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# SUSTAINABILITY AND GROWTH OF ONLINE KNOWLEDGE COMMUNITIES: EXAMINING THE IMPORTANCE OF PERCEIVED COMMUNITY SUPPORT AND PERCEIVED LEADER SUPPORT

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# SUSTAINABILITY AND GROWTH OF ONLINE KNOWLEDGE COMMUNITIES: EXAMINING THE IMPORTANCE OF PERCEIVED COMMUNITY SUPPORT AND PERCEIVED LEADER SUPPORT

*Completed Research Paper*

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## Abstract

*Voluntary behaviors (i.e., knowledge contribution and word of mouth) are important to the sustainability and growth of online knowledge communities. Although previous studies have identified various factors leading to knowledge contribution and related behaviors, the underlying psychological processes have rarely been examined. In particular, previous studies have not examined how characteristics of online knowledge communities influence voluntary behaviors through support perception. This study aims to fill the gap in the literature by developing and testing a model to explain voluntary behaviors in online knowledge communities. To develop the research model, we drew on theories of justice, organizational support, and citizenship behavior to explain the influence of characteristics of online knowledge communities on individuals' voluntary behaviors through their perceptions of support from the community and the leader. The research model was tested on survey data collected from 214 online knowledge community users. The results largely supported our model. In particular, we found that pro-sharing norm and information need fulfillment affect perceived community support. Perceived recognition from leader and perceived co-presence of leader affect perceived leader support. Additionally, perceived community support was found to be important in shaping knowledge contribution and word of mouth. Perceived leader support was found to influence individuals' knowledge contribution behavior. Theoretical and Practical implications are discussed.*

## Introduction

Online knowledge communities comprise of people with common interests, goals, or practices, who participate to share knowledge and engage in social interactions (Chiu et al. 2006; Khalifa and Liu 2003). They are becoming increasingly important as part of individuals' daily life (Chiu et al. 2006; Ma and Agarwal 2007). It has been reported by Big-board.com[1] that as of April 2010, there are 587 online knowledge communities that have more than 100,000 registered users. One of the biggest online knowledge communities contains 21 million registered users- the UK *Gaia Online*[2]. These communities revolutionize lives by offering a space for social interactions (Armstrong and Hagel 1996; Phang et al. 2009). They enable individuals to obtain knowledge, express opinions, and obtain feedbacks from others (Ma and Agarwal 2007). In a recent survey, for example, 70% of Americans are found to acquire knowledge through online knowledge sharing platforms, such as bulletin boards and online forums, and 62% reported to have spent more than 30 minutes online every week to acquire their required knowledge (Zalesne 2009).

Despite the promises of online knowledge communities, a survey on 1,650 Americans has revealed that less than 1-out-of-10 (6%) have engaged in voluntary behaviors, such as posting of information and comments (PEW 2009). Past research has revealed similar evidences. For instance, Cummings et al. (2002) have examined 1,066 listservs for a 130-day period and reported that less than 50% of members contributed message. Likewise, Preece et al. (2004) have revealed that contributing individuals made up 54.5% of health support communities and only 18% of software support communities. Therefore, lack of contribution challenges the sustainability of online knowledge communities and at the same time, endangers their growth (Fang and Chiu 2010).

Previous research has focused on investigating the drivers of voluntary behaviors (e.g., Bock et al. 2005; Brown et al. 2007; Ma and Agarwal 2007) in online knowledge communities. Earlier studies have found that interaction structures and functionality of the community affect users' interaction (e.g., Butler 2001; Preece et al. 2004; Wasko and Faraj 2000). Subsequently, researchers have found that personal gains including the amount of knowledge acquired, peer recognitions, and personal pride affect users' voluntary knowledge contribution (e.g., Chiu et al. 2006; Wasko and Faraj 2005). More recently, this stream of research has extended its horizon to study the influence of interpersonal relationship between community members on encouraging voluntary behaviors (e.g., Brown et al. 2007; Ma and Agarwal 2007). Several studies further suggest that individuals' voluntary behaviors might be influenced by the interpersonal interaction between individuals and the forum leader (e.g., Koh et al. 2007; Preece and Shneiderman 2009). Typically, forum leader is a user who is perceived, either formally or informally, as a knowledge leader and sought by others for information and advice (Hildreth and Kimble 2004; Yoo and Alavi 2004). He/she plays an important role in contributing knowledge to communities and developing the necessary social climate to elicit interactions among members (Koh et al. 2007). Besides, forum leader is also engaged in synthesizing discussions and arguments to articulate ideas for other users (Cassell et al. 2006).

Plenty of studies have focused on the relationship between characteristics of online communities and individuals' voluntary behaviors in Information Systems (IS) field. However, the underlying psychological processes which shape knowledge contribution and related voluntary behaviors have rarely been studied. In particular, past research has not examined how characteristics of online communities influence voluntary behaviors in terms of individuals' perception of support from community-oriented exchange as well as leader-oriented interaction (Preece and Shneiderman 2009).

This study aims to fill the gap by developing a model to explain voluntary behaviors in online knowledge communities. Specifically, our study places a special focus on the role of community-oriented exchange and leader-oriented interaction in motivating voluntary behaviors. To develop the research model, we have drawn on theories of justice, organizational support, and citizenship behavior to explain the way characteristics of online knowledge communities influence individuals' voluntary behaviors through their perceptions on the community and the forum leader. In essence, the model maintains that characteristics of online knowledge communities (i.e., procedural, distributive, and interactional) are summarized into support perceptions (i.e., perceived community support and perceived leader support), and these beliefs result in voluntary behaviors (i.e., knowledge contribution and word of mouth). Overall, this study is expected to contribute to the literature by offering an integrated and coherent perspective to explain individuals' voluntary behaviors in online knowledge communities. The findings of this study will help practitioners develop effective technological strategies and community policies to enhance the sustainability and growth of online knowledge communities.

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[1] http://rankings.big-boards.com, Bigboards.com is a Web directory that lists most active online communities ranked by their post count, member count, traffic, etc.
[2] http://www.gaiaonline.com/forum/index.php

## Literature Review

### *The Justice Framework*

The notion of justice is shown to be useful in identifying antecedents to psychological processes (Clemmer and Schneider 1996; Cropanzano et al. 2001). In the literature, three types of justice, namely procedural, distributive, and interactional, are suggested as particularly relevant to explain the psychological process of social exchange (Moorman 1991). First, procedural justice centers on the availability of structural mechanisms in which the benefits are allocated (Folger and Greenberg 1985; Lind and Tyler 1988). Individuals view the procedure as fair when the organizational structure provides unambiguous assurance to their welfare (Thibaut and Walker 1975). Procedural justice is fostered where outcomes are consistent with implicit norms of allocation (Colquitt 2001). Past studies have shown the importance of norms on voluntary behaviors. For instance, in a study of electronic networks of practice, Wasko and Faraj (2005) have found that individuals guided by a norm of reciprocity will contribute more helpful responses. Similarly, Argote et al. (2003) have examined social norms within teams and found that sharing norms facilitate knowledge sharing and team communications.

