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Abstract: With the development of Internet marketing, virtual CSR co-creation has attracted the attention of enterprises. This paper explores the influence mechanism of different routes of interactivity of virtual CSR co-creation on consumer identity by introducing interaction theory and self-construal theory. The experimental results show that routes of interactivity have a positive impact on consumer identity, and experiential route has a stronger impact on consumer identity. Routes of interactivity and self-construal have an interactive effect on consumer identity: When virtual CSR co-creation is structural route, the interdependent self show a higher consumer identity; On the contrary, when virtual CSR co-creation is experiential route, the independent self show a higher consumer identity. The results also indicate that CSR perception plays a mediating role in the interaction effect between routes of interactivity and self-construal on consumer identity.

Keywords: virtual CSR co-creation, structural route, experiential route, self-construal, CSR perception

1. INTRODUCTION

Corporate social responsibility (CSR) has been extensively researched by academia as early as the 1950s. With the popularity of the Internet, most enterprises integrate their CSR activities with Internet thinking. The concept of virtual CSR co-creation (VCSR) was proposed, which means that enterprises invite stakeholders to participate in and implement CSR activities through online media [1]. Virtual CSR co-creation provides consumers with opportunities to participate in public welfare. Compared with traditional CSR, virtual CSR co-creation has the advantages of high implementation accuracy, design viscosity and information content freshness, which is conducive to maximizing the effect of CSR activities, enhancing enterprises image and brand awareness, thus bringing benefits to enterprises [2]. However, as corporate social responsibility under the dual background of social media and value creation, virtual CSR co-creation has different forms and different levels of consumer response. Therefore, it is necessary to study the mechanism of virtual CSR co-creation on consumer identity.

The existing studies on virtual CSR co-creation mainly focus on: (1) the impact of value types and value frameworks of virtual CSR co-creation on consumers' attitudes and behaviors. For example, Korschun points out that virtual CSR co-creation with interaction as the core can significantly enhance consumers' relevant identity, and then promote the improvement of enterprise performance [1]; (2) The influence mechanism of consumer psychological variables on CSR co-creation behavior. Yu Weiping suggests that individuals with different characteristics respond differently to the same information. Through this study, we can see that the factors influencing the realization of virtual CSR co-creation value include not only the characteristics of virtual CSR co-creation itself, but also the psychological factors related to consumers' own characteristics [4]. Therefore, when discussing the impact of virtual CSR co-creation on consumers, it is necessary to combine virtual CSR co-creation itself with the characteristics of consumers. Therefore, this study introduces the psychological variable of self-construal to explore the level of consumers' identity with different routes of interactivity of virtual CSR co-creation activities.

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In summary, most of the existing studies focus on the theoretical value of virtual CSR co-creation, the framework of value generation and the one-way effect of consumer psychological characteristics on CSR co-creation behavior, and seldom discuss the consistency between different types of virtual CSR co-creation and consumer psychological cognition. Therefore, unlike previous researches, this study explores the influence mechanism of interaction routes of virtual CSR co-creation and individual characteristics on consumer identity through experiments, including the relationship between different routes of interactivity and consumer identity, the moderating role of self-construal and the mediating role of CSR perception. So to provide reference for enterprises to carry out Internet public welfare, formulate and implement specific virtual CSR co-creation strategy.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

2.1 The impact of virtual CSR co-creation routes of interactivity on consumer identity.

Interactivity is the core of virtual CSR co-creation and is the behavior trace of realizing co-creation value, it refers to the exchange of resources between users and media environment [5]. Existing studies on interactivity focus on the impact of interactivity levels and types on consumer attitudes, but few studies directly links interactivity with CSR activities. In the new media environment, the interaction theory points out that the interactive features are important determinants of consumers' interaction quality in the community, and interactive features mainly include media structure, functional features, hedonic features, etc. These interactive features are also known academically as routes of interactivity [3]. Combining interaction theory [6], routes of interactivity positively affect consumers' perception and evaluation to community activities, which is an important factor for consumers to participate in virtual CSR co-creation. Existing studies have discussed the classification of routes of interactivity in virtual community. Mcmillan put forward three kinds of interactive features between consumers and enterprises, including structural features, process features and perceptual features; Wu divided virtual community interactivity into interpersonal and human-computer interactivity according to the purpose of consumers' interaction. However, these classifications do not consider the content and essence of CSR activities, so there are some limitations in marketing suggestions for enterprises. On this basis, Chan [3] divided the routes of interactivity into structural route and experiential route according to the different focus of community activities. This classification is followed in this study.

