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Key Influencers of Virtual Community Knowledge-Sharing Among Chengdu University Students

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Abstract

Purpose: This research paper aims to investigate the key influencers that significantly impact the willingness of college students to share knowledge using virtual communities in four universities in Chengdu, Sichuan. The conceptual framework proposed a causal relationship among rewards, reputation, trust, reciprocity, self-efficacy, subjective norms, attitude toward knowledge sharing, intention to share knowledge. **Research design, data, and methodology:** Researchers conducted a quantitative study with 500 college students from four universities in Sichuan. These students studied for over a year and actively participated in virtual communities. The sampling method involved judgmental sampling for selecting universities, quota sampling for questionnaire distribution, and convenience sampling for data collection and survey distribution. The data was analyzed using structural equation modeling and confirmatory factor analysis, evaluating model fit, reliability, and validity. **Results:** The attitude towards knowledge sharing is the primary and strongest predictor of the intention to share knowledge. Attitudes towards knowledge sharing are significantly driven by rewards, reputation, trust, reciprocity, self-efficacy, and subjective norms. **Conclusions:** Seven hypotheses met the study objectives. To promote the knowledge-sharing behavior of college students in virtual communities, university and community managers should cultivate positive sharing attitudes through various strategies.

Keywords: Reciprocity, Self-efficacy, Subjective Norms, Attitude Toward Knowledge Sharing, Intention to Share Knowledge

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Virtual communities, also known as virtual innovation communities or open innovation communities, are user-centered information technology platforms where community users communicate, exchange information, and share ideas (Wang et al., 2020; Zhao et al., 2016). With the rapid development of the digital economy, virtual communities have become central hubs for many individuals engaging in online collaborative innovation and knowledge-sharing activities (Chen et al., 2018; Nguyen & Malik, 2020). They are widely recognized as crucial tools for promoting knowledge sharing (Dholakia et al., 2004; Hazel & Dianne, 2004; Wasko & Faraj, 2000). Interaction between users and the community is the foundation for the existence and development of online communities and one of their core values. However, user participation in online communities is generally low and follows the "90-9-1" rule, where 90% of users only browse community content, 9% engage in discussions, and only 1% actively create content (Jia & Xiong, 2020). Understanding the factors that motivate users to share knowledge in online communities may help increase their engagement. Thus, it is crucial to investigate the factors that promote knowledge-sharing behaviors in virtual communities (Chen, 2007). In this context, how to enhance users' willingness to share knowledge and promote actual knowledge-sharing behaviors in virtual communities has become widely discussed. Virtual communities provide an efficient knowledge-sharing platform, facilitating faster information flow and broader knowledge dissemination. As

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Hsu and Chiu (2004) noted, knowledge-sharing behaviors among virtual community members help build tighter community relationships and foster knowledge innovation and individual growth.

A virtual community is an important channel for college students to acquire knowledge and expand their horizons. In virtual communities, college students can freely exchange and share knowledge to promote collaborative learning, knowledge building, and intelligent development. However, not all students are willing to share their knowledge in virtual communities. So, what factors influence college students' knowledge-sharing behavior in virtual communities? Extensive research has shown that multiple factors affect knowledge-sharing behavior in virtual communities. Among these, motivational factors (such as rewards, reputation, and reciprocity) and social factors (such as trust, self-efficacy, and attitudes toward knowledge sharing) are significant influencers. For instance, Bock et al. (2005) found that rewards, reputation, and reciprocity significantly promote knowledge-sharing behavior. Zhao et al. (2016) demonstrated that providing virtual currency rewards can significantly increase users' willingness to share knowledge in virtual communities.

Additionally, one of the strongest motivations for people is to make themselves known. Many activities in social networks are carried out voluntarily, without any monetary reward. If people perceive that sharing knowledge and information in virtual communities can enhance their social status and reputation, they are more motivated to participate in such activities (Arenas-Gaitán et al., 2013; Pi et al., 2013). According to the social exchange theory proposed by Thibaut and Kelley (1959), the belief in reciprocity makes community members feel responsible for sharing useful knowledge and information with other members (Wasko & Faraj, 2005).

Moreover, trust, self-efficacy, and attitudes toward knowledge-sharing are also important factors influencing knowledge-sharing behavior in virtual communities. For example, the literature widely assumes that trust directly impacts knowledge sharing (Chowdhury, 2005; Staples & Webster, 2008), particularly in virtual communities (Chiu et al., 2006; Ridings et al., 2002). Wasko and Faraj (2005) pointed out that trust and factors in the trust-building process are crucial for knowledge-sharing behavior. Hsu and Chiu (2004) found that users with high self-efficacy are more inclined to share knowledge; Bock et al. (2005) emphasized that a positive attitude towards knowledge sharing significantly enhances users' willingness to share knowledge in virtual communities.

