

A value-justice model of knowledge integration in wikis: The moderating role of knowledge equivocality

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ABSTRACT

The sustainability of Wikis heavily relies on the quality of knowledge that is collaboratively integrated by volunteers. Although the factors influencing one specific knowledge contribution or knowledge-sharing behavior (e.g., adding) have been widely examined, the research on the factors that affect another type of knowledge contribution, i.e., knowledge integration, is still rare. Considering the collaborative nature of knowledge integration, beyond the value-centric logic of knowledge contribution, we propose a value-justice model of knowledge integration. We further identify the boundary conditions under which the proposed value-justice model works by investigating the moderating role of knowledge equivocality. A survey was conducted in a well-known Wiki-based website in China, namely, Baidu Baike, to test the research model and hypotheses. Our results show that both perceived justice and perceived value influence knowledge integration, which in turn affects knowledge quality, and knowledge equivocality strengthens the relationship between perceived justice / perceived value and knowledge integration and the relationship between knowledge integration and knowledge quality. Implications for research and practice are also discussed.

1. Introduction

The rapid development of the Internet has changed the way in which people create, share, and use information (Matschke et al., 2013; Yang & Lai, 2010), especially with regard to the emergence of Wikis (Santana & Wood, 2009). Wikis as a “collaboratively created and iteratively improved set of web pages” (Wagner, 2004, p. 265) enable users not only to add the content of their domain expertise but also modify the knowledge already contributed to the Wiki to advance the knowledge quality (Majchrzak et al., 2013). Majchrzak et al. (2013) classified knowledge contribution into two types: knowledge adding and knowledge integration. Knowledge adding refers to the extent to which users add new content to knowledge sharing platforms (e.g., Wikis), while knowledge integration is defined as “the recombination of knowledge by merging, categorizing, reclassifying, and synthesizing existing knowledge” (Majchrzak et al., 2013, p. 456).

Unlike knowledge integration that is controlled by privileged individuals through centralized and formal organizational structures in organizations, knowledge integration in the Wiki context is operated in a decentralized way such that anyone is allowed to modify others' contributions as well as one's own (Majchrzak et al., 2013). As Wiki

users may hold different viewpoints, it is very possible that there will be conflicts about how to edit Wiki content (Arazy et al., 2011, 2013). In this case, the facilitation of effective collaboration or knowledge integration among Wiki users becomes a critical issue for Wiki sustainability.

Although the prior knowledge contribution or knowledge sharing studies have shed light on the underlying mechanisms that explain adding-type knowledge contribution behavior, the theoretical understanding of knowledge integration is still underexplored (Arazy et al., 2011; Majchrzak et al., 2013). Specifically, the prior knowledge contribution (knowledge adding in particular) research, following a *value-centric logic*, examines the impacts of a variety of value perceptions including extrinsic rewards, reputation or images, reciprocity, sense of self-worth, and enjoyment in helping others on knowledge contribution intention or behavior (e.g., Bock et al., 2005; Chiu et al., 2006; Kankanhalli et al., 2005b; Sun et al., 2015). In this study, which considers knowledge integration to be a special type of knowledge contribution (Majchrzak et al., 2013), the value perceptions relevant to knowledge contribution may also be applicable to knowledge integration because when Wiki users make decisions about whether to engage in knowledge integration behavior, they will also evaluate the values or

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benefits derived from the behavior (Cheung et al., 2015). However, there are still some differences between the adding-type knowledge contribution and knowledge integration, which calls for clarification by considering the unique features of knowledge integration.

Specifically, different from simply adding one's specialized domain knowledge to a knowledge repository, which will not lead to the modification of the knowledge contributed by others, knowledge integration involves the reorganization, modification, and deletion of others' contributions (Yates et al., 2010). It suggests that knowledge adding behavior can be regarded as an *independent* behavior that is only associated with an individual's cognitive evaluations about his or her own behavioral consequences (i.e., self-interest), while knowledge integration is an *interdependent* behavior that is related to the interests of both knowledge integrator and those Wiki users whose contributed knowledge is modified (Majchrzak et al., 2013; Yang & Lai, 2010; Zhao et al., 2013). The interdependent nature of knowledge integration suggests that one knowledge integration action may cause the re-allocation of resources or benefits of stakeholders, and conflicts may occur during the benefit allocation process (Arazy et al., 2011, 2013). As one Wiki integrator's own benefits and the benefits of others whose contributed knowledge is modified are connected, Wiki users will consider the benefits of both sides to evaluate whether they are fairly treated (Lai & Yang, 2014). In this case, Wiki users may not only consider their own benefits (e.g., value-centric logic), but they may also consider the fairness of benefit allocation through a social comparison mechanism. Therefore, justice theory, which is developed to explain disputes or conflict resolution (Kerwin et al., 2015; Kidwell et al., 2012; Richard et al., 2002) and captures the social comparison mechanism (Adams, 1963), should be considered to complement the value-centric logic. Thus, the first research question is as follows:

RQ1. Will perceived justice and perceived value jointly affect knowledge integration in Wikis?

To address the first research question, we will propose a value-justice model of knowledge integration that posits perceived value and perceived justice as two antecedents of knowledge integration that further affect knowledge quality. A follow-up question relevant to the generalizability of the proposed model is about the boundary conditions under which the value-justice model works. A key assumption about the important role of knowledge integration and perceived justice is that there may be conflicts during the collaborative editing process (Arazy et al., 2011, 2013). However, for different types of knowledge, the potential conflicts during the knowledge integration process may vary (Neill & Rose, 2007), suggesting that the impacts of perceived justice and knowledge integration may be determined by knowledge features. Specifically, knowledge equivocality, which captures the extent to which the knowledge is unclear, uncertain, and/or ambiguous (Daft & Lengel, 1986; Lim & Benbasat, 2000), is selected as the construct given the positive relationship between equivocality/uncertainty and conflict (Weber & Mayer, 2014; Weingart et al., 2015). Thus, we put forward the second research question as follows:

RQ2. Will knowledge equivocality moderate the relationships proposed in the value-justice model?

This study makes two major theoretical contributions. First, it distinguishes knowledge integration from prior knowledge contribution behavior (e.g., adding) by highlighting the interdependent nature of knowledge integration and proposes a value-justice model of knowledge integration beyond the value-centric logic to address this contextual feature. Second, it identifies the boundary conditions under which the value-justice model works by investigating the moderating role of an important knowledge feature, e.g., knowledge equivocality.

The rest of the article is structured as follows. First, the prior literature on knowledge contribution is reviewed, and theoretical foundations such as cognitive evaluation theory and justice theory are introduced. Second, the research model is developed, and the underlying

mechanisms of the hypotheses are explained. Third, the data collection process is described, and the data analysis results are reported. Finally, the key findings, limitations, theoretical and practical implications are discussed.

2. Theoretical background

2.1. Knowledge integration

Knowledge contribution or knowledge sharing, in general, captures a variety of behaviors through which knowledge is exchanged among individuals in organizations or virtual communities (Chiu et al., 2006; Kankanhalli et al., 2005b; Majchrzak et al., 2013). Although some scholars may treat knowledge sharing behavior as the combination of knowledge contribution from the knowledge contributor side and knowledge seeking from the knowledge seeker side (e.g., He & Wei, 2009), most prior studies use knowledge contribution and knowledge sharing as interchangeable concepts (e.g., Bock et al., 2005; Kankanhalli et al., 2005b; Shen et al., 2018a; Wasko & Faraj, 2005). Similarly, in this study, we focus on the knowledge contributor's behavior and use knowledge contribution and knowledge sharing interchangeably.

