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A study of the differential impact of online community users' social capital on value co-creation

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Abstract: Online community facilitates firm-consumer and consumer-consumer interactions for value co-creation. This study explores the relationship between social capital of online community users and community value co-creation in the context of the Xiaomi community. In the study, the forms of value co-creation are differentiated into two forms: initiated value co-creation and participatory value co-creation, and the effects of different types of online community users' social capital on the forms of value co-creation in which they participate are empirically examined, and the results find that: structural capital has a significant positive effect on initiated value co-creation, while the effect on participatory value co-creation is insignificant; cognitive capital has a significant positive effect on both initiated value co-creation and participatory value co-creation; and cognitive capital has a significant positive effect on both initiated value co-creation and participatory value co-creation. In this context, the present study contributes to a deeper comprehension of the interplay between social capital and models of value co-creation.

Keywords: social capital; value co-creation; online community; Xiaomi community

1. Introduction

The basis of value co-creation is to strengthen the interaction between consumers and firms as well as consumers, and brand communities (McAlexander, 2002; Muniz, 2001) are considered to be a favorable place to strengthen the interaction between consumers and firms as well as consumers. Online communities, in particular, break the time and geographic location constraints of traditional brand communities, allowing consumers to join online communities and communicate with firms and other consumers anytime, anywhere via the Internet. Online communities gather a large number of community members, and firms need to be more efficient in their marketing strategies. Some community members are keen to be the first to put forward ideas and thoughts on product/service innovation, improvement or new applications; while some community members are keen to express their own unique ideas on value co-creation ideas put forward by others, i.e., joining in other people's value co-creation discussion activities. According to the different forms of community members' participation in online community value co-creation, this study categorizes two forms of participation in value co-creation, one is initiating value co-creation and the other is participating value co-creation. Because opinion leaders or seed users have a strong spreading and leading effect, firms want to identify opinion leaders or seed users of the online community to support the firm (Faraj and Kudaravalli, 2015). Therefore, opinion leaders or seed users are the focus of firms' marketing strategies. Then, it is a challenge

for firms to effectively identify opinion leaders or seed users in online brand communities.

Through literature combing, at present, in the research on user behavior in online knowledge communities, researchers mostly focus on the research on the impact of users' subjective willingness on the collaborative value co-creation of users in online knowledge communities. Research on customer participation in online brand communities mainly focuses on the motivation of customers to participate, such as the impact of the environmental characteristics of online brand communities on customer participation. Nielson (2006) found that customers participating in online communities often follow the 90-9-1 rule: 90% of customers are divers (e.g., reading or observing but not commenting), and 9% participate in the community. Co-creation activities are time-regulated, with occasional contributions based on temporal priorities; only 1% of customers participate frequently in co-creation activities and contribute more content to the community. For example, Wikipedia is mainly contributed by a few customers. There is no study that analyses the value co-creation of community members from the perspective of social capital. Therefore, this study argues that those opinion leaders or seed users are usually candidates for initiating value co-creation. They often come up with original, novel ideas or thoughts and attract others to discuss them; on the other hand, those who are not opinion leaders or seed users usually just participate in other people's value co-creation conversations. They may also be rich in ideas and thoughts, but these ideas and thoughts need to be stimulated by others' topics. Firms are then faced with the question, what kind of community members initiate value co-creation activities? And what kind of community members like to participate in value co-creation activities? Therefore, this study analyzes which community members with which kind of social capital will be enthusiastic about which form of value co-creation from the perspective of social capital.

2. Research models and research hypotheses

Based on the social capital theory and value co-creation theory related research, this paper constructs a model of the relationship between social capital and value co-creation of firm-led online community members (see **Figure 1**).

