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39. Understanding Knowledge Sharing in Virtual Communities: An Integration of Expectancy Disconfirmation and Justice Theories

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Abstract

This paper integrates expectancy disconfirmation theory and justice theory to construct a model for investigating the motivations behind people's knowledge sharing in open professional virtual communities. The study holds that three dimensions of positive disconfirmation (i.e., knowledge quality, self-worth, and social interaction), three dimensions of justice (i.e., distributive, procedural justice, and interactional), and playfulness will influence individuals' satisfaction with knowledge sharing in open professional virtual communities. We also argue that playfulness and satisfaction can engender knowledge sharing continuance intention in such communities. Data collected from 270 members of one open professional virtual community provide support for the proposed model. The results help identifying the motivation underlying individuals' knowledge sharing behavior. Implications for theory and practice and limitations are discussed.

Keywords: expectancy disconfirmation theory, justice, knowledge sharing, open professional virtual communities.

Introduction

The development of professional virtual communities, of course, is due to the fact that most organizations do not possess all the required knowledge within their formal boundaries. Organizational members also tend to hoard valuable knowledge because of the fear of losing superiority arising from the ownership of that knowledge (Szulanski 1996). Individuals, thus, often have to rely on outside knowledge resources. One important way to obtain external knowledge is through professional virtual communities residing outside organizations (Wasko and Faraj 2005), i.e., open professional virtual communities. The term "open" denotes that participation is open to individuals interested in a shared practice.

The objective of this study is to examine the factors that increase or reduce individuals' satisfaction and intentions to continue sharing knowledge in open professional virtual communities. Open professional virtual communities are based on voluntary participation and weak ties, typical of relationships among casual acquaintances and strangers. Stimulating individuals to participate and share knowledge in a virtual community is a difficult task with weak-tie relationships and under the condition that usually lacks extrinsic monetary rewards for contributing knowledge in such a community. According to Coleman (1994), knowledge contributors forgo ownership or power of knowledge in that they give up control with expectations of gaining utility and maximizing their realization of interests via social exchange. Prior research indicates that anticipated social relationships (Bock et al. 2005), anticipated access to valuable knowledge (Butler et al. 2002), enhancing reputation (Wasko and Faraj 2005), enjoyment (Kankanhalli et al. 2005), and achieving a sense of self-worth (Bock et al. 2005) are motivations of individuals' contribution to virtual communities.

Disconfirmation (the discrepancy between performance and expectations) is an important and direct determinant of satisfaction (Oliver 1980). Prior research has affirmed the importance of expectations and returns (i.e., outcomes or performance) to knowledge sharing in virtual communities. However, little is known about the impact of disconfirmation. Fairness or justice is at the heart of relationship maintainability of all kinds (Lind et al. 1993). While prior research (Brock et al. 2005; Wasko and Faraj 2005) considered the influence of fairness or reciprocity on knowledge sharing, they only addressed one aspect of justice, i.e., fair balance between inputs and returns. Scholars have identified different dimensions of justice. This begs the question - whether an individual's perceptions of disconfirmation and various dimensions of justice are strong enough to stimulate his or her satisfaction and intention to continue sharing knowledge in open professional virtual communities. Since knowledge sharing behaviors are likely to be influenced not only by personal motivation but also contextual factors (Brock et al. 2005), we apply a theoretical model in which individual motivation factors, social network factor, and justice theory are integrated with expectancy disconfirmation theory (Oliver 1980; Oliver 1993) to address our research questions.

Theoretical Background

Knowledge Sharing in Professional Virtual Communities

Chiu et al. (2006) define a professional virtual community as “an online social network in which people with common interests, goals, or practices interact to share information and knowledge, and engage in social interactions”. In various definition of a professional virtual community, we found three important components of it: members (people), social network, and knowledge. Researchers interested in understanding why individuals share knowledge in professional virtual communities have undertaken from these three aspects.

What are the individual factors that drive people to share knowledge in professional virtual communities? According to Blau (1965), individuals engage in social interaction with an expectation of some future rewards such as approval, status, and respect. Prior research indicates that there are numerous intangible benefits individuals could have for knowledge sharing, ranging from enhancing reputation (Kollock 1999), achieving a sense of self-worth (Brock et al., 2005), to enjoyment in helping others (Kankanhalli et al. 2005). Tangible benefits include access to useful information and expertise (Butler et al. 2002).