In the prior studies, knowledge contribution has been examined in the research context of electronic knowledge repositories (EKR) in organizations (e.g., Kankanhalli et al., 2005b), online communities of practice (CoP) or virtual communities (VC) (e.g., Chen & Shen, 2015; Chiu et al., 2006), and social question and answer (Q&A) websites (e.g., Lou et al., 2013). With regard to technological constraints, knowledge contribution in these research contexts is mainly based on a *knowledge adding* mode, such that knowledge contributors can contribute their own domain expertise to the EKR or VC either actively or reactively to respond to knowledge seekers' requests. Every knowledge contributor independently contributes his or her knowledge and does not change the knowledge contributed by others. In contrast, Wikis differ from earlier knowledge management technologies in that they enable *collaborative* knowledge contribution such that knowledge contributors can not only add their own knowledge but they can also integrate knowledge already contributed to the Wiki to further improve the knowledge quality (Majchrzak et al., 2013). The emergency of Wiki enlarges the scope of knowledge contribution by including knowledge integration as another important knowledge contribution type beyond knowledge adding.

Knowledge integration differs from knowledge adding in several ways. First, knowledge adding is an *independent* knowledge contribution behavior, while knowledge integration is an *interdependent* knowledge contribution behavior. Knowledge adding is helpful for increasing the total amount of knowledge; however, it does not modify the extant contributed knowledge, while knowledge integration leads to the reorganization, modification, and deletion of the knowledge contributed by other Wiki users (Majchrzak et al., 2013), linking the knowledge contribution behaviors of different knowledge contributors (Beck et al., 2015; Tiwana & McLean, 2005).

Second, the key determinants of knowledge quality are different. Knowledge quality is defined as the extent to which an individual believes that a knowledge sharing platform provides precise and accurate content that meets knowledge needs (Durcikova & Gray, 2009). At different knowledge sharing platforms, knowledge quality may be ensured by different knowledge contribution activities. For EKR or VC platforms, as knowledge is independently contributed by different knowledge contributors without explicit knowledge integration, knowledge quality relies on whether every knowledge contributor tries his or her best to codify his or her domain expertise. The prior studies on knowledge quality focus on the different impacts of value perceptions (e.g., rewards, reputation, sense of self-worth, consistency) on knowledge quality and knowledge quantity (e.g., Chiu et al., 2006; Lou et al., 2013; Shen et al., 2018b). However, they pay less attention to the

role of knowledge integration. In contrast, for a Wiki platform, as a common piece of knowledge can be continuously modified and refined by different knowledge contributors, knowledge quality depends on the knowledge integration process, which is regarded as a collective action of all the knowledge contributors (Arazy et al., 2011, 2013).

Third, due to the independence / interdependence differences between knowledge adding and knowledge integration, the motivations that drive these two types of knowledge contribution behaviors are also different. Specifically, for knowledge adding, which is an independent behavior, knowledge contributors may only need to consider their own interests based on the cognitive evaluation mechanism (Deci, 1975; Ryan, 1982). Instead, as knowledge integration involves the modification of others' knowledge contributions, one Wiki user may spend a lot of effort on one piece of knowledge and later find that his or her contributed knowledge is totally modified by other Wiki users. With adequate experience of knowledge integration, when making a decision about whether to engage in a knowledge integration behavior, Wiki users may consider not only their own interests but also compare their benefits with others' benefits through the social comparison mechanism (Adams, 1963).

In summary, knowledge contribution includes both knowledge adding and knowledge integration, and knowledge integration plays a more important role in the Wiki context. The key distinction between knowledge integration and knowledge adding is the interdependence of knowledge contribution behaviors, and this distinction calls for understanding the knowledge integration behavior from a new theoretical perspective (e.g., social comparison mechanism).

2.2. Cognitive evaluation and social comparison mechanisms of motivations

The prior knowledge contribution studies, which have focused on the knowledge adding behavior, have investigated a variety of factors that drive knowledge contribution behavior. Specifically, based on social exchange theory, scholars state that whether an individual wants to participate in a pro-social behavior (e.g., knowledge contribution) is dependent on his or her evaluation of the benefits and costs involved in the behavior, and she or he will conduct the behavior when the benefits outweigh the costs (Bock et al., 2005; Kankanhalli et al., 2005b; Kuo & Feng, 2013; Thompson & Heron, 2005). Although the original social exchange theory may imply the importance of both benefits and costs, almost all the knowledge contribution studies drawing upon social exchange theory concentrate only on the benefit aspect except for Kankanhalli et al. (2005b), which examines the effect of codification effort and finds an insignificant impact. Thus, in this study, following the previous literature, we pay attention to only the benefit side to understand the knowledge contribution motivations.

Further, there are two ways to use the term perceived value in the prior studies. Some studies stress that perceived value is a result of the trade-off between the benefits and costs (Sun et al., 2014; Zeithaml, 1988), while others employ this term only to capture the benefit aspect. For example, customer perceived value is regarded as a three-dimensional concept that includes emotional value, social value, and functional value (Sweeney & Soutar, 2001), and shopping value is interpreted as a concept with two components, hedonic value and utilitarian shopping value (Babin et al., 1994). The question of how to reflect perceived value using different dimensions of benefits has also been addressed in the prior information systems (IS) research (e.g., Wang et al., 2013; Zhou et al., 2012) and in the knowledge sharing literature in particular (e.g., Liao et al., 2013; Zhang et al., 2017). Considering the perceived value of knowledge integration as a multi-dimensional construct, we used this term to capture the benefits associated with knowledge integration by following the second method in this study.

Cognitive evaluation theory (CET) or self-determination theory (SDT) (Ryan & Deci, 2000) is widely used to categorize the different motivations for knowledge contribution (knowledge adding in particular). CET/SDT generally classifies individual motivation into two

types (e.g., intrinsic motivation and extrinsic motivation) or three types (e.g., intrinsic motivation, internalized extrinsic motivation, and extrinsic motivation) in terms of the extent to which humans' inner needs for competence, autonomy, and relatedness are satisfied (Ryan & Deci, 2000). In the knowledge contribution context, extrinsic motivation includes extrinsic rewards (Bock et al., 2005; Kankanhalli et al., 2005b; Lin, 2007; Lou et al., 2013; Sun et al., 2012), reciprocity (Bock et al., 2005; Kankanhalli et al., 2005b; Lin, 2007), and reputation/image (Chiu et al., 2006; Kankanhalli et al., 2005b; Wasko & Faraj, 2005), while intrinsic motivation includes self-efficacy (Kankanhalli et al., 2005b; Lin, 2007; Lou et al., 2013; Zhang et al., 2018) or sense of self-worth (Bock et al., 2005; Chiu et al., 2006), and enjoyment in helping others (Kankanhalli et al., 2005b; Lin, 2007; Lou et al., 2013; Wasko & Faraj, 2005). As these motivators all are about the values or benefits derived from knowledge contributors' independent contribution behaviors, we term it as value-centric logic.