Structural route emphasizes the structural and functional features of virtual community or activities, such as accessibility of virtual community information, convenience and reliability of fast search, etc. Experiential route emphasizes consumers' emotional experience, such as social ties established between consumers through virtual community activities and other consumers, personal enjoyment in the process of participating in CSR activities, etc [3]. They help to improve the quality of consumers' using of community platforms [7] and their reciprocal behavior in communities [3], they are important driving factors for consumer to participate in virtual community, and play an important role in consumer identity of virtual CSR co-creation activities. Consumer identity is the loyalty relationship between consumers and enterprises [8], which is one of the important factors to measure the value of virtual CSR co-creation. According to Daft, when the community media has more efficient structural features, consumers can receive more information, have a quicker feedback which leads a higher level of identity; Burgoon's [5] research shows that structural features of virtual community help generate useful information resources for consumers and affect consumer's perception and evaluation of CSR activities; Wasko have shown that individuals who gain pleasures from community are more likely to make contributions for community and participate in community activities with long-term [9], such as more positive knowledge-sharing behavior; Based on technology acceptance model, Bagozzi thinks that joyful emotion significantly increases

people's intention for risk investment. Based on the above studies, Sharma et al show that compared with virtual community activities which emphasize structural characteristics, a community activity aimed at strengthening social ties and promoting consumer pleasure has a higher level of incentives for consumers. In addition, Chan, Chou found that the impact of experiential route on consumer community perception was stronger than that of structural route [3]. Thus, the routes of interactivity of virtual CSR co-creation have a positive impact on consumers' attitudes and decision-making process, and different routes of interactivity have different effects on consumer identity. Therefore, the following assumptions are proposed:

H1: Routes of interactivity have positive impact on consumer identity. Compared with structural route, experiential route has a stronger impact on consumer identity.

2.2 The moderating role of self-construal.

Individuals with different self-construal have different cognition, preferences and behaviors towards the same thing [10]. The impact of virtual CSR co-creation with different routes of interactivity on consumers' attitudes and behaviors will also be affected by consumers' cognition. When consumers receive the information of virtual CSR co-creation, their psychological perception is affected. Consumers will be more optimistic about activities that are more consistent with themselves. At this time, consumers' self-construal plays an important role. Therefore, this study introduces self-construal, which represents the individual's level of attention to external information, aims to explore whether consumers with different self-construal have different levels of identity to virtual CSR co-creation activities with different routes of interactivity. Self-construal is used to explain how individuals view the relationship between themselves and external environments. It can be divided into interdependent self-construal and independent self-construal. Independent individuals think they have unique attributes, pay less attention to the external environment information, and emphasize the self-presentation [11]; While interdependent individuals think they have a strong correlation with the external environment, and emphasize the individual's high attention to the external environment.

Relevant studies on individual information processing patterns show that consumers with different self-construal have different information processing patterns. Independent consumers are less affected by stimulus information background, while interdependent consumers pay more attention to the background of stimulus information. Existing research on advertising information shows that independent self-construal consumers have a higher purchase intention with emotional advertising information, while interdependent consumers have a higher purchase intention with objective functional and attribute advertising information. Similarly, among the virtual CSR co-creation with different routes of interactivity, the structural route emphasizes functional attributes of virtual CSR co-creation activities, such as practicability, which is favorable to realize the responsibility goal of individual participation in CSR co-creation activities, highlighting the background information; While the experiential route emphasizes the happy emotions and emotional experiences of virtual CSR co-creation activities [3], which is favorable to consumers' self-expression, highlighting de-background information. Consumers with interdependent self-construal pay more attention to the background information of social environment, that is, the structural route of virtual CSR co-creation activities; While independent consumers pay more attention to the de-background information of environment, that is, the experiential route of virtual CSR co-creation activities. When the consistency level of interactivity and self-construal is higher, the easier it is for consumers to process information, the higher the level of acceptance of CSR activities, and the stronger the identity is [9]. Therefore, the following assumptions are proposed:

H2: Self-construal plays a moderating role in the impact of routes of interactivity on consumer identity.

H2a: When consumers are interdependent self-construal, the structural route is easier to make consumers

produce high level of identity.

H2b: When consumers are independent self-construal, the experiential route is easier to make consumers produce high level of identity.

