Study on Virtual Reality and E-commerce

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Abstract

Electronic commerce (E-commerce) using virtual reality (VR) has the advantage of being able to purchase products without restrictions of time and location by overcoming the limitations of existing offline transactions. It is still a rudimentary but fast growing technology, and the use of E-commerce in VR is expanding. The barriers that consumers might face in utilizing E-commerce in VR is the relevance to Information and Communications Technologies (ICT) technology. Fundamentally, it requires Internet access and use through PCs or mobile devices such as smart phones. Because unlike off-line markets, it is difficult to determine the purchase patterns of customers, customer purchasing behavior analysis must be done using computer access records.   In order to expand and develop E-commerce in VR in the future, learning ability should be improved through combining with artificial neural network by deep learning that is recently in the spotlight, and the ability to overcome errors need to be improved to enable use in various fields.

Keywords: VR, E-commerce, ICT, AR.

1. Introduction

Recently, interest in electronic commerce (E-commerce) using virtual reality (VR) is increasing. In addition to research on consumer behavior in VR, analysis on economic performance is also being performed. Considering the speed of E-commerce of VR and the ripple effect on the industry, online E-commerce is attracting attention as a field with high potential in the future [1].

The function of VR is giving sense of reality and immersion based on 3D VR graphics. In order to explore the benefits that cannot be obtained from existing offline purchasing and to be successful in E-commerce in VR, it is necessary to closely analyze the effects on consumer purchasing intentions such as price comparison and quality comparison. Simple information search function and two-dimensional Internet environment will not be able to stimulate desire in customers and it will be difficult to lead to purchase.

The possibility for customers to use information communication technology conveniently for purchase should be explored, information desired by customers should be provided through customer purchasing behavior, and ways to improve E-commerce satisfaction in customers must be found.

2. Theoretical Background

2.1 Concept of VR

VR is a technology that allows people to have a realistic experience by experiencing the five senses of the human body (visual, auditory, olfactory, taste, touch) by providing experiences or environments that are difficult or impossible to obtain by using artificial technology. It has been studied since 30 to 40 years ago, but it has not been popularized.

However, with the recent advancement of Information and Communications Technologies (ICT) related technology, VR technology has been applied to E-commerce.

As the concept and scope of VR are expanded, researchers define it in various ways, but in summary, it can be described as 'humans feeling sense of reality in a virtual space created by computers'. It can be classified into projected reality where the consumer can experience VR that the computer creates while being in reality and augmented reality (AR) that provides video and audio that can combine with senses of reality.

2.2 E-commerce Frame of VR

In order to create a sophisticated VR that is virtually indistinguishable from reality, it is necessary to have a very advanced computer with very sophisticated equipment and fast computing power. However, as shown in Table 1, in this study, the E-commerce frame of VR is not VR using large-scale equipment but a VR such as a 3D graphic provided as a user interface on the Internet [2, 11].

Table 1. Virtual Commerce Framework

Out of store: Home design Remote inventory check	Social shopping
In store: Product visualization Makeup mirror	Virtual fitting room/product trial

3. VR and E-commerce

3.1 Application of VR in E-commerce

VR is a three-dimensional artificial environment that users can interact with. Real-time interaction and immersion should be assumed, rather than simple 3D visual images. With the potential of VR to enrich the user experience, E-commerce is applicable for market preemption. The E-commerce industry has had an unbalanced growth in the past. The internal elements that make up the foundation of the industry such as customer management and promotion have greatly improved, but the online user experience has not improved greatly. In this situation, as shown in Table 2, VR is being actively applied as a method for providing a new experience similar to an offline store in recent online shopping [3-5].

Table 2. Example of Application of VR in E-commerce

eBay & Myer Australia VR department store	· Opened the world's first VR-based department store as an app · 'Site Search' function: ① Clicks are automatically made when vision is fixed within the app ② Create a list of products when one gazes for a certain amount of time, and provide consumers with a mind map format ③ Useful for obtaining consumer response data on products
Alibaba Buy+	· Possible to shop feeling immersion through virtual experience · Checking products in 360° in virtual space
IKEA VR catalog	· Catalog utilizing augmented reality (AR) and VR · Due to the nature of furniture products, it has large influence on purchase decisions

3.2 Use of VR in E-commerce

Online shopping has become commonplace. However, electronic commerce using VR is still in its infancy. Efforts to develop online shopping experience and brand awareness using VR are actively underway all over industry. In the future, services to experience the latest famous fashion shows, visit famous shops and restaurants around the world, and explore products in various ways will be actively utilized in the future.

