


The impact of social capital on the creation of customer participation value in virtual brand communities

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ABSTRACT

Purpose: This paper aims to investigate the effect of social capital on the contributions of knowledge and the behavior of citizens towards customer participation and value co-creation in virtual brand communities.

Design/Methodology/Approach: This study uses structural equation modelling (SEM) to analyse 213 questionnaires in order to validate a model that is based on social capital theory. This method examines the assumed theoretical connections assessing both the direct and indirect impacts of social capital on customer engagement in value co-creation.

Findings: The findings indicate that social interaction ties, principles of reciprocity and trust and a shared vision of social capital positively influence customers' knowledge contribution behaviors and citizenship behaviors for engaging in value co-creating in virtual brand communities.

Conclusion: The study concludes that societal capital plays a significant role in customer participation in value-creating behaviors within the communities of virtual brands.

Research Limitations/Implications: The main limitation of the study is the potential bias of self-reported data and it proposes to conduct a longitudinal study to dynamically understand customer engagement value co-creation and explore the interactions between dimensions of social capital.

Practical Implications: The study points out that strengthening social capital in virtual brand communities can motivate customers to participate more in knowledge contribution and civic behavior, thereby enhancing value co-creation. Therefore, companies should aim to strengthen interaction, trust and shared vision within the community to drive this process.

Contribution to the Literature: This study expands the existing research on value co-creation by revealing the mechanism of social capital influencing the participation of customers in value co-creation in virtual brand communities.

Keywords: *Customer citizenship behaviors, Knowledge contribution behaviors, Participation of customers in value co-creation behavior, Social capital, Virtual brand communities.*

1. INTRODUCTION

The development of information technology has rapidly propelled social media to become a primary marketing channel for enterprises, thus revolutionizing the interaction patterns between enterprises and consumers (Meng, 2017; Shen & Jia-Jing, 2018). Businesses establish online brand communities to support creative activities like product creation, new product development and product feedback in order to connect customers more intimately. This strategy has effectively transformed the role of consumers from passive receivers to active contributors in value co-creation (Sawhney, Verona, & Prandelli, 2005). An increasing number of enterprises are fostering social interactions with consumers by creating virtual brand communities to attract consumers and gather valuable feedback on products or services (He & Yan, 2015; Shen & Jia-Jing, 2018). This interactive approach not only

provides customers with opportunities to express their needs and share brand experiences explicitly but also aids enterprises in taking a crucial step towards customizing products and cultivating a competitive advantage, thereby jointly driving value co-creation (Wang, Ding, & Fang, 2019). Research indicates that more than half of the top 1000 businesses have created virtual brand communities but they have not been successful in creating enduring consumer relationships (Porter, Donthu, MacElroy, & Wydra, 2011). Existing research has extensively explored the impact of customer interactions, needs and corporate strategies on engagement to create value. It has begun to emphasize the importance of networking and resource integration in this process. This suggests that the customer's position in the social structure can shape their contribution to value creation (Edvardsson, Tronvoll, & Gruber, 2011). However, the effect of the social capital embedded in these network relationships on customer participation in co-creating value is notably missing from existing research. Customers in virtual brand communities frequently establish a constant communication network based on common traits and interests. The customer becomes both a link and a node in this network by integrating into a network of social contacts while creating a distinct social capital (Coleman, 1988). This social capital encompasses elements such as social interaction, reciprocity and shared language and has a diverse impact on customer behavior.

This study attempts to investigate how social capital affects consumers' participation in value co-creation inside virtual brand communities in order to close a gap in the existing research. This paper addresses the following research questions: (1) How does social capital influence customers' knowledge contribution and customer citizenship behavior in value co-creation within virtual brand communities? (2) What role does social capital play in strengthening customer relationships and maintaining participation in virtual brand communities? This study attempts to offer new insights into the literature on virtual brand communities and practical advice for organizations looking to use these communities for co-creating value through an in-depth analysis of these challenges. Consequently, this can facilitate the creation of more potent marketing plans and raise overall company efficiency.