2.3 The mediating role of CSR perception.

Relevant theories and studies show that routes of interactivity of CSR activities affect consumers' CSR perception. For example, interaction theory proposes that information quality, personal or situational features can positively affect consumers' perception of community activity [12]; Customer perceived value theory indicates that after receiving CSR activity information, consumers form the overall utility perception and evaluation of CSR activity, that is, CSR perception [13]; At the same time, Zinkhan considers that the structural, functional and hedonic features of the community will affect consumers' perception of community from the perspective of interactive features of communities, that is, routes of interactivity will affect consumer identity.

Consumers' CSR perception will also affect their identity of virtual CSR co-creation. Cognitive-emotion model considers that CSR perception is the leading factor of consumer perception, while identity is the emotional response of consumers, consumer identity depends on consumer perception, that is, CSR perception positively affects consumer identity; According to the theory of planned behavior, consumers' attitudes directly affect consumers' behavioral intentions, and CSR perception as an attitudinal element of consumers to CSR activities, directly affect consumers identity; Shupan believes that the interaction between enterprises and customers in virtual brand community has a positive impact on perceived value of customers, and then enhancing consumers' recognition of the community brand; Godfrey thinks that consumer's CSR perception positively affects consumer identity based on Halo effect of CSR behavior. The higher CSR perception level is, the stronger consumer's identity degree is. Meanwhile, according to the previous discussion on the relationship between routes of interactivity and self-construal, hypothesis 3 is proposed. The model of this study is shown in Figure 1.

H3: CSR perception plays a mediating role in the joint effect of routes of interactivity and self-construal on consumer identity.
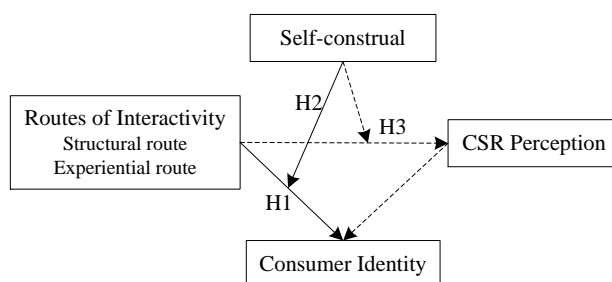

Figure 1.   Research framework

3.   RESEARCH DESIGH

3.1 Pre-experiment.

The purpose of pre-experiment is to select the virtual CSR co-creation activities of structural route type and experiential route type needed for formal experiment. Study refers to Sheng et al. to determine the experimental method of environmental protection [14]. After referring to the CSR activities advocated and carried out by Government organs such as Ministry of National Ecology and Environment, WWF and ten famous Internet enterprises such as Ali and Tencent, a series of CSR activities carried out by these organizations and enterprises were found through network, and 18 virtual CSR co-creation activities with good social response were screened

out. Subsequently, 61 subjects (student account for 31%) were randomly selected to participate in the pre-test. (1) Using Level 7 Likert Scale, subjects were asked to score familiarity with 18 activities. According to the average results, the activities with the highest familiarity were "Ant Forest" (*M*=5.89), "Walking Donation" (*M*=5.08), "Panda Guardian" (*M*=4.23), "Headline Search" (*M*=3.98); (2) Explain the concept of experiential route to the subjects and ask them to answer the level of attributes of experiential route in each activity. The results show that the top three virtual CSR co-creation activities with the highest level of experiential route are "Ant Forest" (*M*=5.16), "Panda Guardian" (*M*=5.05), and "Rice Commonweal" (*M*=4.70). The results also showed that there were significant differences in the similarity of experiential route between "Headline Seeker" and "Ant Forest" (*F*=16.205, *P*<0.001). From the above results, we can see that "Headline Search" and "Ant Forest" belong to the virtual CSR co-creation activities of structural route type and experiential route type, respectively. Therefore, we selected these two activities as structural route virtual CSR co-creation and experiential route virtual CSR co-creation respectively in formal experiment.

3.2 Formal experiment.

The experiment use a single factor and two levels (Routes of interactivity: Structural route/Experiential route) design between groups. By entrusting "Questionnaire Star" enterprises to randomly select 254 consumers (42.5% of males, mean age is 26.2) from its 2.6 million sample library as participants.

