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ARTICLE



## Contract governance and value co-creation in virtual community: the moderating effect of psychological ownership

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### ABSTRACT

Previous research has identified the factors that affect the value co-creation in virtual community from the perspective of customer demands, however, less has been studied in the literature from the perspective of firms' contract governance. Drawing on the literature on this topic, this paper focuses on the impact of contract governance on value co-creation in virtual community and introduces the belongingness, self-efficacy, and self-identity contained in psychological ownership of customers as moderators into the model. The findings show that contract governance has a positive effect on value co-creation in virtual community, psychological ownership has a positive moderating effect, which is mainly reflected in belongingness and self-identity of psychological ownership, but this effect is not obvious in self-efficacy of psychological ownership. This study will provide inspiration for brands to better manage virtual brand communities, enhance customers' willingness to participate in value co-creation, and expand the research on transaction cost theory and value co-creation theory.

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### KEYWORDS

Value co-creation; virtual community; contract governance; belongingness; self-efficacy; self-identity

## Introduction

With the widespread use of the Internet and the popularity of social media, firms have shifted from focusing only on products or services to focusing on customer experience. The era of experience economy has quietly arrived. More and more people choose to join virtual communities to communicate and exchange brand-related information with others with similar preferences (Brodie et al., 2013). Value co-creation can be realised by participating in the trial, design, and evaluation of products or services of firms. Value co-creation refers to a series of processes in which customers actively participate in the design, development, and production of products or services, and interact with firms or other stakeholders in the consumer domain (Payne et al., 2008) to realise the co-creation of value by customers and firms (Prahalad & Ramaswamy, 2000).

Virtual community, first defined by Rheingold (1994), refers to an online virtual space where products or brands are discussed. Virtual brand community, as the product of online development of the brand community, provides more interaction opportunities for customers. As a typical platform for value co-creation (Schau et al., 2009), the virtual brand

community can help firms establish and consolidate the relationship between the brand and customers and reduce interaction costs. The biggest advantage lies in attracting customers and collecting information. Virtual communities connect customers with firms, and on this platform, virtual community customers can easily obtain a large amount of information about brands, products, and the dynamics of firms. Customers can also participate in activities such as new product evaluation and new product ideas crowdsourcing initiated by firms, and get certain material rewards. Customers can satisfy their own needs by participating in the activities of the virtual community, such as helping to improve products or services and gaining trust from other community members. This process, allows customers to perceive more value from the brand and further enhances customers' willingness to participate in value co-creation (Zhao et al., 2019).

Nowadays, it has gradually become a trend to encourage customers to participate in value co-creation activities in virtual communities initiated and managed by firms. For example, both Samsung virtual community and Xiaomi virtual community had initiated product and service ideas crowdsourcing activities. The reason for this is that virtual community customers tend to be highly aligned with most consumers of the brand, and their opinions and suggestions can serve as an important basis for firms to further improve their products and expand into emerging markets. By refining and adopting suggestions from members of the virtual community, a firm is likely to improve the quality of its products or services, thus further enhancing its competitiveness.

However, virtual communities are characterised by anonymity and weak control (Christopherson, 2007) and some customers in the communities have certain opportunistic behaviours, which makes it difficult for firms to perfectly supervise and control value co-creation activities in virtual communities. Once the problem of opportunistic behaviour or abuse of intellectual property occurs in the community activities that customers participate in, it will spread the problem rapidly due to the infinite diffusion of the Internet, thus hurting firms. Therefore, the question of this study is what factors can help to solve the irregular participation behaviour of customers in virtual communities, to improve the value co-creation performance.

A virtual community can be regarded as a collection of organisations. As one aspect of the study on inter-organisational relationship management, will contract governance restrain the opportunism generated by customers of the virtual communities? Contract governance can clarify the responsibilities and obligations of each participant, formulate corresponding codes of conduct, restrain opportunistic behaviours (Q. Yang et al., 2016). And contract governance mechanism is mainly manifested as joint contract terms and proprietary asset investment, which can reduce risks, promote knowledge transfer, and improve integration performance. Although lots of studies had confirmed the positive role of contract governance in the cooperation between the participants through conflict alleviation (Bai et al., 2016), opportunism prevention (Steinicke et al., 2012), and so on, most of existing contract governance research mainly focused on the organisation level, such as the interfirm relationship governance (Choi et al., 2020) and knowledge transfer management (Jiang et al., 2013), and few studies, especially empirical studies, had confirmed the impact of contract governance at the individual level.

In addition, from the perspective of customers, their motivation to participate in the interaction in the virtual community largely comes from belongingness, self-identity (Phua et al., 2017), and self-efficacy (Woisetschlager et al., 2008), which constitute

psychological ownership (Pierce et al., 2001). According to the social identity theory, customers with higher belongingness usually have higher brand purchase intention (Kilambi et al., 2013) and enough self-identity could satisfy the individual's utilitarian and hedonistic consumption goals (Muñiz, Jr. & Schau, 2007), which will encourage customers to participate in the value co-creation activities. Based on the social cognition theory, customers with high self-efficacy will expect to highlight themselves in the activities held by the community and expect to gain some control over the virtual community (Woisetschlager et al., 2008). So, they will actively participate in value co-creation activities and increase their influence in the community. Considering the different effects of the three sub-dimensions of psychological ownership on value co-production, we used them as our moderating variables in this study.

The value co-creation of customers in virtual communities will reduce transaction costs in the process of value exchange between firms and customers (Meunier & Quinet, 2010). For example, advertising input is reduced, customers can obtain a large amount of information related to products in virtual communities, lower the threshold for customers to obtain the use-value of products or services, or improve their willingness (Brodie et al., 2013). However, most existing researches focus on the construction of virtual brand community and customer engagement behaviour (Dholakia et al., 2004; Kaur et al., 2018; Royo-Vela & Casamassima, 2011), there are few studies on the influencing factors of value co-creation in virtual communities, and few studies on value co-creation from the perspective of transaction cost theory, especially value co-creation in virtual communities, and few studies on the mechanism of contract governance affecting value co-creation in virtual communities.

Therefore, this study aims to test whether contract governance can play its role in regulating behaviour at the individual level, thus having a positive impact on the performance of value co-creation activities in virtual communities. And this study will contribute to the literature in two ways. First, by exploring the opportunism prevention role of contract governance at the individual level in the virtual community, this study will fill in the gaps of empirical research in this field. Second, examining the one antecedent and three moderators, and their relationships with value co-creation in virtual communities will advance our knowledge of what factors facilitate the development of this means of value creation, and what factors influence the relationship between value co-creation and its antecedents. Finally, this study will inspire brands to better manage virtual brand communities and enhance customers' willingness to participate in value co-creation, and expand the research on transaction cost theory and value co-creation theory.

## Literature review

### *Value co-creation*

Value co-creation originated from Storch's idea in the 19th century, that is, the process of service requires the participation of both providers and customers. With the rapid development of the Internet, customers can quickly obtain comprehensive and diversified information, instead of passively responding to the market, which breaks the traditional value creation theory. After that, many scholars began to attach importance to the role of customers. Payne et al. (2008) explicitly place customers as co-creators of value on an equal footing with firms (Payne et al., 2008).

Value co-creation refers to the integration of resources provided by both firms and customers through the interaction, and the ultimate realisation of value-creating activities (Cova & Salle, 2008), which has proved to be a source of future competitive advantage for firms (Prahalad & Ramaswamy, 2000). At present, the definition of value co-creation is divided into narrow and broad senses by scholars. In a narrow sense, value co-creation refers to the co-creation of value in the direct interaction between firms and customers (Gronroos & Voima, 2013). In a broad sense, value co-creation is reflected not only in the use-of value generated by the direct interaction between customers and firms, but also in the process of R&D, design, production, and consumption, and customers and firms co-create value through direct or indirect interaction and cooperation (Sheth & Uslay, 2007). The value co-creation theory adopted in this study is the generalised value co-creation theory, which aims to study the value co-creation generated by the interaction between customers and firms more comprehensively.