Therefore, by engaging in knowledge sharing within virtual communities, college students can better adapt to the trends of the knowledge economy, enhance their overall qualities and competitiveness, and lay a solid foundation for their future development. However, sharing knowledge requires more time and effort than acquiring information and knowledge from virtual communities. In Chengdu, Sichuan, China, the prevalence of universities has led to the widespread use of virtual communities, attracting many college students to participate actively. Numerous vibrant community platforms such as WeChat, Weibo, Tieba, Douyin, and Zhihu have emerged. These platforms not only attract a large number of college students but also create a unique knowledge-sharing ecosystem. However, the factors and mechanisms influencing knowledge-sharing behavior in virtual communities in Chengdu remain unclear and require further investigation. For instance, are college students willing to share knowledge in various virtual communities? What is their knowledge-sharing behaviors in these communities? What factors influence their knowledge sharing? How can exploring the influencing factors of college students' knowledge-sharing behaviors guide their growth? Answering these questions will help understand the needs of social networks and learning, explore the factors affecting college students' participation in virtual community knowledge sharing, and provide a comprehensive understanding of their psychological and informational needs regarding knowledge sharing.

2. Literature Review

2.1 Rewards

Reward is any form of gain people perceive after sharing knowledge. This includes, but is not limited to, monetary rewards, performance bonuses, pay increases, and virtual currency. Social exchange theory (Blau, 1986) describes the exchange between people. According to the theory, people exchange with others because they think giving and rewarding are worthwhile. In other words, when someone gives, he also expects a return.

From a socioeconomic perspective, individuals tend to engage in behaviors that promote their best interests. In the context of knowledge sharing, people are more willing to share knowledge if some benefit is expected. Bock et al. (2005) believe that the success of knowledge management depends on whether the organization provides incentives. These incentives may include potential pay increases, performance bonuses, or other monetary incentives. More and more non-commercial virtual communities use virtual currencies to reward members, which can be used to capture privileges within the community and serve as incentives to encourage members to share knowledge.

The researchers believe that incentives can motivate employees. Employees like to see rewards for successful tasks or activities (Cameron & Pierce, 1997; Constant et al.,

1994; Jarvenpaa & Staples, 2000). Often, employees act in ways they believe will be rewarded (Cameron & Pierce, 1997). This is not limited to monetary rewards but also the need to meet their internal or external needs (Mullins, 2002; Palardy, 1994). Although extrinsic rewards may be immediately successful and easy to use, they are not effective in the long term (Bock & Kim, 2002). Deci et al. (1999) conducted a meta-analysis of reward effects on intrinsic motivation in 128 laboratory studies. They found that verbal reward (e.g., positive feedback) positively affected intrinsic motivation. Ryan et al. (1983) found that positive feedback was superior to material reward. Material rewards are often negatively associated with willingness to share in previous research; however, some rewards remain as reward points on knowledge-sharing platforms. From the interview, one knowledge sharer said, " There should be a higher level than the knowledge sharer because there are already many members at this level." I felt satisfied when my level was upgraded, " another knowledge-taker said. We can infer that rewards still have an impact on knowledge sharing. Many studies have examined the relationship between reward and knowledge-sharing attitudes and have proposed that rewards significantly influence knowledge-sharing attitudes in virtual communities, as shown in the following hypotheses.

H1: Rewards have a significant impact on attitude toward knowledge sharing.

2.2 Reputation

Within the framework of social exchange theory, individuals who expect social rewards engage in social interactions with the expectation of receiving social rewards such as recognition, status, and respect. Personal reputation is a crucial form of social capital that helps individuals establish and maintain their status within a community. As articulated by Blau (1964), the motivation for individuals to participate in social activities stems from the anticipation of social returns like recognition, status, and respect. Jones et al. (1997) also noted that personal reputation is an essential asset that aids individuals in gaining and preserving status within a group.

Existing research indicates that establishing a personal reputation is a powerful motivator for active participation in online networks. In the context of organizational electronic networks, the possibility of enhancing one's reputation serves as a key incentive for offering valuable advice to others (Constant et al., 1996). Moreover, evidence suggests that individuals in online environments can positively extend their professional careers (Stewart, 2003).

Having a good reputation is an important motivating factor for knowledge sharing. Those who share knowledge are often seen as experts with valuable skills and expertise (Tamjidyamcholo et al., 2014). These individuals can expect to gain respect and recognition through knowledge-sharing behaviors, thereby expanding their social networks (Weng et al., 2018). Additionally, knowledge-sharing provides potential employers or clients with information to assess the developer's capabilities, thus opening more opportunities for career advancement for the knowledge-sharers (Oreg & Nov, 2008).

H2: Reputation has a significant impact on attitude toward knowledge sharing.