According to Nahapiet and Ghoshal (1998), social interaction is an important feature of social networks and it strongly influences the extent to which interpersonal knowledge sharing occurs. Some studies have examined the impact of social interaction or network ties on knowledge sharing. For example, Brock et al. (2005) indicated that improved mutual relationships with others through knowledge sharing had a positive effect on attitude toward knowledge sharing. Chiu et al. (2006) empirically examined the influence of social interaction ties on the knowledge sharing in open professional virtual communities.

Some studies examined knowledge sharing behavior from the perspective of knowledge quality. For example, Wasko and Faraj (2005) and Chiu et al. (2006) investigated the influence of facets of social capital on knowledge quality. Social cognitive theory (Bandura 1997) defines human behavior as a triadic, dynamic, and reciprocal interaction of personal factors, behavior, and the social network (environment). Accordingly, outcomes of knowledge sharing behavior (e.g., high-quality knowledge) would affect personal cognition. However, little research has been done to examine the effect of knowledge quality on individuals' feelings of satisfaction.

Expectancy Disconfirmation Theory

The EDT model originally developed by Oliver (1980) theorizes that repurchase intentions are determined primarily by satisfaction. Satisfaction is jointly determined by expectations and disconfirmation. Oliver and colleagues (Oliver and Swan 1989a; Oliver 1993) have advanced the original EDT (Oliver 1980) to include performance, affect, and equity as the determinants of customer satisfaction and repurchase intention.

Cadotte et al. (1987) defined perceived performance as customers' perception of how product performance fulfills their needs, wants, and desires. Recent studies have found that knowledge quality (Wasko and Faraj 2000), sense of self-worth, and social interaction ties (Chiu et al. 2006) are related to knowledge sharing in virtual communities. According to Cadotte et al.'s (1987) definition, aforementioned antecedents of knowledge sharing behavior are individuals' perception of how knowledge sharing fulfills their needs, wants, and desires, and thus can be considered as perceived performance of knowledge sharing.

Disconfirmation is the degree to which performance (outcomes) exceeds, equals, or falls short of an individual's expectations, resulting in positive, zero, and negative disconfirmation, respectively (Oliver and Swan 1989a). Prior research has examined the influence of anticipated reciprocal relationships (Bock et al. 2005) and personal outcome expectations (Chiu et al. 2006) on knowledge sharing. Butler et al. (2002) suggested that a primary reason for individuals to share knowledge is their expectation of being seen as skilled, knowledgeable or respected. However, there is little empirical research into how disconfirmation of expectations relates to knowledge sharing.

Oliver (1993) proposed an extended EDT model that integrates cognitive judgments with affective responses elicited in consumption. Wasko and Faraj (2005) and Kankanhalli et al. (2005) have empirically examined the influence of enjoyment in helping others on knowledge sharing. However, their operation of enjoyment in helping others is derived from the concept of altruism which is a pro-social attitude rather than affective response such as participation and sharing knowledge for fun and playfulness.

Oliver and Swan (1989a; 1989b) extended the original EDT by including the equity concept that considers fair outcomes both exchange parties received, rather than the buyer taken alone. Their interpretation of equity has origin in traditional models of equity. Oliver and Swan (1989a) viewed both equity and disconfirmation as comparison processes but conceptually distinct and complementary. In equity processes, an individual's own outcomes and inputs are compared with those of the other party; in disconfirmation, outcomes are compared with an individual's own expectations for those outcomes. Oliver and Swan (1989a; 1989b) have shown that equity considerations are antecedent to customer satisfaction next to disconfirmation perceptions.

Justice Theory

The earliest influential theories of justice were the rule of distributive justice (Homans 1961) and the equity theory (Adams 1965). Homans' (1961) simple formula for distributive justice stressed that "a man's rewards in exchange with others should be proportional to his investments." Adams (1965) theorizes that an individual's perception of the fairness of exchange relationships is determined by comparing the output/input ratio for oneself with that of referent others and he or she seeks a fair balance between input and output and become satisfied whenever feeling his or her inputs are being fairly rewarded. Scholars have identified three important dimensions of justice: distributive, procedural, and interactional.