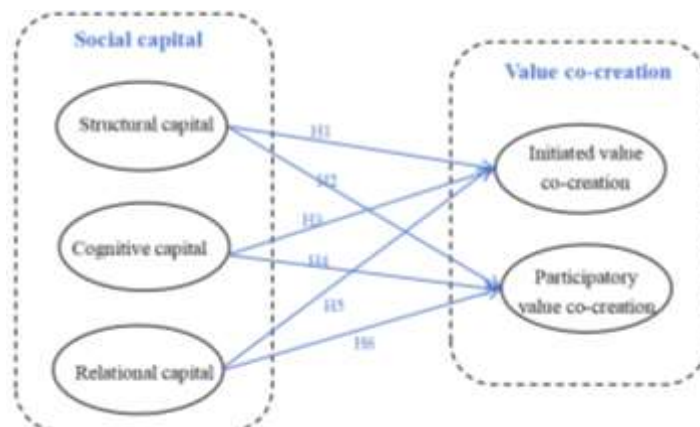


Figure 1. Model of the relationship between social capital and value co-creation of community members.

2.1. Structural capital and value co-creation

Despite the inherent limitations of online communication, for knowledge contribution, social capital plays an important role, most notably structural social capital, where an individual is more likely to maintain knowledge contribution behaviors if the individual is at the center of the network and connected to more people (Wasko, 2005). Structural social capital is the social interaction connections that community members have with other members in the community (Chiu and Huang, 2019). In innovative communities, the higher a community member's structural social capital is, the more it indicates that he or she is at the center of the network. Faraj et al. (2015) argued that socially active members of a community do not necessarily become community leaders, but when the network structure of community members, i.e. structural social capital, is considered, the higher a community member's structural social capital is, the likelihood that the community member will become a community leader is The higher the structural social capital of a community member, the higher the possibility of that community member becoming a community leader. Then, the higher the structural social capital of a community member, the more likely it is that the member will be motivated to publish value co-creation themed activities rather than participate in value co-creation activities. Therefore, the following hypothesis is proposed.

H1: Structural capital of community members has a positive effect on initiated value co-creation.

H2: There is no significant effect of structural capital of community members on participatory value co-creation.

2.2. Cognitive capital and value co-creation

For knowledge contribution, cognitive capital, i.e., an individual's level of experience and expertise, plays a crucial role both in the organizational domain (Constant, 1996) and in the online network (community) domain (McLure Wasko, 2000; Wasko, 2005). This study focuses on the impact of social capital on value co-creation in firm-led online brand communities at the individual level, where an individual's cognitive social capital is the professional knowledge, techniques, norms, etc., that he has acquired himself and learnt in the composition of his interactions with others, and where an individual is only as good as the knowledge, he possesses about the product to which he is able to provide a knowledge contribution (Wasko, 2005). Cognitive social capital is a relatively neutral concept, and having a certain amount of cognitive social capital is desirable to participate in value co-creation activities, whether for opinion leaders or ordinary participants, or non-opinion leaders. Therefore, the following hypothesis is proposed.

H3: Cognitive capital of community members has a positive effect on initiated value co-creation.

H4: Cognitive capital of community members has a positive effect on participatory value co-creation.

2.3. Cognitive capital and value co-creation

Relational social capital is equally important for knowledge integration in organizations in both offline and online virtual environments (Robert, 2008), and relational social capital, such as reciprocity, identification, and altruism, has a positive impact on knowledge sharing in online communities (Chang and Chuang, 2011; Chiu and Huang, 2019). The relational dimension of social capital is reflected in group members' identification with the group, trust in others, perceived responsibility, recognition, and adherence to group norms, and this relational capital facilitates group activities and is an important value for both the group and the individual (Wasko, 2005). Individuals' relational capital can be measured in terms of commitment and reciprocity, commitment implies responsibility and obligation to the group and reciprocity implies a sense of mutual debt of individuals to ensure that individuals assist each other, both commitment and reciprocity facilitate knowledge contribution (Wasko, 2005). The reciprocity and commitment elements of relational social capital mean that mutual aid and support among community members are strengthened, especially when firms encourage more interaction among members in the community, the social attributes of relational social capital are better reflected. For example, in Xiaomi's online community, firms encourage community members to invite their community friends to participate in value co-creation activities, at which time the number of people participating in value co-creation activities increases. Therefore, this study concludes that relational social capital is more effective in motivating community members to participate in value co-creation activities rather than actively posting value co-creation activity topics. Therefore, the following hypothesis is proposed.