2. LITERATURE REVIEW

2.1. Communities of Virtual Brands

The virtual brand community has grown quickly and developed into a crucial platform for value co-creation as a result of network technology's continuous advancement. A virtual brand community is an online platform that has been independently created by companies, brand partners or other parties to give customers who share an interest in a brand access to and share brand-related information (Brodie, Ilic, Juric, & Hollebeek, 2013; Liao, Lin, & Wei, 2019; Shi & Zhang, 2023). Jang, Olfman, Ko, Koh, and Kim (2008) argue that businesses can reach consumers through virtual brand communities, engage with consumers continuously and stay in touch for continuous feedback. Brodie et al. (2013) argue that consumers, businesses and other actors must develop virtual brand communities for the greater benefit in order to enhance co-creation. Wang, Ma, and Li (2015) argue that virtual brand communities transcend the limitations of time and space allowing all brand stakeholders to build strong, weak and dynamic relational connections. Zhao-hui, Qing-Juan, and Bing (2019) define it as the brand loyalty that particular brand enthusiasts have to a business and how they enjoy connecting with the corporate brand community. The relationship between members of the virtual brand community revolves around the brand itself including creating and maintaining the community (Gruner, Homburg, & Lukas, 2014). This gives businesses advice for enhancing the products or services provided by collecting input from customers on both novel ideas and current goods and services. In addition, businesses can learn about customer demands in the community which enables them to recognize and address each customer's distinctive requirements and provide better customer service (Rodríguez-López, 2021). In a nutshell, researchers believe that familiar brand goals, network technology, efficient user communication and virtual brand communities are required to realise the value creation of these communities. This paper argues that virtual brand communities have the typical characteristics of virtual and brand communities and members can freely join or leave the internet and its electronic network media. These communities can be funded by businesses or brand managers or they can arise spontaneously from consumer demand. It draws on the perspectives of Muniz and O'guinn (2001) and Ming, Xinhua, and Yongshun (2021). This kind of community mainly centers on sharing consumer experiences, common interests or emotions and builds a close social network.

2.2. Social Capital

As described in the previous literature review on value co-creation in virtual brand communities (Meek, Ogilvie, Lambert, & Ryan, 2019; Zhao, Lu, Wang, Chau, & Zhang, 2012), social capital facilitates communication among community members, fosters their sense of belonging and consequently promotes their behavioral participation (Sheng & Hartono, 2015). Social capital is "the sum of actual and potential resources embedded within the social networks of individuals or social organizations from which actors can draw upon their network connections (Nahapiet & Ghoshal, 1998). Coleman (1988) and other social science and humanities researchers primarily developed and propagated this concept. Social capital is widely used in virtual branded communities to explain interactions and networking resources between community members. Despite variations among scholars in the definition and conceptualization of social capital in virtual brand communities (Jeong, Ha, & Lee, 2021), it is generally acknowledged that social capital emanates from the relational structures among members of virtual brand communities (Chiu, Hsu, & Wang, 2006; Meek, Ryan, Lambert, & Ogilvie, 2019).

This research refers to the three-dimensional model of social capital proposed by Nahapiet and Ghoshal (1998) based on the above discussion. A virtual brand community's social capital is a multi-dimensional structure that is influenced by three distinct aspects: the structural, relational and cognitive dimensions. The structural dimension draws on the social interaction and connection dimensions of Chiu et al. (2006) and Tsai and Ghoshal (1998) which mainly reflect the frequency and intensity of interactions between members of a virtual brand communities (Chiu et al., 2006). Relational social capital draws on the two dimensions of trust and reciprocity norms of Tsai and Ghoshal (1998) and Chiu et al. (2006). Reciprocity is a vital norm and is integral to members' ongoing engagement in the community (Mathwick, Wiertz, & De Ruyter, 2008). Cognitive social capital draws on the shared vision and common language of Nahapiet and Ghoshal (1998); Tsai and Ghoshal (1998) and Chiu et al. (2006). Shared language is related to a common language or code used by community members in an online brand community (Liao & Chou, 2012). A shared vision represents a shared social norm, belief or ground rule that governs the behavior of members in an online brand community (Meek, Ryan, et al., 2019).

In addition, a large number of previous studies have confirmed that social capital is essential for bringing about multiple positive relationship outcomes including competitive intelligence (Kalra, Agnihotri, & Briggs, 2021), knowledge sharing (Zhang, Zhu, & Wang, 2019), collective efficacy (Collins, Neal, & Neal, 2014) and user loyalty (Zhang, Zhou, Zhan, & Zhou, 2021). Therefore, it is of great value to delve into the various aspects of social capital in the context of virtual brand communities and their impact on customer engagement value co-creation as it profoundly impacts the quality of communication, knowledge sharing and the establishment of consumer-brand relationships.

Social capital is a critical facilitator of member communication, belonging and engagement in virtual brand communities (Meek, et al., 2019; Sheng & Hartono, 2015; Zhao et al., 2012). Nahapiet and Ghoshal (1998) define social capital as the resources accessible within social networks. Coleman (1988) and other social science and humanities researchers primarily developed and propagated this concept. Although definitions vary (Jeong et al., 2021), there's consensus that social capital arises from the relationships within these communities (Chiu et al., 2006; Meek, et al., 2019).