Distributive justice involves resource allocation and the perceived outcome of exchange (Adams 1965). Procedural justice is concerned with the processes by which outcomes are allocated or distributed among parties to an exchange (Thibaut and Walker 1975). Bies and

Moag (1986) separated out the interpersonal aspect of procedural justice, labeled as interactional justice. Interactional justice refers to the perceived fairness of the interpersonal treatment received during the enactment of formal procedures. The prevailing relationship marketing approach suggests that procedural and interactional justice should play a prominent role in predicting satisfaction. Martínez-tur et al. (2006) suggest a recovery of the classical equity approach, which indicates that the process by which individuals compare costs (inputs) and benefits (outcomes) is critical in understanding their satisfaction.

Prior work examining the impact of the three dimensions of justice predominantly used this concept in work environments and conflict resolutions: topics have included job satisfaction (Moorman, 1991), work outcomes (Ramaswami and Singh 2003), service recovery (Smith et al. 1999), and complaint handling (Maxham and Netemeyer 2002). However, the possible impact of these three dimensions of justice on individuals' satisfaction is still unclear in the knowledge sharing context. No empirical work has been done to address this issue.

Thibaut and Kelly (1959) suggest that participants in virtual communities expect mutual reciprocity that justifies their expense in terms of time and effort spent contributing their knowledge. Wasko and Faraj (2000) indicated that knowledge sharing in electronic networks of practice is facilitated by a strong sense of reciprocity and a strong sense of fairness. Wasko and Faraj (2005) found that reciprocity is negatively related to volume of contribution in electronic networks of practice. Bock et al. (2005) found that individuals' knowledge sharing intention was influenced by organizational climate that is characterized by fairness, innovativeness and affiliation. Aforementioned knowledge sharing studies and Oliver and Swan's (1989a) operation of equity, fairness or reciprocity is analogous to distributive justice.

Research Model and Hypotheses

While the updated EDT model proposed by Oliver and colleagues (1989a; 1993) considered the influence of equity on satisfaction, they only addressed one aspect of justice, i.e., the distributive aspect. Following recent development in justice theory, three important dimensions of justice are introduced to augment the updated EDT model to address our research questions. The constructs in the research model are post-sharing variables. Expectation construct is not included in the research model because it is a pre-sharing variable. Disconfirmation is a function of perceived performance, and thus our research model includes disconfirmation instead of performance constructs as direct predictors of satisfaction. Members, social network, and knowledge are important components of a professional virtual community, and thus disconfirmations of knowledge quality, members' self-worth, and social interaction are included in the research model. In addition, this study focus on positive disconfirmation (performance exceeds expectation). Figure 1 presents the research model. The dependent variable is continuance intention. Continuance intention refers to the subjective probability that an individual will continue sharing knowledge.

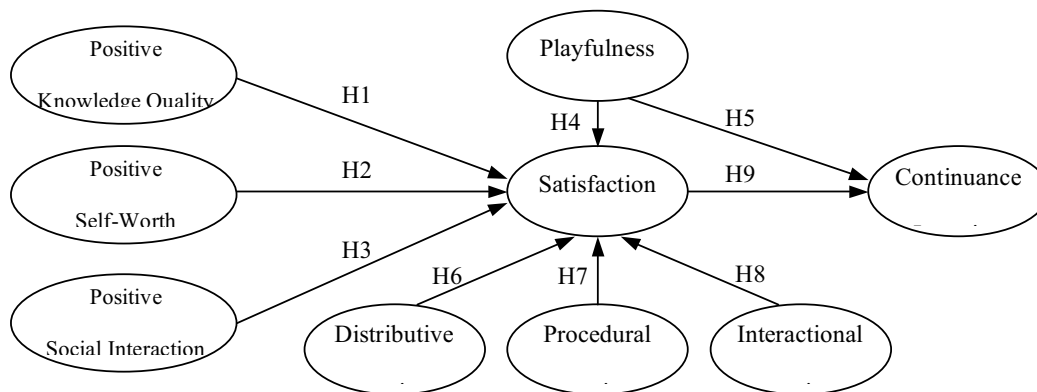


Figure 1. Research Model for Knowledge Sharing in Professional Virtual Communities

Positive Knowledge Quality Disconfirmation

Positive knowledge quality disconfirmation refers to the quality of knowledge shared in the virtual community is better than an individual's expectation. Knowledge quality deals with readability, accuracy, completeness, and reliability of shared knowledge. Wasko and Faraj (2000) reported that useful and up to date information/knowledge is the most important tangible motivation for participation and sharing knowledge in electronic networks of practice. As with the importance of information quality disconfirmation in increasing customer satisfaction with online shopping (McKinney et al. 2002), positive knowledge quality disconfirmation is expected to be an important driver of individuals' satisfaction with knowledge sharing in open professional virtual communities. Support for the role of positive disconfirmation on satisfaction is provided by Hsu et al. (2006).