According to good-dominant(G-D) logic, service-dominant(S-D) logic, and customer-dominant(C-D) logic respectively, value co-creation can be divided into three categories, namely production-oriented value co-creation, service-oriented value co-creation, and experience-oriented value co-creation. Firstly, value co-creation based on the goods-dominant logic emphasises exchange value and the creator of value is the firm that creates value by embedding value into products or services (Vargo & Lusch, 2004). Value is jointly produced by firms and consumers(Ramirez, 1999), and co-creation takes place before consumption, use, or experience. Customers are mere consumers of value, while firms are providers of value. The role of the firm is the leader in this series of value exchanges. Secondly, value co-creation based on service-dominant logic points to services and emphasises the use-value. Firms provide value propositions containing services, and value co-creation between consumers and firms takes place in the service process (Vargo, 2011; Vargo & Lusch, 2008). Thirdly, value co-creation based on customer-dominant logic emphasises situational value. This kind of value co-creation is led by consumers. Customers use their knowledge and skills to integrate the resources provided by the firm to create value in the use and experience of new products or services. Customers use their knowledge and skills to integrate the resources provided by the firm to create value in the use and experience of new products or services (Gronroos & Voima, 2013). Firms provide an experience basis, and consumers pay attention to situational value while consuming, which brings self-perceived value to consumers and creates value in the use and experience of new products or services to realise value co-creation. This research adopted a perspective based on service-dominant logic, which is different from the traditional value creation model. In this process of value co-creation, customers participate in the communication and interaction with firms according to their preferences and knowledge, getting rid of the original innovation mode that firms design new products and services alone (Mustak et al., 2013).

In the process of virtual community value co-creation, customers take the brand or product as the centre and create value by participating in the social interaction between firms and other customers in product design, development, production, or consumption. Zwass (2010) divided virtual community value co-creation into two categories according to the different initiators. The first one is sponsored value co-creation, which is initiated and organised by firms in the brand community. The second one is autonomous value co-creation, which is created and organised by virtual community customers

spontaneously. The type of value co-creation adopted in this paper is sponsored value co-creation, and the concrete manifestation is the development and design activities initiated and organised by firms for new products or new services, in which customers participate in the interaction with other participants to generate ideas.

As for the antecedents of value co-creation in virtual communities, previous studies have focused on the perspective of firms (Chen & Wang, 2016; Gohary et al., 2016), there are few studies on factors influencing customers' willingness to participate in value co-creation from the aspects of customers, environment, and the brand itself. From the perspective of the individuals, most of the previous studies focused on the influence of customers' psychological motivation and personal characteristics on value co-creation behaviours.

Customers are motivated to create value together not only by creating value for themselves (self-value co-creation) but also by contributing to the benefits of other participants in the virtual community (Casali et al., 2018). Based on the theory of satisfaction and from the perspective of customer-dominant logic, Nambisan and Baron (2010) proposed that the cognitive needs, individual integration needs, social integration needs, and entertainment needs of customers in virtual communities were the driving factors for customers to participate in value co-creation. Fuller et al. (2012) found that customers' knowledge, professional skills, brand-related knowledge, and creativity could play an important role in the virtual community and had a positive impact on firm product innovation. Tseng and Chiang (2016) explain why customers should collaborate with firms to create value in the tourism sector because both parties can benefit from the development, design, and promotion of new products (Tseng & Chiang, 2016). Zhao et al. (2019) empirically concluded that the willingness of virtual community customers to participate in value co-creation will be affected by subjective factors, environmental factors, brand factors, and perceived value factors (Zhao et al., 2019). Baltes and Parker (2000) believed that customer interaction was an important activity in the virtual community and an important means for customers to create value and obtain value, and the interaction between customers would have a positive impact on firm value co-creation. Vargo et al. (2008), Cheung et al. (2013) found that customer participation can help to understand customer needs and improve customer satisfaction (Cheung et al., 2013; Vargo et al., 2008). Highly engaged customers actively share information and potentially recommend products or services, so customer engagement is seen as the basis for sustainable development of virtual communities and value co-creation (Storbacka et al., 2016; Zhao et al., 2019).

### **Contract governance**

A virtual brand community is an online communication platform based on the media of network platform for brand fans to interact and exchange brand-related information (Brodie et al., 2013). Virtual network communities can be divided into three categories in terms of their originators, including transactional communities initiated by third parties, communities formed spontaneously by brand fans, and virtual brand communities established by firms. Because this research was closely related to the governance of virtual communities, this research selected the perspective of virtual brand communities established by firms.

Compared with traditional offline communities, virtual communities are more flexible, in which customers can speak, discuss and interact more freely (Lin, 2007). The open virtual community atmosphere may give customers a better environment for innovation. However, compared with traditional offline communities, virtual communities also have the following disadvantages. First, offline communication is lacking in virtual communities (Lin, 2007), and virtual community customers generally have the characteristics of anonymity (Yoon & Rolland, 2012). Therefore, the interaction between customers has certain uncertainty and risk. Second, virtual communities have an open structure and lack corresponding laws and regulations compared with traditional communities, so participants in virtual communities are prone to opportunistic behaviours (Hoffmann & Prause, 2015; Martinez-Lopez et al., 2017). Given the deficiency of virtual communities compared with traditional communities, many virtual communities initiated by firms set up contracts and assume management responsibilities in virtual communities with the help of community managers, to constrain the behaviours of members in virtual communities and reduce the risk of opportunism (Wirtz et al., 2013).

In the existing literature, scholars tried to use different perspectives to depict virtual community governance. In terms of the formal degree of governance, the governance of virtual communities is divided into two dimensions: contract governance and relationship governance (Hoetker & Mellewigt, 2009). Contract governance refers to formal governance with explicit contract and legal effect, while relationship governance refers to informal governance with implicit contract reliant on trust mechanisms. A wealth of research on governance has already investigated the effectiveness of both contract governance and relationship governance for improving satisfaction (Gencturk & Aulakh, 2007) and curbing opportunism (Cavusgil et al., 2004; Heide et al., 2007). This study selected the more common form of governance dimension in the academic circles to divide the governance of virtual communities and focused on analysing the relationship between contract governance and value co-creation initiated by firms in a virtual community.

The research of contract governance originated from transaction cost theory. The basic theories involved in corporate and market governance also include transaction cost theory. Therefore, transaction cost theory has become a tool used by many scholars to explain and study contract governance. Williamson (1987) pointed out that there were six types of reasons for transaction costs. The first is bounded rationality. In the process of trading, the participants are neither economic men with 'super-rationality' nor irrational men, but bounded rationality due to personal emotion and mind which will hinder the maximisation of transaction benefit and thus produce transaction cost. The second type is opportunism. In the process of trading, some traders will speculate for their interests, so the supervision on traders' speculation will generate supervision costs, which thus reduces the trading efficiency. The third type is uncertainty and complexity. In the transaction process, both parties may bring additional contract bargaining costs due to the uncertainty and complexity of the future environment. The fourth type is the minority transactions. Because of the specificity or heterogeneity, transaction resources are usually mastered by a few people, thus causing market failure and extra transaction costs. The fifth type is information asymmetry. In the transaction process, due to the uncertainty of the future environment and possible opportunistic behaviours, there will be certain information asymmetry between the two parties of the transaction, and then



the person who enters the market first may make more profits, resulting in lower transaction fairness and transaction costs. The sixth type is the trading atmosphere. If both parties lack trust in each other, it is not conducive to creating a good trading atmosphere, making the transaction process more complex, and thus generating additional transaction costs.

Hart and Moore (2008) believe that contracts can accurately identify the possible future outcomes of both sides of a transaction, thus reducing deadweight loss and avoiding greater transaction risks (Hart & Moore, 2008). Contracts can be rigid or flexible, and the best contract should be a trade-off between rigidity and flexibility (Sande & Haugland, 2015). In the process of virtual community value co-creation, contract governance can specify the level of coordination and potential adjustments that need to be made (Mooi & Ghosh, 2010) and the rights and obligations of the parties in the transaction arrangement (Lumineau & Malhotra, 2011). The contract specifies the roles and responsibilities to be performed, the results to be delivered, and the adaptation process for resolving unforeseen results (Wuyts & Geyskens, 2005), while the open provisions contained in the contract provide the partners with opportunities for future adjustment (Mooi & Ghosh, 2010), opportunism behaviour in the process of value co-creation in the virtual community can be avoided to a great extent (Q. Yang et al., 2016).

