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UNDERSTANDING SATISFACTION OF KNOWLEDGE CONTRIBUTORS IN TRANSACTIONAL VIRTUAL COMMUNITIES FROM A COST-BENEFIT TRADEOFF PERSPECTIVE

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Abstract

Knowledge sharing behavior in virtual communities has long been an important area of research. Prior related research has primarily focused on relational virtual community (RVC) where knowledge sharing is regarded as a social exchange behavior, heavily depending on the social concerns such as reciprocity, identification and norms. The objective of our study is to investigate knowledge contributors' satisfaction in a distinct type of virtual communities (transactional virtual communities, TVCs), where knowledge sharing is mainly guided under the principle of economic exchange, and cost-benefit tradeoff is the primary motives for knowledge sharing. Drawing upon the goal attainment theory, we examine the effects of two types of benefits (e.g., extrinsic and intrinsic benefit) and two types of costs (e.g., actual and opportunity cost) on knowledge contributors' satisfaction, as well as the mediating role of perceived net goal attainment. A field survey with 205 subjects in a specific TVC in China was conducted to test the research model. We find that knowledge contributors' perceptions of extrinsic and intrinsic benefits and opportunity cost significantly influence their satisfaction through the full mediation of perceived net goal attainment. Implications and future research are discussed.

Keywords: Transactional virtual community, Knowledge sharing, Economic exchange, Satisfaction, Cost-benefit tradeoff

1 INTRODUCTION

The Internet revolution, such as the emergence of Web 2.0, has led to the proliferation of virtual community (VC) all over the world (Lin et al. 2009). The bloom of virtual community enables the knowledge and information exchange for mutual learning or problem solving in ways such as online group meetings without the physical constraints (Hsu et al. 2007; Koh et al. 2003; Wasko & Faraj 2005; Wasko et al. 2009). In these virtual communities, sometimes termed as professional virtual communities (PVC) or virtual community of practice (CoP) (Chiu et al. 2006; Hsu et al. 2007), participants voluntarily share their knowledge to and acquire needed knowledge from others. However, since the knowledge provided by participants is taken as a public good which is free to all participants, no economic value is generated in these communities. A call for extracting economic value from knowledge shared within virtual communities (Armstrong & Hagel 1996; Lechner & Hummel 2002) has recently motivated practitioners to explore opportunities for capitalizing on knowledge to realize economic value.

Since 2005, a new form of virtual communities supporting this transformation has emerged and rapidly developed worldwide. Most popular applications include Amazon's Mechanical Turk and myTino.com in the USA, and Taskcn.com, Witkey.com in China. In these virtual communities, participants can post tasks and provide certain monetary compensations to sourcing others' knowledge to resolve problems. Unlike knowledge sharing behavior in traditional virtual communities, knowledge contributors in these emerging virtual communities need to leverage their knowledge to help knowledge seekers by completing certain tasks or solving problems for monetary returns.

This new application of virtual communities has achieved enormous success over the past several years. For instance, there have already been more than 20 websites adopting this business mode in China, and the scale and revenue of these websites are also considerable. A typical website Taskcn.com already has more than 2.5 million participants, over 20 thousands of tasks, and over 3 million US\$ of task rewards. Likewise, over eighty thousand knowledge sourcing requests, human intellectual tasks in their terms, have been posted on Amazon's Mechanical Turk.

Despite the huge business potential of this new form of virtual communities, both scholars and practitioners are concern about how to keep generating economic value by sustaining these virtual communities. Since these virtual communities cannot exist or prosper without ongoing participation of knowledge contributors who spend their time and effort sharing their knowledge for problem solving (Roberts et al. 2006), the success of these virtual communities heavily relies on their participation behavior. Consistent with a few recent reports (Yang et al. 2008), we term these knowledge contributors as "solvers." However, because solvers are often self-employed volunteers rather than traditional employees in formal organizations, their participation behaviors can not be managed through employment relationships or contracts (Roberts et al. 2006). Thus, a vital question is how to direct and sustain solvers knowledge sharing behaviors. To the extent that solver satisfaction with virtual communities is an important performance indicator for their stay with a virtual community (Ortiz de Guinea & Markus 2009; Sangwan 2005; Tiwana & Bush 2005), our study is purported to identify determinants of solver satisfaction in this specific research context.