This study focuses on social capital from three angles: structure, relationships and cognition using the research framework (Nahapiet & Ghoshal, 1998). We use the social interaction connections defined by Chiu et al. (2006) and Tsai and Ghoshal (1998) to measure the frequency and intensity of interactions between community members. The relational dimension draws on the normative principles of trust and reciprocity from Tsai and Ghoshal (1998) and Chiu et al. (2006) which are important foundations for community engagement. The shared vision and common language of the cognitive dimension draw on research (Chiu et al., 2006; Nahapiet & Ghoshal, 1998) which play an important supporting role in mutual understanding and norms within communities (Liao & Chou, 2012; Meek, et al., 2019).

2.3. Customer Participation in the Co-Creation of Value Behaviors

Value co-creation refers to the interaction between customers and companies integrating the resources each provides and ultimately achieving value creation (Cova, Pace, & Skålén, 2015). Yi and Gong (2013) divide value co-creation into two dimensions: customer engagement behavior and customer citizenship behavior. Verifying that the value co-creation behaviour of virtual brand communities among customers has a noteworthy effect on

businesses and consumers (Xiao Dong & Kwangyong, 2016). Many scholars have studied the motivating factors of customer participation in virtual brand value co-creation (Chou, Lin, & Huang, 2016; Xiao Dong & Kwangyong, 2016). Jian and Linghu (2018) believe that customer participation is the basis of value co-creation. Fangcheng and Yitong (2018) verify that different customer income perceptions affect the two value co-creation behaviors. This paper divides customer participation in value co-creation into knowledge contribution behavior and citizenship behavior based on the connotation of value co-creation and related empirical research (Chou et al., 2016; Yi & Gong, 2013). The former refers to the intra-role behavior of individuals to share information and participate in knowledge creation. The latter is voluntary, spontaneous and beneficial out-of-role behavior for the enterprise. This paper takes virtual brand community customers as the research object to study the impact of social capital on social interaction networks focusing on the relationship between knowledge contribution behavior and customer citizenship behavior.

Value co-creation is an interactive process in which customers and companies combine their resources to create value (Cova et al., 2015). This concept is categorized as customer engagement and civic behavior (Yi & Gong, 2013). Research has shown that customer participation in value co-creation in virtual brand communities is of great benefit to both businesses and consumers (Xiao Dong & Kwangyong, 2016), prompting research into what drives customer engagement in value co-creation (Chou et al., 2016; Xiao Dong & Kwangyong, 2016). Scholars such as Jian and Linghu (2018) argue that customer engagement is the foundation of value co-creation while scholars such as Fangcheng and Yitong (2018) explore how customers' perceived benefits influence their co-creation behavior. Conceptual and empirical research on value co-creation (Chou et al., 2016; Yi & Gong, 2013) distinguishes between customer engagement as knowledge contribution and civic behavior. The former involves sharing information and participating in knowledge creation while the latter includes voluntary and beneficial actions that go beyond formal roles. This study explores the impact of social capital on their social interaction networks and the interaction between knowledge contribution and civic behavior.

3. RESEARCH HYPOTHESES AND MODELS

3.1. Research Hypotheses

3.1.1. Structural Dimensional Societal Capital and Customer Involvement in Value Co-Creation Behavior

Structural social capital is mainly measured through social interaction connections, reflecting the social network's structural traits. The social interaction connection in a virtual community refers to the time spent, interaction frequency and intimacy between members reflecting members' relationship structure and intimacy based on social interaction. When social interaction is more vital, members spend more time and energy on social interaction and are more willing to share their expertise to assist other members in solving problems. In addition, when the social interaction among community members is strong, the more intense, frequent and comprehensive the information exchange, the more it can promote the feedback behavior of members. Finally, when the social interaction bond is more robust, the intimacy of the relationship between members is higher and this strong relationship promotes recommendation behavior. Based on this, this study suggests that

Hypothesis H_{1a}: Social interaction connection positively affects knowledge contribution behavior.

Hypothesis H_{1b}: Social interaction connection positively affects customer citizenship behavior.