However, within the Wiki context, due to the interdependent nature of knowledge integration as elaborated in the section above, knowledge integration may be explained through a social comparison mechanism. Different from a cognitive evaluation mechanism, which relies on the evaluation of knowledge contributors' own benefits, a social comparison mechanism shifts the evaluation focus to the comparison between one's own benefits and others' benefits. Justice theory or equity theory provides solid support for the potential of the social comparison process.

Equity theory asserts that individuals seek to maintain equity among the inputs that they bring to a behavior and the outcomes that they receive from it against the perceived inputs and outcomes of others (Adams, 1963). Justice theory further argues that justice perceptions can be evaluated from three principle dimensions, specifically distributive justice, procedural justice, and interactional justice (Skarlicki & Folger, 1997). Distributive justice refers to "the perceived fairness of the distribution outcomes among different parties" (Zou et al., 2015, p. 258). It focuses on the fairness of outcomes and addresses resource distribution (Cohen-Charash & Spector, 2001). Procedural justice refers to "the perceived transparency and consistency of the process of making the outcomes distribution" (Zou et al., 2015, p. 258). Different from distributive justice, which is thought to be outcome-oriented, procedural justice is process-oriented (Cohen-Charash & Spector, 2001). That is, procedural justice is about whether the principles and regulations of the community are consistent for everyone (Tulubas & Celep, 2012). Interactional justice refers to "the communities conducting interpersonal treatment procedures with politeness, dignity, and respect when they carry out an evaluation process" (Zou et al., 2015, p. 258). Interactional justice is about the human aspect of community practices (Cohen-Charash & Spector, 2001) and is related to the reactions of individuals' attitudes, affects and behaviors (Tulubas & Celep, 2012).

Justice theory is widely used in various research contexts that involve the collaboration or teamwork among individuals. For example, perceived justice has been found to significantly affect teamwork quality (Dayan & Benedetto, 2008), team reflexivity (Wu et al., 2017), collaborative problem solving (Li et al., 2007), and new product success (Açikgöz, 2017) in new product development projects, idea cooperation and generation in crowdsourcing communities (Zou et al., 2015), and knowledge sharing (Akram et al., 2016), knowledge donating (Yeşil & Dereli, 2013), team effectiveness (Chen & Tjosvold, 2002), and team cooperation (Sinclair, 2003) in organizations. Given that knowledge integration involves collaboration between different knowledge contributors, perceived justice may play an important role in the knowledge integration process.

Although there are several studies that discuss the knowledge integration issue in the Wiki context, these studies mainly focus on the objective social network structure (e.g., cognitive diversity and group orientation) (Arazy et al., 2011, 2013) or knowledge contributors' knowledge resources (e.g., knowledge depth and breadth) (Majchrzak et al., 2013). The underlying motivational mechanisms for Wiki users'

participation in knowledge integration behaviors are not well explored, especially based on a comparison of knowledge adding and knowledge integration.

2.3. Knowledge equivocality as a relevant knowledge characteristic

Although knowledge contribution behavior has been substantially investigated in the prior literature, the role of knowledge characteristics in knowledge contribution has not yet been well studied (Bogers, 2011). One frequently mentioned knowledge characteristic is the tacitness or explicitness of knowledge based on the dichotomy of tacit and explicit knowledge. For example, Bock et al. (2005) examine how various motivational factors affect the intention to share explicit knowledge and implicit knowledge. However, most of these studies simply treat tacit and explicit knowledge as two types of knowledge rather than taking knowledge tacitness as a continuous variable, except for Kankanhalli et al. (2005a), which operationalizes task (knowledge) tacitness as a variable that moderates the relationship between motivational factors and knowledge seeking behavior. Knowledge tacitness is taken as a component of knowledge complexity by Hansen (1999). Thus, knowledge complexity is also empirically investigated in several studies (e.g., Willem & Buelens, 2009).

The prior literature on knowledge tacitness or complexity may inspire us to consider their role in knowledge integration; however, they are not appropriate for the current research context. First, as knowledge contributed to the Wiki platform can be well-codified, Wiki knowledge should be regarded as explicit knowledge, leading to a lack of variance for the construct of knowledge tacitness. Second, knowledge integration stresses the process through which different knowledge contributors collaboratively work on a common piece of knowledge, while knowledge tacitness cannot clearly reflect this collaboration process.

Recognizing that knowledge contributors may hold different viewpoints about the same problem and provide multiple conflicting explanations (Arazy et al., 2011), the extent to which the knowledge is unclear, uncertain, and ambiguous may be closely related to the knowledge integration process. Therefore, knowledge equivocality or ambiguity is considered in this study. Daft and Lengel (1986) defined equivocality as “the existence of multiple and conflicting interpretations about an organizational situation” (p. 556). Similarly, we define knowledge equivocality in the Wiki context as the possibility of the existence of multiple and conflicting interpretations of a common Wiki. As it is relatively easy for Wiki contributors to achieve agreement on certain problems (e.g., mathematical problems) than on other problems (e.g., university rankings), knowledge equivocality well captures such knowledge difference.

One consequence of knowledge equivocality is that conflicts may occur during the knowledge integration process. The prior studies on teamwork and collaboration have suggested that task uncertainty or ambiguity may affect user satisfaction with teamwork (Sussman & Guinan, 1999) and task conflict (Breugst & Shepherd, 2017) because uncertainty can generate different views of the exchange and lead to unexpected conflict (Shen et al., 2018c; Weber & Mayer, 2014; Weingart et al., 2015). Given that knowledge integration in the Wiki context is a collaboration task, knowledge equivocality may play an important role in the knowledge integration process. Specifically, it may determine the extent to which perceived justice and knowledge integration exert impacts.

3. Hypotheses

To understand the antecedents, consequences, and boundary conditions of knowledge integration in the Wiki context, we propose a research model as shown in Fig. 1. Specifically, perceived value and perceived justice are proposed to affect knowledge integration, which further influences knowledge quality. Perceived equivocality is proposed to moderate the relationship between perceived justice /

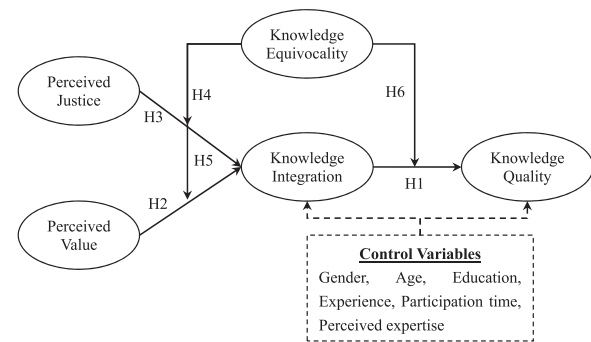


Fig. 1. Research Model.

perceived value and knowledge integration and the relationship between knowledge integration and knowledge quality. Further, following the prior studies (e.g., Fadel & Durcikova, 2014), demographic variables (such as gender, age, education, experience) and perceived expertise are included as control variables. Perceived expertise is taken into account because the prior studies have suggested that self-efficacy may have important impacts on knowledge contribution (Hsu et al., 2007) and knowledge quality (Chiu et al., 2006).

3.1. Knowledge quality

In the prior knowledge contribution studies, regarding the independent nature of knowledge adding, knowledge quality is regarded as the result of independent knowledge contributors' own motivations (Chiu et al., 2006; Lou et al., 2013) or efforts (Ke & Zhang, 2009). However, in the Wiki context, as all the Wiki users who are interested in a common piece of knowledge collaboratively work to continuously refine the Wiki knowledge, knowledge quality should heavily rely on the knowledge integration process (Kittur & Kraut, 2008; Kittur et al., 2007; Wilkinson & Huberman, 2007).