H1: Positive knowledge quality disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.

Positive Self-Worth Disconfirmation

Positive self-worth disconfirmation refers to the sense of value an individual gets by sharing knowledge with other members is better than his or her expectation. According to Harter (1985), perceptions of self-competence are associated with successful performance and are critical determinants of subsequent motivation to share knowledge. Chen et al. (2006) argued that how one evaluates the self constitutes an important component of satisfaction with one's own life. Kollock (1999) outlines increased reputation or recognition as one of the three motivations of individuals' contributions to online communities. Wasko and Faraj (2005) suggested that individuals contribute knowledge in electronic networks of practice with expectations to improve status and reputation.

H2: Positive self-worth disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.

Positive Social Interaction Disconfirmation

Positive social interaction disconfirmation refers to the online interactions and relationships between an individual and other members are better than his or her expectation. People who come to a virtual community are not just seeking information or knowledge and solving problem; they also expect to meet other people and to seek support and friendship (Zhang and Hiltz 2003). It is the nature of social interaction that sustains virtual communities. One of the

personal benefits one expects to receive from contributing to an online group is establishing social relationships with others (Butler et al. 2002). Bock et al. (2005) argued that individuals who believe their mutual relationships with other members in virtual communities can be improved through their knowledge sharing are likely to have positive feeling toward knowledge sharing.

H3: Positive social interaction disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.

Playfulness

Playfulness refers to the extent to which participation and sharing knowledge is perceived to be personally enjoyable and fun. According to self determination theory (Deci and Ryan 1985), individuals are self-determining and intrinsically motivated in knowledge sharing when they are interested in it or enjoy doing it. Davis et al. (1989) suggested that perceived enjoyment has a direct influence on behavioral intention. Prior research indicates that individuals participate in electronic networks of practice or Web-based discussion boards and help others because participation is fun, and helping others is enjoyable and brings satisfaction (Wasko and Faraj 2000; Lee et al. 2006).

H4: Playfulness is positively associated with individuals' satisfaction with knowledge sharing.

H5: Playfulness is positively associated with individuals' knowledge sharing continuance intentions.

Distributive Justice

Distributive justice refers to an individual's perceptions of fairness about returns or outcomes in terms of his or her knowledge contribution. According to Kumar et al. (1995), distributive justice is helpful in building good relationships between members in open professional virtual communities, which in turn will lead to their satisfaction with knowledge sharing. Prior research indicates that knowledge sharing in electronic networks of practice is facilitated by a strong sense of reciprocity along with a strong sense of fairness in terms of favors given and received (Wasko and Faraj 2000). Kollock (1999) argued that a person is motivated to contribute valuable information/knowledge to the virtual community in the expectation that one will receive useful information/knowledge in return. Support for the role of distributive justice on satisfaction is provided by Teo and Lim (2001) and Martínez-tur et al. (2006).

H 6: Distributive justice is positively associated with individuals' satisfaction with knowledge sharing.

Procedural Justice

Procedural justice refers to an individual's perceptions of fairness in the procedures used in dealing with issues occurred in the knowledge sharing process. Dealing with inappropriate postings and handling conflicts among members is an integral part of knowledge sharing in virtual communities, thus hosts of virtual communities can enhance individuals' satisfaction with knowledge sharing by engaging activities that enhance individuals' perceptions of procedural justice. Prior research indicates that if consumers believe that the procedures used to produce the outcomes are fair; they are likely to be satisfied with the outcomes—even if the outcomes are considered unfair (Lind and Tyler 1988). Maxham and Netemeyer (2002) suggest that perception of procedural justice enhances the probability of maintaining a long-term satisfaction between exchange parties. Support for the role of procedural justice on satisfaction is provided by Teo and Lim (2001) and Martínez-tur et al. (2006).

H 7: Procedural justice is positively associated with individuals' satisfaction with knowledge sharing.