3.1.2. Relationship Dimension Societal Capital and Customer Participation in Value Co-creation

Relationship behavior dimension and societal capital are the interpersonal relationships between participants in social activities such as trust, reciprocation etc. Chiu et al. (2006). Trust in a virtual community refers to the belief among community members that others are willing to abide by the community's rules and obligations to one another. The reciprocity norm means that the virtual community exchanges are mutual and fair. According to research, when members of a community trust one another, they are more anxious to participate in group activities and offer their expertise or assistance. This can encourage more honest communication among members and the sharing and discussion of information. Trust in the virtual community will enhance his purchase intention including recommending this virtual online community to his relatives and friends (Zhe & Zhong-Dong, 2018). Similarly, when community members feel that this reciprocity norm exists within a virtual community, they will be more ready to comment on or suggest the community to others because they want to maintain it. Based on this, this study suggests that

Hypothesis H_{2a}: The principle of trust reciprocity influences knowledge contribution behavior.
Hypothesis H_{2b}: The principle of trust and reciprocity positively influences customer civic behavior.

3.1.3. Cognitive Societal Capital and Customer Participation in Value Co-Creation

The shared vision in the virtual community describes individuals in the organization as having similar goals, interests, and values. This connection enables individuals on the network who may not know each other to engage in interactive behaviors together. Studies have shown that members of an organization are more willing to exchange and share resources with members who share common goals and values. A shared vision can be seen as a link between different members of the community (Tsai & Ghoshal, 1998). Cohen and Prusak (2002) proposed that members who share values and objectives are probable to work well together and exhibit behaviors that are advantageous to the organization. When community members in a virtual community have similar objectives and values, they are more willing to donate their resources to assist others and aid in the community's promotion. Based on this, this study suggests that

Hypothesis H3a: Shared vision positively affects knowledge contribution behavior.
Hypothesis H3b: Shared vision positively affects customer citizenship behavior.

3.2. Research Model

This section will detail the structure and components of the model used in the study. It will elaborate on how the model puts into practice the theoretical concepts of social capital and customer engagement in value co-creation within virtual brand communities.

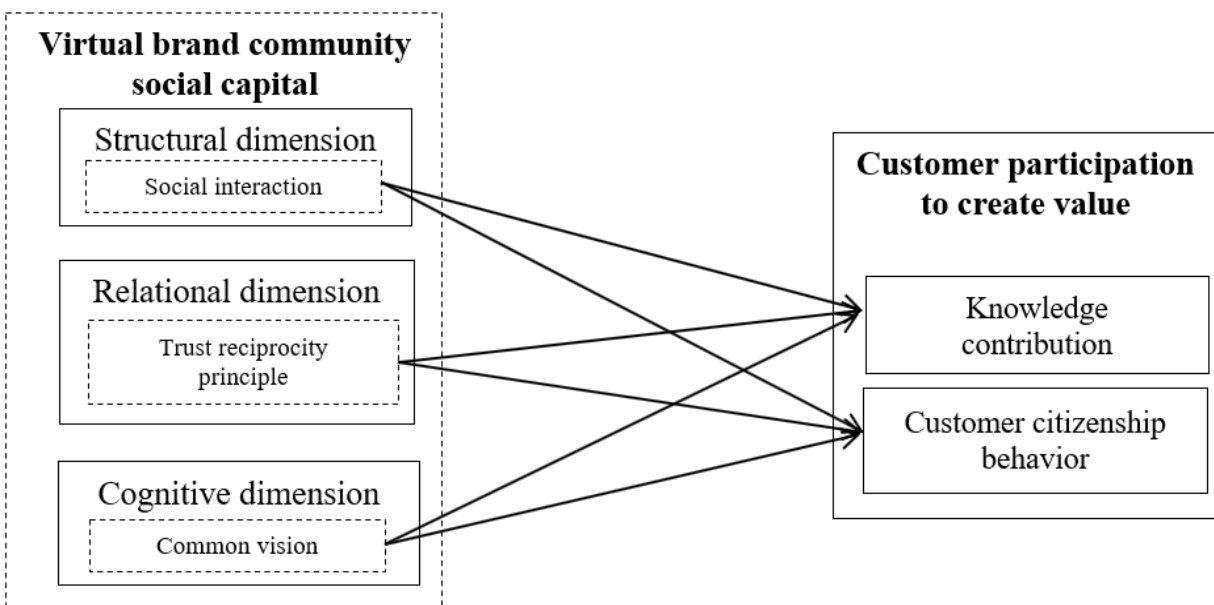


Figure 1. Research model on the impact of virtual brand community social capital on customer participation in value co-creation.

Figure 1 serves as a blueprint for empirical research outlining two hypothetical paths by which the dimensions of social capital (structure, relationship and cognition) influence customer participation in value co-creation: knowledge contribution behavior and customer citizenship behavior. The model integrates previous empirical findings and theoretical perspectives to test the strength and nature of these relationships using structural equation modeling (SEM) to provide a visual and statistical representation of complex interactions.