2.3 Trust

Trust is the willingness to show vulnerability based on positive expectations of others' behavior (Gambetta, 2000; Riegelsberger et al., 2003). Trust can enhance positive behavioral intent (Gambetta, 1988). In communities, a lack of trust can lead to reluctance among members to share knowledge, which may stem from concerns about the reliability and uncertainty of knowledge resources (Hislop, 2005). Research has found that members are generally willing to share knowledge if they believe it will benefit them and the organization (Riege, 2005). Furthermore, Sharrat and Usoro (2003) point out that when organizations maintain mutuality, commitment, reliability, and honesty as credible values, the motivation and intention to participate and share knowledge will increase. Thus, it can be concluded that there is a relationship between trust and knowledge-sharing intent (Kalantzis & Cope, 2003).

Trust is an important antecedent in knowledge sharing in virtual communities (Ridings et al., 2002). Cooperative interactions are more likely to occur when there is trust between two parties (Nahapiet & Ghoshal, 1998). Creating a knowledge-sharing atmosphere in teams and organizations requires interpersonal trust (Nonaka, 1994). Shared social norms, repeated interactions, and shared experiences contribute to developing trust (Bradach & Eccles, 1989; Lewis & Weigert, 1985; Mayer et al., 1995). Powell (1990) asserts that the expectation of future association is another factor that promotes trust and cooperation. The high uncertainty level in modern technological environments, especially in global virtual teams, is reduced when trust plays a key role (Jarvenpaa & Leidner, 1999).

Based on the above discussion, we can propose the following hypothesis.

H3: Trust has a significant impact on attitude toward knowledge sharing.

2.4 Reciprocity

Reciprocity is a central concept in social exchange theory, which posits that individuals who provide resources also expect others to reciprocate in kind (Blau, 1964). In virtual communities, members who share knowledge

typically expect reciprocity, representing a sense of mutual indebtedness and ensuring ongoing supportive exchanges (Wasko & Faraj, 2005). Studies have shown that individuals who believe in reciprocity are likelier to share knowledge (Chiu et al., 2006; Lin, 2007).

Reciprocity benefits the direct recipient and others involved in subsequent exchanges (Feng & Ye, 2016; Hung et al., 2011; Wasko & Faraj, 2005). Developers may feel a sense of indebtedness after receiving knowledge from others, leading them to share their knowledge in anticipation of future returns when they need knowledge (Chen & Hung, 2010; Xu & Li, 2015). Reciprocity helps to establish mutually beneficial relationships among developers (Hsu & Lin, 2008), and based on social norms, developers are expected to respond with similar knowledge-sharing behaviors when others exhibit such behaviors (Hau & Kim, 2011; Kwahk & Park, 2016).

According to social exchange theory, members will be more motivated to contribute if the efforts invested in knowledge-sharing behaviors can be reciprocated (Chang & Chuang, 2011). The more knowledge members share, the higher their perceived satisfaction (Liao et al., 2013). Based on the above discussion, we can propose the following hypothesis.

H4: Reciprocity has a significant impact on attitude toward knowledge sharing.

2.5 Self-efficacy

Self-efficacy is a key concept involving an individual's assessment of their ability to perform a specific task or behavior (Bandura, 1986). In the context of knowledge sharing, self-efficacy refers to a person's confidence level in their ability to contribute knowledge effectively. Many studies have shown that self-efficacy is important to knowledge-sharing behavior. Specifically, individuals with higher self-efficacy tend to be more willing to share their knowledge because they believe they have the skills and expertise needed to complete the task (Bock et al., 2005; Chen & Hung, 2010; Hsu et al., 2007; Lee Endres et al., 2007; Lin, 2007; Tohidinia & Mosakhani, 2010). This relationship is particularly evident when the knowledge to be shared is complex and highly specialized (Hsu et al., 2007; Lee Endres et al., 2007).

In addition, self-efficacy also acts as an intrinsic motivator, prompting people with a higher sense of self-efficacy to share knowledge with others more actively (Bock & Kim, 2002). They believe that they can be helpful to others and that sharing knowledge increases their sense of self-worth, increasing their motivation to share knowledge (Wasko & Faraj, 2000). Self-efficacy has also been associated with electronic knowledge bases (Kankanhalli et al., 2005) and is a key antigen of behavioral intent (Ajzen, 2006).

It is worth noting that personal beliefs and environmental factors, such as organizational culture, influence the role of self-efficacy in knowledge sharing. A positive organizational climate or culture that supports knowledge-sharing can create an environment conducive to enhancing self-efficacy, thus promoting more knowledge-sharing behaviors (Bock et al., 2005; Yu et al., 2010). Based on the above discussion, we can propose the following hypothesis.

H5: Self-efficacy has a significant impact on attitude toward knowledge sharing.