Contracts have dual functions of control and coordination (Faems et al., 2008; Lumineau & Malhotra, 2011). The control function of contracts is reflected in the fact that contracts contain many penalty clauses that can impose penalties on customers of virtual communities for violations (Faems et al., 2008). The coordination function of a contract is reflected in the fact that a contract can integrate dispersed activities through providing programmes, simplifying decision-making, and eliminating disputes in the process of task realisation (Faems et al., 2008). Contract governance can help overcome potential misunderstandings and coordination difficulties caused by differences in management or organisational practices (Luo & Park, 2004), which will greatly reduce information asymmetry between the two parties. As a result, detailed contracts avoid the potential risk of damaging the partnership. Contract governance greatly reduces potential transaction risks by specifying transaction rules and procedures and taking into account unexpected contingencies (Lumineau & Malhotra, 2011; Luo, 2002).

After sorting out, we found that the effect of contract governance on the value co-creation in virtual community could be roughly divided into three categories. Firstly, contract governance can establish a boundary framework for customer behaviours and reduce opportunistic behaviours in virtual communities (Q. Yang et al., 2016). Secondly, contract governance can alleviate the information asymmetry between the two parties through the establishment of a series of rules and regulations, thus creating a good and trusting atmosphere for the transaction (Witt, 2007). Thirdly, contract governance can incorporate future uncertainty into the contract and help both parties involved in the transaction to avoid risks (Donaldson, 2012).

### *Psychological ownership*

Psychological ownership is defined as the psychological state in which an individual has ownership of all or part of the object (material or immaterial; Pierce et al., 2001). Most of the scholars' extended research on psychological ownership is based on the definition of



Pierce et al. (2001). In customer management, the establishment of psychological ownership is divided into the following three dimensions: The first dimension is the customer's ability to touch objects to inspire psychological ownership (Peck & Shu, 2009); The second dimension is that customers can form psychological ownership simply by seeing the goal (Kamleitner & Feuchtl, 2015); The third dimension is the customer's psychological ownership of the product by naming it (Lessard-Bonaventure & Chebat, 2015). In the field of marketing, brand psychological ownership is defined as people's desire to possess the brand and the psychological state of control over the brand (Chang et al., 2015).

In the literature review on psychological ownership, we found that more and more virtual brand community studies introduced the concept of psychological ownership (Karahanna et al., 2015). Open virtual communities allow individuals to join and keep their identities secret, and this anonymity helps to increase the autonomy of customers within the brand community (Pedersen, 1997). In addition, due to free governance mechanisms, customers of virtual communities can be online for long periods without being noticed. Meanwhile, customers can describe themselves in any way they want and feel free to join the community forum for chatting and discussion (DeSanctis & Gallupe, 1987). Virtual communities provide a platform for customers to display their real self and ideal self simultaneously. Therefore, in the virtual community, the self-discrepancy of customers is greatly reduced.

The difference between the real self and the ideal self can be explained by the self-discrepancy theory, which holds that an individual has three selves, namely the real self, the ideal self, and the ought self. The real self is a person's view of himself, while the ideal self is the way a person wants to be seen by others. The difference between the real self and the ideal self represents the ideal level of the individual. And this level of difference is the determinant of an individual's emotions and experience (Higgins, 1987), which can influence the individual's thoughts, feelings, and behaviours (Fletcher & Simpson, 2000). Psychological ownership is a person's cognitive and emotional state, which is affected by the self-difference experienced by customers in virtual communities (Lee & Suh, 2015).

According to the research of Pierce et al. (2003) on the sources of psychological ownership, the sources of psychological ownership can be divided into three categories: belongingness, self-efficacy, and identity.

Belongingness is a feeling that a person belongs to an organisation. Individual psychological ownership of an object or organisation is deeply rooted in 'a place' within the target object, where the need for belongingness is met (Avey et al., 2009). Belongingness is an important factor and has been used to test the existence of online communities. Customers tend to gain the benefits of social integration by joining open virtual communities. They identify with the virtual brand community and other members in the community, which leads to belongingness (Nambisan & Baron, 2010). Based on the social capital theory, firms provide customers with a space for social communication, which is conducive to the development of customers' interpersonal relations, thus enhancing their belongingness to open virtual communities (Chang & Chuang, 2011). Driven by belongingness, community members quickly embrace the brand community and help promote the brand. Furthermore, customers in a virtual community with high belongingness can form a strong social identity in the virtual community, thereby inspiring a high willingness to participate in the virtual community (Phua et al., 2017).

Self-efficacy is related to people's belief that they can successfully carry out an action and complete a specific task, reflecting a person's belief in successfully acting on a task (Bandura, 1977). Based on social cognitive theory, strong self-efficacy can positively influence individuals to become confident to perform a certain behaviour (Bandura, 1977), and this feeling is usually generated when someone owns an object and gets control of it (Pierce et al., 2001). Therefore, to gain self-efficacy, people will integrate their resources and participate in community interaction and communication activities (Nambisan & Baron, 2009). Furthermore, virtual community customers with high self-efficacy tend to expect to highlight themselves in activities held by the community and expect to gain some control over the virtual community (Woisetschlager et al., 2008).

Self-identity is an important dimension of psychological ownership, which can help individuals to distinguish their real self from their ideal self to maintain self-consistency (Pierce et al., 2001). Self-identity and personality are closely related to possession. People use ownership to define themselves, express their self-identity to others, and ensure continuity of the self across time (Pierce et al., 2001). Both for the virtual community and its members, identity plays a very important role, which is regarded as one of the main reasons for members to join the virtual brand community. In the reality, members will seek the same emotional cognition in the virtual brand community and may form a subordinate relationship with the community manager to realise their desired self (Laroche et al., 2012). Therefore, the identity can promote the enthusiasm of members to participate in community activities (Wirtz et al., 2013). Furthermore, with a high self-identity, virtual community customers can find similar cognitive and emotional experiences more easily in virtual communities, which can promote the generation of organisational citizenship behaviour (Dutton et al., 1994), improve the sustainability of members' participation in community activities (Reicher & Levine, 1994), and promote the knowledge contribution behaviour of virtual community members (Tadajewski & Hewer, 2011). Therefore, customers with a high identity can create a virtual community atmosphere that is willing to share and trust each other for the virtual community, and customers with a high identity can also improve their constraints and reduce the appearance of opportunistic behaviours.

## Research model and hypotheses

### *Contract governance and value co-creation in virtual community*

Contract governance provides virtual community members with a code of conduct to interact and participate in community activities by making a series of rules to be followed by virtual community members. Based on transaction cost theory, first of all, contract governance can establish a boundary framework for customer behaviour and clarify the coordination level and potential adjustment required by value co-creators (Mooi & Ghosh, 2010). And to clarify the responsibilities and obligations of all parties in the transaction arrangement (Lumineau & Malhotra, 2011; W. Yang et al., 2017), thereby reducing opportunistic behaviour in virtual communities; Second, contract governance alleviates information asymmetry by establishing a series of rules and regulations (Witt, 2007), enhances mutual trust between both parties, and reduces transaction costs of both parties to some extent. Thus it will create a good atmosphere (Barros & Nunes, 2007),

which motivates customers to participate in the value co-creation activities initiated by firms. Finally, reasonable incentive measures in contract governance also promote customers' participation in the virtual community activities led by firms (Jabr et al., 2014). On the one hand, by establishing a sound supervision and incentive system, contract governance brings future uncertainty into the contract, helps both parties to avoid risks (Donaldson, 2012), promotes knowledge contribution activities in virtual communities, and guarantees the rights and interests of customers (Robeson & O'Connor, 2007). On the other hand, due to the incentive mechanism in contract governance, virtual community customers' self-identity to the community is gradually enhanced. The personal goals of the customers and the goals of the virtual community are constantly approached through incentive means, to promote the customers to participate in value co-creation.