4. THE METHODOLOGY OF RESEARCH

4.1. Data Gathering and Samples

We selected the Xiaomi community and the Huawei Pollen Club which have large and active user bases for this study. Twenty-nine of the questionnaire's questions were assessed using the Likert scale which ranged from 1 to 5.

The scale's endpoints were labeled "strongly disagree" and "strongly agree" respectively. The questionnaires are mainly designed as electronic questionnaires through the questionnaire star. Questionnaires with links to complete them will be sent out to the community after they have been evaluated by community management. Interested parties will be encouraged to participate by giving out red envelopes and point awards. The questionnaire collection process lasted for one month (2022.05.08–2022.06.20). Moreover, the questionnaire "Please write down your real registered user name" is designed to confirm that the respondents are part of the virtual brand community. Check the items to ensure that the respondent's identity is correct. Incomplete answers and illogical responses: 217 valid surveys were obtained out of a total recovery of 256 questionnaires after excluding unqualified questionnaires such as false identities. [Table 1](#) depicts the sample distribution.

Table 1. Sample distribution.

Index	Options	Number of samples	Percentage (%)
Gender	Male	112	51.6
	Female	105	48.4
Age	Under 20 years old	59	27.2
	20-30 years old	108	49.8
	30-40 years old	36	16.6
	Over 40 years old	14	6.5
Education	High school (Technical secondary school) or below	31	14.3
	High school (Technical secondary school)	71	32.7
	Undergraduate	84	38.7
	Master's degree or above	31	14.3
Time to follow a virtual brand community	Less than one year	69	31.8
	1-3 years	119	54.8
	3-5 years	24	11.1
	More than five years	5	2.3
The time spent in the community	1 hour or less per week	59	27.2
	1-3 hours per week	106	48.8
	3-6 hours per week	38	17.5
	More than 6 hours per week	14	6.5

4.2. Variable Measure

All variable scales are based on scale measurements from earlier literature research and changed to fit the actual situation of this study. With a total of 11 questions, the social capital scale measurement is primarily comprises three variables of social interaction, trust and shared vision drawing on the measuring scales of [Tsai and Ghoshal \(1998\)](#), [Chiu et al. \(2006\)](#) and [Nahapiet and Ghoshal \(1998\)](#).

Measuring knowledge contribution and customer civic behavior primarily depends on the measurement scales of [Chou et al. \(2016\)](#) and [Yi and Gong \(2013\)](#) which have 18 items. [Table 2](#) displays the variable settings and the outcomes of the confirmatory factor analysis.

Table 2. Variable measurement and confirmatory factor analysis.

Variable name	Ask the item	Factor loading	CR	AVE
Social interaction Cronbach's alpha =0. 848	I developed a strong bond with certain members of this virtual brand community.	0.966	0.859	0.608
	I spend a lot of time interacting with some members of this virtual brand community.	0.680		
	I have a personal understanding of some members of this virtual brand community.	0.716		
	I have frequent communication with some	0.724		

Variable name	Ask the item	Factor loading	CR	AVE
	members of this virtual brand community.			
Trust the principle of reciprocity Cronbach's alpha =0. 892	I tend to have the trust of other members of this virtual brand community.	0.946	0.897	0.687
	I believe that the information that members of this virtual brand community post or share is true.	0.739		
	Helping others in that community is mutually fair.	0.794		
	I should take the initiative to help other members when they need it.	0.822		
Shared vision Cronbach's alpha =0. 885	Members of this virtual brand community join the community because they share the same vision and goals.	0.938	0.886	0.722
	Members of this virtual brand community share a common goal of learning about the brand and its products.	0.818		
	Members of the virtual brand community find it enjoyable to share knowledge and information about the brand and its products with each other.	0.786		
Knowledge contribution Cronbach's alpha =0. 875	I often go to the company's virtual brand community to share product and service experiences.	0.962	0.882	0.604
	I often initiate topics and discussions in this virtual brand community.	0.738		
	I am active in this virtual brand community.	0.714		
	I often actively follow and discuss this virtual brand community.	0.773		
	I often contribute and share my knowledge in this virtual brand community.	0.667		
Customer citizenship conduct Cronbach's alpha =0. 961	I will suggest improvements to this virtual brand community.	0.934	0.961	0.657
	I will communicate my thoughts to the virtual brand community if I receive satisfactory service from them.	0.801		
	I often praise this virtual brand community to others.	0.801		
	I would comment on the shortcomings of this virtual brand community.	0.817		
	I recommend this virtual brand community to others.	0.805		
	I would encourage other to participate in this virtual brand community.	0.763		
	I will assist other members of the virtual brand community if they need it.	0.779		
	I'll try my best to assist other customers who may be having difficulties in this online brand community.	0.816		
	I like helping other customers in making the most of the virtual brand community's services.	0.783		
	I am happy to offer advice to other customers in	0.833		