The importance of knowledge integration in knowledge quality improvement is based on the logic of the “wisdom of crowds,” which states that the aggregation of information/knowledge in groups results in decisions that are often better than could have been made by any single member of the group (Surowiecki, 2004). As every Wiki user may have a certain knowledge bias due to bounded rationality (Simon, 1991), knowledge diversity among Wiki users ensures that they can provide complementary knowledge to improve the quality of cumulative knowledge (Arazy et al., 2011; Cummings, 2004). The prior studies also empirically examine the relationship between knowledge integration and team creativity in the organizational context (Tiwana & McLean, 2005) and the relationship between knowledge integration and contribution value in the Wiki context (Majchrzak et al., 2013; Zhao et al., 2013). Thus, we hypothesize the following:

H1. Knowledge integration is positively associated with knowledge quality.

3.2. A value-justice model of knowledge integration

With regard to knowledge integration as a special type of knowledge contribution (Majchrzak et al., 2013), the motivational factors discussed in the prior knowledge contribution research can also be applied to the knowledge integration context. Specifically, based on cognitive evaluation theory or self-determination theory, the prior studies have identified a variety of knowledge contribution motivations including extrinsic rewards (either real rewards in organizations or virtual rewards in online communities), reputation or image, reciprocity, sense of self-worth or achievement, and enjoyment in helping others (Bock et al., 2005; Kankanhalli et al., 2005b; Wasko & Faraj, 2005). As the impacts of these factors have been well-established in the prior studies,

we package them into a single independent variable, specifically, perceived value in parsimony, by following Chiu et al.'s (2006) operationalization.

In the Wiki context, through knowledge integration, Wiki users can obtain certain virtual rewards and reputations (e.g., there is an explicit score system for Baidu Baike, the most famous Chinese Wikipedia), demonstrate their abilities, and help others who need to learn certain knowledge, thus perceived value should be an important motivational factor that influences knowledge integration behavior. Thus, we hypothesize the following:

H2. Perceived value is positively associated with knowledge integration.

In addition to perceived value, which may focus on knowledge contributors' own benefits, perceived justice, which stresses the equity of the benefit distribution among different knowledge contributors, may also have a significant effect on knowledge integration. As knowledge integration involves the modification of the knowledge contributed by others, conflicts may occur when knowledge contributors hold different viewpoints (Arazy et al., 2013). The disagreements may result in unpleasant emotions, suspicion, confusion, and hostility among Wiki users, which may further impede their continuous collaboration behaviors (Arazy et al., 2011) or lead to knowledge withholding (Lin & Huang, 2010). Perceived justice, as a conflict resolving approach (Kerwin et al., 2015; Kidwell et al., 2012; Richard et al., 2002), is helpful for rebuilding mutual trust (Lin & Huang, 2010; Tsai & Cheng, 2012), enhancing satisfaction (Chiu et al., 2011), shaping commitment (Li et al., 2017; Tsai & Cheng, 2012), and strengthening self-efficacy (Tsai & Cheng, 2012), all of which will foster Wiki users' continuous knowledge integration.

The prior studies on teamwork or collaboration have already empirically confirmed the important impacts of perceived justice in facilitating collaboration between group members (Açikgöz, 2017; Li et al., 2007; Sinclair, 2003). Although the Wiki context is different from the traditional organizational context in several ways (e.g., formal organizational structure and strong ties between organizational employees), knowledge integration shares several similar features with group collaboration in that both behaviors involve the leveraging of the wisdom of crowds. More importantly, the lack of formal organizational structure and affinity relationships may lead to higher turnover rate than organizations (Fang & Neufeld, 2009), leading the issue of justice to become more salient. Therefore, we propose the following:

H3. Perceived justice is positively associated with knowledge integration.

3.3. Moderating effects of knowledge equivocality

Knowledge equivocality is proposed to moderate the relationship between perceived justice and knowledge integration and the relationship between knowledge integration and knowledge quality. Specifically, conflicts in knowledge integration may bring negative affect and discourage Wiki users when their contributed knowledge is modified by others, thereafter impeding their continuous collaboration behaviors (Arazy et al., 2011). Perceived justice as a conflict resolving approach can help to rebuild mutual trust and shape commitment, which fosters knowledge integration (Lin & Huang, 2010; Tsai & Cheng, 2012) as stated in the section above. Following this logic, the extent to which perceived justice can exert its influence on knowledge integration should rely on the possibility of conflict occurrence. Further, knowledge equivocality as a conflict creator has been found to be positively associated with conflicts (Weber & Mayer, 2014; Weingart et al., 2015). In this case, when knowledge equivocality is high (compared to when it is low), conflicts are more likely to occur, and the conflict resolving through justice mechanism becomes more important for knowledge integration, suggesting that knowledge equivocality will

strengthen the relationship between perceived justice and knowledge integration. Therefore, we propose the following:

H4. Knowledge equivocality positively moderates the relationship between perceived justice and knowledge integration.

Further, the relationship between perceived value and knowledge integration may be moderated by knowledge equivocality too. When knowledge equivocality is high, Wiki users need to spend more time and effort in contributing and integrating their knowledge with shared knowledge contributed by other Wiki users (Kankanhalli et al., 2005b). According to the social exchange theory, individuals tend to balance the benefits derived from a behavior and the costs associated with the behavior and will commit to a behavior when benefits outweigh costs (e.g., Bock et al., 2005; Chiu et al., 2006; Kankanhalli et al., 2005b). As knowledge equivocality increases the costs of knowledge integration, Wiki users will expect more benefits as the compensation for their knowledge integration behaviors. In this case, perceived value will become more important when knowledge equivocality is high compared to when it is low. Therefore, we propose that:

H5. Knowledge equivocality positively moderates the relationship between perceived value and knowledge integration.

The underlying mechanism for the relationship between knowledge integration and knowledge quality is based on the logic that knowledge integration can leverage the wisdom of crowds to avoid the knowledge bias induced by a single knowledge contributor, foster knowledge complementarity, and improve knowledge quality finally (Arazy et al., 2011; Cummings, 2004). Thus, the relationship between knowledge integration and knowledge quality should depend on the extent to which biased knowledge is likely to be contributed. As knowledge equivocality captures the extent to which Wiki users may hold different opinions (Weber & Mayer, 2014; Weingart et al., 2015), indicating that the knowledge contributed by a single Wiki user will very possibly be biased. In this situation, avoiding knowledge bias through knowledge integration becomes more critical, suggesting a strong relationship between knowledge integration and knowledge quality. Specifically, for knowledge with low equivocality (e.g., mathematical problems), a single Wiki user is adequate to provide a high-quality answer, requiring less coordination among different Wiki users. In contrast, for knowledge with high equivocality (e.g., university rankings), it is very possible that a single Wiki user will provide biased opinions. In this case, continuously refining the knowledge through knowledge integration will be helpful in generating high-quality knowledge. Therefore, we propose the following:

H6. Knowledge equivocality strengthens the relationship between knowledge integration and knowledge quality.