Second, distributive justice concentrates on the outcome of a social exchange (Gilliland 1993). This concept purports that individuals' attitudes towards an exchange are influenced by the satisfaction of intrinsic and extrinsic needs (Rhoades and Eisenberger 2002). For example, in the same study by Wasko and Faraj (2005) discussed previously, individuals are found to be intrinsically satisfied when their information need is fulfilled and extrinsically satisfied when they gain interpersonal recognitions. When their intrinsic and extrinsic needs are satisfied, they formulate more positive perceptions towards the online community. Similarly, Dholakia et al. (2004) have examined the effects of knowledge gains and social recognition on online community participations. Their result suggests that fulfillment of these two needs might lead to individuals' positive feelings towards the online community.

Lastly, interactional justice focuses on the quality of dyadic interaction in the course of a social exchange (Colquitt 2001). It emphasizes the importance of dyadic interaction which differs from other justice types related to organizational exchange (Cropanzano et al. 2002; Masterson et al. 2000). Several studies have revealed the importance of interactional justice to individuals' attitudes towards an online community. For example, in a study on social loafing, Murphy et al. (2003) have found that when individuals' interaction with the forum leader is of high quality, they are more likely to regard the forum leader positively. Likewise, Koh et al. (2007) have found that medium facilitates awareness of other people is crucial for social interactions in online communities.

Extant research has attempted to draw on the justice framework to explain individuals' behaviors in organizations. For instance, Allen et al. (2003) have drawn on the three categories of justice to explain employees' turnover behavior. On the basis of the justice framework, they have found that a fair procedure, a reasonable fulfillment of expectation, and a positive relationship significantly enhance their perceptions on the organization. Similarly, Ambrose and Schminke (2003) have examined supervisory exchange through the justice framework. Their findings show that organizational structure and inducements affect organization-referenced beliefs, whereas interpersonal inducement and relationship quality affect supervisor-referenced beliefs. Likewise, Masterson et al. (2000) have found that the quality of interpersonal treatment has a significant influence on individuals' beliefs about the supervisor while fairness of organizational procedure has a significant influence on individuals' beliefs about the organization. A consistent finding of these studies is that the three categories of justice influence individuals' perceptions on the organization and the supervisor. Accordingly, we draw on the justice framework to explain the effects of online knowledge community characteristics on individuals' perceptions of support.

### *Support Perception and Voluntary Behaviors*

Past organizational studies have identified several factors that influence individuals' voluntary behaviors (e.g., Coyle-Shapiro 2002; Kang et al. 2007; Rhoades and Eisenberger 2002). Underlying all these research works is individuals' perception of support. In the literature, two types of perceptions – organizational support and supervisor support are suggested to be particularly relevant to individuals' behaviors within an organization (Eisenberger et al. 2002; Rhoades et al. 2001). Organizational support refers to individuals' general beliefs concerning the extent to which the organization values their contributions and cares about their well-beings (Eisengber et al. 1986). Through communal exchanges, a sense of organizational support can be induced by the community's readiness to reward increased efforts made on its behalf (Shore and Shore 1995). For instance, Allen et al. (2003) note that a fair structure of reward allocations contributes substantially to perceived

organizational support. Rhoades and Eisenberger (2002) have found that organizations that fulfill expectations signal that individuals' contributions are valued. Aselage and Eisenberger (2003) suggest that individuals perceive organizational support when the organization is trustworthy and fulfills their expectations. Coyle-Shapiro and Conway (2005) have reported that organizational practices and inducements are important to individuals' perception of organizational supportiveness, which in turn, is influential to their behaviors beneficial to the organization. In the context of online communities, perceived organizational support is the assurance that the online community, as a whole, will be available to provide knowledge aids and social support (George et al. 1993).

Supervisor support represents individuals' general beliefs that the supervisor is appreciative to their contributions and cares about their well-beings (Eisenberger et al. 2002). In contrast to organizational support, supervisor support is based on a dyadic interaction, wherein each party offers something valuable to the other party and each party views the exchange as reasonably equitable or fair (Graen and Scandura 1987). The notion of supervisor support is found to be useful in examining voluntary behaviors in organizations. For instance, Schyns and Felfe (2006) have found that the relationship between leader and members is influential on group consensus, which in turn, induces voluntary behaviors. More importantly, Wayne et al. (1997) have revealed that the fulfillments of interpersonal expectation and liking are important determinants of voluntary behaviors through the perception of supervisor supportiveness.

While supervisor support is shown to have a substantial influence on voluntary behaviors, individuals' perception on the supervisor is also found to influence their beliefs about organizational supportiveness. From individuals' perception, supervisors are responsible for the provision of information and support because they are the principal agents of the organization, and hence the main channel through which knowledge flows (Cole et al. 2006). Eisenberger et al. (2002) have found that individuals view the supervisor's supportiveness as representative of the organization's overall orientation toward them. Likewise, Rhoades et al. (2001) have reported that individuals tend to attribute supervisor's supportive treatments, in part, to the organization rather than solely to the supervisor's personal inclinations.

Past studies examining organizational citizenship behavior suggest that communal exchange and dyadic interaction both motivate voluntary behaviors (Eisenberger et al. 2002; Shanock and Eisenberger 2006; Wayne et al. 1997). Likewise, extant research on online communities suggests that individuals' voluntary behaviors are influenced by their perception about the overall community and a particular member (Chiu et al. 2006; Wiertz and Ruyter 2007; Yu and Chu 2007). We define voluntary behavior as behavioral outcomes that are not directly or explicitly recognized with formal rewards (Smith et al. 1983). Typically, voluntary behavior is not formally required but it benefits and increases the efficiency of an organization (Chen et al. 2005; Moorman et al. 1998; Wayne et al. 1997). While past research has identified ample types of voluntary behaviors, two behaviors, namely, knowledge contribution and word of mouth, have been the focus of attention among researchers and practitioners (Fang and Chiu 2010; Williams and Cothrel 2000; Yu and Chu 2007).

Knowledge contribution refers to the extent to which individuals codify and explicate their knowledge such that it can be accessed and reused by other community users (He and Wei 2009). Since knowledge articulation and codification is time-consuming and effortful (Kankanhalli et al. 2005), individual users might not be motivated to contribute knowledge voluntarily (Chiu et al. 2006). Past studies suggest that knowledge contribution is crucial for the sustainability of online communities. For instance, Koh et al. (2007) have found that the survival of an online community depends on the amount of posting and viewing. Similarly, Bulter (2001) has revealed that knowledge contribution has an extensive influence on the amount of audience which is vital to the long term sustainability of online communities. When knowledge is undersupplied, individuals tend to be less satisfied with the online community, and hence cannot be sustained by the community. Accordingly, it is important for practitioners to understand the mechanism that motivates individuals to contribute their knowledge.

Whereas knowledge contribution enables "sustainability", word of mouth induces "growth" of online communities (Brown et al. 2007; Wasko et al. 2004). Word of mouth refers to the extent to which an individual intends to recommend, or communicate positive things about, an organization to others (Srinivasan et al. 2002). Giving recommendation is risky because it might potentially tarnish individuals' social image or creditability (Jones and Sasser 1995). Hence, recommendation behavior exemplifies individuals' commitment to an organization. Research shows that word of mouth predicts the growth of an organization above and beyond satisfaction, switching costs, and loyalty (Kumar and Petersen 2005; Xu et al. 2007).