H5: There is no significant effect of community members' relational capital on initiated value co-creation.

H6: Community members' relational capital has a positive effect on participatory value co-creation.

3. Data selection and variable measurement

3.1. Data selection

This study is set in the context of the Xiaomi community, a more specialized professional and technical community about product/service innovation, development and application. The community was founded by a famous firm in China, and its aim is to bring together the firm's customers and to co-define the product and its value by drawing on their knowledge and experience to make original suggestions and comments on product or service development, new applications, and usage issues. The theme of each value co-creation activity can be seen as an innovative, creative orientation for community members to participate in the discussion. This study still takes the members of Xiaomi community as the survey object, firstly, this study grabs the information of the community members, and grabs 3520 community members, and then chooses 500 randomly from inside the list of the grabbed community members, or invites to fill in the questionnaire by email or sends the station information, and at

the same time, gives a certain amount of financial remuneration. After eliminating unqualified questionnaires, 230 valid questionnaires were obtained.

3.2. Measurement of variables

Based on the acquired value co-creation theme posts and their response posts, they were further analyzed to extract the research variables involved in this study. The definitions of the variables and their measurements are shown in **Table 1**.

Table 1. Indicators or connotations of conceptual measures.

Concept		Measurement indicators
Dependent Variable	Initiated value co-creation	The amount of activity initiated by community members, i.e., the number of threads posted, is used as a strategic indicator.
	Participatory value co-creation	The amount of activity participation of community members, i.e., the number of participating reply posts, was used as the strategic indicator. In this study, a screening criterion of 30 words was set based on the actual situation of the community, i.e., only those reply posts with more than 30 words were included in the value co-creation measurement system.
Independent Variable	Structural capital	Refers to the sum of patterns of connectivity between actors, i.e. who connects to you and how you connect to them. Individual structural capital can be measured in terms of the number of links that that individual has to others, e.g. degree centrality, bridging centrality.
	Cognitive capital	It refers to resources that provide common representations, interpretations, and institutions for all parties. An individual's cognitive capital is the expertise, techniques, norms, etc., that he or she has acquired on his or her own and that he or she has learned in the composition of his or her interactions with others.
	Relationship capital	Refers to assets that are built and amplified through relationships. For individuals, relational capital is reflected in group members' identification with the group, trust in others, perceived responsibility, recognition and adherence to group norms.

4. Empirical analysis

In this paper, Stata 12.0 was used to analyze the descriptive characteristics and correlations of the key variables and model regression analyses were carried out, the results of which are presented below.

4.1. Descriptive statistics

Firstly, we performed descriptive statistics for each variable, and the statistical results are shown in **Table 2** Descriptive statistics for each variable:

Table 2. Descriptive statistics for each variable.

Variable	Obs	Mean	Std. Dev	Min	Max
Coi	230	3.957	0.764	2.000	5.000
Cop	230	4.070	0.812	1.000	5.000
Str	230	3.475	0.746	1.667	5.000
Cog	230	4.084	0.536	2.250	5.000
Rel	230	4.091	0.536	2.250	5.000

Note: Coi for initiating co-creation; Cop for participating in co-creation; Str for structural capital; Cog for cognitive capital; Rel for relational capital.

4.2. Covariance test

In order to avoid the possibility of multicollinearity, we first tested the data for covariance. One of the methods to test for multicollinearity is the correlation coefficient method, as shown in **Table 3** Correlation Coefficient Matrix of Variables, the correlation between the main independent variables of each variable does not exceed 0.9, which indicates that there may not be serious covariance problems.

Table 3. Matrix of variable correlation coefficients.