Although factors that influence participant satisfaction have been extensively studied in the traditional virtual communities (Koh et al. 2003), we are concerned that prior findings may not be sufficient in explaining solver satisfaction in these new, emerging virtual communities. Prior related studies focus on either the roles of social factors, such as the norm of reciprocity, or motivators, such as intrinsic benefit (Wasko & Faraj 2000), on the premise that knowledge exchange in traditional virtual communities (which we categorize as relational virtual communities) is based on the social relationships and the principle of social exchange (Chiu et al. 2006; Wasko & Faraj 2000; Wasko & Faraj 2005). However, in these emerging new virtual communities (which we categorize as transactional virtual communities), knowledge exchange has become a transactional or commercial activity rather than a social activity; the exchange principle has changed from social exchange to economic exchange (Gefen & Ridings 2002). As a result, solvers may contribute their knowledge

primarily for instrumental reasons such as earning monetary rewards rather than for social reasons such as reciprocating or socializing. Thus, the social factors (e.g., the norm of reciprocity) may become much less relevant. In contrast, considerations of cost and benefit may play an important and distinct role (Wasko & Faraj 2000), as solvers pay more attention to evaluate how much they would gain and sacrifice. Thus, the concern with cost should be explicitly taken into consideration when studying this new form of virtual communities. Unfortunately, prior related research efforts have not drawn upon theories that could account for the role of costs for predicting knowledge sharing. An alternative theoretical lens should, therefore, be developed to understand solver's behavior in this new context.

To address these issues, we draw upon the goal attainment theory (Briggs et al. 2006; Reinig 2003) to investigate the extent to which and how perceived benefits and costs influence solver satisfaction. Specifically, we examine the role of two types of perceived benefits (e.g., extrinsic and intrinsic benefits) and two types of perceived costs (e.g., actual costs and opportunity costs), and the mediating effect of perceived net goal attainment (PNGA) which is regarded as a tradeoff evaluation between benefits and costs.

2 THEORETICAL BACKGROUND

2.1 The Emergence of Transactional Virtual Communities

Virtual community is defined by Porter (2004) as “an aggregation of individuals or business partners who interact around a shared interest, where the interaction is at least supported and/or mediated by technology and guided by some protocols or norms.” Virtual communities have long been understood, as well as practiced, as an Internet-based space for socialization (Rheingold 1993), where “social aggregations ... emerge from the Net when enough people carry on those public discussion long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace”(Rheingold 1993). As virtual communities of this kind exist to facilitate exchanges and interactions that bring value to members and form relationships with other members, we call them relational virtual communities (RVC), where knowledge sharing activities are driven by social norm (e.g., reciprocity), and knowledge is treated as a public good that is free to all the members of virtual communities (Wasko & Faraj 2000). Most prior studies on virtual communities are focused on this particular form.

However, the nature and form of virtual communities does seem to be diverging. Hagel and Armstrong go beyond the social view of virtual communities by conceptualizing such communities as a business model (Hagel & Armstrong 1997; Lechner & Hummel 2002), on the premise that the information and knowledge the participants shared there can create actual economic value (Lechner & Hummel 2002). This emerging awareness of the economic value of information or knowledge in virtual communities has stimulates the growth and prosperity of another form of virtual communities, which we call transactional virtual communities (TVC), such as Amazon's Mechanical Turk in USA, and Taskcn.com in China. In TVC, knowledge can be priced and exchanged in a transactional way. Thus, the principle for knowledge sharing could change from the original form of social reciprocity to more of an economic contract.