2.6 Subjective Norms

Subjective norms are defined as a person's perception of a particular behavior by their social circle (Ajzen & Fishbein, 1980; Pavlou & Fygenson, 2006). Subjective norms reflect participants' perceptions of whether their social circle accepts, encourages, and practices a particular behavior. In the context of knowledge sharing, Subjective norms reflect individuals' perceptions of whether knowledge sharing is considered necessary and desirable by their social circle. Several studies have shown that Subjective norms are positively correlated with behavioral intentions. For example, Karahanna and Straub (1999), Thompson et al. (1991), Venkatesh and Davis (2000), Venkatesh and Morris (2000), Taylor (2006), Srite and Karahanna (2006) confirm the positive correlation between Subjective norms and knowledge sharing intentions. This suggests that a person is more likely to develop an intention to share knowledge if he/she believes that his/her social circle supports knowledge sharing. As Subjective norms reflect individual social circles' expectations and support for knowledge sharing, this will affect individuals' attitudes towards knowledge sharing and intention to generate knowledge sharing, which in turn affect their knowledge-sharing behaviors. Based on theoretical analysis and empirical research, the following two conclusions can be drawn.

H6: Subjective norms have a significant impact on attitude toward knowledge sharing.

H7: Subjective norms have a significant impact on intention to share knowledge.

2.7 Attitude Toward Knowledge Sharing

Attitude refers to an individual's consistent psychological state of giving positive or negative evaluations to a concept or object (Fishbein & Ajzen, 1975; Vijayasarathy, 2004). In knowledge sharing, this attitude reflects an individual's positive or negative emotions toward sharing knowledge (Bock et al., 2005). Studies have shown that an individual's attitude serves as a bridge between their beliefs and intentions (Bock et al., 2005; Vijayasarathy, 2004) and is

typically considered a significant determinant of behavioral intention (Bock et al., 2005; Fishbein & Ajzen, 1975; Vijayasarathy, 2004). Both theory and practice indicate a strong correlation between intention and actual behavior, making intention a powerful predictor of behavior (Bock et al., 2005; Vijayasarathy, 2004). Across various research fields, attitude has been confirmed as a key factor in predicting behavioral intentions (Armitage & Conner, 2001; Bock et al., 2005; Millar & Shevlin, 2003).

Individuals tend to form intentions that align with their positive attitudes, thus a positive attitude towards a specific behavior promotes its execution (Bock et al., 2005). This principle applies to the context of knowledge sharing: the stronger an individual's positive attitude towards knowledge sharing, the stronger their intention to engage in it (Bock et al., 2005; Chow & Chan, 2008; Zimmer et al., 2010). This finding emphasizes the importance of fostering a positive attitude towards knowledge sharing within virtual communities to increase the likelihood of members participating in knowledge sharing. Based on the above content, we can conclude the following.

H8: Attitude toward knowledge sharing has a significant impact on intention to share knowledge**.**

2.8 Intention to Share Knowledge

According to the Planned behavior theory (TPB) proposed by Ajzen (1991), knowledge-sharing intention is a key factor that affects an individual's behavioral motivation. It reflects the amount of effort an individual is willing to put into performing an action. In the context of knowledge-sharing, individuals' knowledge-sharing intentions reflect their readiness to participate in knowledge-sharing behaviors and are influenced by attitudes, subjective norms, and perceived behavioral control (Bock & Kim, 2002; Bock et al., 2005; Park et al., 2014; Ryu et al., 2003). Many studies have shown that individuals' attitudes toward knowledge-sharing significantly impact their knowledge-sharing intentions (Bock et al., 2005; Kolekofski & Heminger, 2003; Kuo & Young, 2008; Pavlou & Fygenson, 2006).

Attitudes, defined as the extent to which individuals hold positive emotions about knowledge sharing, can influence knowledge-sharing intentions in a variety of ways, such as assessments of the benefits and costs of knowledge sharing, perceptions of organizational culture and colleague relationships, and perceptions of individual abilities and resources (Ajzen & Fishbein, 1980; Bock & Kim, 2002; Bock et al., 2005; Kolekofski & Heminger, 2003). In addition, subjective norms are important antecedents of knowledge-sharing intentions. Subjective norms reflect an individual's perceived social pressure to perform or avoid a certain behavior, which may influence an individual's attitudes and intentions toward knowledge sharing (Mathieson, 1991; Taylor & Todd, 1995; Thompson et al., 1991). For example, individuals are more likely to express an intention to participate in knowledge sharing if they perceive that their social circle supports it (Bock et al., 2005). Perceived behavioral control is also important, reflecting an individual's perception of how difficult it is for them to perform a certain action. When individuals perceive fewer barriers to knowledge sharing and more resources and support, they are more likely to exhibit positive intentions (Bock & Kim, 2002; Bock et al., 2005; Kolekofski & Heminger, 2003). Situational factors, such as the organization's incentive mechanism, work environment, leadership style, etc., also indirectly affect knowledge-sharing intentions by influencing attitudes, subjective norms, and perceived behavioral control. For example, an organizational culture encouraging knowledge-sharing and collaboration may enhance employees' knowledge-sharing intentions (Bock et al., 2005).