Contract governance through the establishment of rules and regulations, especially the supervision and punishment mechanism for speculative behaviour, is beneficial to reduce opportunistic behaviour in virtual communities (Q. Yang et al., 2016), creates a civilised and harmonious communication and interactive atmosphere in virtual communities, and a fair and transparent knowledge sharing atmosphere. A good virtual community atmosphere is an environmental guarantee for customers to participate in value creation. At the same time, the reduction of opportunistic behaviour can help firms that initiate value co-creation save the cost of initiating value co-creation activities (Meunier & Quinet, 2010). Firms can have more budgets to encourage customers to participate in value co-creation. Therefore, we proposed the first hypothesis.

**H1.** *In virtual community, contract governance has a positive effect on value co-creation.*

### ***Moderating role of belongingness***

The influence of belongingness on the relationship between contract governance and value co-creation in virtual community is mainly reflected in two aspects: affecting the atmosphere of customer community participation and reducing customer opportunistic behaviour.

From the perspective of customer community participation atmosphere, based on the theory of transaction costs, firms that initiate virtual communities provide customers with a social space to communicate and interact with each other. And through the establishment of a series of rules and regulations, the virtual community provides a good customer behaviour restriction and supervision mechanism. Customers recognise the space and get social support and recognition, and generate high belongingness to the virtual community (Chang & Chuang, 2011). Under the effect of high belongingness, the behaviour of virtual community customers in the community is affected, showing a higher willingness to participate in the virtual community (Phua et al., 2017). Customers with social support and validation are more likely to give back to the virtual community (Rosenbaum & Massiah, 2007). Through the process of community, social identification, and recognition, members can have the opportunity to interact with other members (Ashforth & Mael, 1989). Customers with high social belongingness can help virtual communities by sharing

information with other members (Wasko & Faraj, 2005). Customers with high social belongingness can help virtual communities by sharing information with other members (Wasko & Faraj, 2005), thereby forming a good atmosphere for the participation of virtual community customers. A good atmosphere for customer participation in virtual communities makes contract governance more influential in value co-creation in virtual community.

From the perspective of reducing customers' opportunistic behaviour, customers' higher belongingness to the community will promote customers to increase their dependence on the community. Customers with high belongingness will feel an identity, security, and value in the virtual community, and customers with high belongingness tend to have a higher responsibility for the virtual community and higher binding force on oneself when participating in community activities (Bonet et al., 2011). Customers with high belongingness will reduce their opportunistic behaviours in virtual communities, thereby reducing transaction costs, and making contract governance have a stronger effect on value co-creation in virtual community (Pessali, 2009). Therefore, we proposed the second hypothesis.

**H2.** *In virtual community, the belongingness of customers will strengthen the positive effect of contract governance on value co-creation.*

### ***Moderating role of self-efficacy***

The influence of self-efficacy on the relationship between contract governance and value co-creation in virtual community is mainly reflected in the influence of the atmosphere of participation in virtual community activities and customer citizenship behaviour.

From the perspective of the atmosphere of participation in virtual community activities, customers with a strong self-efficacy will have a strong belief in the successful implementation of a certain action in the task. Customers with strong self-efficacy will have strong confidence in completing tasks initiated by the virtual community (Bandura, 1977). Therefore, customers with a strong self-efficacy will be more looking forward to participating in activities initiated by the virtual community (Nambisan & Baron, 2010), and enhancing their influence on the virtual community. Since contract governance can establish a boundary framework for customer behaviour, customers with a strong self-efficacy will actively participate in virtual community activities and act by this prescribed framework, avoiding opportunistic behaviours to a large extent. At the same time, contract governance alleviates the information asymmetry between the two parties. These customers will have stronger confidence in completing the tasks initiated by virtual communities, thus creating a good atmosphere for participating in virtual community activities, and thus reducing the operating costs of firms (Heide et al., 2007) and strengthening the effect of contract governance on value co-creation in virtual community.

From the perspective of customer citizenship behaviour, owning an object and controlling it will make people feel self-efficacy (Pierce et al., 2001), and customers with a strong self-efficacy also expect to control the virtual community to a certain extent. Because contract governance can incorporate future uncertainty into contracts and reduce transaction risks (Donaldson, 2012), it helps these customers to control virtual communities. However, customers with a strong self-efficacy can generate customer citizenship behaviour outside the customer role due to the desire to control the virtual community without the formal incentive mechanism of the virtual community, including customers using their resources to participate in virtual community activities and word-of-mouth publicity for virtual communities and so on (Groth, 2005). Customers with a strong self-efficacy will produce customer citizenship behaviour, weaken opportunistic behaviour, and strengthen the relationship between contract governance and value co-creation in virtual community. Therefore, we proposed the third hypothesis.

**H3.** *In virtual community, the self-efficacy of customers will strengthen the positive effect of contract governance on value co-creation.*

#### ***Moderating role of self-identity***

The influence of identity on the relationship between contract governance and value co-creation in virtual community is mainly reflected in the influence of customer community participation atmosphere and the reduction of opportunistic behaviour.

From the perspective of customer community participation atmosphere, customers with a strong identity in the virtual community will learn from their identity in the virtual community to define themselves (Pierce et al., 2001). Therefore, customers with a strong identity are more likely to find the emotional and cognitive experience that fits them in the virtual community, and it is easier to increase their enthusiasm for participating in community activities (Wirtz et al., 2013). Customers with a high identity have high compatibility with the activity goals of the virtual community. Meanwhile, contract governance can alleviate the information asymmetry between the two parties by establishing a series of rules and regulations, creating a good community atmosphere of mutual trust and common progress for the virtual community (Witt, 2007). Based on the transaction cost theory, a good atmosphere is conducive to strengthening the impact of contract governance on customers' participation in value co-creation.

From the perspective of reducing customer opportunistic behaviour, customers with a high identity have emotional and normative identification with virtual communities. They are more binding on themselves, more abide by the norms of the virtual community, and have fewer opportunities for opportunistic behaviour. Therefore, a high identity will strengthen the influence of contract governance on customers' participation in value co-creation. Therefore, we proposed the fourth hypothesis.

**H4.** *In virtual community, the self-identity of customers will strengthen the positive effect of contract governance on value co-creation.*

Based on the research hypothesis of this article, we further refined the research model of this article, as shown in Figure 1.

## Research method

### Data collection

The object of this research was virtual community customers, and relevant second-hand data and materials were difficult to obtain from public platforms. Therefore, this study adopted a questionnaire survey method to collect data to ensure the timeliness and accuracy of survey data. In this questionnaire survey, the design of the questionnaire used a structured scale to measure the contract governance in virtual community, the three dimensions of belongingness, self-efficacy, and self-identity included in psychological ownership of customers, and value co-creation in virtual community. To ensure that the questionnaire had good reliability and validity, all questionnaire items were from the mature scale.

First, after the first draft of the questionnaire was designed, we discussed and revised it with the tutor in the academic team and doctoral students, revised the problem of misinterpretation by questionnaires due to improper translation, and improved the questions that were not conducive to the understanding of the questionnaire. Second, pre-test questionnaires were distributed on a small scale in the C-trip virtual community, and the questionnaire items were further modified according to the problems in the questionnaire, to reduce the deviation between the academic concept and the actual understanding of the virtual community customers. Through brief interviews with some customers, opinions and suggestions for further revision and improvement of the questionnaire were obtained. Finally, a formal questionnaire was formed under the double inspection of the tutor and the doctoral team, and the pre-test.

In addition to collecting the basic information of virtual community customers, the questionnaires in this study all used the 5-point Likert scale to design the questionnaire items. The questionnaire was divided into four parts. The first part was the basic situation of virtual community customers, including gender, industry, and activity level. The second part was the contract governance in virtual community. The third part was the psychological ownership of virtual community customers, including customer belongingness, customer self-efficacy, and customer identity. The fourth part was the participation of customers in virtual community value co-creation.

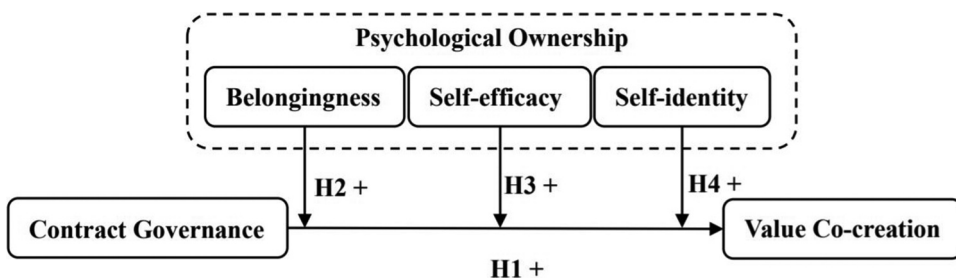


Figure 1. The research model.