Interactional Justice

Interactional justice refers to an individual's perceptions about the fairness with which he or she has been treated by other members during online interaction. People who come to a virtual community attempt to develop social relationships with others inside the community (Zhang and Hiltz 2003). Theorists argue that in social exchanges, subjects not only consider the economic importance of outcomes, but also their socioemotional value (Martínez-tur et al. 2006). This socioemotional value focuses on the quality of the relationships among individuals, including aspects such as the courtesy and dignity people receive. It suggests a clear role for knowledge contributors in relation to the development of other members' satisfaction through acts with concern, respect and truthful manner. Support for the role of interactional justice on satisfaction is provided by Maxham and Netemeyer (2002).

H 8: Interactional justice is positively associated with individuals' satisfaction with knowledge sharing.

Satisfaction

Satisfaction is an individual's feelings of pleasure or disappointment resulting from comparing the perceived performance (or outcomes) of knowledge sharing in relation to his or her expectations (Kolter, 2000). Satisfaction is an affective response that is known to be associated with intense states of arousal that lead to focused attention on specific targets and may therefore impact ongoing behavior (Patterson and Spreng 1997). Oliver (1980) theorizes that satisfaction is positively associated with future intention, both directly and indirectly via its impact on attitude. In the final step of satisfaction formation processes, satisfaction determines intentions to patronize or not to patronize the store in the future (Swan and Trawick, 1981). Prior research has showed that an individual's positive feelings about knowledge sharing lead to intention to share knowledge (Bock et al. 2005; Ryu et al. 2003).

H9: Individuals' satisfaction with knowledge sharing is positively associated with their continuance intentions.

Research Methodology

Measurement Development

Measurement items were adapted from the literature wherever possible. Items for measuring justice perceptions were adapted from Folger and Konovsky (1989). Playfulness was measured with items adapted from Moon and Kim (2001). Items for measuring knowledge quality disconfirmation, self-worth disconfirmation, and social interaction disconfirmation adopted Oliver's (1980) "better than expected/worse than expected" scale. Knowledge quality disconfirmation was assessed with items adapted from McKinney et al.'s (2002) scale for information quality. Self-worth disconfirmation was assessed with items adapted from Rosenberg (1965) and Rokeach (1973). Social interaction disconfirmation was assessed with items adapted from Tsai and Ghoshal (1998) and Bock et al. (2005). Items related to satisfaction were adapted from Oliver and Swan (1989a). Continuance intention was assessed with items adapted from Bhattacharjee (2001). For all the measures, a seven-point Likert scale was adopted with anchors ranging from strongly disagree (1) to strongly agree (7).

Survey Administration

The research model was tested with data from members of one professional virtual community called Programmer Club. A banner with a hyperlink connecting to our Web

survey was posted on the homepage of the Programmer Club and members with knowledge sharing experience were cordially invited to support this survey. The Web survey yielded a total of 270 complete and valid responses for data analysis. Table 1 lists the demographic information.

Table 1. Demographic Information of Respondents (N = 270)

Variable	Age	Gender	Education	Working Experience	Member History
Mean (STD)	29 (6)	88.9 % of males	Some College	5.5 years (5.6)	2.4 (1.6)

Data Analysis

Structural equation modeling (SEM) was used to evaluate the proposed research model because it estimates multiple and interrelated dependence relationships, enables to represent unobserved concepts in these relationships and correct for measurement error in the estimation process, and defines a model to explain the entire set of relationships (Hair et al. 2006).

Confirmatory factor analysis (CFA) was applied to test the adequacy of the measurement model with LISREL 8.5. The adequacy of the measurement model was evaluated on the criteria of reliability, convergent validity, and discriminant validity. Reliability was examined using the composite reliability (CR) values. Table 2 shows that all the values were above 0.7, which is the commonly acceptable level for explanatory research. Additionally, the convergent validity of the scales was verified by using two criteria suggested by Fornell and Larcker (1981): (1) all indicator loadings should be significant and exceed 0.7 and (2) average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (i.e., AVE should exceed 0.50). For the current measurement model, all loadings were above the 0.7 threshold (see Table 3). AVE ranged from 0.73 to 0.89 (see Table 2). Hence, both conditions for convergent validity were met.