In the context of online communities, the effects of word of mouth are not limited to the continued participations from existing members but also the recruitments of new members. For instance, in a study of voluntary behaviors in online communities, Kang et al. (2007) suggest that word of mouth is an indication of allegiance to and promotion of the online community's interests beyond individual interests. In addition to knowledge

exchange among members, word of mouth is a representative behavior in which individuals help build good reputation for and advance the interest of the whole community. Likewise, Cothrel (2000) has noted that word of mouth is an expression of affective commitment in which individuals who have a strong sense of affiliation tend to make referrals of the online community to their friends. Thus, word of mouth is effective in predicting growth of online communities.

## Research Model and Hypotheses

On the basis of the justice framework, we synthesize past empirical findings and emerge with three dimensions (Figure 1). First, the *procedural* dimension reflects the implicit rules that govern communal exchange. It is known that community norm plays an important role in voluntary behavior (Wasko and Faraj 2005). In the context of online knowledge community, the norm of a community becomes particularly important as individual may not make active contribution in the forum. Accordingly, this study investigates how pro-sharing norm affects online knowledge communities. Second, the justice framework suggests that individuals' satisfaction towards a social exchange is influenced by their *distributive* perception. Extant studies show that individuals are satisfied by the fulfillment of their intrinsic and extrinsic needs (Dholakia et al. 2004). When information need is met, they may perceive the social exchange meaningful and satisfying. Likewise, when individuals feel respected and recognized, they may perceive the exchange valuable. Thus, we examine the extent to which individuals' informational and reputational needs are fulfilled. Lastly, the *interactional* dimension focuses on the quality of interpersonal interaction in a dyadic interaction. In the literature, perceived co-presence is particularly relevant to this study. Perceived co-presence facilitates interpersonal closeness and hence enhances individuals' perception of social connectedness and bonding in a dyadic interaction (Nowak and Biocca 2003). Accordingly, this study examines perceived co-presence of leader under the interactional dimension.

To explain the impact of these three dimensions, we draw on the organizational support literature to explain the way individuals perceive support derived from an online knowledge community. Past studies have utilized the justice framework to explain the impact of justice on voluntary behavior through support perceptions. For instance, Moorman et al. (1998) have examined the influence of a fair procedure on individuals' citizenship behaviors, such as interpersonal helping, loyal boosterism, and individual initiative, through individuals' perception of organizational support. Likewise, Wayne et al. (2002) have examined the influence of the three justice dimensions on commitment and citizenship behavior through individuals' perceptions of support from the organization and manager. In line with past studies, this study maintains that the impact of antecedents is summarized into perceived community support and perceived leader support, which in turn, influence individuals' voluntary behaviors. Following past organizational support studies, we define perceived community support as individuals' general belief that the online community, as a collective whole, is a reliable source of knowledge and social support (Eisenberger et al. 1986) and perceived leader support as their general belief that the leader, as a specific person, is a reliable source of knowledge and social support (Eisenberger et al. 2002). Furthermore, we predict that these support perceptions result in voluntary behaviours (i.e., knowledge contribution and word of mouth).
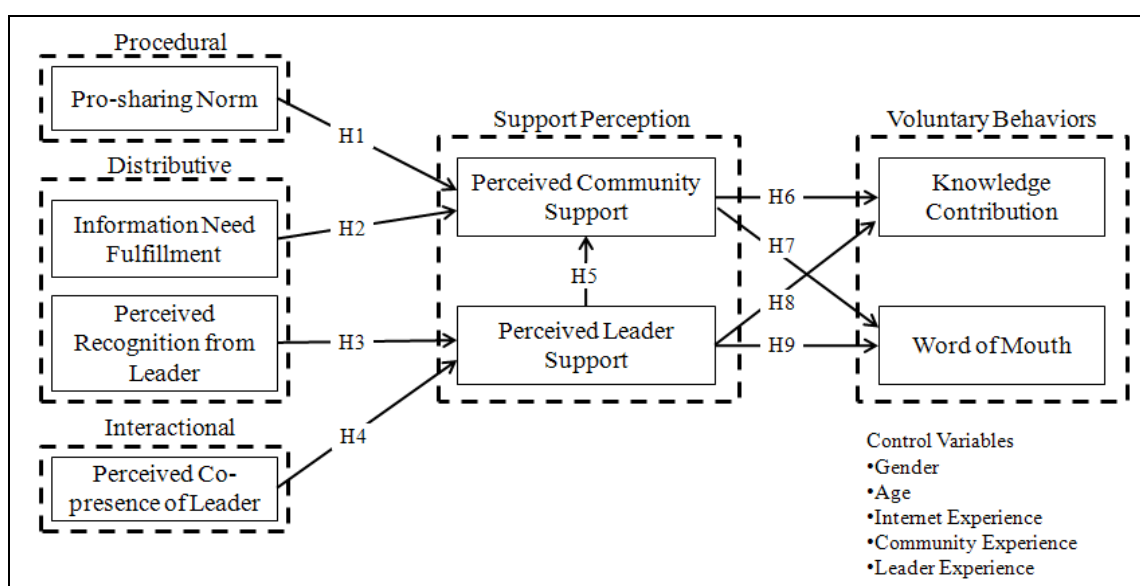


**Figure 1. Research Model**

## *Procedural*

### Pro-sharing Norm

A myriad of structural mechanisms are likely to affect individuals' support perception, such as organizational structures, formal policies, and informal rules (Maureen and Marshall 2003; Wiesenfeld et al. 2001). Nevertheless, pro-sharing norm has been the focus of attention among researchers (Cabrera and Cabrera 2005; Wiertz and Ruyter 2007). Pro-sharing norm refers to the prevalence of norms that are intended to facilitate knowledge sharing in online communities (Kankanhalli et al. 2005). Past studies suggest that pro-sharing norm significantly influences the perception of community support. For example, Chiu et al. (2006) have found that sharing norm induces a feeling of reciprocity in which individuals expect other community members to contribute knowledge and provide social support, which in turn, induce their perceptions of community support. Yee et al. (2007) have found that individuals use sharing norm as a proxy to evaluate normative influence of the online community. Individuals who perceive a strong sharing norm are likely to regard the online community as committed and supportive to its members. Likewise, Masterson et al. (2000) have found that fair structural mechanism enhances perceived support from the organization but not from the leader. Thus, we predict that information need fulfillment will increase perceived community support:

*H1: Pro-sharing norm is positively related to perceived community support.*

## *Distributive*

### Information Need Fulfillment

In addition to procedural mechanisms, benefits have been discussed in relation to perceived community support and perceived leader support. Individuals are motivated by benefits to participate in a social exchange (Kankanhalli et al. 2005). Under such expectations, individuals are motivated to pursue their extrinsic and intrinsic benefits (Wasko and Faraj 2005). In knowledge management research, information need fulfillment and perceived recognition from the forum leader have been chosen to represent extrinsic and intrinsic benefits. Information need is defined as individuals' desire to locate and obtain information to satisfy their conscious or unconscious need (Dholakia et al. 2004). In the context of online communities, fulfillment of information need is not limited to the acquisition of knowledge but also the understanding of others members' opinions and perspectives (Flanagin and Metzger 2001). Past studies suggest that information need fulfillment influences perceived community support. For example, Ridings and Gefen (2004) have reported that individuals' positive regard toward an online community is influenced by the amount of useful information they can obtain through participations. Similarly, Ma and Agarwal (2007) have found that participations in an online community are driven by information need. When this need is fulfilled, individuals would be satisfied with the online community and hence perceive community support. Thus, we predict that information need fulfillment will increase perceived community support.