4. Methodology

4.1. Research setting

To examine the research model, we conducted an online survey. Baidu Baike was chosen as the research context. Data were collected from users of Baidu Baike who had participated in collaborative editing activities. Similar to Wikipedia, Baidu Baike is a Chinese version of an online encyclopedia hosted by Baidu Inc. It provides an open and free platform for collaborative editing, allowing its users to edit almost any article. Baidu Baike is one of the most popular online encyclopedias in China. Up to December 2015, Baidu Baike had collected more than 1300 million entries, with 5.69 million users involved in the editing process. Therefore, Baidu Baike is suitable for this study.

4.2. Measurement

All constructs were measured using items adapted or developed

from prior studies. Some expressions were changed to fit the research context. Knowledge integration was measured using four questions adapted from [Tiwana and McLean \(2005\)](#). Drawing on [Durcikova and Gray \(2009\)](#), we measured knowledge quality using seven items. Referring to the previous literatures about values and/or benefits ([Bock et al., 2005](#); [Kankanhalli et al., 2005b](#); [Yang & Lai, 2010](#)), we summarized eight items that are related to knowledge contribution behaviors in virtual communities to measure perceived value. Adapted from [Colquitt \(2001\)](#), perceived justice was measured through three dimensions with ten questions. The measures of knowledge equivocality were developed from [Daft and Lengel \(1986\)](#) and [Lim and Benbasat \(2000\)](#). In addition to the constructs in the model, perceived expertise was taken as a control variable and measured using three items developed by [Durcikova and Gray \(2009\)](#). All items were measured using a 7-point Likert scale, ranging from “1” to “7” (1 = strongly disagree, 7 = strongly agree). Considering the Chinese language context of the investigation, all questions were translated into Chinese before the questionnaires were distributed. All measurement items are shown in Appendix A. At the same time, demographic variables such as gender, age, education, experience, and participation time were included as control variables.

4.3. Data collection

We conducted an online survey to collect the data. The respondents were recruited by sending emails to Baidu Baike users who had experience in collaborative editing activities. Meanwhile, messages about the survey were also posted on the Baidu Baike users' forum. In these emails or forum posts, the research objective as well as the URL link of the survey were provided. Then, the snowball technique was used to diffuse the questionnaire. When the data collection was done, we deleted the inappropriate responses (e.g., reduplicative responses from the same IP address, responses missing information and including the same values, and responses within a short time), and finally 166 valid questionnaires were obtained. [Table 1](#) shows the demographic information of the respondents.

5. Data analysis

We used partial least squares (PLS), a second-generation structural

Table 1
Respondent Demographics.

Demographic Variables	Category	Frequency	Percentage (%)
Gender	Male	111	66.9
	Female	55	33.1
Age	< = 20	39	23.5
	21–25	102	61.4
	26–30	17	10.2
	> 30	8	4.8
Education	High school or below	13	7.8
	Two year college	25	15.1
	Bachelor	115	69.3
	Graduate or above	13	7.8
Experience	< 3 months	36	21.7
	3–6 months	12	7.2
	7–12 months	18	10.8
	1–2 year	36	21.7
	> 2 year	64	38.6
Participation time (per week)	< 1 hour	47	28.3
	1–3 hours	43	25.9
	3–5 hours	25	15.1
	5–7 hours	7	4.2
	7–9 hours	5	3.0
	9–11 hours	4	2.4
	> 11 hours	35	21.1

equation modeling (SEM) technique, to conduct the data analysis in this study. First, it can estimate the items loadings of constructs and simultaneously the relationships among constructs ([Fornell & Bookstein, 1982](#)). Second, it has been recognized as appropriate for research with relatively small samples ([Hair et al., 2011](#)). The sample size requirement for PLS analysis should be ten times the largest number of independent variables or formative indicators ([Chin & Newsted, 1999](#)), which is 80 for the current study as there are 8 independent variables (including control variables) for knowledge quality. The sample size of the current study ($N = 166$) is greater than 80, suggesting that such sample size is adequate for PLS analysis for the research model in this study. Considering its advantages and our small samples, PLS was a good choice for this study. Hence SmartPLS 2.0 was used to perform the data analysis ([Ringle et al., 2005](#)).

5.1. Measurement model

The quality of measurement model is evaluated in terms of reliability, convergent validity and discriminant validity. The adequacy of reliability was proposed as an average variance extracted (AVE) higher than 0.5 ([Fornell & Larcker, 1981](#)), a composite reliability (CR) higher than 0.7 and a Cronbach's Alpha higher than 0.7 ([Nunnally, 1978](#)). According to [Table 2](#), all these values are higher than the recommended thresholds, indicating good reliabilities.

Confirmatory factor analysis (CFA) was used to assess the convergent validity and discriminant validity. As shown in [Table 3](#), all item loadings within their intended constructs are highly correlated, and each item loading on the intended construct is higher than on any other construct, demonstrating that the measurement model meets the requirement of convergent validity and discriminant validity. In addition, discriminant validity can be examined by checking whether the square root of the AVE of the given construct is greater than the correlations between the construct and any other construct ([Fornell & Larcker, 1981](#)). As shown in [Table 4](#), all square roots of AVE are higher than the correlations, indicating the adequacy of the discriminant validity.

Further, perceived justice was treated as a reflective second-order construct with three dimensions (e.g., distributive justice, procedural justice, and interactional justice) as suggested by [Colquitt & Rodell \(2015\)](#). The loadings from the second-order construct to the three first-order constructs were 0.904, 0.949, and 0.936 respectively ($p < 0.001$).

As the correlations among the constructs were relatively high, common method bias may be an issue. According to [Podsakoff et al. \(2003\)](#), two methods were used to evaluate common method bias. First, using Harman's single-factor test, six factors were extracted with eigenvalues greater than 1 (the three dimensions of perceived justice loaded on the same principle component), and the first principle component explained 43% of the overall variance, suggesting that common method bias was not serious. Second, to further check the issue, the technique of controlling for the effects of an unmeasured latent method factor was used. As shown in [Table 5](#), the method variable explained only 1.6% of the overall variance, while the trait variables explained

Table 2
Reliability.

	AVE	CR	Cronbach's Alpha
Perceived Expertise	0.795	0.921	0.872
Knowledge Quality	0.736	0.943	0.927
Knowledge Equivocality	0.900	0.964	0.958
Knowledge Integration	0.736	0.918	0.880
Distributive Justice	0.860	0.948	0.918
Interactional Justice	0.862	0.962	0.947
Procedural Justice	0.863	0.950	0.920
Perceived Value	0.692	0.947	0.936

Table 3
Loadings and Cross-Loadings of Measures.