3. Research Methods and Materials

3.1 Research Framework

The conceptual framework is developed from studying previous research frameworks. It is adapted from three

theoretical models. Firstly, Hassandoust et al. (2011) applied the theory of reasoned action to study the virtual knowledge-sharing behavior of Multimedia University students in Malaysia, finding that trust, reciprocity, and intention to share knowledge have a positive impact on the attitude towards knowledge sharing. Secondly, Liao et al. (2013) studied the effect of rewards, reciprocity, reputation, enjoying helping, expected relationships, self-efficacy, fairness, identification, and openness on attitude towards knowledge sharing and intention to share knowledge in virtual communities. The third research was explored by Choi et al. (2020), who researched third-party developers' knowledge-sharing motivation in mobile platforms, focusing on perceived platform openness, relationships among developers, and personal traits. The conceptual framework of this study is proposed in Figure 1.

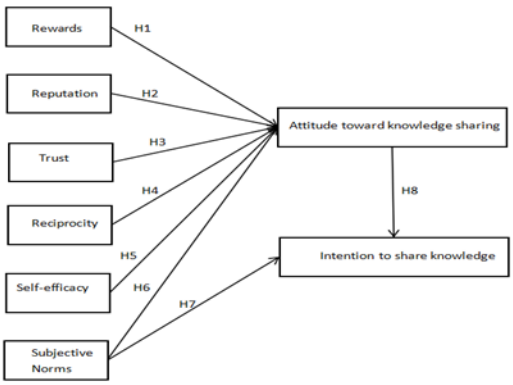

Figure 1: Research Conceptual Framework

H1: Rewards have a significant impact on attitude toward knowledge sharing.
H2: Reputation has a significant impact on attitude toward knowledge sharing.
H3: Trust has a significant impact on attitude toward knowledge sharing.
H4: Reciprocity has a significant impact on attitude toward knowledge sharing.
H5: Self-efficacy has a significant impact on attitude toward knowledge sharing.
H6: Subjective norms have a significant impact on attitude toward knowledge sharing.
H7: Subjective norms have a significant impact on intention to sharing knowledge.
H8: Attitude toward knowledge sharing has a significant impact on intention to share knowledge.

3.2 Research Methodology

This study used a non-probabilistic sampling method to conduct a quantitative survey of undergraduates in four universities in Chengdu through online and paper questionnaires. These undergraduates have at least one year of knowledge-sharing experience in a virtual community. Data were collected and analyzed for factors that significantly impact college students' attitudes and intentions to share knowledge in virtual communities. The survey was divided into three parts. First, the screening questions are used to identify the characteristics of the respondents. Second, to analyze all eight hypotheses, a 5-point Likert scale was used to measure eight proposed variables, ranging from strongly disagree (1) to agree (5). Finally, demographic questions include gender, age, grade level, length of use of virtual communities, length of use per week, and preference for virtual communities for knowledge sharing. For the pilot test, three experts evaluated the Goal Alignment Index (IOC) indicator and conducted the pilot test on 50 respondents.

Cronbach's Alpha method was used to test the validity and reliability of the questionnaire. After the reliability test, the questionnaire was distributed to the target respondents, ultimately receiving 500 valid responses. The collected data were analyzed using SPSS AMOS 26.0. Next, a confirmatory factor analysis (CFA) was used to test convergence accuracy and validation of validity. By calculating the degree of fit of the model, the overall test is carried out with the given data to ensure its validity and reliability. Finally, the researchers applied structural equation models (SEM) to examine the effects between the variables.

3.3 Population and Sample Size

The target population in this paper is undergraduate students from four universities in Chengdu, China, who are the most active group using virtual communities for knowledge sharing. For Structural Equation Models, a minimum of 200 respondents (Kline, 2011) is recommended to ensure a robust sample size. The survey was distributed to 500 students. After data screening, 500 valid responses were used in this study.

3.4 Sampling Technique

The researchers used non-probability and judgment sampling to select four universities in Chengdu, China. Then, quota sampling was used, using the 111,725 Population Size shown in Table 1. Later, the investigators distributed the questionnaires online and offline using convenience sampling.