*H2: Information need fulfillment is positively related to perceived community support.*

### Perceived Recognition from Leader

Whereas intrinsic benefit is derived from information need fulfilment, extrinsic benefit is obtained through perceived recognition from the forum leader. Perceived recognition from leader refers to the extent to which the forum leader appreciates and acknowledges individuals' contributions to the online community (Kottke and Sahrainski 1988). Past leadership research suggests that individuals respond more positively to leaders who recognize them on the basis of their contributions (Podsakoff et al. 1984; Wayne et al. 2002). For instance, Tangirala et al. (2007) have investigated the relationship between supervisors and subordinates and found that recognition from the supervisor results in better employees' attitude towards the supervisors. Similarly, in a study on leader-member exchange, Wat and Shaffer (2005) have found that when the leader recognizes a member's contribution to the organization, the member would form more positive perception on the leader. In the context of online communities, recognition is also shown to induce reciprocal respect and commitment between members (Kankanhalli et al. 2005; Preece and Shneiderman 2009). Thus, we hypothesize that perceived recognition from leader will increase perceived leader support.

*H3: Perceived recognition from leader is positively related to perceived leader support.*

## *Interactional*

### Perceived Co-presence of Leader

Perceived co-presence of leader refers to a psychological connection to and with the forum leader (Nowak and Biocca 2003). Past IS research has considered the effect of co-presence, as an IT-artifact, on the quality of dyadic exchange. For example, Burgoon et al. (2002) have examined proximity and availability of nonverbal cues and found that perceived co-presence affects dyadic communication and interpersonal judgment. Likewise, Matheson (1991) has found that perceived co-presence has a positive relationship with interpersonal awareness. In a study of virtual education, Richardson and Swan (2003) have found that perceived co-presence significantly influences students' relationship with the instructor. In essence, these studies hold that perceived co-presence induces interpersonal closeness, which in turn, influences the quality of a dyadic exchange. Considering perceived leader support is known to be derived out of social exchange, it is safe to argue that perceived co-presence of the forum leader will enhance perceived leader support. Hence, we propose that perceived co-presence will increase perceived leader support.

*H4: Perceived co-presence of leader is positively related to perceived leader support.*

## *Support Perception*

### Agent Effect

Ample evidences reveal that the forum leader plays a role of an agent between individuals and the online community. For example, Maertz et al. (2007) have investigated employee turnover and found that the extent to which the leader values individuals' contributions and care about their well-being enhances their perception on the organization. Likewise, in a study of voluntary behavior, Shanock and Eisenberger (2006) have reported that individuals' perceived leader support is positively related to their general views concerning the organization. More importantly, in a meta-analysis study, Rhoades and Eisenberger (2002) have concluded that individuals perceive their relationships with the leader as a specific indicator of the organization's general support to them. Despite the leader's role in individualized treatments, such as the provision of recognitions and social support, individuals tend to attribute the supportiveness of such treatment, in part, to the organization rather than solely to the leader (Settoon et al. 1996; Wayne et al. 1997). In essence, individuals view the support they receive from a forum leader as representative of the online community's favorable orientation toward them. Thus, we propose that perceived leader support will increase perceived community support.

*H5: Perceived leader support is positively related to perceive community support.*

## *Voluntary Behaviors*

### Perceived Community Support

From a social exchange perspective, when benefits directed at individuals are honored by the organization, a feeling of obligation is created (Wayne et al. 1997). This obligation, in turn, propels individuals to reciprocate in ways that are beneficial to the organization (Eisenberger et al. 1986). In a similar vein, individuals who perceive community support experience a sense of indebtedness, and hence are motivated to address such aversive feeling by engaging in-role and extra-role behavior (Chen et al. 2005; Moorman et al. 1998). In the context of online communities, in-role behavior is characterized by knowledge contribution and extra-role behavior is represented by word of mouth. In contributing knowledge, individuals exert explicit efforts in codifying their knowledge and making their perspectives and opinions transferrable to the online community. Likewise, in spreading word of mouth, individuals utilize their social resources and assume risks to their images and creditability. In sum, these two behaviors exemplify individuals' reciprocity to the support they have obtained from the online community. Thus, we predict that perceived community support will increase knowledge contribution and word of mouth.

*H6: Perceived community support is positively related to knowledge contribution.*

*H7: Perceived community support is positively related to word of mouth.*

### Perceived Leader Support

A number of studies suggest that perceived leader support significantly influences voluntary behaviors. For example, in a study on perceived organizational support and leader-member exchange, Wayne et al. (1997) have reported that individuals who experience high quality leader-member relationship are more willing to reciprocate through both in-role and extra-role behaviors. Likewise, Settoon et al. (1996) have found that better relationship between supervisors and subordinates enhances work quality and induces mutual helping among

coworkers. Yu and Chu (2007) have investigated the dyadic exchange between the leader and the member in online communities and found that a strong dyadic relationship leads to more organizational citizenship behaviors. These findings imply that individuals' positive beliefs about the forum leader may induce voluntary behaviors. Hence, we hypothesize that perceived leader support will increase knowledge contribution and word of mouth.

*H8: Perceived leader support is positively related to knowledge contribution.*

*H9: Perceived leader support is positively related to word of mouth.*

### Control Variables

We also include in the model a number of control variables that might affect voluntary behaviors. First of all, age and gender are included to represent demographic information. Evidence suggests that individuals' Internet experience has a positive effect on voluntary behavior (Chou et al. 2009; Sun et al. 2006). Accordingly, we have considered Internet experience as a control variable. Furthermore, in order to reflect individuals' experience with the online community and the forum leader, we include community experience and leader experience. Past studies have identified organization experience and leader experience to be positively related to perceived community support and perceived leader support respectively (Wayne et al. 1997).

## Research Methodology

Since online knowledge community users were the target population for data collection in this study, it seemed appropriate to collect data through an online survey. Before the main study, the online survey was pilot tested using respondents from online knowledge communities with the instruments' wording, content, format, and procedures. For this pilot test, surveys were distributed to 60 active users. Pilot participants completed the instruments and provided comments about length, wording, and instructions. Three of the participants were interviewed to gain a richer understanding of the feedback.

Based on the results of the pilot test, minor modifications were made to the survey design. Respondents were university students who had online knowledge community experience. The rationale for using student samples was to exemplify those who are typically active in online forums (Synovate 2008).