	PEXP	KQ	KE	KI	PDJ	PIJ	PPJ	PV
PEXP1	0.866	0.438	0.234	0.440	0.321	0.347	0.338	0.287
PEXP2	0.886	0.507	0.157	0.572	0.404	0.418	0.447	0.536
PEXP3	0.922	0.414	0.240	0.462	0.291	0.321	0.328	0.387
KQ1	0.472	0.856	0.083	0.619	0.484	0.473	0.538	0.493
KQ2	0.460	0.889	0.019	0.655	0.451	0.517	0.503	0.505
KQ3	0.465	0.889	0.045	0.584	0.495	0.509	0.547	0.605
KQ4	0.407	0.837	0.119	0.567	0.396	0.400	0.425	0.480
KQ5	0.498	0.917	0.114	0.663	0.446	0.453	0.468	0.492
KQ6	0.319	0.748	−0.026	0.545	0.400	0.424	0.441	0.531
KE1	0.240	0.058	0.966	0.081	−0.025	0.018	0.052	0.013
KE2	0.197	−0.005	0.912	−0.011	−0.036	−0.031	0.026	0.001
KE3	0.208	0.070	0.968	0.079	−0.039	−0.022	0.020	0.052
KI1	0.458	0.540	0.051	0.835	0.462	0.385	0.441	0.523
KI2	0.444	0.646	0.002	0.901	0.550	0.476	0.539	0.571
KI3	0.470	0.576	0.119	0.872	0.426	0.357	0.431	0.439
KI4	0.540	0.658	0.134	0.823	0.372	0.354	0.424	0.438
PDJ1	0.404	0.445	−0.007	0.454	0.916	0.642	0.743	0.582
PDJ2	0.336	0.468	−0.035	0.480	0.955	0.667	0.760	0.568
PDJ3	0.334	0.531	−0.049	0.533	0.910	0.734	0.784	0.572
PIJ1	0.354	0.510	−0.078	0.445	0.747	0.920	0.841	0.605
PIJ2	0.396	0.490	−0.058	0.430	0.723	0.947	0.798	0.586
PIJ3	0.382	0.539	0.049	0.430	0.667	0.950	0.770	0.550
PIJ4	0.397	0.466	0.098	0.401	0.585	0.896	0.692	0.471
PPJ1	0.338	0.528	0.052	0.475	0.774	0.773	0.885	0.631
PPJ2	0.423	0.516	0.039	0.501	0.767	0.762	0.956	0.633
PPJ3	0.414	0.540	0.014	0.518	0.751	0.797	0.944	0.624
PV1	0.400	0.527	0.063	0.541	0.519	0.495	0.582	0.868
PV2	0.441	0.466	0.123	0.513	0.422	0.458	0.514	0.805
PV3	0.343	0.566	−0.045	0.519	0.503	0.456	0.527	0.869
PV4	0.390	0.597	0.017	0.529	0.553	0.546	0.583	0.858
PV5	0.458	0.477	0.131	0.502	0.599	0.474	0.589	0.755
PV6	0.261	0.461	−0.030	0.351	0.577	0.551	0.624	0.797
PV7	0.376	0.397	−0.015	0.358	0.453	0.497	0.521	0.838
PV8	0.370	0.451	−0.048	0.428	0.493	0.526	0.582	0.858

Note: KQ = Knowledge quality; KE = Knowledge equivocality; KI = Knowledge integration; PDJ = Perceived distributive justice; PIJ = Perceived interactional justice; PPJ = Perceived procedural justice; PEXP = Perceived expertise; PV = Perceived value.

76.9% of the overall variance, indicating that common method bias was not a critical concern for this study.

5.2. Structural model

Table 6 shows the PLS results for the structural model. For the main effect model, as hypothesized, knowledge integration has a significant positive effect on knowledge quality ($\beta = 0.612$, $t = 10.154$, $p < 0.001$), supporting H1; perceived value has a significant positive effect on knowledge integration ($\beta = 0.312$, $t = 3.599$, $p < 0.01$), supporting H2; perceived justice has a significant positive effect on knowledge integration ($\beta = 0.173$, $t = 2.017$, $p < 0.05$), supporting H3. With regard to the effects of the control variables, except for perceived expertise, which is found to significantly affect knowledge integration ($\beta = 0.339$, $t = 4.986$, $p < 0.01$) and knowledge quality ($\beta = 0.172$, $t = 2.527$, $p < 0.05$), the other factors such as gender,

age, education, experience and time are found to insignificantly affect knowledge integration and knowledge quality ($p > 0.05$ for all the relevant path coefficients).

At the same time, knowledge equivocality is found to moderate the effect of perceived justice ($\beta = 0.162$, $t = 1.997$, $p < 0.05$) and perceived value ($\beta = 0.233$, $t = 2.268$, $p < 0.05$) on knowledge integration and the effect of knowledge integration on knowledge quality ($\beta = 0.211$, $t = 3.889$, $p < 0.01$). Including the interaction effect between knowledge integration and knowledge equivocality, the R-squares of knowledge quality increase from 0.526 to 0.556 with Cohen's (1988) $f^2 = 0.068$. Including the interaction effect between perceived justice and knowledge equivocality, the R-squares of knowledge integration increase from 0.469 to 0.487 with Cohen's $f^2 = 0.035$. Including the interaction effect between perceived value and knowledge equivocality, the R-squares of knowledge integration increase from 0.469 to 0.504 with Cohen's $f^2 = 0.071$, suggesting a

Table 4
Means, Standard Deviations, and Correlations.

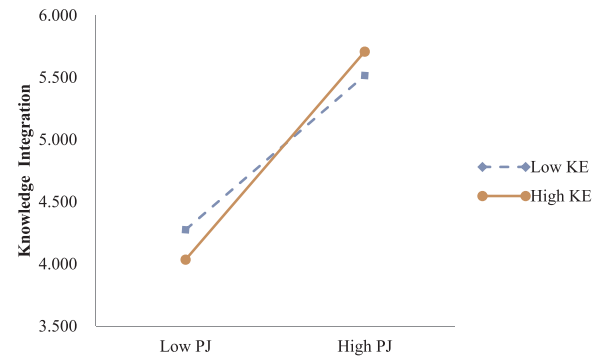
	Mean	Std. Dev	PEXP	KQ	KE	KI	PDJ	PIJ	PPJ	PV
PEXP	4.245	1.496	0.892							
KQ	4.864	1.254	0.513	0.858						
KE	3.733	1.503	0.232	0.071	0.949					
KI	4.877	1.327	0.557	0.715	0.088	0.858				
PDJ	5.376	1.285	0.385	0.509	−0.033	0.528	0.927			
PIJ	5.300	1.260	0.410	0.533	−0.002	0.460	0.737	0.928		
PPJ	5.422	1.307	0.422	0.556	0.038	0.536	0.822	0.838	0.929	
PV	5.410	1.262	0.471	0.603	0.081	0.635	0.582	0.518	0.613	0.832

Note: PEXP = Perceived expertise; KQ = Knowledge quality; KE = Knowledge equivocality; KI = Knowledge integration; PDJ = Perceived distributive justice; PIJ = Perceived interactional justice; PPJ = Perceived procedural justice; PV = Perceived value.

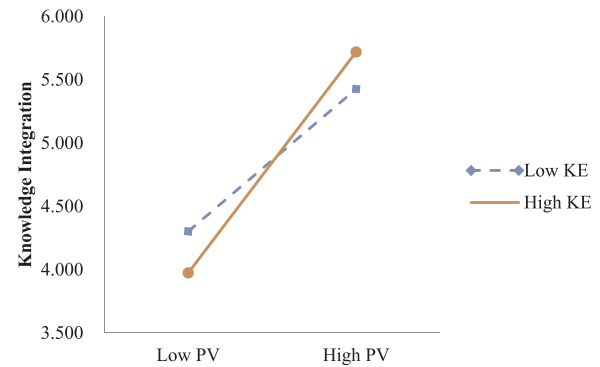
Table 5
Common Method Bias.