Table 1: Sample Units and Sample Size

University Name	Population Size	Proportional sample size
Sichuan University	37,564	168
University of ElectronicScience and Technology of China	21,000	94
Chengdu University of Technology	30,161	135
Sichuan University of Media and Communication	23,000	103
Total	**111,725**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The demographic target is the profile of 500 undergraduate students, the conclusions of which are shown in Table 2. Male respondents accounted for 47.8 percent and female respondents' 52.2 percent, with slightly more female

users than men. All users are over 18 years old. Regarding grade distribution, sophomores accounted for 31.2%, juniors 36.4%, and seniors 32.4%.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	239	47.8%
	Female	261	52.2%
Age	under 18 years old	0	0%
	over 18 years old	500	100%
Education	Sophomore	156	31.2%
	Junior	182	36.4%
	Senior	162	32.4%

4.2 Confirmatory Factor Analysis (CFA)

Based on the confirmatory factor analysis (CFA) results, we performed a factor load test, which indicated that all items were statistically significant. This demonstrates that the model exhibits good convergent and discriminant validity. Specifically, the factor loadings in the model are all above 0.30, the P-values are below 0.05, the construct reliability exceeds the 0.7 threshold, and the average variance extracted (AVE) is above the 0.5 threshold (Fornell & Larcker, 1981). Additionally, the square root of AVE in Table 3 confirms that all correlation coefficients between constructs are higher than the corresponding correlation coefficients between the constructs and their measurement indicators (Hair et al., 2006).

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Rewards (RE)	Liao et al. (2013)	3	0.910	0.846-0.924	0.913	0.779
Reputation (REP)	Liao et al. (2013)	4	0.922	0.816-0.936	0.923	0.751
Trust (TR)	Zhang et al. (2010)	4	0.899	0.782-0.907	0.902	0.697
Reciprocity (REC)	Liao et al. (2013)	3	0.883	0.798-0.916	0.889	0.728
Self-efficacy (SE)	Liao et al. (2013)	3	0.903	0.821-0.904	0.904	0.759
Subjective Norms (SN)	Jolaee et al. (2014)	3	0.912	0.853-0.927	0.915	0.782
Attitude toward knowledge sharing (ATKS)	Hassandoust et al. (2011)	4	0.906	0.794-0.917	0.908	0.713
Intention to share knowledge (ITSK)	Jolaee et al. (2014).	4	0.911	0.682-0.956	0.909	0.714

According to Table 4, the correlations between constructs are higher than those between each construct and its measurement indicators, which supports the model's convergent validity. The model fit indices, including CMIN/DF, GFI, AGFI, NFI, CFI, TLI, and RMSEA, all meet or exceed acceptable thresholds, indicating strong aggregate and discriminant validity (Bentler, 1990; Pedroso et al., 2016; Sharma et al., 2005; Sica & Ghisi, 2007).

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary & Shamsuddin, 2015;)	1.218
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.949
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.935
NFI	≥ 0.80 (Wu & Wang, 2006)	0.961
CFI	≥ 0.80 (Bentler, 1990)	0.993
TLI	≥ 0.80 (Sharma et al., 2005)	0.991
RMSEA	< 0.08 (Pedroso et al., 2016)	0.021
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

These results affirm the model's discriminant validity and provide a robust foundation for validating the subsequent structural model estimates (Hair et al., 2006). The CFA results indicate that the model demonstrates strong convergent and discriminant validity, which supports the reliability of the structural model analysis. Discriminant validity is assessed by ensuring that the average variance extracted (AVE) square root for each construct exceeds the intercorrelation coefficients between constructs (Fornell & Larcker, 1981). Table 5 shows that the square roots of AVE, presented on the diagonal, are greater than the inter-construct correlations, thus confirming the model's discriminant validity.

Table 5: Discriminant Validity

	RE	REP	TR	REC	SE	SN	ATKS	ITSK
RE	**0.894**							
REP	0.155	**0.867**						
TR	0.058	0.062	**0.835**					
REC	0.070	0.077	0.003	**0.853**				
SE	0.003	0.113	0.090	0.018	**0.871**			
SN	0.023	0.112	0.063	0.134	0.141	**0.884**		
ATKS	0.172	0.210	0.188	0.231	0.169	0.212	**0.844**	
ITSK	0.145	0.202	0.169	0.154	0.210	0.169	0.274	**0.845**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

Structural Equation Modeling (SEM) is an advanced statistical method to explore complex models and relationships among variables, including mediation and moderation effects (Kline, 2015). SEM allows researchers to evaluate direct and indirect effects, interaction effects, and causal relationships (Hair et al., 2006). Its strengths include flexibility, the capability to model latent variables, error handling, and hypothesis testing, with its most notable advantage being latent variable modeling, which corrects measurement errors (Kline, 2015). According to Sica and Ghisi (2007), the Chi-square/degrees-of-freedom ratio (CMIN/DF) should not exceed 3, and GFI and CFI should be greater than 0.8. Using SPSS AMOS version 26 for model calculation and adjustment, the fit indices were reported as follows: CMIN/DF = 1.400, GFI = 0.936, AGFI = 0.924, NFI = 0.952, CFI = 0.986, TLI = 0.984, and RMSEA = 0.028. These values, detailed in Table 6, indicate a good model fit.