An email invitation was sent to 1,300 students who had been randomly selected from the email directory of a university. The e-mail invitation included a short description of the study and a hyperlink to the online survey questionnaire. The survey was divided into three parts. The first part included the definitions of online knowledge community and forum leader.[3] Based on these definitions, respondents were instructed to indicate the online knowledge community which they have used, their user names, and identify a forum leader with his or her user name. In the second part, measurements for all research variables were presented (Table 1). Finally, the third part included measurements for the control variables (Table 2). The online survey ran for 2 weeks in early March.

A total of 214 completed surveys were received, yielding a response rate of 16.5%. The respondents reported usage experience in a total of 10 online knowledge communities (Table 3). All reported online communities had a strong focus on knowledge-sharing (i.e., academic discussion, product reviews, and immigration tips). The largest response from a single community was 44 (20.6%) and the smallest was 11 (5.1%). The average age of the respondents was 21.5 years, and 49% were female. The respondents also reported that they had an average of 9.45 years of internet experience and 3.01 years of online community experience. As recommended by Armstrong and Overton (1977), non-response bias was assessed by comparing early and late respondents. No significant differences between the first third and last third of all respondents were found on the variables in the research model. This suggests that non-response bias was not a serious concern in this study.

## Data Analysis and Results

SmartPLS (version 2.0.M3) was used for data analysis. Structural equation modelling (SEM) analysis was chosen over regression analysis, because SEM can simultaneously analyze all of the paths in one analysis (Chin 1998). Within SEM, PLS was chosen over LISREL because this study aims at theory development instead of theory testing. Whereas LISREL requires a sound theory base, PLS supports exploratory research (Barclay et al.

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[3] Definitions of online knowledge community and forum leader are provided as follows: Online knowledge community refers to a group of people with common interests, goals, or practices, who participate to share knowledge and engage in social interactions over the Internet (i.e., online forums and message boards). Forum Leader refers to a member of the online community who is recognized (either formally or informally) as a knowledge leader and sought by others for information and advice.

1995; Gefen et al. 2000). PLS provides the analysis of both a structural model and a measurement model. In the model tested, all constructs were modeled as reflective, because their measurement items are manifestations of these constructs (Barclay et al. 1995) and because these items covary (Chin 1998).

## *The Measurement Model*

Convergent validity is assessed by (1) reliability of items, (2) composite reliability of constructs, (3) average variance extracted (AVE) (Barclay et al. 1995; Hu et al. 2004), and (4) factor analysis results. Examining each item's loading on its corresponding construct assesses reliability of items. Barclay et al. (1995) suggest that the item loading should exceed 0.70. In this study, the loading of each item meets this criterion (Table 4). Regarding internal consistency (reliability), composite reliability scores and Cronbach's alpha scores for every construct (as shown in Table 5) are well above 0.70, which is the suggested benchmark for acceptable reliability (Fornell and Larcker 1981). AVE measures the amount of variance that a construct captures from its indicators relative to the amount due to measurement error (Chin 1998). It is recommended to exceed 0.50 (Hu et al. 2004). Table 5 shows that the AVE score for every construct, ranging from 0.76 to 0.91, satisfies this requirement. In addition, to show good convergent validity in factor analysis results, all of the items should load highly on their own latent variables (Hair et al. 1998; Tabachnick and Fidell 2000). The factor analysis results in this study (Table 4) are satisfactory according to these criteria.

Discriminant validity is assessed by examining the indicator-construct loadings and inter-construct correlations (Chin 1998). As shown by Table 5, that all indicators load more strongly on their corresponding construct than on other constructs in the model. Table 5 shows the square roots of the average variance extracted (AVE) are larger than the inter-construct correlations. Overall, the constructs demonstrate strong discriminant validity.

| Table 1: Operationalization of Constructs | |
|---|---|
| **Perceived-sharing Norm (PsM)** | adapted from Kankanhalli et al. (2005) |
| PsM1 | There is a norm of cooperation in this online community. |
| PsM2 | There is a norm of collaboration in this online community. |
| PsM3 | There is a norm of helping others in this online community. |
| **Information Need Fulfillment (INF)** | adapted from Dholakia et al. (2004)  and Ma and Agarwal (2007) |
| INF1 | I can obtain necessary information from this online community |
| INF2 | I can learn how to do things from this online community |
| INF3 | I can generate ideas with the help of this online community |
| **Perceived Recognition from Leader (PRfL)** | adapted from Kankanhalli et al. (2005) |
| PRfL1 | Sharing my knowledge improves my image to this forum leader |
| PRfL2 | Users in this community who share their knowledge receive more prestige than those who do not from this forum leader |
| PRfL3 | Sharing my knowledge improves this forum leader's recognition of me |
| **Perceived Co-Presence of Leader (PCoPL)** | adapted from Nowak and Biocca (2003) |
| PCoPL1 | I believe this forum leader find our interaction stimulating |
| PCoPL2 | I believe this forum leader communicates warmth rather than coldness |
| PCoPL3 | I believe this forum leader creates a sense of closeness between us |
| **Perceived Leader Support (PLS)** | adapted from Eisenberger et al. (2002) |
| PLS1 | In general, this forum leader strongly considers my goals and values |
| PLS2 | In general, this forum leader is willing to help me when I need a special favor |
| PLS3 | In general, this forum leader cares about my opinions |
| **Perceived Community Support (PCS)** | adapted from Eisenberger et al. (1986) |
| PCS1 | In general, this online community strongly considers my goals and values |
| PCS2 | In general, this online community is willing to help me when I need a special favor |
| PCS3 | In general, this online community cares about my opinions |

| Knowledge Contribution (KC) | adapted from Ma and Agarwal (2007) |
|---|---|
| KC1 | I help other people in this online community who need help/information from other members |
| KC2 | I take an active part in helping others in this online community |
| KC3 | I contribute knowledge to this online community |
| KC3 | I contribute knowledge to other members that may result in their development of new insights |
| **Word of mouth (WoM)** | adapted from Kim and Son (2009) |
| WoM1 | I frequently talk to people about the benefits of this online community |
| WoM2 | I often introduce my peers or friends to this online community |
| WoM3 | I usually spend some time providing useful suggestions for this online community |
| **Fantasizing (FAN)** | adapted from Lindell and Whitney (2001) and Malhotra et al. (2004) |
| FAN1 | I daydream a lot. |
| FAN2 | When I go to the movies I find it easy to lose myself in the film. |
| FAN3 | I often think of what might have been. |

Note:
   All items are based on 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

| Table 2: Control Variables | |
|---|---|
| **Age** | Please provide your age (in years). |
| **Gender** | Male / Female |
| **Internet Experience** | How long have you been using the World Wide Web (in years)? |
| **Community Experience** | How long have you been using the online community (in years)? |
| **Forum Leader Experience** | How long have you known this forum leader (in years)? |

| Table 3: Online Knowledge Communities Surveyed | | |
|---|---|---|
| **Knowledge Community** | **Community Topic** | **No. of Respondents (% of Total)** |
| Flowerpod | Skincare, Cosmetic and Hair | 44 (20.6%) |
| Hardwarezone | IT Gadgets | 32 (15.0%) |
| Vrzone | Computer Modifications | 27 (12.6%) |
| SgForum | National Service | 24 (11.2%) |
| TalkBack | Campus Life | 22 (10.3%) |
| sgChinese | Immigration Rules and Regulations | 20 (9.3%) |
| Funkygrad | Academic Discussion | 17 (7.9%) |
| Gter | Open Examinations | 15 (7.0%) |
| International Student Forum | Overseas Education | 13 (6.1%) |
| AnalystForum | Professional Certifications | 11 (5.1%) |

## *Post Hoc Mediation Analysis*

Post hoc analyses were conducted to examine the mediation effects. We applied Baron and Kenny (1986)'s method to verify whether perceived community support and perceived leader support mediate the influences of antecedent variables on knowledge contribution and word of mouth. Two additional PLS models were run, i.e., one containing only direct paths and the other containing both direct and mediated paths. Table 6 shows the PLS path coefficients. Since all direct links become not significant when the mediating variables are added to the model, perceived community support and perceived leader support are strong mediators.