Table 2. AVE and Correlation among Constructs

	CR	AVE	PKQD	PSWD	PSID	PL	DJ	PJ	IJ	SA	CI
PKQD	0.94	0.79	0.89								
PSWD	0.95	0.83	0.54	0.91							
PSID	0.92	0.75	0.36	0.57	0.87						
PL	0.96	0.89	0.59	0.53	0.29	0.94					
DJ	0.92	0.75	0.60	0.52	0.35	0.64	0.87				
PJ	0.93	0.77	0.50	0.44	0.25	0.43	0.56	0.88			
IJ	0.95	0.82	0.61	0.49	0.33	0.60	0.67	0.60	0.91		
SA	0.92	0.73	0.56	0.51	0.29	0.67	0.64	0.48	0.63	0.85	
CI	0.96	0.88	0.44	0.44	0.21	0.67	0.53	0.36	0.55	0.76	0.94

Note: PKQD=Positive Knowledge Quality Disconfirmation; PSWD=Positive Self-Worth Disconfirmation; PSID=Positive Social Interaction Disconfirmation; PL=Playfulness; DJ=Distributive Justice; PJ=Procedural Justice; IJ=Interactional Justice; SA=Satisfaction; CI=Continuance Intention

Table 3. Descriptive Statistics of Items

Items	Factor Loadings	Mean (STD)	Items	Factor Loadings	Mean (STD)
KQD1	0.86	5.19 (0.96)	KQD2	0.90	5.25 (0.99)
KQD3	0.87	4.96(1.10)	KQD4	0.92	5.11 (0.97)
SWD1	0.93	4.94 (1.14)	SWD2	0.94	4.89 (1.06)
SWD3	0.86	4.69 (1.11)	SWD4	0.92	4.87 (1.12)
SID1	0.89	3.92 (1.40)	SID2	0.93	3.77 (1.40)
SID3	0.83	3.74 (1.20)	SID4	0.82	4.17 (1.46)
PL1	0.95	5.83 (1.00)	PL2	0.97	5.79 (1.00)
PL3	0.92	5.71 (1.03)	DJ1	0.83	5.40 (1.11)
DJ2	0.88	5.28 (1.14)	DJ3	0.90	5.18 (1.17)
DJ4	0.85	5.23 (1.19)	PJ1	0.83	4.94 (1.14)
PJ2	0.91	4.93 (1.13)	PJ3	0.90	4.91 (1.11)
PJ4	0.85	4.83 (1.06)	IJ1	0.88	5.30 (1.03)
IJ2	0.86	5.28 (1.03)	IJ3	0.93	5.27 (1.03)
IJ4	0.94	5.33 (1.02)	SA1	0.85	6.05 (0.95)
SA2	0.90	5.82 (1.01)	SA3	0.81	5.78 (1.06)
SA4	0.87	5.84 (1.01)	CI1	0.90	6.14 (0.87)
CI2	0.96	6.07 (0.97)	CI3	0.95	6.02 (0.99)

The discriminant validity of the scales was assessed using the guideline suggested by Fornell and Larcker (1981): the square root of the AVE from the construct should be greater than the correlation shared between the construct and other constructs in the model. Table 2 lists the correlations among the constructs, with the square root of the AVE on the diagonal. All the diagonal values exceed the inter-construct correlations; hence the test of discriminant validity was acceptable.

The structural model (which includes hypotheses in addition to the paths between the item and its latent construct) was examined on the cleansed measurement model. The fit indices are within accepted thresholds, except for AGFI, which is slightly lower than the commonly cited threshold: χ^2 to degrees of freedom ratio of 1.94 ($\chi^2=966.51$; $df=497$), AGFI=0.79, NNFI = 0.94, CFI = 0.95, and RMSEA = 0.059. The results of the analysis are depicted in Figure 2 and summarized in Table 4. The explanatory power of the research model is also shown in Figure 2. Overall, the research model accounted for 67% of the variance in continuance intention.