(1) Laboratory materials and questionnaires. Each participant randomly received a situation questionnaire. The homepage of the questionnaire contains relevant instructions and noun explanations, also suggest participants to draw a lottery after completed questionnaire. Firstly, the questionnaires asked participants to read the introduction materials about virtual CSR co-creation activities. The virtual CSR co-creation activity of structural route group is "Headline Search", the virtual CSR co-creation activity of experiential route group is "Ant Forest". Activity information is respectively expressed as "The public welfare Seeking project, launched by today's headlines, aims to help families reunite by means of science and technology. By using accurate Map Pushing Technology and Face Recognition Technology, the information of the missing is pushed to the headline users near the missing sites. At present, this public welfare activity has helped to find many missing people and have received good social response." and " Ant Forest public welfare project launched by Alipay aims to encourage users' low carbon behaviors through emotional connection, and to get the energy needed for planting virtual trees through travel, online payment, participation in social networking and game activities, so as to effortlessly and conveniently complete the planting public welfare. This public welfare activity has realized national public welfare and the oasis of desert areas, and has received good social response." After reading, the subjects were asked to complete the CSR perception and consumer identity scale, self-construal scale, routes of interactivity manipulation test, activity familiarity and personal information questionnaire in turn.

(2) Measurement of variables. Scales adopted by Singelis were used to measure self-construal, there were 24 items, the first 12 items were used to test the subjects' interdependent self-construal, and the last 12 items were used to test the subjects' independent self-construal. According to Holland's treatment of self-construal, the average scores of independent self-construal and interdependent self-construal were standardized, and the standard values of independent self-construal and interdependent self-construal were subtracted, the positive final values indicated that the subjects tended to be independent self-construal. Two questions are used to examine the routes of virtual CSR co-creation activities: "This CSR activity is more in line with attributes of structural route; This CSR activity is more in line with attributes of experiential route". CSR perception and consumer identity were measured using the maturity scale adopted by Salmones et al and Bhattacharya et al [8] respectively. All variables were measured and manipulated using Level 7 Likert Scale.

4.   RESULT ANALYSIS

4.1 Reliability and validity analysis and manipulation test.

Firstly, the reliability and validity of the self-construal, CSR perception and consumer identity scale are analyzed. The results show that the Cronbach's α of self-construal, CSR perception and consumer identity are 0.775, 0.859 and 0.761 respectively, and the construct validity are 0.732, 0.812 and 0.724 respectively, which shows that scales have good reliability and validity. Variance analysis is used to test the manipulation of routes of interactivity. The results show that the structural route attribute of the structural route group is stronger than that of experiential route attribute ($M_{structural}$=5.87, $M_{experiential}$=5.13, F=6.22, P<0.05); The experiential route attribute of experiential route group is stronger than that of structural route attribute ($M_{structural}$=4.77, $M_{experiential}$=6.13, F=7.47, P<0.01). At the same time, there is no significant difference in the familiarity of virtual CSR co-creation between structural route group and experiential route group ($M_{structural}$=5.42, $M_{experiential}$=5.54, F=0.89, P>0.05), which exclude the influence of activity familiarity on the experimental results.

4.2 The impact of routes of interactivity on consumer identity.

Using one-way ANOVA, we found that routes of interactivity have significant effect on consumer identity. Compared with the virtual CSR co-creation activities of structural route, the virtual CSR co-creation activities of experiential route have a greater impact on consumer identity ($M_{structural}$=5.03, $M_{experiential}$=5.34, F=6.37, P<0.05), that is, H1 is validated.

4.3 The moderating role of self-construal.

Two-way ANOVA was used to test the moderating effect of self-construal. The results show that the interaction terms between self-construal and routes of interactivity are significant (β=−0.815, P<0.001), which indicates that there is an interaction between the two on consumer identity. Further simple effect analysis shows that independent self-constructed consumers have a higher level of identify with experiential route virtual CSR co-creation activities ($M_{structural}$=4.26, $M_{experiential}$=5.18, P<0.01); While interdependent self-constructed consumers have a higher level of identify with structural route virtual CSR co-creation activities ($M_{structural}$=6.08, $M_{experiential}$=5.58, P<0.05), H2, H2a, H2b are verified. The interaction between self-construal and routes of interactivity is shown in Figure 2.
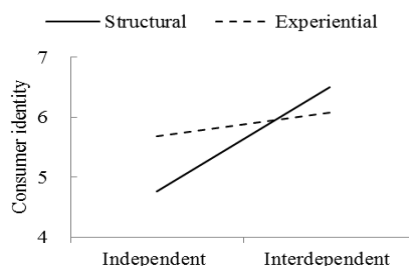