Variable name	Ask the item	Factor loading	CR	AVE
	this virtual brand community.			
	If the virtual brand community service does not meet my expectations, I am willing to tolerate it.	0.792		
	If there is a problem with this virtual brand community service, I am willing to wait patiently.	0.789		
	If the virtual brand community takes longer than expected to get services, I am willing to adapt.	0.808		

4.3. Method of Data Analysis

SEM is used in this study to test theoretical models and assumptions. The validity and reliability of the measurement model were initially assessed using the AMOS 23 software. You should keep testing theoretical models and hypotheses once the measurement model's validity and reliability have been determined.

Structural Equation Modeling (SEM) is a comprehensive statistical approach that analyzes complex relationships between observed and latent variables. SEM encompasses multiple regression analyses, factor analysis and path analysis enabling researchers to assess direct and indirect effects within a hypothesized model. This method is useful in social science research since complex interactions between constructs are common and there is often interaction between numerous variables. Our study used SEM to estimate the relationships between social capital and customers participating in value co-creation in virtual brand communities. This approach allows us to consider the measurement error and the relationships between latent constructs simultaneously. The application of SEM in our research offers several advancements over methodologies used in past studies.

1. Multivariate Nature: SEM allows us to examine a series of dependency relationships simultaneously. This is crucial for our study which investigates how different dimensions of social capital impact various aspects of customer engagement behavior.

2. Latent Variables: Our study deals with constructs like 'social capital' and customers participating in value co-creation that are not directly observable but are inferred from multiple indicators. SEM is adept at handling such latent variables and their measurement errors.

3. Model Fit: SEM provides a framework to assess the model's overall fit enabling us to determine how well the proposed model represents the data.

4. Theory Testing: SEM is both a data-driven and theory-driven approach. It allows us to test the theoretical framework of social capital's role in value co-creation grounded in social capital theory.

Our study's use of SEM represents an improvement over previous research by enabling a more detailed and nuanced analysis of the factors influencing customers to participate in value co-creation in virtual brand communities. We can shed light on social capital's function which hasn't received as much attention in the literature as it could by using SEM.

In data analysis, we will employ Analysis of Moment Structures (AMOS) software known for its structural equation modeling capabilities. It allows for the specification, estimation, assessment and modification of statistical models. We will use multiple fit indices to assess the model's fit.

1. Root Mean Square Error of Approximation (RMSEA): Measures the model's error of approximation in the population with values less than 0.05 indicating a close fit and values up to 0.08 representing a reasonable error of approximation.

2. Standardized Root Mean Square Residual (SRMR): Reflects the average discrepancy between the observed correlations and the model's predicted correlations. A value less than 0.08 is generally considered good.

3. Normed Fit Index (NFI): Compares the chi-square of the model with the chi-square of a null model indicating an incremental fit. Values closer to 1 suggest a better fit.

4. Incremental Fit Index (IFI): Similar to NFI, it compares the model to a baseline model but it also accounts for model complexity. Values above 0.9 are typically deemed acceptable.

5. Comparative Fit Index (CFI): Assesses the fit of a user-specified model relative to other models taking into account sample size. Like IFI, values above 0.9 are preferable.

6. Tucker-Lewis Index (TLI): It is also known as the non-normed fit index. It adjusts the NFI for degrees of freedom

with values closer to 1 indicating a better fit. These indices will collectively help us determine the robustness of our model and the reliability of our findings.