Table 6: Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/ DF	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	1.400
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.936
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.924
NFI	≥ 0.80 (Wu & Wang, 2006)	0.952
CFI	≥ 0.80 (Bentler, 1990)	0.986
TLI	≥ 0.80 (Sharma et al., 2005)	0.984
RMSEA	< 0.08 (Pedroso et al., 2016)	0.028
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

4.4 Research Hypothesis Testing Result

Study models calculated significance using regression weights and R2 variance for each variable. The results in Table 7 show that the hypothesis except H7 is significantly supported at p= 0.05. Specifically, rewards (β = 0.137), reputation (β = 0.159), trust (β = 0.164), reciprocity (β = 0.214), self-efficacy (β = 0.133), and subjective norms (β = 0.147) all had significant positive effects on Attitude toward knowledge sharing. In addition, Attitude toward knowledge sharing (β = 0.275) also had a considerable positive impact on the intention to share knowledge. However, subjective norms had little significant influence on knowledge-sharing intention. Thus, the findings support assumptions H1 to H6 and H8, suggesting that factors including reward, reputation, trust, reciprocity, self-efficacy, subjective norms, and attitudes have important effects on virtual community knowledge-sharing attitudes and intentions among college students.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: RE→ATKS	0.137	3.015*	Supported
H2: REP→ATKS	0.159	3.513*	Supported
H3: TR→ATKS	0.164	3.577*	Supported
H4: REC→ATKS	0.214	4.621*	Supported
H5: SE→ATKS	0.133	2.888*	Supported
H6: SN→ATKS	0.147	3.216*	Supported
H7: SN→ ITSK	0.121	2.565*	Supported
H8: ATKS →ITSK	0.275	5.757*	Supported

Note: * p<0.05
Source: Created by the author

The result from Table 7 can be refined: The H1 results indicate that reward is a key driver influencing the attitude of virtual community members towards knowledge sharing, with a standardized pathway coefficient of 0.137. This finding is supported by the study by Liao et al. (2013), where incentives motivate members to pursue knowledge sharing. The results of H2 showed a supported positive influence of reputation on knowledge-sharing attitudes, with a standardized path coefficient of 0.159. Liao et al. (2013) showed that reputation can promote knowledge-sharing attitudes among members. H3 results showed that the positive effect of trust on knowledge-sharing attitudes was supported by a standardized path coefficient of 0.164. Zhang et al. (2010) confirmed that trust promotes knowledge sharing among virtual community members. H4 showed that the positive effect of reciprocity on knowledge-sharing attitudes is supported by a standardized path coefficient of 0.214. Liao et al. (2013) found that reciprocity can enhance the knowledge-sharing behavior of virtual community members. H5 showed that the positive effect of self-effects on knowledge-sharing attitudes was supported by a standardized path coefficient of 0.133. Liao et al. (2013) showed that self-efficacy can enhance the knowledge-sharing attitudes of virtual community members. H6 shows that the positive effect of subjective norms on knowledge-sharing attitudes is supported, with a standardized path coefficient of 0.147. The study by Jolaee et al. (2014) confirmed that subjective norms can enhance the knowledge-sharing attitudes of virtual community members. H7 results showed that the positive effect of subjective norms on knowledge-sharing intention was not supported, with a standardized path coefficient of 0.121. H8 showed that the positive impact of knowledge-sharing attitudes on knowledge-sharing intention is supported by a standardized path coefficient of 0.275. This result is consistent with the

study by Jolaee et al. (2014), showing that knowledge-sharing attitudes can enhance knowledge-sharing intentions among virtual community members. In conclusion, the results in Table 7 support the positive effects of reward, reputation, trust, reciprocity, self-efficacy, subjective norms, and knowledge-sharing attitudes on knowledge-sharing intentions. These findings provide important references for the management practice of virtual communities.

5. Conclusion and Recommendation

5.1 Conclusion

In this study, college students in Chengdu, Sichuan, China, were selected to explore the factors affecting their attitude and intention to share knowledge in virtual communities. The research mainly adopts quantitative research methods, constructs a conceptual framework, and collects data through a questionnaire survey. The questionnaire was sent to 500 undergraduates at four universities in Chengdu, including sophomore, junior, and senior students, with 47.8 percent male and 52.2 percent female. These public and private schools cover comprehensive and art schools, so the sample is fairly representative. To evaluate the validity and reliability of the conceptual model, confirmatory factor analysis (CFA) was used to measure and test these concepts, including convergence validity and discriminant validity of each variable. The results show that the factor load of all variables is significantly greater than 0.5, the composite reliability is greater than 0.7, the average extraction variation is greater than 0.5, and the discriminant validity is good, indicating that the conceptual model has good validity. In addition, the structural equation model (SEM) was used to analyze the influencing factors of knowledge-sharing behavior, and the results showed that the positive influence of subjective norms on knowledge-sharing intention was insignificant, and the other hypotheses were supported. Reward, reputation, trust, reciprocity, self-efficacy, and other factors have a significant positive impact on knowledge-sharing attitude, and knowledge-sharing attitude also has a considerable positive impact on knowledge-sharing intention. In addition, the positive influence of subjective norms on knowledge-sharing attitudes is also significant.