Finally, we assessed the extent of common method bias (CMV) using the marker-variable technique (Lindell and Whitney 2001; Malhotra et al. 2004). The marker variable utilized was *fantasizing*. Results from confirmatory factor analysis showed that the smallest correlation with fantasizing was -0.08 (p = ns), indicating that CMV was not substantial in our study (Lindell and Whitney 2001).

| | **PSM** | **INF** | **PRfL** | **PCoPL** | **PCS** | **PLS** | **KC** | **WoM** |
|---|---|---|---|---|---|---|---|---|
| **PsM1** | **0.84** | 0.41 | 0.29 | 0.24 | 0.39 | 0.38 | 0.42 | 0.39 |
| **PsM2** | **0.86** | 0.33 | 0.30 | 0.21 | 0.50 | 0.47 | 0.48 | 0.42 |
| **PsM3** | **0.91** | 0.34 | 0.28 | 0.24 | 0.45 | 0.41 | 0.47 | 0.42 |
| **INF1** | 0.35 | **0.91** | 0.30 | 0.27 | 0.50 | 0.42 | 0.43 | 0.38 |
| **INF2** | 0.37 | **0.94** | 0.26 | 0.35 | 0.51 | 0.46 | 0.44 | 0.38 |
| **INF3** | 0.41 | **0.89** | 0.34 | 0.38 | 0.54 | 0.47 | 0.49 | 0.52 |
| **PRfL1** | 0.31 | 0.23 | **0.92** | 0.28 | 0.24 | 0.41 | 0.26 | 0.29 |
| **PRfL2** | 0.22 | 0.27 | **0.89** | 0.27 | 0.24 | 0.32 | 0.27 | 0.24 |
| **PRfL3** | 0.37 | 0.39 | **0.94** | 0.32 | 0.32 | 0.47 | 0.35 | 0.34 |
| **PCoPL1** | 0.31 | 0.36 | 0.31 | **0.95** | 0.27 | 0.37 | 0.36 | 0.32 |
| **PCoPL2** | 0.24 | 0.33 | 0.32 | **0.95** | 0.20 | 0.35 | 0.31 | 0.28 |
| **PCoPL3** | 0.20 | 0.35 | 0.28 | **0.95** | 0.24 | 0.40 | 0.29 | 0.23 |
| **PCS1** | 0.46 | 0.54 | 0.31 | 0.21 | **0.92** | 0.39 | 0.46 | 0.43 |
| **PCS2** | 0.50 | 0.52 | 0.27 | 0.22 | **0.95** | 0.48 | 0.54 | 0.50 |
| **PCS3** | 0.48 | 0.52 | 0.25 | 0.27 | **0.92** | 0.43 | 0.51 | 0.46 |
| **PLS1** | 0.42 | 0.43 | 0.46 | 0.30 | 0.36 | **0.89** | 0.50 | 0.33 |
| **PLS2** | 0.43 | 0.34 | 0.28 | 0.32 | 0.37 | **0.84** | 0.47 | 0.34 |
| **PLS3** | 0.43 | 0.50 | 0.42 | 0.41 | 0.49 | **0.89** | 0.56 | 0.33 |
| **KC1** | 0.50 | 0.45 | 0.29 | 0.30 | 0.50 | 0.53 | **0.95** | 0.43 |
| **KC2** | 0.49 | 0.46 | 0.30 | 0.30 | 0.49 | 0.56 | **0.96** | 0.41 |
| **KC3** | 0.51 | 0.44 | 0.29 | 0.30 | 0.50 | 0.54 | **0.95** | 0.42 |
| **KC4** | 0.47 | 0.49 | 0.34 | 0.35 | 0.53 | 0.55 | **0.88** | 0.50 |
| **WoM1** | 0.42 | 0.44 | 0.33 | 0.29 | 0.46 | 0.35 | 0.43 | **0.92** |
| **WoM2** | 0.43 | 0.38 | 0.27 | 0.19 | 0.45 | 0.32 | 0.40 | **0.92** |
| **WoM3** | 0.48 | 0.49 | 0.31 | 0.33 | 0.50 | 0.39 | 0.49 | **0.97** |

**Table 4: Correlations between Measures and Latent Variables**

Notes

PsM = Pro-sharing norm; INF = Information Need Fulfillment;

PRfL = Perceived Recognition from Leader; PCoPL = Perceived Co-presence of Leader;

PCS = Perceived Community Support; PLS = Perceived Leader Support;

KC = Knowledge Contribution;

WoM = Word of mouth.

| Table 5: Means, Standard Deviations, Scale Reliabilities, and Intercorrelations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SD | CA | CR | PsM | INF | PRfL | PCoPL | PCS | PLS | KC | WoM |
| **PsM** | 5.03 | 1.09 | 0.84 | 0.90 | **0.76** | | | | | | | |
| **INF** | 5.17 | 1.07 | 0.90 | 0.94 | 0.41 | **0.84** | | | | | | |
| **PRfL** | 4.76 | 1.00 | 0.90 | 0.94 | 0.33 | 0.33 | **0.84** | | | | | |
| **PCoPL** | 5.73 | 1.13 | 0.94 | 0.97 | -0.13 | -0.33 | 0.05 | **0.91** | | | | |
| **PCS** | 4.81 | 1.03 | 0.92 | 0.95 | 0.51 | 0.41 | 0.30 | 0.25 | **0.86** | | | |
| **PLS** | 4.55 | 1.04 | 0.85 | 0.91 | 0.49 | 0.49 | 0.45 | -0.40 | 0.47 | **0.76** | | |
| **KC** | 4.86 | 1.14 | 0.95 | 0.97 | 0.53 | 0.50 | 0.33 | 0.34 | 0.54 | 0.53 | **0.87** | |
| **WoM** | 4.78 | 1.08 | 0.93 | 0.96 | 0.47 | 0.47 | 0.32 | 0.29 | 0.50 | 0.38 | 0.47 | **0.88** |

Notes
  Diagonal elements are the average variance extracted (AVE)
  SD = Standard Deviation; CA= Cronbach's Alpha; CR = Composite Reliability.

| Table 6: Path Coefficients of PLS (Test for Mediating Effects) | | | | |
|---|---|---|---|---|
| | Dependent Variable | | | |
| Independent Variable | Non-mediated Model | | Model with PCS and PLS as mediators | |
| | KC | WoM | KC | WoM |
| **Pro-sharing Norm** | 0.353** | 0.297** | 0.206 | 0.225 |
| **Information Need Fulfillment** | 0.280* | 0.288* | 0.116 | 0.276 |
| **Perceived Recognition from Leader** | 0.078 | 0.102 | -0.001 | 0.092 |
| **Perceived Co-Presence of Leaders** | 0.119 | 0.079 | 0.071 | 0.079 |

Notes
  * Denotes significance at the $p < 0.05$ level; **denotes significance at the $p < 0.01$ level.