As shown in Figure 1, through the concept of VR, in a situation where product and contents using multimedia technology are rapidly spreading, E-commerce using VR technology will be able to provide a differentiated experience from existing off-line commerce to providing maximum immersion.
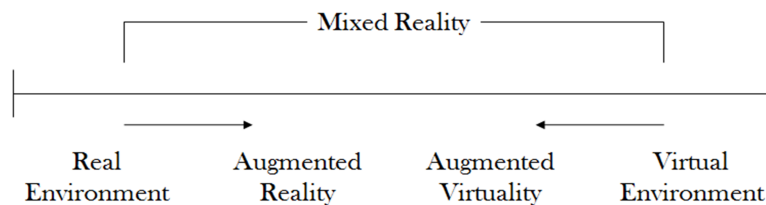
Figure 1. Concept of VR

Offline commerce is more likely to be connected with purchase due to meticulous price comparison and quality comparison. However, in E-commerce and VR, it is less likely to be connected to purchase due to the lack of actuality of products. Therefore, these limitations must be overcome and new methodology must be found. It is VR shopping mall (VR drIven Shopping Agent; VRISA) that has avatar, learning, and VR functions. Avatar function represents a virtual person that can play a specific role in virtual space like a person and learning function is a function to learn the various purchasing behavior of the consumer and to find the product desired by the consumer in the optimum direction in the shortest time without having to click many times. As shown in Table 3, VR function is a function that can give a sense of reality and immersion in E-commerce based on three-dimensional VR graphics [6-8].

Table 3. Main Functions of VRISA

Layer	Main function
VR interface layer	· VR avatar moves to where the product inside the virtual space is located · Present products recommended in learning layer as 3D graphics
Learning layer	· Learn consumer profile and lifestyle · Optimal product recommendation based on learning results

4. Measures on VR and E-commerce and Effects

4.1 Measures on Technology Provision and Acceptance

The barrier that consumers might face in utilizing E-commerce in VR is the relevance to ICT technology. Fundamentally, it requires Internet access and use through PCs or mobile devices such as smart phones. Therefore, users who are unfamiliar with the ICT environment may show lower accessibility and utilization levels in E-commerce than users who are familiar. Therefore, it can be determined that, in order to utilize E-commerce for VR, consumers need to have acceptance and affinity for ICT technology [9-10].

In terms of technology provision, it is the application of wireless transmission technology. To express VR, wired connection must be made with a powerful desktop and wired method can have restrictions in mobility. Therefore, wireless transmission technology should be further developed and refined to become universal.

4.2 Measures on Technical Environment

While existing E-commerce has the inherent problem of not being able to experience a product before purchase, VR technology can revolutionize it. Virtual technology enables experiencing virtual products as if you are actually using them. Especially, VR can be used to provide experiences of hotels, shops and restaurants in advance. In the E-commerce industry, which mainly focuses on customer service, it will be possible to share various information and conduct consultation as if they are actually facing customers in virtual space.

4.3 Effects of VR and E-commerce

It is possible to innovatively reduce the operating costs for product use education and product explanation, and increase the satisfaction of consultation and efficiency. The E-commerce of the service industry which cannot provide offline service will be actively performed and it will be able to provide experience services beyond the restrictions of location. The marketers in VR are able to effectively utilize much more information than most marketers are using now. Also, there is an effect of segmenting the market of E-commerce in VR and incentive to attract the attention of potential customers.

4.4 Side Effects of VR and E-commerce

It is possible that a small number of beneficiaries with economic wealth will enjoy more wealth and benefits. In addition, it is possible to obtain satisfaction and experience of products through virtual experience in virtual space, but if it cannot be connected to purchase in reality, it may waste time and result in meaningless results. E-commerce by VR has both positive and negative aspects. Is necessary to predict and prepare for problems such as commerce ethics and norms in virtual space and how to reduce side effects of privacy violation.

4. Conclusion

  E-commerce using VR is a field with great potential for development. Because unlike off-line markets, it is difficult to determine the purchase patterns of customers, customer purchasing behavior analysis must be done using computer access records. Through the purchase behaviors of customers, it is necessary to provide the information desired by customers and to improve E-commerce satisfaction. In the study, while existing online commerce suggested simple results based on the search function, VRISA presented appropriate products by learning the lifestyles and profiles of consumers. By presenting the product in 3D graphic in E-commerce using VR, it helped consumers to purchase products by improving their awareness of products. The avatar navigated freely within E-commerce on behalf of the consumer to explore products. In order to expand and develop E-commerce in VR in the future, learning ability should be improved through combining with artificial neural network by deep learning that is recently in the spotlight, and the ability to overcome errors need to be improved to enable use in various fields.

Acknowledgement

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