Research on VR Products' Customer Satisfaction Based on SEM

Tiantian Quan¹, Zhe Wang²

ABSTRACT

With the rapid development of science and technology, many consumers has experienced virtual reality technology (Virtual Reality, hereinafter referred to as VR) when rising to the level of the industry, VR products are still in the growth stage. Product development is often based on customers’ demand which is of vital significance. This paper is based on the principles of customer satisfaction and structural equation model (SEM). Then, it improved the American customer satisfaction index (ACSI) model and studied the theory of VR product customer satisfaction model. Moreover, it has carried on the empirical research of the model, with the aid of SPSS and LISERL. As a result, it provided an important basis for improving the quality and service standard of VR products.

Key words: Virtual Reality; Structural Equation Model; American customer satisfaction index.

INTRODUCTION

2015 is known as the beginning which the VR products first came into being in China. Though the current VR industry layout is still on the stage of the concept of promotion, the whole market is more likely to expand rapidly in the future: The China Virtual Reality Industry Research Report in the First Half of 2016 released by iiMedia Research shows that in 2020 the market size is expected to reach 55 billion 630 million yuan. Under double pressures caused by product development and customer requirements, it is a crucial part of the development of VR products to figure out the problem about how to improve customer satisfaction. DellaBitta[1] believes that customer satisfaction is acquired through the consistency between the use of the product and the judgment or service performance of the product. So customer satisfaction is influenced by some factors such as personal needs, expected recognition, etc. At present, domestic and foreign scholars in the field of VR mostly researched on the improvement of its technology, the extension of application field, only a few scholars researched on customer satisfaction of VR products. There are so many instances showed that ACSI model or improved ACSI model is successfully applied in different areas. Therefore, this paper, which is based on improved ACSI model and uses the structural equation model, aims to connect the influential path of customer satisfaction and find various factors that affect customer satisfaction.

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REVIEW OF RESEARCH AT HOME AND ABROAD

In domestic, Lu Yingjun[2] analyzed the application of VR technology in the digital library service, and put forward some suggestions. University of North Carolina (UNC) applies VR technology to molecular modeling, surgery simulation, aviation driving, and building simulation, etc. [3]. Feng Xiuqin[4] evaluated and optimized customer satisfaction about the mobile phone industry, and mentioned that the combination of SEM and customer satisfaction could be easier to reflect the relationship between the theory and variables of customer satisfaction and could be closer to the nature of customer satisfaction.

While in studying customer satisfaction model, many scholars have discussed the importance of customer expectation, perceived quality, perceived value, customer satisfaction, customer loyalty and complaint in ACSI model. The observation index of each hidden variable is given, the enterprise image is introduced creatively, and the proof is given in the empirical study [5-6]. This paper draws lessons from the results of domestic and foreign research and practical experience, considering the advantages of the SEM. The author will use the structural equation model and the improved ACSI model to evaluate the customer satisfaction of VR products, and finally put forward suggestions to improve customer satisfaction.

RESEARCH HYPOTHESIS AND MODEL CONSTRUCTION

This paper is based on the ACSI evaluation index system, considering the improvement of the ACSI model and the characteristic of VR product as a special light luxury product. Therefore, this paper adds corporate image as a model of implicit variables, reflecting the corporate image on the impact of customer expectations and customer satisfaction. In addition, customer’s perceived value of VR product also affects customer satisfaction, so perceived value should also be the variable of customer satisfaction. The direct result of customer satisfaction is the promotion of customer loyalty. The following assumptions are made in this paper:

Hypothesis $H_1$: Corporate image has a significant positive effect on customer satisfaction.
Hypothesis $H_2$: Corporate image has a significant positive effect on customer expectations.
Hypothesis $H_3$: Customer expectation has a significant positive effect on perceived value.
Hypothesis $H_4$: Customer expectation has a significant positive effect on customer satisfaction.
Hypothesis $H_5$: Customer expectation has a significant positive effect on perceived value.
Hypothesis $H_6$: Perceived quality has a significant positive effect on perceived quality.
Hypothesis $H_7$: Perceived quality has a significant positive effect on customer satisfaction.
Hypothesis $H_8$: Perceived value has a significant positive effect on customer satisfaction.
Hypothesis $H_9$: Customer satisfaction has a significant positive effect on customer complaints.
Hypothesis $H_{10}$: Customer satisfaction has a significant positive effect on customer complaints.
Hypothesis $H_{11}$: Customer complaints have a significant positive effect on customer loyalty.
QUESTIONNAIRE DESIGN AND VALIDITY TEST

Questionnaire Design

The evaluation index system is divided into four levels. The first 2 indicators are shown in TABLE I in the evaluation system. The data of this study was mainly from the questionnaires designed based on the Likert scales, and the object of this study was the VR product consumers. In this paper, 500,389 questionnaires are recovered in total, and 328 are valid, the effective recovery rate is about 84.32%.

TABLE 1. CLASSIFICATION TABLE OF VR PRODUCT CUSTOMER SATISFACTION INDEX SYSTEM.