	Coi	Cop	Str	Cog	Rel
Coi	1				
Cop	0.350*	1			
Str	0.366*	0.162	1		
Cog	0.390*	0.531*	0.270*	1	
Rel	0.383*	0.5121*	0.330*	0.665*	1

Note: * $p < 0.05$. Note: Coi for initiating co-creation; Cop for participating in co-creation; Str for structural capital; Cog for cognitive capital; Rel for relational capital.

In addition, the VIF in the model, i.e., Variance Inflation Factor (VIF), is shown in **Table 4** Multicollinearity VIF test, the VIF of each independent variable in the model is less than 2.27, and the overall VIF of the model is 1.60, which indicates that the data in this study do not have serious multicollinearity problems, and can be used for further statistical analyses and empirical tests.

Table 4. Multiple covariance VIF test.

Variable	VIF	1/VIF
Rel	1.87	0.53
Cog	1.80	0.56
Str	1.13	0.89
Mean VIF	1.60	

Note: Str: Structural Capital; Cog: Cognitive Capital; Rel: Relational Capital.

4.3. Model regression analysis

Table 5. Model Regression Results.

	Coi	Cop
Str	0.263*** (4.16)	-0.0301 (-0.48)
Cog	0.313** (2.82)	0.521*** (4.70)
Rel	0.217 [†] (1.92)	0.443*** (3.92)

Note: T statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.00$, [†] $p < 0.1$. Note: Coi initiates co-creation; Cop participates in co-creation; Str structural capital; Cog cognitive capital; Rel relational capital.

The model regression analysis in this study was statistically analyzed using Stata 12.0, and the results of the model regression analysis are shown in **Table 5** Model Regression Results.

Effect tests were conducted and what the results show is the differential impact of different social capital components on value co-creation. Firstly, structural capital has a significant positive effect on initiated value co-creation ($\beta = 0.263, p < 0.00$), while the effect on participatory value co-creation is insignificant ($\beta = -0.0301, ns$), and Hypothesis H1 and Hypothesis H2 are supported. We know that structural capital represents the structural position of community members in the social network, typical indicators such as degree centrality and bridging centrality, the higher these indicators represent the more community members are in the center of the network, such as opinion leaders. The empirical results of this study confirm that structural capital has a positive and significant effect on initiating value co-creation, while it has a non-significant effect on participating value co-creation, indicating that community members with a higher position, the more they are at the center of the network, are more inclined to initiate discussions on topics, rather than participate in value co-creation or topic discussions. Secondly, cognitive capital has a significant positive effect on both initiated value co-creation ($\beta = 0.313, p < 0.05$) and participatory value co-creation ($\beta = 0.521, p < 0.00$), and Hypothesis H3 and Hypothesis H4 are supported. Cognitive capital is a more neutral concept, which is the accumulation of individual knowledge and information about the community, products, etc. There is no difference in the influence of structural capital, regardless of whether it is initiated value co-creation or participatory value co-creation. Third, relational capital has a marginally significant positive effect on initiatory value co-creation ($\beta = 0.217, p < 0.06$), and it has a significant positive effect on participatory value co-creation ($\beta = 0.443, p < 0.00$), Hypothesis H5 and Hypothesis H6 are supported. Relatively speaking, relational capital puts more emphasis on sociality, and for community members with high social capital, they have stronger emotional ties to the community and community members, are more willing to work together with other community members to maintain the community, and are willing to help others and actively participate in community activities. Therefore, community members with high social capital are more likely to participate in participatory value co-creation activities than in initiated value co-creation activities.