	Method Factor (R_1)	R_1^2	Trait Factors (R_2)	R_2^2
KQ1	−0.129	0.017	0.800	0.640
KQ2	−0.117	0.014	0.883	0.779
KQ3	0.112	0.013	0.912	0.832
KQ4	0.118	0.014	0.857	0.734
KQ5	−0.019	0.000	0.919	0.845
KQ6	0.026	0.001	0.764	0.583
KE1	−0.033	0.001	0.951	0.905
KE2	−0.027	0.001	0.961	0.923
KE3	0.061	0.004	0.948	0.898
KI1	−0.002	0.000	0.771	0.595
KI2	0.102	0.010	0.874	0.764
KI3	−0.070	0.005	0.864	0.746
KI4	−0.033	0.001	0.819	0.671
PDJ1	−0.042	0.002	0.900	0.810
PDJ2	−0.089	0.008	0.923	0.851
PDJ3	0.147	0.022	0.793	0.629
PEXP1	−0.191	0.036	0.892	0.796
PEXP2	0.191	0.037	0.890	0.793
PEXP3	−0.010	0.000	0.948	0.899
PIJ1	−0.018	0.000	0.888	0.789
PIJ2	0.003	0.000	0.942	0.888
PIJ3	0.104	0.011	0.949	0.901
PIJ4	−0.096	0.009	0.892	0.796
PPJ1	0.005	0.000	0.857	0.735
PPJ2	−0.084	0.007	0.958	0.918
PPJ3	0.081	0.007	0.934	0.872
PV1	0.235	0.055	0.881	0.776
PV2	0.041	0.002	0.843	0.710
PV3	−0.015	0.000	0.801	0.642
PV4	0.039	0.002	0.861	0.742
PV5	−0.021	0.000	0.750	0.562
PV6	−0.458	0.210	0.788	0.621
PV7	−0.083	0.007	0.844	0.713
PV8	0.193	0.037	0.879	0.773
Average	−0.002	0.016	0.875	0.769

small effect size for these moderating effects. Fig. 2 describes the interaction effect between perceived justice and knowledge equivocality. Perceived justice is shown to have a significant effect on knowledge integration under both high and low conditions of knowledge equivocality. However, the effect of perceived justice on knowledge integration is stronger with high knowledge equivocality, demonstrating a positive moderating effect of knowledge equivocality. Similarly, Fig. 3 suggests that the impact of perceived value on knowledge integration is stronger when knowledge equivocality is high. Fig. 4 describes the interaction effect between knowledge integration and knowledge



Note: PJ=perceived justice, KE=knowledge equivocality

Fig. 2. Interaction Effect between Perceived Justice and Knowledge Equivocality.

Note: PV=perceived value, KE=knowledge equivocality

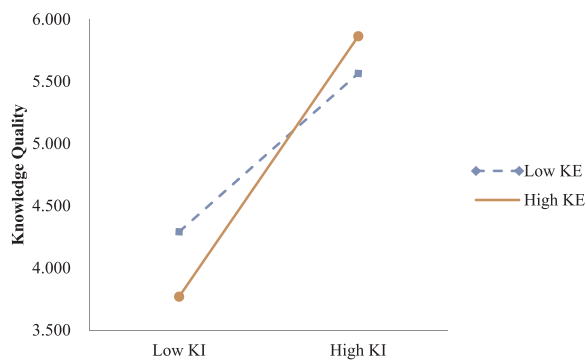
Fig. 3. Interaction Effect between Perceived Value and Knowledge Equivocality.

equivocality. Knowledge integration is shown to have a significant effect on knowledge quality under both high and low conditions of knowledge equivocality. However, the effect of knowledge integration on knowledge quality is stronger with high knowledge equivocality, demonstrating a positive moderating effect of knowledge equivocality. Hence H4, H5 and H6 are supported.

Table 6
PLS Results for Structural Model.

	DV = Knowledge Integration				DV = Knowledge Quality		
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3
Gender	0.073 ^{ns}	0.071 ^{ns}	0.067 ^{ns}	0.073 ^{ns}	0.002 ^{ns}	−0.043 ^{ns}	−0.023 ^{ns}
Age	−0.012 ^{ns}	−0.024 ^{ns}	−0.034 ^{ns}	−0.050 ^{ns}	0.010 ^{ns}	0.020 ^{ns}	0.018 ^{ns}
Education	−0.089 ^{ns}	−0.013 ^{ns}	0.015 ^{ns}	0.037 ^{ns}	−0.090 ^{ns}	−0.035 ^{ns}	0.008 ^{ns}
Experience	−0.001 ^{ns}	−0.005 ^{ns}	−0.011 ^{ns}	−0.018 ^{ns}	−0.030 ^{ns}	−0.027 ^{ns}	−0.025 ^{ns}
Time	0.008 ^{ns}	−0.030 ^{ns}	−0.012 ^{ns}	−0.005 ^{ns}	0.002 ^{ns}	−0.005 ^{ns}	0.020 ^{ns}
Perceived Expertise	0.553**	0.339**	0.312**	0.310**	0.506**	0.172*	0.187**
Knowledge Equivocality (KE)		−0.001 ^{ns}	−0.080 ^{ns}	−0.124 ^{ns}		−0.020 ^{ns}	−0.133*
Perceived Justice (PJ)		0.173*	0.177*	0.197*			
Perceived Value (PV)		0.312**	0.338**	0.333**			
Knowledge Integration (KI)						0.612**	0.580**
PJ*KE			0.162*				
PV*KE				0.233*			
KI*KE							0.211**
R ²	0.328	0.469	0.487	0.504	0.274	0.526	0.556
ΔR ²		0.141	0.018	0.035		0.252	0.030
f ²		0.266	0.035	0.071		0.532	0.068

Note: ^{ns}p > 0.05, *p < 0.05, **p < 0.01.



Note: KI=knowledge integration, KE=knowledge equivocality

Fig. 4. Interaction Effect between Knowledge Integration and Knowledge Equivocality.

6. Discussions and implications

6.1. Discussions on the key findings

Based on the interdependent nature of knowledge integration, this study proposes and empirically examines the antecedents, consequences, and boundary conditions of knowledge integration. The key findings of this study can be summarized as follows. First, it confirms the positive relationship between perceived value and knowledge integration, which is consistent with the prior knowledge contribution literature (e.g., Bock et al., 2005; Kankanhalli et al., 2005b), as knowledge integration is conceptualized as a special type of knowledge contribution. Second, it shows that perceived justice has a positive impact on knowledge integration in the Wiki context, indicating that perceived justice is another important predictor of knowledge integration beyond perceived value. Third, knowledge integration is found to positively affect knowledge quality in the Wiki context. Unlike the prior studies, which stress only motivational factors (e.g., Chiu et al., 2006; Lou et al., 2013), this finding indicates that the collaboration between different Wiki users is more important in the Wiki context. Fourth, this study finds that knowledge equivocality moderates the relationship between perceived justice / perceived value and knowledge integration and the relationship between knowledge integration and knowledge quality, suggesting that the proposed effects become more important when knowledge equivocality is high.

6.2. Theoretical implications

This study makes two major theoretical contributions. First, it determines the fundamental distinctions between knowledge adding and knowledge integration and proposes a value-justice model of knowledge integration to address these distinctions. Specifically, this study identifies the differences between knowledge adding and knowledge integration in behavioral interdependence, the key determinants of knowledge quality, and motivational mechanisms. Knowledge integration is interdependent as it involves the modification of the knowledge contributed by others, and the interdependent nature of knowledge integration further causes the key determinants of knowledge quality to shift from independent knowledge contribution to interdependent knowledge integration, which causes the motivational mechanisms to shift from cognitive evaluation to social comparison. Value – centric logic, which focuses on the knowledge contributors' own benefits, is not adequate to capture the whole picture of knowledge integration. Instead, including perceived justice as another important antecedent of knowledge integration can better explain the interdependence of different knowledge contributors. Therefore, this study not only contributes to the prior knowledge contribution literature by expanding the scope of knowledge contribution and clarifying the distinctions

between two types of knowledge contribution (e.g., knowledge adding and knowledge integration), but it also provides a more comprehensive theoretical framework (e.g., the value-justice model) to understand the knowledge integration behavior or collaboration behavior in general.

