theoretical exploration of the relationship between content interaction, function interaction, and service interaction, this paper discovers that content interaction has a positive influence on perceived value and perceived quality, so as function interaction and service interaction.

Therefore, under the background of VR technology, focusing on the product's content, function, and service interaction will significantly promote the consumers' perceived value and perceived quality. The purchase intention will only be generated after the consumer has fully understood the value and quality of the product.

(2) Perceived value and perceived quality have a positive influence on purchase intention.

Product display is only an external presentation. The actual factors that can promote consumers' purchase intention are the perceived value and perceived quality of the consumers. After studying the relationship between product and consumers' purchase intention, this paper has discovered that perceived value and perceived quality are the root driver to promote purchase intention, which means that the guarantee of product quality and value will promote the purchase intention of the consumers.

5.2 Enlightenment

By constructing a conceptual model of the influence on online consumers' purchase intention under VR technology, and using the methods of questionnaire and data analysis, this paper draws the following conclusions:

In the external environment of VR online shopping, human-computer interaction is an important variable that affects consumers' purchasing intention. Combined with the test results of the website model and the moderating effect of variables, the influence of human-computer interaction on consumers' purchase intention can be reflected through content, function and service interaction. In terms of VR shopping with the characteristics of virtual reality service and online experience service, there is difference among the levels of influence of three interaction factors on consumers' perception, the influence of service interaction is the largest, the influence of content interaction is the second, and the influence of function interaction is the least, but the test results are all significant.

Perception variables have a certain moderating effect. Perceived value and perceived quality play a part of mediating role in the relationship between interactivity and consumers' purchasing intention, which indicates that consumers' environment interactivity can directly or indirectly affect their purchase intention in the process of online shopping with VR devices, and the indirect influence is made through perceived variables.

5.3 Limitation of the study

First of all, there is no comprehensive discussion of all critical factors affecting VR consumers' shopping perception. Among many factors influencing VR consumers' shopping perception, this paper only discusses the factors influencing VR consumers' shopping perception from human-computer interaction and experience.

Secondly, the research objects are relatively limited. While collecting data, this paper proposes a primary analysis mode based on an intersection of a specific period. The users who are registered with and purchase from the well-known comprehensive shopping website are selected; they have a certain understanding of online shopping and businesses and can generate a certain degree of trust; they may pay attention to whether the service content provided by businesses is beneficial to themselves, therefore, in the survey, they may fill out the questionnaire but not make a detailed analysis of all the questions.

Finally, the topic of this paper is in a new aspect, and the existing literature is not sufficient. With VR technology development and more application in e-commerce and abundant related research materials, we can get more theoretical support. Also, a more reasonable variable measuring method can be adopted in the future to make the research conclusion more scientific, precise, and persuasive.

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Authors



Xiao-Yin Liu. Received the Bachelor's and Master's Degrees from Konyang University, Currently Studying for a Doctoral Course in Global Business from Kyonggi University. During in Doctoral Course Mainly engaged

in the field of Big Data and Business, Consumer Psychology, and E-business.



Jia-Yu Liu. Received the B.A. and the M.A. degree from Shandong University of Arts , Currently studying for a Doctoral Course in Global Business from Kyonggi University. During in Doctoral Course Mainly engaged

in the field of Big data and Business, Consumer Psychology, and E-business.



Zi-yang Liu. Received the B.A. degree in Management from Army superintend institute of Shijiazhuang China PLA ,China, in 2006, M.A. degree and Ph.D. degree in Management from Kyonggi University, Korea,

in 2010 and 2013, respectively. Dr. Liu joined the faculty of the Global Business Kyongggi University, Korea in 2015. He is currently a Professor in the Global Business Kgonggi University. He is interested in Quality Management, Big data & Business, International economics, E-business, Global Business etc.