Figure 2.   Interaction between routes of interactivity and self-construal

4.4 The mediating role of CSR perception.

Using hierarchical regression to test mediation, the specific results are shown in Table 1. Therefore, the mediation effect of CSR perception exists and is partially mediated, and H3 is verified. Meanwhile, according to Hayes' [15] method, Bootstrap program (95% confidence interval, 5000 sample size) was used to test the mediation effect. The results show that the mediating effect of CSR perception is 0.199 and the confidence interval is [0.127, 0.287]. It indicates that CSR perception plays a mediating role in the interactive effect of

interactivity routes and self-construal on consumer identity, which further verifies hypothesis H3.

Table 1.　Mediation test results of CSR perception

Variable	Consumer Identify		CSR Perception		Consumer Identify	
	β	t	β	t	β	t
Routes of Interactivity	1.277*	2.098	0. 734***	3.565	0. 804**	3.553
Self-construal	0.674***	8.565	0.294***	9.290	0.386***	8.469
Routes of Interactivity * Self-construal	−0.815***	−6.036	−0.799***	−4.881	−0.913***	−6.091
CSR perception					0.628***	6.335

Note: *, **, *** are significant at 0.05, 0.01, 0.001 levels respectively.

5.　CONCLUSIONS

　　The purpose of this study is to explore the influence mechanism of virtual CSR co-creation activities on consumer identify. The conclusions are as follows: (1) Different routes of interactivity have different effects on consumer identify, and experiential route virtual CSR co-creation has a stronger effect on consumer identify. It is in line with Sharma's research, compared with community activities which emphasize structural features, an activity aimed at strengthening social ties and promoting consumers' pleasure has a higher level of incentives to consumers; (2) Routes of interactivity and self-construal interact with consumer identity. Independent consumers are vulnerable to experiential route virtual CSR co-creation activities, showing a higher level of identity; While interdependent individuals are showing a higher level of identity to structural route virtual CSR co-creation; (3) CSR perception plays a mediating role in the interaction between routes of interactivity and self-construal on consumer identity. After consumers received virtual CSR co-creation information, the higher the evaluation is, the higher the level of CSR perception is, and the stronger the consumer identity is.

　　The main contributions of this study are as follows: (1) It enriches the research on the influence mechanism of consumers' participation in virtual CSR co-creation. The related research on virtual CSR co-creation at home and abroad started late, research in this field is still in its infancy. By introducing self-construal, this study explores the relationship between virtual CSR co-creation and consumer identity from the perspective of experimental psychology; (2) Consumers' recognition of CSR activities plays an important role in improving enterprises' image and performance. From the enterprise CSR activity itself, this study divides virtual CSR co-creation into structural route and experiential route according to interaction theory and previous research. The effect of virtual CSR co-creation of two types of interactive routes on consumer identity is explored through experiments. The research shows that experiential route type virtual CSR co-creation activities can obtain higher level of consumer identity. Enterprises can accurately judge the main characteristics of enterprise consumer groups by means of Internet big data, and then scientifically design CSR activities; (3) It enriches the theoretical relationship between routes of interactivity and consumer identity. From the perspective of consumer cognition, this study validates the mediating role of CSR perception in the interaction between interaction route and self-construal on consumer identity. Enterprises should pay attention to improving the information transparency and the relevance with consumers of virtual CSR co-creation activities, so as to enhance consumers' perception of virtual CSR co-creation activities, improve consumers' identity level, and promote consumers' response.

　　There are still some limitations: (1) This study measures consumers' long-term self-construal through scales. Without considering consumers' situational self-construal, situational materials can be used to activate consumers' situational self-construal in future research; (2) Structural route and experiential route type virtual CSR co-creation activities are determined by pre-test, which avoids the error caused by the subjective

manipulation. However, these specific virtual CSR co-creation activities all have their own brand image, so it is difficult to exclude the possible brand effect in the experimental process. So in the future research, virtual brand can be used to manipulate the virtual CSR co-creation activities in the experiment, further verify the conclusions; (3) This study validates the mediating role of CSR perception in the interaction between routes of interactivity and self-construal on consumer identity. Future research can further explore the other intrinsic mechanisms of self-construal and routes of interactivity on consumer identity, so as to better understand the role of interactive routes on consumer identity, and improve the theoretical system of virtual CSR co-creation.

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