Second, this study identifies the boundary conditions under which the proposed value-justice model works by exploring the moderating effects of knowledge equivocality. This study remedies the lack of theoretical understanding of knowledge characteristics in the prior knowledge contribution literature by proposing the concept of knowledge equivocality. More importantly, this study further theorizes how knowledge equivocality moderates the relationship between perceived justice / perceived value and knowledge integration and the relationship between knowledge integration and knowledge quality. Specifically, we posit an interaction effect between knowledge equivocality and perceived justice by taking knowledge equivocality as a conflict creator and perceived justice as a conflict resolver, and we explain the interaction effect between knowledge equivocality and knowledge integration by treating knowledge equivocality as a knowledge bias inducer and knowledge integration as a knowledge bias eliminator. Knowledge equivocality is also proposed to moderate the impacts of perceived value on knowledge integration based on social exchange theory. Thus, the future knowledge contribution research should consider knowledge equivocality as an important knowledge characteristic; other researchers are encouraged to borrow our theorization to further the understanding of the role of knowledge equivocality.

6.3. Practical implications

Wiki practitioners can consider the following suggestions during their service design. First, Wiki service providers should enhance users' value perceptions through website design. For example, Wiki service providers can employ the gamification design to improve users' intrinsic motivations by making the collaborative editing process more enjoyable and extrinsic motivation by making the reputation mechanism more visible. Wiki service providers also can improve the social interaction functions to enhance users' social motivations. Second, Wiki service providers can enhance users' justice perceptions through community climate building and editing mechanism design. For example, Wiki service providers can engage in shaping a fair climate by publishing a series of policies relevant to fairness assurance to make users understand that fairness is a principle for collaborative editing. To avoid conflicts, Wiki service providers can design a transparency mechanism which asks users to provide clear explanations about why others' contributions are modified. Third, under different levels of knowledge equivocality, knowledge integration may have different requirements. One way to consider the contingency effect is to develop a knowledge equivocality rating system. When a knowledge integration task starts, all the Wiki users should be aware of the score of knowledge equivocality and then use appropriate strategies that fit with knowledge equivocality accordingly.

6.4. Limitations and future research

Although this study offers some valuable implications, some of its limitations should be noted. First, as the investigation was implemented in China, the website features and cultural differences may limit the generalizability of our conclusions. Future studies should extend the investigation across different languages and cultural contexts to enhance the generalizability of findings. Second, alternative independent variables, such as social capital (Tiwana & McLean, 2005) and cost factors (Kankanhalli et al., 2005b), may also exert effects but are not included in the current model. Future research can extend the current model by taking other important factors into account. Third, in addition to knowledge equivocality, there may be other knowledge features (e.g., knowledge tacitness) that can be considered as potential

moderators in future research. Fourth, when arguing the relationship between perceived justice and knowledge integration, we employed mutual trust as the underlying mechanism to explain their relationship without testing this mediating effect. Future research can include this construct in the model and examine its mediating role, thereafter advancing the theoretical understanding by opening the black box.

7. Conclusion

Although knowledge adding has been well-understood in the prior studies, the underlying mechanisms that explain knowledge integration in the Wiki context are still underexplored. To fill this research gap, this study proposes a value-justice model of knowledge integration to address the interdependence in the knowledge integration process and introduces knowledge equivocality as an important knowledge characteristic that moderates the relationships in the value-justice model.

Appendix A

See Table A1.

Table A1
Measures of Constructs.

Variable	Item	Measurement
Knowledge integration (KI) (Tiwana & McLean, 2005)	KI1	To refine entries, members of Baidu Baike synthesize and integrate their individual expertise.
	KI2	Members of Baidu Baike synthesize their expertise to develop shared understanding of entries.
	KI3	Members of Baidu Baike can clearly note their different opinions.
	KI4	Members of Baidu Baike can quickly find errors in the entries.
Knowledge quality (KQ) (Durcikova & Gray, 2009)	KQ1	The knowledge in Baidu Baike is precise.
	KQ2	The knowledge in Baidu Baike is accurate.
	KQ3	The knowledge in Baidu Baike is complete.
	KQ4	The knowledge in Baidu Baike is timely.
	KQ5	The knowledge in Baidu Baike is clarified.
	KQ6	The knowledge in Baidu Baike is useful.
	KQ7	Overall, the quality of knowledge in Baidu Baike is high.
	KQ8	Contributing knowledge to Baidu Baike can improve my bonus point.
Perceived value (PV) (Beck et al., 2015; Bock et al., 2005; Kankanhalli et al., 2005a, 2005b; Yang & Lai, 2010)	PV1	Contributing knowledge to Baidu Baike can improve my reputation.
	PV2	Contributing knowledge to Baidu Baike can increase my knowledge.
	PV3	Because of my knowledge contribution in Baidu Baike, I can get help from others when I need others' expertise.
	PV4	Contributing knowledge to Baidu Baike can help me know more people.
	PV5	Contributing knowledge to Baidu Baike can meet my personal interest.
	PV6	Contributing knowledge to Baidu Baike can get a sense of achievement.
	PV7	Contributing knowledge to Baidu Baike can make me feel the happiness of helping others.
	PV8	What I get from Baidu Baike reflect what I have contributed to it.
Perceived distributive justice (PDJ)(Colquitt, 2001)	PDJ1	What I get from Baidu Baike reflect the effort I have put into it.
Perceived procedural justice (PPJ)(Colquitt, 2001)	PDJ2	What I get from Baidu Baike are justified, given my contribution.
	PPJ1	I am able to express my views and feelings during the procedures of resolving problems in Baidu Baike.
Perceived interactional justice (PIJ)(Colquitt, 2001)	PPJ2	The regulations and procedures of Baidu Baike are consistent for each member.
	PPJ3	The regulations and procedures of Baidu Baike are free of bias.
	PIJ1	Baidu Baike truthfully accepts my questions.
	PIJ2	Baidu Baike treats my questions with respect.
Knowledge equivocality (PE)(Daft & Lengel, 1986; Lim & Benbasat, 2000)	PIJ3	Baidu Baike gives explanations regarding my related queries.
	PIJ4	Baidu Baike communicates with me to understand my thinking.
	PE1	Overall, what do you think of the knowledge in entries of Baidu Baike:
	PE2	Very settled - Very unsettled (1–7)
Perceived Expertise (PEXP) (Durcikova & Gray, 2009)	PE3	Very definite - Very indefinite (1–7)
	PEXP1	Very explicit - Very inexplicit (1–7)
	PEXP2	Baidu Baike members are very good at solving problems in the relevant domains.
	PEXP3	Baidu Baike members are expert troubleshooters in the relevant domains.

This study not only contributes to the knowledge contribution literature by theorizing the knowledge integration process but also provides practical suggestions for Wiki practitioners to further improve their service quality.

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