5. Conclusions and implications

This study focuses on the relationship between the social capital of online community users and community value co-creation. This study distinguishes between two forms of value co-creation: initiated value co-creation and participatory value co-creation. From an opinion leader's perspective, opinion leaders in online communities are more inclined to initiate value co-creation activities, or the initiators of value co-creation are mainly those who are initiated by members of higher status in the community. From an individual's perspective, initiating value co-creation is a more proactive behavior, and community members who are happy to initiate value co-creation activities indicate that they are more likely to be people who are more interested, proactive and active in the community and its activities. These members

are more likely to inspire other members to participate in community value co-creation activities or to inspire value co-creation ideas from other community members. Of course, the initiation of value co-creation activities needs to be met with a response from other community members in the hope that more members will participate in the activities, i.e., there needs to be more participatory value co-creation activities to explore value creation together.

This study deepens the understanding of social capital's influence patterns on value co-creation. Theoretically, there is a fundamental difference between initiated value co-creation and participatory value co-creation. Initiating value co-creation is more likely to reflect community opinion leader qualities, with community members being more proactive. Participatory value co-creation, on the other hand, is more likely to be inspired by others or to involve in value co-creation activities due to social connections. As a result, the influences or drivers of these two different forms of value co-creation may differ. According to social capital theory, community opinion leaders are generally those with higher levels of structural social capital, which means that structural social capital is more likely to have a positive impact on initiated value co-creation than participatory value co-creation. In addition, participatory value co-creation is slightly more passive than initiatory value co-creation, and relational social capital emphasizes the emotional commitment of community members to reciprocity and trust in the community as well as in other members. Therefore, relational social capital has a greater impact on participatory value co-creation than on initiatory value co-creation. In addition, this study reaffirms that cognitive social capital in online communities is an important resource for value co-creation. In contrast to structural and relational social capital, which have differential effects on value co-creation, cognitive social capital has a positive and significant effect on both initiated and participatory value co-creation. In this sense, this study deepens our understanding of the relationship between social capital and value co-creation models.

6. Perspectives

This study reveals the social capital drivers behind different forms of value co-creation (initial value co-creation and participatory value co-creation) through an in-depth exploration of the relationship between social capital and community value co-creation among online community users. However, there are still many directions that deserve further exploration in this area.

6.1. Refining the impact of the dimensions of social capital

6.1.1. Structural social capital

Future research could further refine the specific impacts of different components of structural social capital (e.g., network centrality, network size, etc.) on the co-creation of initial value, as well as how these components differ across different types of communities.

6.1.2. Relational social capital

The factors of trust, reciprocity and emotional commitment in relational social capital can be further explored in terms of their manifestation in different cultural and social contexts and their impact on value co-creation.

6.1.3. Cognitive social capital

Future research could analyze in more depth how cognitive social capital (e.g., shared language, shared vision, etc.) facilitates knowledge sharing and innovation among community members, and how this sharing affects the efficiency and effectiveness of value co-creation.

6.2. Cross-community comparative study

This study focuses on online communities, but different communities (e.g., professional communities, interest communities, social communities, etc.) may exhibit different characteristics in the value co-creation process. Future research can compare the relationship between social capital and value co-creation in different types of communities to reveal the commonalities and differences.

6.3. Social capital and value co-creation in a dynamic perspective

This study explores the impact of social capital on value co-creation based mainly on a static perspective. However, both social capital and value co-creation are dynamic processes. Future research can adopt time series analysis or case study methodology to explore the interaction between social capital and value co-creation at different time stages and their changes.

6.4. The impact of technological factors on the co-creation of social capital and value

As technology develops, the form and function of online communities evolve. Future research could explore how new technologies (e.g., artificial intelligence, big data, blockchain, etc.) affect the formation and evolution of social capital and how these technologies facilitate or hinder the value co-creation process.

In summary, this study provides a rich theoretical foundation and empirical support for future research. Future research can further deepen and expand on this basis to reveal a more complex and multifaceted relationship between social capital and value co-creation.

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Informed consent: Full informed consent was obtained from all individuals participating in this study. We explained the purpose, process, potential risks and benefits of the study in writing to participants and ensured that they understood this information. Participants were informed that their participation was voluntary and that they had the right to withdraw their consent at any time without suffering any adverse consequences.

Conflict of interest: The authors declare no conflict of interest.

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