## The Structural Model

The path coefficients and explained variances for the structural model are shown in Figure 2. Demographic variable (i.e., gender, age, internet experience, community experience, and leader experience) and the online community reported were included in the analysis as controls for knowledge contribution and word of mouth. As none of the controls were significant, they were dropped from the model and excluded from subsequent analyses.
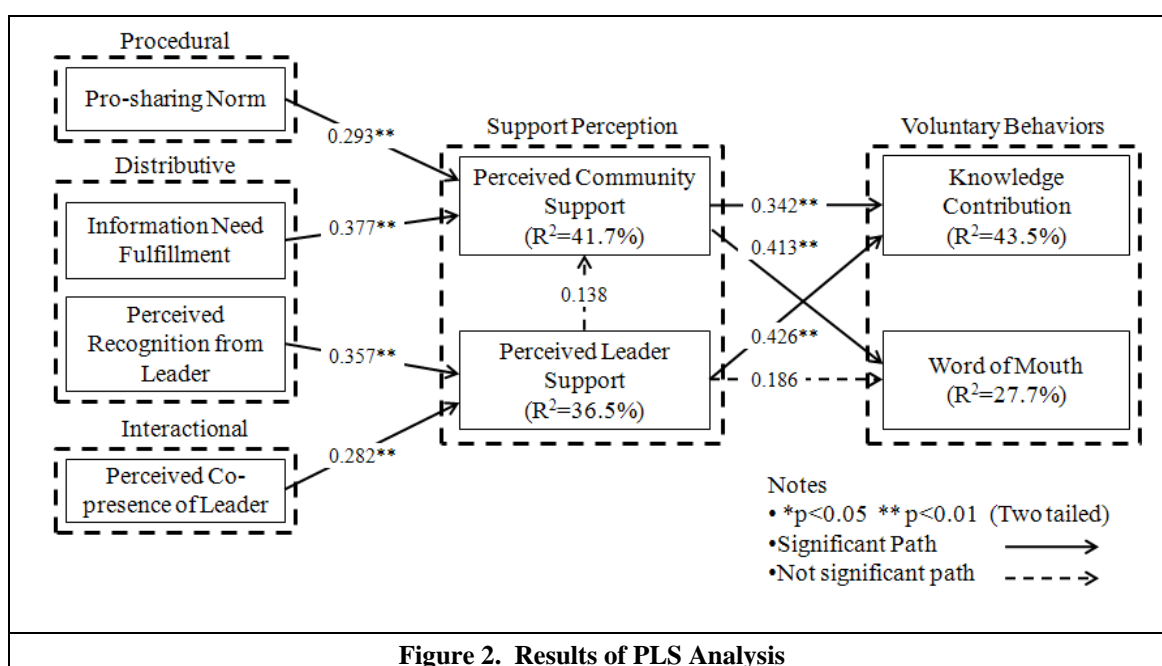


**Figure 2. Results of PLS Analysis**

Out of the nine hypotheses, seven were supported. Consistent with our prediction, pro-sharing norm is positively related to perceived community support (β=0.293, p<0.01), thereby supporting H1. Information need fulfilment is found to be positively related to perceived community support (β=0.377, p<0.01) whereas perceived recognition from leader is found to be positively related to perceived leader support (β=0.357, p<0.01), therefore H2 and H3 are supported. As anticipated, H4 is supported as perceived co-presence exhibits a positive relationship with perceived leader support (β=0.282, p<0.01). Contrary to our expectation, the relationship between perceived leader support and perceived community support is found to be not significant (β=0.138, p>0.05), thus H5 is rejected.

In addition, perceived community support exhibit a positive influence on knowledge contribution (β=0.342, p<0.01) and word of mouth (β=0.413, p<0.01), hence supporting H6 and H7. Perceived leader support shows positive influence on knowledge contribution (β=0.426, p<0.01) but no significant relationship with word-of mouth (β=0.186, p>0.05), thereby supporting H8 but not H9.

## Discussion

The results are in support of most of our hypotheses. We seek to enrich the understanding of individuals' voluntary behavior in the context of online knowledge communities by concurrently examining perceived community support and perceived leader support. We establish that as a result of perceived community support and perceived leader support, individuals engage in knowledge contribution and word of mouth behaviors. Their eventual behavior, be it knowledge contribution or word of mouth, is often a reciprocal action. We also hope to achieve a more comprehensive understanding by examining three categories of antecedents: procedural, distributive, and interactional, which are derived based on the justice framework (Colquitt 2001; Gilliland 1993; Lind and Tyler 1988). Our findings show that pro-sharing norm and information need fulfillment affect perceived community support. In addition, perceived recognition from leader and perceived co-presence both affect perceived leader support. More about the three categories will be expounded in the Theoretical Implication section.

Although perceived leader support is expected to induce positive beliefs on the online community, thereby enhancing perceived community support, our results exhibit no significant relationship. A plausible explanation is that the agent effect plays a bigger role in closed organizations (i.e., limited physical exposure), as opposed to open communities (i.e., infinite virtual exposure). In the former case, individuals' exposure to the organization is typically limited by the organizational structure. This hints at the reliance on the leader (supervisor) for information beyond their proximity. However, for the latter case, individuals usually are not restricted by a formal structure. Instead, the spirit of online knowledge sharing is to make information freely available to all members of an online community. Since the forum leader is not the sole channel of access to the online knowledge community, the agent effect does not come into play.

Also contrary to our prediction, perceived leader support has little significant relationship with word of mouth. It may be because although perceived leader support induces commitment to the online community, it also emphasizes individuals' dependence on the leader. This, in turn, assuages individuals' sense of indebtedness to the online community for two reasons. First, they may think that the recognitions and social support are exclusively interpersonal, and hence their gratitude should be expressed to the forum leader specifically; second, since word of mouth behavior can potentially tarnish individuals' social image and credibility, they may opt to assume reticence in inferring the supportiveness of the overall online community. This cautions individuals that word of mouth behavior can be more or less inappropriate.

## Theoretical Implication

We enrich knowledge sharing studies on several grounds. First, past research has largely focused on individuals' motivation to contribute knowledge and has paid little attention to the underlying psychological mechanisms that drive voluntary behaviors. This lack of attention to cognition is somewhat surprising since knowledge sharing is known to be largely propelled by a variety of psychological processes, such as the calculation of intrinsic/extrinsic benefits, the attribution of indebtedness, and the evaluation of obligations. Drawing on the organizational support literature, we explicitly differentiated between perceived community support, which represents supportiveness from the online knowledge community as a collective whole, and perceived leader support, which represents supportiveness from the forum leader as a specific person. Our findings show that perceived community support is indeed distinct from perceived leader support, and these support belief powerfully affects voluntary behaviors over and above characteristics of the online community. To the best of

our knowledge, this study is the first to employ the notion of perceived support and show the mediating roles of perceived community support and perceived leader support in determining behavioral outcomes.