<table>
<thead>
<tr>
<th>First index</th>
<th>Second index</th>
</tr>
</thead>
<tbody>
<tr>
<td>VR product customer satisfaction index</td>
<td>Corporate image($\xi_1$)</td>
</tr>
<tr>
<td></td>
<td>Customer expectation($\eta_1$)</td>
</tr>
<tr>
<td></td>
<td>Perceived quality($\eta_2$)</td>
</tr>
<tr>
<td></td>
<td>Perceived value($\eta_3$)</td>
</tr>
<tr>
<td></td>
<td>Customer loyalty($\eta_4$)</td>
</tr>
<tr>
<td></td>
<td>Customer satisfaction($\eta_5$)</td>
</tr>
<tr>
<td></td>
<td>Customer complaints($\eta_6$)</td>
</tr>
</tbody>
</table>

Enterprise image measurement indexes are customer value sense($Q_1$), Corporate notion($Q_2$), public welfare($Q_3$), Popularity($Q_4$), Sense of identity($Q_5$); Customer expectation measurement indexes are Overall expectation($Q_6$), Meet the expectations of their own needs($Q_7$); Perceived quality measurement indexes are comfort($Q_8$), The content of the support degree($Q_9$), Service quality($Q_{10}$), Hardware quality($Q_{11}$), Stereoscopic effect($Q_{12}$); Perceived value measurement indexes are Total value of perception($Q_{13}$), The total cost of perception($Q_{14}$); Customer loyalty measurement indexes are Alternative($Q_{15}$), Repeat purchase($Q_{16}$), Recommend to buy($Q_{17}$); Customer satisfaction measurement indexes are Overall satisfaction($Q_{18}$), Differences with the expected($Q_{19}$); Customer complaints measurement indexes are Complaint frequency($Q_{20}$), Complaint times($Q_{21}$).

Reliability and Validity Test

This paper used Cronbach reliability coefficient to test the reliability of the questionnaire and it is generally believed that when the questionnaire’s Cronbach reliability coefficient is more than 0.7 it has high reliability. This paper uses SPSS 19.0 to test the reliability analysis of the questionnaire and gets the coefficient of VR product customer satisfaction survey questionnaire is 0.882 more than 0.7, it shows that the questionnaire is of high validity. In this paper, we tried to delete the explicit variables one by one. The validity of the questionnaire generally takes convergent validity and discriminant validity into account. Convergent validity can be explained by the square variance (AVE) of latent variables. It is generally believed that
when the validity coefficient is more than 0.5, it has good validity. When the validity coefficient below 0.5 but more than 0.4, it can be accepted.

MODEL BUILDING

This paper builds the model with the aid of LISERL software. From the fit index of the model, the value of the approximate error exponent RMSEA is 0.095. Generally considered that when it is less than 0.1, it is a good fit, the value of $\chi^2/df$ is 1.906 less than 2, which shows that the fitting effect is very good. AGFI should be between 0 and 1, the closer it is to 1 the greater fitting it is. The results of CFI and NFI are closer between 0 and 1, it has greater fitting. The values of this model are 0.903 and 0.879, respectively. All in all, the results of this model can be accepted. So, the fitting degree of the model is good. However, there are 8 parameters that do not pass the significance test. Therefore, the model still needs to be further modified.

Model Modification

This paper tries to change the original model under the assumption that corporate image has a direct impact on customer loyalty. The fitting effect is not very good, the model and the parameters have not passed the test so we re-estimate the parameters of the model as a free parameter, model and parameter test are passed through smoothly. And then according to the index value of the fitting index to modify the model, the final model can fit the original data better. The final VR product customer satisfaction evaluation model and the standard path coefficient in the latent variables are shown from Fig.1, the 11 hypotheses are verified in the initial stage of the research.

Figure 1. Customer satisfaction model of VR product.
Result Analysis

What can be seen from the Figure 1 is that the latent variable corporate image has a significant impact on customer expectation and customer satisfaction. Customer expectation is positively affected by the corporate image, at the same time, customer expectation has a positive effect on perceived quality, perceived value, and customer satisfaction which shows that if customer satisfaction wants to be improved, it should improve customer expectation satisfaction first. The coefficients of perceived value on the two measurement indexes are 0.84 and 0.70 respectively which show consumers pay more attention to the quality of VR products under a given price relative to the price of VR products with a given quality. The positive influence coefficient of perceived value on customer satisfaction is 0.59, therefore, improving value ratio and price ratio has a significant effect on customer satisfaction measurement.

Customer satisfaction has an obvious influence on the measurement indexes. In addition, customer satisfaction is affected by corporate image, customer expectation, perceived quality and perceived price. Therefore, if enterprises want to improve customer satisfaction, they can improve their own variables or other latent variables. The positive correlation coefficient between customer satisfaction and customer loyalty is 0.47 which shows that customer satisfaction is reflected in the customer loyalty including repeat purchase, recommend purchase and the possibility of using alternatives. Customer complaints are positively affected by customer satisfaction which shows that if customer satisfaction increases, as a result customer complaints will decrease, at the same time, customer loyalty will increase too.

CONCLUSION

This paper takes the satisfaction of VR product as the breakthrough point. Firstly, it introduces the development status of VR products and the application of customer satisfaction model, and then elaborates the scientific and necessary customer satisfaction evaluation of VR products. Secondly, according to the characteristics of the VR product, with improved ACSI customer satisfaction model, using SEM modeling method, constructs the model of customer satisfaction of VR products and revises the model through empirical research to test the validity of the model. Finally, through the analysis of the model results, it puts forward some suggestions for the later development of VR products, and achieves the purpose of improving the customer satisfaction of VR products.

REFERENCES