The questionnaires for this study were distributed in the Huawei Pollen Club, Xiaomi Forum, and Qunar.com forums. Using the questionnaire star platform to issue online questionnaires and invite forum customers to fill in. In the end, a total of 312 questionnaires were collected in the online virtual community, and 260 were valid, 83.3% were effective.

### *Variable measurement*

The independent variable to be measured in this research was contract governance. For the contract governance measurement scale, this paper used the contract governance questionnaire items proposed by Grewal et al. (2010).

The dependent variable involved in this research was value co-creation in virtual community. Based on the service-oriented logic, the value co-creation in virtual community dimension selected in this article focused more on participating in the value co-creation dimension initiated by the firm. The concrete manifestation in the virtual community was that the customer participates in the design and development of new products or new services. For the measurement of value co-creation in virtual community, this paper adopted the maturity scale of Zwass (2010), a foreign scholar recognised by the academic circle.

The moderating variable involved in this research was the psychological ownership of virtual community customers. The psychological ownership of virtual community customers could be divided into three different dimensions, namely, belongingness, self-efficacy, and self-identity. The measurement scales for psychological ownership of customers were all taken from Avey et al. (2009), which had a high degree of recognition for customers' belongingness, self-efficacy, and self-identity.

The control variables involved in this research were the gender, the industry, and the activity level. The measurements are as follows:

Among the value co-creation activities initiated by virtual communities, most activities are related to programming design. In the current Chinese environment, the number of male programmers far exceeds that of female programmers, and they may have more experience in programming design. Therefore, when customers participate in value co-creation activities, men may have a strong enthusiasm to participate in value co-creation in virtual communities. Therefore, we included the gender of virtual community customers as a control variable for measurement, with 0 being male and 1 being female.

Virtual communities originally rely on the computer Internet to generate online interconnections with a vast number of customers. On the one hand, customers working in the Internet industry are generally more familiar with the operating models of Internet firms, and this type of customer may be better able to use their knowledge and skills in a familiar environment. On the other hand, when engaged in Internet-related work, such customers may have already participated in the value co-creation activities initiated by the firm in the organisation. For example, Xiaomi regards employees as its partners and encourages employees to start businesses within the firm and form products. So, workers in the Internet industry may be more likely to participate in the value co-creation of virtual communities than workers in non-Internet industries. Therefore, we included the industry of the virtual community use as a control variable for measurement, with 0 being an Internet firm and 1 being a non-Internet firm.



Studies have shown that active customers in virtual communities are more willing to participate in virtual community activities than other customers and that such customers have stronger psychological ownership of virtual communities than other customers (Nonnecke et al., 2006). Therefore, we included the activity of virtual community customers as a control variable for measurement, with 0 being active customers and 1 being inactive customers.

## Empirical analysis and test results

### *Descriptive statistics*

According to the descriptive statistics of the questionnaire sample shown in Table 1, we briefly summarised the basic characteristics of the virtual community customers participating in the questionnaire as follows:

**Gender characteristics:** A total of 260 customers participated in the virtual community questionnaire survey with valid questionnaire data. Among them, there were 124 virtual community customers with male gender, accounting for 47.69% of the total valid customers; 136 virtual community customers with female gender, accounting for 52.31% of the total valid customers. The overall gender level of the data was relatively average, with slightly more female customers than male customers.

**Industry characteristics:** A total of 260 customers participated in the virtual community questionnaire survey with valid questionnaire data. Among them, 121 virtual community customers were working in the Internet industry, accounting for 46.54% of the total valid customers; 139 virtual community customers working in the non-Internet industry, accounting for 53.46% of the total valid customers. The surveyed customers worked in a relatively even distribution of industries, with slightly more customers working in non-Internet industries than customers working in the Internet industries.

**Active level characteristics:** A total of 260 customers participated in the virtual community questionnaire survey with valid questionnaire data. Among them, 127 active customers were interacting or speaking more than 5 times a week in the virtual community, accounting for 48.85% of the total valid customers; 133 inactive customers interacting or speaking less than 5 times a week in the virtual community, accounting for 51.15% of the total valid customers. The surveyed customers had an even distribution of activity levels in the virtual community, with slightly more inactive customers who interact or speak less than 5 times a week than active customers who interact or speak 5 times a week or more.

**Table 1.** Sample descriptive statistics.

Variable	Category	Number	Percentage (%)
Gender	Male	124	47.69
	Female	136	52.31
Industry	Internet Industry	121	46.54
	Non-Internet Industry	139	53.46
Active Level	Active (Interacting/Speaking 5 times a week and above)	127	48.85
	Inactive (Interactions/Speaking less than 5 times a week)	133	51.15

And the variable descriptive statistics are as follows:

First, the mean of independent variable contract governance was 3.00, indicating that the virtual communities involved in the survey generally had a relatively high level of contract governance. Second, the mean of moderating variables belongingness, self-efficacy, and self-identify were 3.08, 3.32, and 3.08 respectively, indicating that the virtual community customers participating in the survey had a high level of belongingness, self-efficacy, and self-identify to the virtual community. Third, the mean of dependent variable customers participating in the value co-creation initiated by firms was 2.96, indicating that the virtual community customers participating in the survey had a moderately high level of experience in value co-creation. In general, in this survey, the contract governance level of virtual communities was relatively high, and contract governance was relatively complete. Customers in virtual communities had a high level of psychological ownership and were more actively involved in value co-creation activities initiated by firms.

### **Reliability and validity assessment**

The reliability analysis method selected is the Cronbach's  $\alpha$  coefficient test which is suitable for the 5-point Likert scale. The results showed that the reliability of the total questionnaire was 0.939 greater than 0.8, and the reliability of each sub-dimension of the questionnaire was greater than 0.8, which exceeded the acceptable standard. Therefore, the questionnaire had a good consistency and passed the reliability test.

Regarding the content validity of this scale, the items used in this scale were from mature scales that were highly recognised by foreign scholars in the field, and this scale had passed the pre-test and the tutor and doctoral students had discussed how to modify and polish the content and improve the content. Therefore, this scale had a better guarantee in terms of content validity.

Aggregate validity and discrimination validity were assessed using the confirmatory factor analysis (CFA). The CFA results indicated a good model fit for the measurement model ( $\chi^2/df = 1.148$ ,  $IFI = 0.996$ ,  $NFI = 0.966$ ,  $TLI = 0.994$ ,  $CFI = 0.995$ ,  $RMSEA = 0.024$ ). [Figure 2](#) shows the results of CFA model fitting.

Aggregate validity was assessed using the path estimation of the first-order factor model. The results showed that the questionnaire data item dimensions were well divided ( $Estimate > 0.8$ ) and the scale had good aggregation validity ( $AVE > 0.69$ ,  $CR > 0.87$ ). [Table 2](#) shows the results of the path estimation of the first-order factor model.

Discriminative validity was assessed using the comparison of the square root of each variable AVE and the Pearson correlation coefficient to test. The square root of each variable AVE was greater than the Pearson correlation coefficient, indicating that the questionnaire data had good discriminative validity. [Table 3](#) shows the results.

Common method bias was assessed by performing Hartman's single factor test, in which a single factor loads on all measurement items. In doing this test, a total of 5 principal component factors were rotated, and the variance explanation degree of the first principal component factor was 19.95%, which was less than the standard value of 40%, suggesting that common method bias was not a serious concern in this data set.