Our research results are as follows: First, rewards have a significant positive impact on knowledge-sharing attitudes, which is consistent with the findings of Bock et al. (2005), who found that rewards can motivate employees to participate in knowledge-sharing activities. Secondly, reputation has a significant positive impact on knowledge-sharing attitudes, consistent with the research results of Hsu and Lin (2008), who found that personal reputation can be improved through knowledge contribution. Third, trust has a significant positive impact on knowledge-sharing attitude, consistent with the research results of Chiu et al. (2006), who found that trust among virtual community members can promote knowledge-sharing. Fourth, reciprocity has a significant positive impact on knowledge-sharing attitudes, consistent with the findings of Kankanhalli et al. (2005), who found that knowledge-sharers expect reciprocity. Fifth, self-efficacy has a significant positive impact on knowledge-sharing attitude, consistent with the research results of Hsu et al. (2007), who found that self-efficacy can affect knowledge-sharing behavior. Sixth, subjective norms have a significant positive impact on knowledge-sharing attitudes, consistent with the research results of Jolaee et al. (2014), who found that subjective norms can affect knowledge-sharing behaviors. Finally, knowledge-sharing attitude has a significant positive impact on knowledge-sharing intention, which is consistent with the research results of Bock et al. (2005), who found that knowledge-sharing attitude can predict knowledge-sharing behavior.

We can conclude that reward, reputation, trust, reciprocity, self-efficacy, subjective norms, and other factors have a significant positive impact on college students' attitudes toward knowledge sharing, and the attitude toward knowledge sharing has a considerable positive impact on college student's intention to share knowledge. These findings help to understand the knowledge-sharing behavior of college students in virtual communities and provide a scientific basis for promoting knowledge-sharing in related virtual communities.

5.2 Recommendation

The researchers found the key factors that affect the knowledge-sharing behavior of college students in the Chengdu area by using a virtual community. The results revealed that reward, reputation, trust, reciprocity, self-efficacy, and subjective norms significantly positively affect college students' knowledge-sharing attitude. Furthermore, this positive attitude towards knowledge sharing can significantly increase their willingness. Based on these findings, community administrators may consider implementing a variety of rewards and incentives to encourage students to share knowledge. (Bock et al., 2005); Administrators should also improve the reputation system of the community so that students can build and maintain a reputation in the community based on their contributions and interactions (Jones et al., 1997). In addition, trust is crucial for knowledge sharing, and virtual community managers should take active measures to build trust among members (Chang & Chuang, 2011; Lu & Yang, 2011). Encouraging a culture of reciprocity in virtual communities can significantly promote knowledge sharing. Members will be

more motivated to contribute if the effort invested in knowledge-sharing behavior can be rewarded (Chang & Chuang, 2011). Community managers should provide necessary resources and support to improve students' knowledge-sharing self-efficacy, such as training programs, mentoring opportunities, and access to relevant information and tools. Individuals with higher self-efficacy tend to be more willing to share their knowledge because they believe they have the skills and expertise needed to complete the task (Bock et al., 2005; Chen & Hung, 2010; Hsu et al., 2007; Lee Endres et al., 2007; Lin, 2007; Tohidinia & Mosakhani, 2010). Third, virtual community managers should positively influence subjective norms by promoting knowledge sharing as a valuable and socially acceptable behavior. This can be achieved through communication activities, role-building, and highlighting successful community knowledge-sharing examples.

In conclusion, reward, reputation, trust, reciprocity, self-efficacy, and subjective norms affect students' positive knowledge-sharing in virtual communities. The key to the success of successful virtual communities, such as WeChat, Douyin, Little Red Book, etc., lies in the community members themselves. Therefore, virtual communities should strive to create an atmosphere of knowledge-sharing and encourage members to participate in knowledge-sharing activities to promote the growth and success of the community.

5.3 Limitation and Further Study

The limitation of the study is that the population was based on a sample of 500 students from four universities in Chengdu. While the sample size is sufficient for SEM analysis, the findings may only partially apply to other populations or virtual communities. The study focused on Chinese college students, and specific cultural factors may have influenced the findings in the Chinese context. Further research may explore the influence of culture on knowledge-sharing behavior in virtual communities under different cultural backgrounds. In addition, this study investigated several key factors that influence knowledge-sharing behavior, but other factors may contribute to this phenomenon. Further research can also explore the influence of social identity, self-esteem, and individual differences on knowledge-sharing in virtual communities, which can provide a more comprehensive understanding of knowledge-sharing behavior.

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