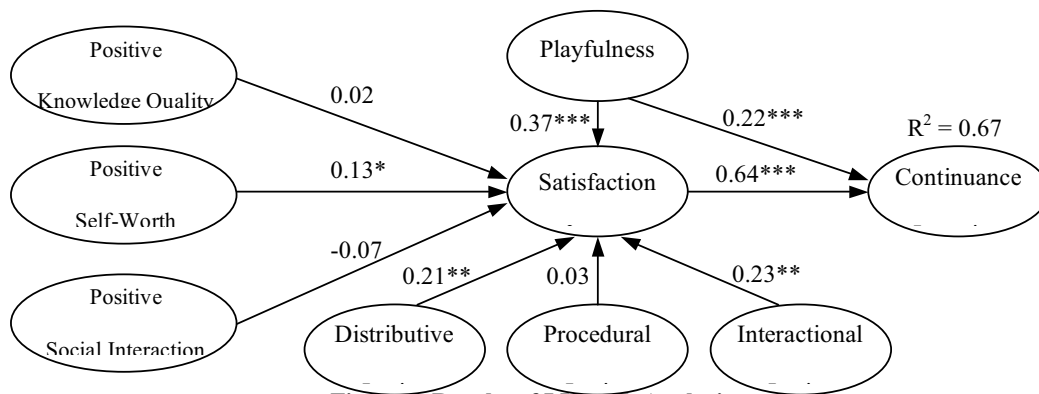


Figure 2. Results of LISREL Analysis

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 4. Results of Hypothesis Testing

Hypotheses	Results
H1: Positive knowledge quality disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.	Not Supported
H2: Positive self-worth disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.	Supported
H3: Positive social interaction disconfirmation is positively associated with individuals' satisfaction with knowledge sharing.	Not Supported
H4: Playfulness is positively associated with individuals' satisfaction with knowledge sharing.	Supported
H5: Playfulness is positively associated with individuals' knowledge sharing continuance intentions.	Supported
H6: Distributive justice is positively associated with individuals' satisfaction with knowledge sharing.	Supported
H7: Procedural justice is positively associated with individuals' satisfaction with knowledge sharing.	Not Supported
H8: Interactional justice is positively associated with individuals' satisfaction with knowledge sharing.	Supported
H9: Individuals' satisfaction with knowledge sharing is positively associated with their continuance intentions.	Supported

Discussion and Implications

This study aimed to test the contribution of justice perceptions to the predictability of individuals' knowledge sharing continuance intentions in open professional virtual communities beyond the expectancy disconfirmation paradigm. Overall, the results provide partial support for the proposed model of knowledge sharing in professional virtual communities. As expected, continuance intention is most dominantly influenced by satisfaction. Further regression analyses indicated that satisfaction alone accounts for 57.8% of the variance of continuance intention, thereby reconfirming the strong role of satisfaction as mediator between perceptions of disconfirmation and justice and continuance intention.

Playfulness is the most important determinant of knowledge contributors' satisfaction and is an important predictor of continuance intention. The results may indicate that when open professional virtual communities are used to support professional activities, the ability to leverage intrinsic returns may become more salient than extrinsic rewards to increase individuals' satisfaction and continuance intentions..

The results indicate that not all justice components have the same importance in predicting satisfaction. Interactional justice was the second most important determinant of knowledge contributors' satisfaction, followed by distributive justice. A possible explanation for the relatively strong effect of interactional justice and distributive justice is that contributors have reasonably complete information about how other members interacted with them and whether other members fairly discharge their obligations to reciprocate (because of the information's relative transparency). The results also indicate that not all disconfirmation components have the same importance in predicting knowledge contributors' satisfaction. Only positive self-worth disconfirmation had a significant impact on satisfaction.

Procedural justice is not significantly related to satisfaction. Herzberg et al. (1959) argue that levels of employee job satisfaction are a function of intrinsic and extrinsic (hygiene) factors. They found that the presence of hygiene factors did not necessarily create satisfaction, but the absence of these factors created dissatisfaction. Accordingly, one possible explanation is that procedural justice may act as a hygiene factor. A minimal level of procedural justice needs to be offered, and an increase in its performance does not lead to higher satisfaction.

The effects of positive social interaction disconfirmation and positive knowledge quality disconfirmation on satisfaction are not significant. The construct mean value for social interaction disconfirmation is 3.90, while construct mean value for satisfaction is 5.87. It suggests that actual social interactions between knowledge contributors and other members in the virtual community are worse than their expectations (i.e., negative disconfirmation), but they are still satisfied with their knowledge sharing experiences. Pieters et al. (1995) argued that individuals do not like to experience negative disconfirmation, and consequently assimilate their interpretations of events in the direction of their previous positions. Accordingly, a possible explanation is that the discrepancy between actual performance and expectations fall within knowledge contributors' zones of indifference and tolerance, and thus negative disconfirmation is acceptable (Strandvik 1994) and assimilation effects occur, which cause knowledge contributors' high levels of satisfaction to be remained. The construct mean value for positive knowledge quality disconfirmation is 5.13. It suggests that knowledge contributors agree that the quality of knowledge shared in the virtual community is better than their expectations (i.e., positive disconfirmation). According to Oliver and Swan (1989a), justice and disconfirmation are both comparison processes. Although they are conceptually distinct, they are complementary. Accordingly, a possible explanation for the finding is that when the impacts of the three dimensions of justice are taken into account, individuals put more emphasis on justice than on knowledge quality disconfirmation when evaluating the feeling of satisfaction.