5. EMPIRICAL FINDINGS AND ANALYSIS

5.1. Analysis of Reliability and Validity

Since the scales were all derived from existing studies, a confirmatory factor analysis was performed to assess the validity and dependability of the measurement model. The item's level of consistency or stability is referred to as reliability which primarily reflects the level of consistency of the measurement item. The internal correlation of the measurement item will also be higher if the reliability is higher. Internal consistency was used to determine whether the data in this study were trustworthy. The questionnaire was appropriate if Cronbach's alpha coefficient was above the threshold of 0.7. Table 2 shows that Cronbach's α coefficients for all variables are more than 0.8 indicating high consistency. This study used validation factor analysis to examine structural, convergence and discriminating validity. The fit indices including χ^2/df , RMSEA, SRMR, NFI, IFI, CFI, and TLI were assessed to determine the quality of fit for the measurement model. The χ^2/df value of 1.472 is less than the threshold of 3 indicating a good fit. Similarly, the RMSEA value of 0.047 is below the recommended cutoff of 0.08 suggesting a satisfactory fit. The SRMR value of 0.065 also falls within the acceptable range of 0.08. Additionally, the NFI, IFI, CFI, and TLI values of 0.893, 0.963, 0.963, and 0.959, respectively, all above the minimum threshold of 0.8 further supporting the conclusion that the measurement model demonstrates a good fit. Table 2 demonstrates that all measurement items exhibit factor loadings larger than 0.5. Each variable has a combinatorial reliability (CR) value surpassing 0.8 and each variable's Average Variance Extracted (AVE) exceeds 0.5 demonstrating the measuring scales' high convergence validity. In this study, the square root of the AVE for each variable surpasses its correlation coefficient with other possible variables as presented in Table 3 and the measurement model has better differential validity. Therefore, all of the study's variables have passed the reliability test which shows that the measurement model is appropriate.

Table 3. Distinguishes validity and related coefficients.

Variable	Social interaction	Trust the principle of reciprocity	Shared vision	Knowledge contribution	Customer citizenship conduct
Social interaction	0.780				
Trust the principle of reciprocity	0.352**	0.829			
Shared vision	0.328**	0.219**	0.850		
Knowledge contribution	0.370**	0.334**	0.258**	0.777	
Customer citizenship conduct	0.476**	0.417**	0.425**	0.472**	0.810

Note: ** indicates a significant correlation at the 0.01 level (both sides). The diagonal position is the square root of the AVE value

5.2. Structural Equation Test

We used AMOS 23.0 to perform additional structural equation modelling in order to test the hypothesis. Table 4 shows a pathway analysis of potential variables which shows that social interaction links have a substantial beneficial impact on the contribution of knowledge ($\beta = 0.238$, $p < 0.01$) indicating the presence of H1a; the principle of trust reciprocity exerts a substantial positive impact on the contribution of knowledge ($\beta=0.216$, $p<0.01$) demonstrating the establishment of H2a. Common vision has a noteworthy and favorable impact on the contribution of knowledge ($\beta= 0.182$, $p < 0.01$), therefore confirming the establishment of hypothesis H3a. Social interactions positively affect customer citizenship behavior ($\beta= 0.288$, $p < 0.001$) confirming the establishment of hypothesis H1b. The trust and reciprocity principles favor customer citizenship behavior ($\beta=0.237$, $p < 0.001$). Common vision influences customer citizenship behavior ($= 0.328$, $p 0.01$) indicating that H3 b is established. In a nutshell, the hypotheses H1a, H1b, H2a, H2b, H3 a, H3b, H4a, H4b, H5 a, H5b, H6a and H6b have been validated in this study.

Table 4. Path coefficient results of the structural equation model.

Route inspection	Estimate	S.E.	C.R.	P	Degree of significance
Knowledge contribution <--- Social interaction	0.238	0.099	3.110	0.002	Significant
Knowledge contribution <--- The principle of trust and reciprocity	0.216	0.074	2.965	0.003	Significant
Knowledge contribution <--- Shared vision	0.182	0.083	2.548	0.011	Significant
Customer citizenship <--- Social interaction	0.288	0.089	4.187	***	Significant
Customer citizenship <--- The principle of trust and reciprocity	0.237	0.065	3.678	***	Significant
Customer citizenship <--- A shared vision	0.328	0.075	5.031	***	Significant

Note: *** indicates that the significance test at the 1% level has passed.

6. RESEARCH CONCLUSION AND DISCUSSION

6.1. Conclusion

Users of virtual brand communities serve as the study's research objects. It investigates how social capital affects brand customers who co-create value behavior inside virtual brands' communities. The three elements of societal capital exert a notable and favorable impact on two aspects of consumer participation in value co-creation based on the findings.