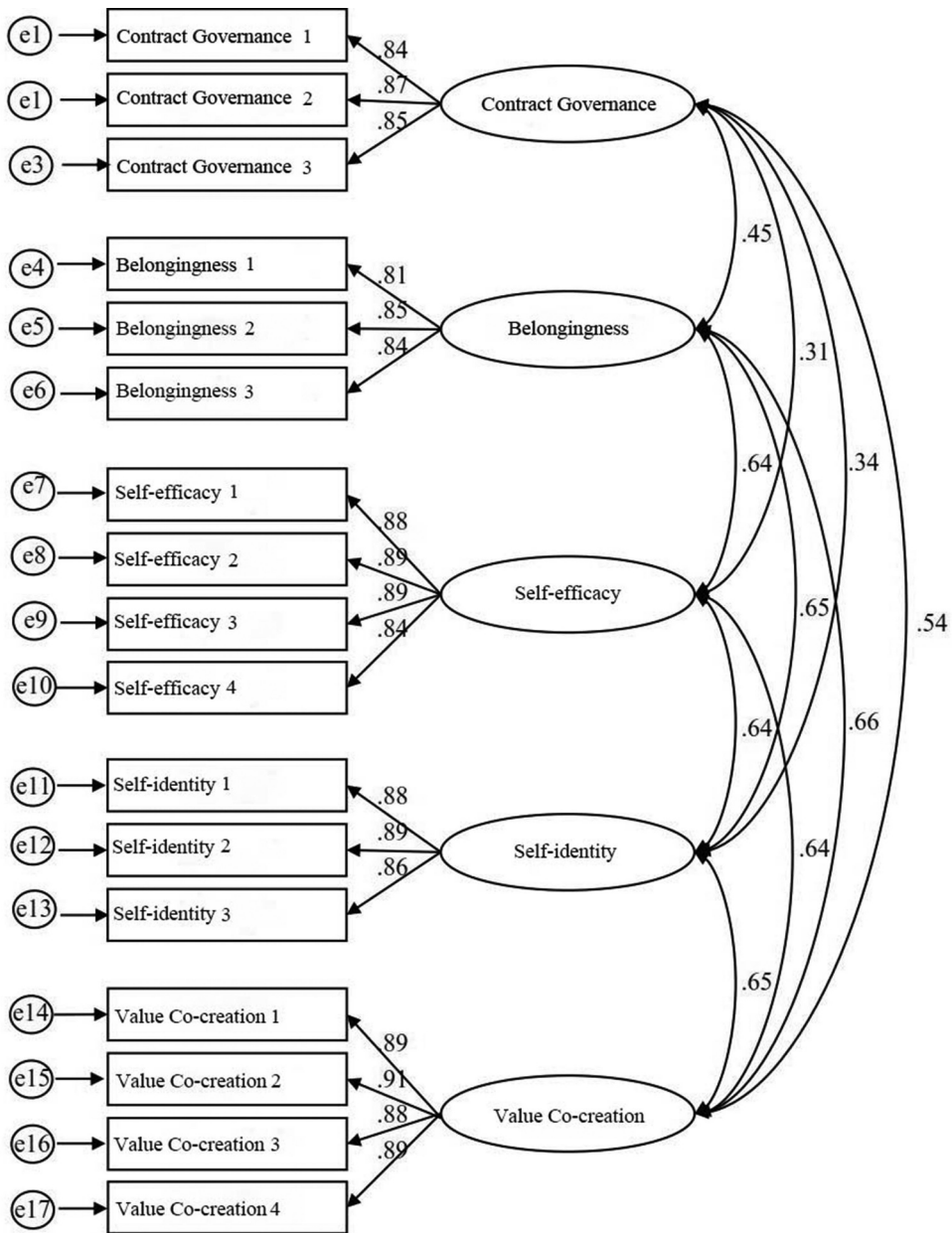


Figure 2. The results of CFA model fitting.

### Regression analysis

It can be obtained from the correlation test in Table 4 that there were significant correlations among contract governance, belongingness, self-efficacy, self-identity, and value co-creation in virtual community. And the Pearson correlation coefficient of each variable was less than 0.9, and the VIF value was less than 10, indicating that there was no multicollinearity problem in the sample data.

**Table 2.** First-order factor model path estimation and values of AVE and CR.

Path			Estimate	AVE	CR
Contract Governance3	< –	Contract Governance	0.847	0.729	0.890
Contract Governance2	< –	Contract Governance	0.870		
Contract Governance1	< –	Contract Governance	0.844		
Belongingness3	< –	Belongingness	0.840	0.692	0.871
Belongingness2	< –	Belongingness	0.849		
Belongingness1	< –	Belongingness	0.806		
Self-efficacy4	< –	Self-efficacy	0.840	0.764	0.928
Self-efficacy3	< –	Self-efficacy	0.889		
Self-efficacy2	< –	Self-efficacy	0.887		
Self-efficacy1	< –	Self-efficacy	0.880		
Self-identity3	< –	Self-identity	0.856	0.765	0.907
Self-identity2	< –	Self-identity	0.893		
Self-identity1	< –	Self-identity	0.875		
Value Co-creation4	< –	Value Co-creation	0.888	0.794	0.939
Value Co-creation3	< –	Value Co-creation	0.880		
Value Co-creation2	< –	Value Co-creation	0.905		
Value Co-creation1	< –	Value Co-creation	0.890		

**Table 3.** Comparison of AVE square root and Pearson correlation coefficient of each variable.

	1	2	3	4	5
1. Contract Governance	0.729				
2. Belongingness	0.116***	0.692			
3. Self-efficacy	0.120***	0.141***	0.764		
4. Self-identity	0.106***	0.124***	0.135***	0.765	
5. Value Co-creation	0.122***	0.132***	0.142***	0.126***	0.794
AVE Square Root	0.854	0.832	0.874	0.875	0.891

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

**Table 4.** Correlation of the main variables.

Variables	1	2	3	4	5	6	7	8
1. Gender								
2. Industry	0.035							
3. Active Level	0.007	–0.326***						
4. Contract Governance	–0.006	–0.130**	0.045	<b>(0.890)</b>				
5. Belongingness	0.034	–0.097	0.020	0.399***	<b>(0.870)</b>			
6. Self-efficacy	0.006	–0.143**	0.053	0.283***	0.578***	<b>(0.928)</b>		
7. Self-identity	–0.013	–0.084	–0.029	0.315***	0.576***	0.594***	<b>(0.906)</b>	
8. Value Co-creation	0.037	–0.145**	–0.007	0.498***	0.603***	0.599***	0.607***	<b>(0.939)</b>

Notes:  $N = 260$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ ; Internal reliabilities (Cronbach's  $\alpha$ ) for the overall constructs are in parentheses on the diagonal.

This study was based on the hypothesis model proposed in the previous article, using SPSS 25.0 software to perform hierarchical regression processing on the questionnaire data. The results of hierarchical regression analysis are shown in Table 5.

Hierarchical regression model 1 showed that the variance explanation of the model was 1.5%. Among them, the industry had a significant impact. This is in line with what has been mentioned in the literature that virtual communities rely on computers to enable customers to realise online interconnection, and people working in the Internet industry are more likely to

**Table 5.** Hierarchical regression model.

Variable	Model1	Model2	Model3	Model4
Gender	0.043	0.044	0.035	0.044
Industry	−0.166**	−0.104*	−0.050	−0.059
Active Level	−0.062	−0.063	−0.046	−0.052
Contract Governance		0.488***	0.262***	0.270***
Belongingness			0.202***	0.205***
Self-efficacy			0.253***	0.223***
Self-identity			0.252***	0.263***
Contract Governance ×Belongingness				0.109**
Contract Governance ×Self-efficacy				−0.107**
Contract Governance ×Self-identity				0.093*
$R^2$	0.015	0.248	0.554	0.569
$F$	2.292*	22.403***	46.899***	35.180***
$\Delta F$	2.292*	80.600***	59.130***	3.969***
$\Delta R^2$	0.026	0.234	0.306	0.020

Notes:  $N = 260$ ; Dependent variable: Value Co-creation; \* $p < 0.1$  \*\* $p < 0.05$  \*\*\* $p < 0.01$ .

use their knowledge and skills to participate in value co-creation activities in the familiar virtual community network environment (Panteli & Sivunen, 2019). While the gender did not have a significant effect on value co-creation in virtual community. This may be because the value co-creation activities launched in the virtual community are in various forms. The creative solicitation activities for new products consider the different thinking modes and preferences of male and female customers and attract virtual community customers of different genders to participate together. The customer activity level also had no obvious impact on participating in value co-creation. This may be because the cycle of value co-creation activities initiated by firms is often long, and virtual community customers who are willing to participate in value co-creation activities can participate in value co-creation activities initiated by the firm even if the communication and interaction are not active.