Implications for Theory

This research contributes to an overall conceptual understanding of the nature and the importance of dimensions of justice in affecting knowledge sharing in virtual communities. From a theoretical perspective, our findings imply that perceptions of disconfirmation by themselves are not sufficient in increasing knowledge contributors' satisfaction with knowledge sharing. Disconfirmation of expectations can increase knowledge contributors' satisfaction to some extent, but it is the justice factors (e.g., distributive justice and interactional justice) that lead to greater level of satisfaction. By identifying dimensions of justice as the determinant of satisfaction, the need for all members to be treated equally and fairly is characterized as important drivers for knowledge sharing beyond that of mere disconfirmation perceptions.

The literature is somewhat inconsistent with regard to the relative importance of justice concepts in explaining satisfaction. The prevailing relationship marketing approach suggests that procedural and interactional justice should play a critical role. However, some previous empirical results have provided support for the predominance of distributive justice (Teo and Lim 2001; Martínez-tur et al. 2006). Our findings indicate that distributive justice is as important in increasing contributors' satisfaction as interactional justice. Thus, the present findings show that knowledge contributors' satisfaction is strongly influenced by the degree to which knowledge exchange is perceived as equitable and interpersonal treatment is perceived as polite and friendly.

Van der Heijden (2004) identified two types of IS: hedonic and utilitarian. Findings of Van der Heijden (2004) and Moon and Kim (2001) suggest that the nature of system use determines the relative importance of hedonic and utilitarian motivators. Our findings imply that although open professional virtual communities have both utilitarian and hedonic functionality, playfulness plays a pivotal role in shaping contributors' satisfaction and continuance intentions.

Implications for Practice

Creating and maintaining a set of core and experienced individuals plays an important role in developing and sustaining a professional virtual community (Wasko and Faraj 2005). The significant relationship between positive self-worth disconfirmation and disconfirmation suggests that raising core knowledge contributors' sense of self-worth is one of the approaches. For example, the Programmer Club community provides a list of top knowledge contributors, enhancing their sense of competence, confidence, and also members' respect to them.

The results indicate that playfulness increase contributors' satisfaction. Accordingly, to create a more enjoyable knowledge sharing environment, developers and designers of virtual communities can incorporate innovative tools and techniques used in the computer gaming industry--such as graphics, animation, video, sound, skill-building challenges, and all of the other aspects of interactive, networked multimedia--to deliver an knowledge sharing experience that's compelling, informative, and fun.

The results indicate that distributive justice increase contributors' satisfaction. Managers of virtual communities can encourage distributive justice by using extrinsic motivators such as financial rewards for sharing knowledge. Given the importance of interactional justice in shaping satisfaction, virtual communities should have some kind of mechanism to encourage or force members to conform to group norms concerning interpersonal treatment. Managers and hosts should also actively deal with impolite or unfriendly online conversations.

Future Research

Justice perceptions have been shown to be key antecedents of trusting relationships in the marketing and management literature. An interesting area for future research is to examine interrelationships among justice, trust, satisfaction, and continuance intention. In addition, future research should identify different types of hedonic motivations and examine their relative importance in explaining knowledge contributors' satisfaction and knowledge sharing continuance intentions.

Limitations

We note that our findings must be interpreted in light of the study's limitations. First, whether our findings could be generalized to all types of professional virtual communities is unclear. Knowledge sharing in open professional virtual communities might be different from that of

professional virtual communities residing inside organizations and communities focused on hobbies. Further research is necessary to verify the generalizability of our findings. Second, the results may have been impacted by self-selection bias. Our sample comprises only current knowledge contributors. Individuals who had already ceased to share knowledge in virtual communities might have different perceptions. Therefore, the results should be interpreted as only explaining knowledge sharing of current knowledge contributors of virtual communities. Whether the results can be generalized to individuals ceased to contribute or to disaffected contributors will require additional research. Finally, as the data are cross-sectional and not longitudinal, the posited causal relationships could only be inferred rather than proven.

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