This research aims to deepen the understanding of customer participation in value co-creation behavior in virtual brand communities and expand the theoretical foundation of this field from the perspective of social capital. It attempts to explore the impact of social capital on customer participation in value co-creation behavior within virtual brand communities to fill the gap in the existing literature. Although existing research has extensively explored various factors that influence consumer engagement motivation, such as social support (Liu, Xiao, Fang, Zhang, & Lin, 2020; Shirazi, Wu, Hajli, Zadeh, & Lin, 2021; Tajvidi, Wang, Hajli, & Love, 2021), website characteristics (Zhang, Lu, Wang, & Wu, 2015), trust (Wong, 2023), and co-creation of experience (Zhang, Shang, Li, & Chen, 2020). It has also examined the interplay between these factors and customer stickiness (Ren, Yang, Zhu, & Majeed, 2021; Zhang, Guo, Hu, & Liu, 2017), loyalty (Fang, 2019) and the cohesiveness of brand communities (Sanz-Blas, Bigne, & Buzova, 2019). However, there is still insufficient research on the role of social capital in virtual brand communities and its relationship with social networks. The results of this paper show that social capital has a significant and positive impact on promoting customer participation in value co-creation behavior in three dimensions: structure, relationship and cognition. This is in line with recent research that highlights the critical role of social capital as a thriving online brand community particularly in facilitating practical resource and information sharing among members thereby creating value for the community and the brand (Chi, Harrigan, & Xu, 2022; Meek, et al., 2019).

Therefore, this paper constructs a theoretical framework based on social capital theory aiming to expand the application of social capital theory in virtual brand communities and further deepen the understanding of customer participation in value co-creation in virtual brand communities. This research brings a new perspective to the academic community and provides practical guidance for businesses on fostering and promoting consumer engagement in virtual brand communities.

This study aims to explore the impact of social capital on value co-creation behavior. The results show that social capital has a positive impact on consumers' participation in value co-creation behavior in terms of structure, relationship and cognition.

This study provides a new dimension for understanding consumers' participation in value co-creation behavior in virtual brand communities and makes important theoretical contributions through the unique perspective of social capital. Although previous studies have examined the factors that influence consumer engagement motivation such as social support (Liu et al., 2020; Shirazi et al., 2021; Tajvidi et al., 2021), website characteristics (Zhang et al., 2015), trust (Chen, Yuan, & Zhu, 2021) and co-creation experiences (Zhang et al., 2020) but the role of social capital and its relationship with social networks have not been explored enough. The findings of this paper highlight the significant impact of social capital on customer engagement in co-creation, consistent with the latest research revealing the key role of social capital in the development of online brand communities especially in facilitating the

sharing of practical resources and information among members thus providing strong support for community and brand value creation (Chi et al., 2022; Meek, et al., 2019).

As a result, this study not only provides new perspectives in the academic field but also provides new insights for businesses. The findings provide practical strategies and guidance for businesses to nurture and drive consumer engagement in virtual brand communities.

6.2. Management Inspiration

Managers must enhance the social resources inside the online brand community to foster consumer engagement and facilitate value co-creation. First, corporations can create a variety of topic sections to cater to users' specific needs. It promotes the establishment of different social circles and updates topics promptly to capture the correlation between popular topics and community items and services designed to entice consumers to join in discussions and communicate with each other. At the same time, through the formulation of incentive measures, users are encouraged to share spontaneously on the community platform, enhance the willingness to interact between users, encourage them to actively help other users solve problems and enhance users' stickiness and sense of identity with the community. Second, establish good social reciprocity norms and trust mechanisms. Reciprocity and trust among members and members' identification with the community will encourage consumer value co-creation. Strict verification of community membership and real-name participation in community discussions can enhance the sense of trust among members. Third, establish a shared vision for the community by using a common language. A virtual community can set up different interest sections to encourage members with common interests to gather, share and discuss. In addition, the virtual brand community should use social norms, values and culture to promote customers to attain a stronger sense of community identification, effectively enhance the commitment and trust of customers to the virtual brand community so that customers and businesses can be more closely linked, enhance the value of customer participation and create a sustainable construction of the virtual brand community.

6.3. Research Limitations

First, this study uses the virtual brand community customer self-assessment method to collect data and all variables belong to the personal perception or attitude category. In the future, we can consider collecting paired data from virtual brand community managers and customers at the same time. It will increase the research's scientific rigor and the validity of the conclusion.

Second, to determine whether the three aspects of societal capital in a virtual brand community are interconnected and how they affect each other, this paper further explores and follow-up on research.

Third, this paper uses cross-sectional sample data. The obtained variables have more of a correlative than a causal relationship with one another. Therefore, future studies may use a wider variety of investigative techniques to increase the scientific validity of their conclusion and explain the relationship between the variables.

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INSTITUTIONAL REVIEW BOARD STATEMENT

The Ethical Committee of the International College, Krirk University, Thailand has granted approval for this study (Ref. No. 2024A1505).

TRANSPARENCY

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.

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