The hierarchical regression model 2 showed that the model variance explanation degree was 24.8% ( $\Delta R^2 = 0.234$ ), which was a significant improvement over model 1. The regression effect was significant ( $\Delta F = 80.6$ ,  $p < 0.01$ ). According to the results, it could be seen that contract governance in virtual communities had a significant positive effect on value co-creation in virtual community ( $\beta = 0.488$ ,  $p < 0.01$ ). Hypothesis 1 was verified.

The hierarchical regression model 3 showed that the model variance explanation degree was 55.4% ( $\Delta R^2 = 0.306$ ), which was a significant improvement over model 2. The regression effect was significant ( $\Delta F = 51.13$ ,  $p < 0.01$ ). According to the results, it could be seen that Hypothesis 1 could still be verified, indicating the model was robust.

The hierarchical regression model 4 showed that the model variance explanation degree was 56.9% ( $\Delta R^2 = 0.020$ ), which was a significant improvement over model 3. The regression effect was significant ( $\Delta F = 3.969$ ,  $p < 0.01$ ). According to the results, it could be seen that the belongingness had a positive moderating effect on the relationship between contract governance and value co-creation in virtual community ( $\beta = 0.109$ ,  $p < 0.05$ ). Hypothesis 2 was verified. The customer self-efficacy had a negative moderating effect on the relationship between contract governance and value co-creation in virtual community

( $\beta = -0.107, p < 0.05$ ). Hypothesis 3 had not been verified. The customer self-identity had a positive regulatory effect on the relationship between contract governance and value co-creation in virtual community ( $\beta = 0.093, p < 0.1$ ). Hypothesis 4 was verified.

## Results discussion

Hypothesis 1 verified shows that in virtual community contract governance has a positive effect on value co-creation. Contract governance creates a good community atmosphere in the virtual community and weakens the customer's opportunistic behaviour. Based on transaction cost theory, on the one hand, contract governance further clarifies the responsibilities and obligations of both parties to the transaction, weakens the information asymmetry between the two parties, strengthens mutual trust, and creates a good virtual community atmosphere. On the other hand, contract governance can reduce the probability of opportunistic behaviour in virtual communities through the improvement of community rules (W. Yang et al., 2017). At the same time, a reasonable incentive mechanism in contract governance can promote customers in virtual communities to participate in community activities, thereby generating knowledge contribution behaviour (Jabr et al., 2014). Contract governance makes customers more willing to participate in value co-creation activities initiated by firms in a good community atmosphere.

Hypothesis 2 verified shows that in virtual community belongingness of customers will strengthen the positive effect of contract governance on value co-creation. The explanation for the moderating effect is that high belongingness helps to create a good atmosphere for customer community participation and reduces customer opportunistic behaviour. Customers with high belongingness have recognition and dependence on the virtual community, and then show a higher willingness to participate in the virtual community (Phua et al., 2017), forming a good atmosphere for customer participation in the virtual community. And because customers with high belongingness have a higher binding force on themselves, it will lead to a reduction in opportunistic behaviour. High belongingness makes the contract governance more influential in the value co-creation of customers participating in virtual communities.

Hypothesis 3 not verified shows that in virtual community self-efficacy of customers will strengthen the positive effect of contract governance on value co-creation. The explanation for the negative regulation of self-efficacy can be found in the existing literature: self-efficacy is an individual's subjective judgement about the ability to complete a task and obtain achievement. Since the people involved in the transaction have bounded rationality, virtual community customers with high self-efficacy are often confident in their abilities and tend to choose more challenging tasks (Bandura, 1977), and if faced with simpler tasks, even individuals with high self-efficacy can achieve their goals smoothly, which will not give them a strong satisfaction. In the virtual community, as the leader in launching value co-creation activities, firms hope to allow as many virtual community customers as possible to participate in the community to promote their knowledge contribution behaviour and form a word-of-mouth effect. Therefore, to ensure the scale of customer participation in creative activities initiated by firms, the design of such activities may be simpler, and the creative solicitation process may be shorter. Compared with high-difficulty value co-creation activities such as the Geek

Challenge, it may not induce large-scale community participation by customers with high self-efficacy. So, high self-efficacy plays a negative role in regulating the relationship between contract governance and value co-creation initiated by customer firms.

Hypothesis 4 verified shows that in virtual community self-identity of customers will strengthen the positive effect of contract governance on value co-creation. The explanation for the moderating effect is that the virtual community customers with a high self-identity will refer to their identity in the virtual community for their identity definition (Pierce et al., 2001). The reduction of the difference in self-cognition in the virtual community will bring customers more similar virtual community emotions and cognitive experience to the real society, thereby enhancing the enthusiasm of customers to participate in value co-creation (Wirtz et al., 2013). Customers with a high self-identity have emotional and normative identification with virtual communities, which in turn will form a good atmosphere for community participation and reduce opportunistic behaviour. Therefore, a high self-identity will strengthen the effect of contract governance on value co-creation in virtual community.

## Conclusions and prospects

### Conclusions

Value co-creation is an important way for firms to create value, and it has received widespread attention in virtual communities. This article started from the perspective of transaction costs theory and studied the influencing factors of value co-creation in virtual community. The existing researches mostly focus on the influence of customers' cognitive needs, entertainment needs, social integration needs, etc., while few types of research study value co-creation from the perspective of transaction cost theory, especially from the perspective of customers in virtual communities. However, due to the anonymity, weak control, and other characteristics of virtual communities (Christopherson, 2007) and certain opportunistic behaviours of some customers in the community, it is difficult for firms to conduct thorough supervision and control of value co-creation activities in virtual communities. Therefore, it is necessary to introduce contract governance in virtual communities. Based on the transaction cost theory, contract governance can clarify the responsibilities and obligations of everyone in the community, formulate corresponding behavioural norms, and suppress opportunistic behaviour in virtual communities, which has an important impact on motivating customers to participate in value co-creation.

This article focused on the issue of 'the impact of contract governance on value co-creation in virtual community', and added the belongingness, self-efficacy, and self-identity as moderating variables. The conclusions of this study are as follows:

First, contract governance is conducive to value co-creation in virtual community. Based on the transaction cost theory, contract governance can formulate a behaviour boundary framework for members in the market and reduce opportunistic behaviour in the market (W. Yang et al., 2017). On the one hand, contract governance in virtual communities regulates the behaviour of community members by setting a series of common rules, regulations, etc. between virtual communities, regulates community operation procedures, reduces members' risks in the community, and creates a fair and transparent knowledge sharing atmosphere in the community (Wathne & Heide, 2000). On the other hand, due to the role of incentive mechanisms in contract governance,



customers' identity with the community has gradually increased. The customer's personal goals and the goals of the virtual community are constantly approached through incentives, which promote the generation of customers' participation in value co-creation. The empirical results of this research also prove that contract governance has a positive effect on value co-creation in virtual community.

Second, the belongingness of customers positively regulates the relationship between contract governance and value co-creation in virtual community. Firms that initiate virtual communities provide customers with a social space for customers to communicate and interact with each other. Customers recognise the space and generate high belongingness to the virtual community (Chang & Chuang, 2011). With high belongingness, the behaviour of virtual community customers in the community is affected, showing a higher willingness to participate in the virtual community (Phua et al., 2017), thereby creating a good community participation atmosphere and reducing the appearance of opportunistic behaviour. The empirical results of this study also prove that the belongingness of customer has a positive moderating effect on the relationship between contract governance and customer participation in value co-creation.