Second, we contribute to the IS literature by providing evidence on the importance of online knowledge community characteristics. While past studies have identified a myriad of factors pertinent to knowledge contribution, rarely have researchers put forth a coherent framework of antecedents. Based on the justice framework (Colquitt 2001; Gilliland 1993; Lind and Tyler 1988), this study synthesizes past research and offers three categories of antecedents, namely, procedural, distributive, and interactional. Specifically, the procedural category centers on the explicit rules that governs communal exchange. The distributive category describes the intrinsic and extrinsic needs fulfilled by participating in the online community. The interactional category focuses on the quality of interpersonal interaction with the leader. Taken as a whole, we hope that our three categories of online community characteristics offer a coherent perspective for online knowledge sharing research and pave the way for future discourse.

Third, prior studies fail to recognize that "sustainability" and "growth" are equally important for the long term survival and success of online knowledge communities. By focusing on antecedents of knowledge contribution which are pertinent to existing community members, many failed to acknowledge factors alluring to non-members. By incorporating these two important aspects into our research model, we empirically tested their importance by examining two voluntary behaviours (i.e., knowledge contribution and word of mouth). From our study, both perceived community support and perceived leader support are crucial to knowledge contribution, but only perceived community support matters for word of mouth behavior. Thus, factors that lead to perceived leader support only enhance sustainability of the online community. Contrary to previous work in this area, our study attempts to offer additional insights of how online community characteristics shape individuals' voluntary behaviors through support perception.

## Practical Implication

Our findings have important implications to application designers and online service providers. Application designers of online knowledge communities often provide features that reduce efforts for knowledge codification and discovery. While features facilitating the fulfilment of knowledge needs are somewhat common, little design efforts have been made on enhancing the exchange of societal benefits in online communities. To this end, we advocate a design strategy which improves societal benefits. As predicted by the proposed model, individuals' perceived leader support is found to be enhanced by recognition from the forum leader. While this result is largely consistent with conventional wisdom, a more interesting finding of this study is probably that individuals perceive leader support when they experience high co-presence of the forum leader. This finding suggests that if the online community incorporates virtual co-presence features, the quality of interpersonal interactions is enhanced. This is because perceived co-presence augment the exchange of relational messages, such as personal or social information, thereby enhancing individuals' social perceptions. Thus, it is important that application designers consider features that facilitate recognitions and co-presence in online communities.

Likewise, online service providers may help motivate voluntary behaviors. We found that perceived leader support has a significant influence on knowledge contribution. For instance, when co-presence of the forum leader is high, individuals are more likely to perceive leader support. Likewise, when individuals are recognized by the forum leader, they perceive stronger leader support. Because perceived leader support is a powerful determinant of knowledge contribution, one recommendation is that online service providers should ensure the presence of a forum leader to be prominent. For example, through status notifications, the forum leader's online status can be made available to individuals. Furthermore, online service providers should make it convenient for individuals' contributions to be recognized. For instance, individuals' knowledge contribution can be recognized through peers' ratings or testimonials.

Meanwhile, it is worthwhile noting that pro-sharing norm is found to have a significant influence on perceived community support. This finding implies that a strong norm of knowledge sharing is an important antecedent to individuals' positive beliefs on the online community. In this regard, we encourage online service providers to emphatically stipulate that voluntary behaviors are vital to the sustainability and growth of the online knowledge community. Individuals should also be made aware that non-contribution is not helpful to the sustainability and growth of the online community.

## Limitations and Future Directions

We acknowledge some limitations in this study. First, we examined individuals' voluntary behaviors in online knowledge communities which they had actual experience. This approach is expected to be realistic and consistent with past studies (Kankanhalli et al. 2005; Ma and Agarwal 2007; Wasko and Faraj 2005). As a result, our findings are generally expected to be comparable with those of prior studies. However, this study employed a recall method to activate respondents' memory about the forum leader. Though such recall task is somewhat unavoidable, it nevertheless introduces some potential covariates (i.e., community tenure and leader tenure). As noted earlier, we controlled the effects of community experience and leader experience and found that these covariates had no significant influence on the dependent variables. Nevertheless, the findings of this study should be viewed with this bias in mind.

Second, our findings are best generalized to those online communities which have a strong focus on knowledge-sharing. We acknowledge that community support and leader support could be less relevant in other types of online communities. For example, in online social communities (i.e. Facebook and MySpace), individuals might focus socially attractive interactants and disregard knowledge leaders. In addition, this study examines voluntary behaivors with a student sample. Thus, our model is not necessarily effective in explaining voluntary behaviors when contribution is compulsory and beyond the student population. For instance, contributions in knowledge sharing might be made compulsory by organizational requirements when it is formalized through course-work requirement or job descriptions. Likewise, in additional to information need fulfilment, the opportunity to market products and services might be an important motivation to business people.

Despite our best effort to incorporate all the relevant factors into the model, we cannot exclude a possibility of omitted variables which could influence the study's results. For example, our model did not consider perceived co-presence of other forum users, which is considered one of the important determinants of knowledge contribution (Ma and Agarwal 2007). However, past studies suggest that the perception of general community support mediates the impact of perceived co-presence of others on individuals' voluntary behaviors (Koh et al. 2007; Liu 1999). Given that support perceptions are already accounted for in our model (i.e., perceived community support), we believe that the impact of perceived co-presence of others on knowledge contribution and word of mouth will be minimal.

This study opens up a number of exciting avenues for further research. First, this study shows the significance of perceived leader support in voluntary behaviors. Yet, recognition of a forum leader remains largely unknown. We encourage researchers to identify factors that may be important to the recognition of a forum leader and examine how such factors affect voluntary behaviors.

Second, we drew upon the three types of justice to capture the different characteristics of online community. However, recent justice literature has teased apart interactional justice and puts forth informational justice and interpersonal justice (Colquitt 2001; Greenberg 1990). We believe that these new dimensions will be a fruitful avenue for further research.

Finally, we see the value in investigating "objective" measures of knowledge contribution and word of mouth, as opposed to our current "subjective" measurements. It is possible that some individuals who have contributed actively but their contribution might not necessarily be meaningful to the online community. Hence, their perceptions may not accurately reflect the quality of their knowledge contribution. Likewise, individuals recommend the online community when being requested, but they may not clearly report such referrals. We believe that our research model will be a solid basis for studying individuals' actual voluntary behaviors.

## Conclusion

Despite various measures taken by online service providers, voluntary behaviors continue to be undersupplied in online communities (Hughes et al. 2005; PEW 2009; Preece et al. 2004). Given the importance of knowledge contribution and word of mouth, practitioners have expressed substantial concerns on encouraging such behaviors. To that end, we offer a theory-driven approach to evaluating the characteristics of online community in helping practitioners to enhance their sustainability and growth. Our findings clearly indicate that the integration of justice, organizational support, and citizenship behaviors is essential for a better understanding of voluntary behaviors in the context of online communities. We believe that the model proposed in this study can serve as a solid foundation for future work in this important area.

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