Third, the self-efficacy of customer not positively regulates the relationship between contract governance and value co-creation in virtual community. Customers with a strong self-efficacy can have civic behaviours due to their desire to control the virtual community without a formal incentive mechanism for the virtual community, which includes the use of their resources to participate in virtual community activities and word-of-mouth publicity for the virtual community (Groth, 2005). However, the results of this study show that customer self-efficacy negatively regulates the relationship between contract governance and customer participation in value co-creation. Because customers in virtual communities have bounded rationality, self-efficacy is an individual's subjective judgement about the ability to complete a task and obtain achievement. Virtual community customers with high self-efficacy are often confident in their abilities and tend to choose more challenging tasks (Bandura, 1977). If faced with simpler tasks that individuals with high self-efficacy can successfully achieve their goals, they cannot gain a strong satisfaction. To ensure the scale of customer participation in creative activities initiated by firms, value co-creation activities in most virtual communities may be designed to have low participation thresholds, so such activities may not trigger large-scale community participation by customers with high self-efficacy. Therefore, high self-efficacy plays a negative role in regulating the relationship between contract governance and value co-creation in virtual community.

Fourth, the self-identity of customer positively regulates the relationship between contract governance and value co-creation in virtual community. Customers with a strong identity in the virtual community will learn from their identity in the virtual community to define themselves (Pierce et al., 2001). Therefore, customers with a strong identity are more likely to find the emotional and cognitive experience that fits them in the virtual community, and then it is easier to increase their enthusiasm for community activities (Wirtz et al., 2013), create a good atmosphere for community participation, and reduce the appearance of opportunistic behaviour. The empirical results of this research also prove that self-identity has a positive moderating effect on the relationship between contract governance and value co-creation in virtual community.

### *Theoretical contributions*

First, many existing studies focus on the construction of virtual brand community and customer engagement behaviour (Dholakia et al., 2004; Kaur et al., 2018; Royo-Vela & Casamassima, 2011). However, past studies seldom create from transaction costs theory research value, especially the customer value to create a virtual social situation, and based on transaction cost theory, this paper studies how contract governance effect virtual social customers to take part in the creation value, and verifies the preventive role of contract governance in virtual community opportunism at the individual level (Q. Yang et al., 2016). Therefore, it expands the research situation of transaction cost theory and value co-creation theory, enriches the research of value co-creation in participating virtual communities, and provides enlightenment for firms to manage virtual brand communities and improve value co-creation.

This study not only provides empirical guidance for firms to use the virtual brand community to create value and how to encourage customers to participate in value creation more actively but also helps firms to better conduct contract governance in virtual community, avoid opportunistic behaviour in value creation activities (Q. Yang et al., 2016) and avoid transaction risks (Donaldson, 2012). According to previous literature studies, most of the studies are from the perspective of virtual community customers, focusing on the impact of virtual community customers' psychological motivations and personal characteristics on participating in value co-creation behaviour, such as the interaction between them will have a positive impact on their participation in the co-creation of firm value (Baltes & Parker, 2000). Based on the theory of satisfaction, customers' cognitive needs, personal integration needs, social integration needs, and entertainment needs are the driving factors for customers to participate in value co-creation (Nambisan & Baron, 2009). Customers' knowledge and professional skills will have a positive impact on their participation in virtual community product innovation (Fuller et al., 2012). The customer's belongingness to the virtual community has a positive impact on their participation in value co-creation. In contrast, few studies have studied value co-creation from the perspective of transaction cost theory, and even fewer scholars have studied the impact of contract governance on customers' participation in value co-creation from the perspective of virtual community governance. Contract governance can make up for the information asymmetry of both parties through the clear formulation of rules and regulations (Witt, 2007), reduce opportunistic behaviour (Q. Yang et al., 2016), and create a good virtual community atmosphere. However, the excessive governance of virtual communities may also inhibit the enthusiasm of customers to participate in value co-creation. In the research of this article, we conclude that in virtual communities, contract governance has a positive effect on value co-creation.

Second, based on the theory of psychological ownership, this article explores the moderating effect of belongingness, self-efficacy, and self-identity on the relationship between contract governance and value co-creation in virtual community, and expands the application boundary of transaction cost theory. This research introduces the concept of psychological ownership in the field of psychology into the research and adds belongingness, self-efficacy, and self-identity as moderating variables to the research model of the relationship between contract governance and value co-creation in virtual community. The research results show that belongingness of customers strengthens the positive relationship between contract governance and value co-creation in virtual community; self-efficacy of

customers weakens the positive relationship between contract governance and value co-creation in virtual community; self-identity of customers strengthens the positive relationship between contract governance and value co-creation in virtual community.

### *Managerial implications*

First, firms should pay full attention to the governance of their brand virtual communities. This research shows that contract governance has a positive effect on value co-creation in virtual community. Virtual communities have the characteristics of anonymity and weak control that are easy to breed opportunistic behaviour. Once opportunistic behaviour occurs in the community, it may affect the firm reputation due to the unlimited spread of the Internet. Therefore, the managers of virtual communities should form relatively complete contract governance rules in the community, formulate customer behaviour norms and guidelines in virtual communities, reduce opportunistic behaviours, create a good virtual community atmosphere, and promote customers to participate in value creation.

Second, psychological ownership of customers also has an important influence on their participation in the value co-creation of virtual communities. According to the conclusions of this study, the high belongingness of customer can strengthen the positive effect of contract governance on value co-creation in virtual community. Therefore, the managers of the virtual community can enhance the customer's belongingness through gratitude feedback, encourage customers to interact and communicate in the virtual community, and so on, thereby promoting customers to participate in the co-creation of firm value. A high self-efficacy of customer has a weakening effect on the positive relationship between contract governance and value co-creation in virtual community. It is difficult for customers with high self-efficacy to feel satisfied with easy-to-achieve tasks. Therefore, for customers with high self-efficacy, the managers of virtual communities can make challenging creative solicitation activities for such groups when planning value co-creation activities to stimulate them to participate. A high self-identity of customer can strengthen the positive effect of contract governance on value co-creation in virtual community. Therefore, virtual community managers can further improve the rules and regulations that help enhance customers' self-identity, such as grade points and membership, to stimulate customers to create value co-creation behaviour.

### *Research limitations and prospects*

First, the types of virtual communities studied in this article are limited to virtual brand communities established by firms. Virtual communities initiated by third parties and virtual communities spontaneously constructed by customers are not within the scope of this research, and these two types of virtual communities also have a wide range of customer groups. Therefore, for these two types of virtual communities, research can also be initiated.

Second, the depth of this article needs to be improved. This article uses the method of empirical research to test the hypothesis model from the perspective of data statistical analysis but does not conduct a more in-depth analysis of the internal mechanism of the research content. In addition, this study only discusses the possible reasons for the negative regulation of self-efficacy and does not conduct further in-depth research and analysis.

Future research on the relationship between contract governance and value co-creation in virtual community can be extended to virtual communities initiated by third parties and by consumers themselves. Based on the research results, provide more guidance and theoretical support for firms to initiate value co-creation activities.

Further, explore the moderating role of customer psychological ownership in the relationship between contract governance and value co-creation in virtual community. According to the level of psychological ownership of customers, six psychological ownership situations can be divided, and the research on the relationship between contract governance and value co-creation in virtual community can be under different situations of high belongingness, low belongingness, high self-efficacy, low self-efficacy, high self-identity, and low self-identity.

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## Ethical approval

This study does not involve human subjects and adheres to all current laws of China.

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## Appendix

### Survey measures

Constructs	Item	Reference
Contract Governance	One of the most important roles of virtual community managers is to regulate the environment of the community. The virtual community manager will supervise the entire community to avoid speculation among some customers. This virtual community has clear rewards and punishments, and the managers of the community will seriously deal with complaints about speculation or harming the interests of others.	Grewal et al. (2010)
Value Co-Creation	I often participate in new product ideas solicitation activities initiated by companies or communities. I often participate in new product design solicitations initiated by companies or communities. I often participate in new product evaluation activities initiated by companies or communities. I often participate in new product promotion activities initiated by companies or communities.	Zwass (2010)
Belongingness	I think I belong to this online community. This online community is like my home. I feel very comfortable in this online community.	Avey et al. (2009)
Self-efficacy	I believe I have the ability to contribute to the successful operation of this online community. I can bring positive changes to this online community. I believe that I can perform well in this online community and realise my own value. My existence makes the atmosphere of this online community worse.	Avey et al. (2009)
Self-identity	The success of this online community is like my own success. The membership of this online community helps me get to know myself better. When my online community was criticised, I feel it necessary to defend it.	Avey et al. (2009)