2.2 Distinctions between Transactional and Relational Virtual Communities

There are important distinctions of transactional virtual communities, in comparison to the relational ones. First, while knowledge is viewed as a public good defined by its non-excludability (i.e., the inability to exclude non-contributors from consumption of the public good) and non-rivalry (i.e., the good is not used up or depleted in its consumption) (Olson 1967; Von Hippel & Von Krogh 2003; Wasko & Faraj 2000; Wasko et al. 2009) in RVC, TVC regards knowledge as a private good which is possessed by only knowledge seekers who provide the monetary rewards.

Second, the underlying mechanisms of solvers' knowledge sharing behavior are different across these two kinds of VCs too. Regarding knowledge as a public good, solvers in RVCs treat knowledge exchange as a social activity that relies on the relational contract (Rousseau & McLean Parks 1993), such as reciprocity and norms, and a collective action that aims to advance the community development (Chiu et al. 2006; Wasko & Faraj 2000). In contrast, solvers in TVCs tend to view the knowledge exchange as a commercial activity that depends on the transactional contract (Rousseau & McLean Parks 1993), such as economic benefits and costs, and a private action in which self-interest rather than moral obligation matters (Wasko & Faraj 2000). Correspondingly, economic exchange rather than social exchange becomes the principle for the knowledge exchange activities in TVCs (Gefen & Ridings 2002; Rousseau & McLean Parks 1993). Specifically, in the RVCs, knowledge contributors are likely to work on the assumption of relatively long-term relationships of interest, where obligations of knowledge contributors and seekers are not clearly specified (Kankanhalli et al. 2005; Molm 1997). In contrast, in the TVCs, the knowledge exchange is one-off with specific obligations of seekers and solvers (Kankanhalli et al. 2005; Molm 1997)¹.

These distinctions suggest that factors influencing knowledge exchange may also diverge. In the TVC context, social factors may become not so important; the economic factors such as benefits and costs may become a big concern. Specifically, costs are less discussed in the RVC context since both the loss of proprietary rights to intellectual property, and the cost of diffusion are low when knowledge is taken as a public good (Von Hippel & Von Krogh 2003). However, in the TVC context, knowledge is regarded as a private good, and the tasks require solvers to adopt their prior knowledge to create an artifact rather than simply share what they have already had. Therefore, perceived costs are no longer negligible when solvers appraise their knowledge sharing experience in TVC. To explain solver satisfaction, an alternative theoretical lens with explicit consideration of cost is called for.

2.3 Goal Attainment Theory

In this study, we draw upon the goal attainment theory (Briggs et al. 2006; Reinig 2003) as the theoretical underpinning to develop our research model. Satisfaction is considered as a direct result of perceived net goal attainment (PNGA) which is defined as "the degree to which one perceives that some object of satisfaction either advances or hinders the attainment of one's salient individual goals" (Briggs et al. 2006, p. 588), representing the tradeoff between perceived benefits and perceived costs. Benefits act as motivators which facilitate the goal attainment, whereas costs act as inhibitors that block the goal attainment (Kankanhalli et al. 2005). People tend to maximize their benefits and minimize their costs when conducting certain behavior. Therefore, PNGA, as an overall evaluation in terms of benefits and costs, should be positively associated with perceived benefits but negatively associated with perceived costs.

The goal attainment theory also postulates the mediating role of PNGA between perceived benefits, perceived costs, and satisfaction. Specifically, perceived benefits and perceived costs do not directly influence satisfaction but through the tradeoff between these two aspects, meaning that high benefits may not necessarily lead to high satisfaction if costs are high too. People form their feelings of satisfaction not solely based on what they gain or what they lose, but according to the tradeoff between benefits and costs (Reinig 2003). PNGA just plays the role of this proxy. When the benefits of fulfilling goals exceed the costs of attempting to fulfill those goals, the positive PNGA leads to satisfaction. In contrast, when individuals perceive that the benefits are not worth the costs involved in fulfilling the goals, they may feel dissatisfied. Therefore, perceived benefits and costs influence PNGA which in turn affects satisfaction, i.e., PNGA is a mediator between perceived benefits, costs and satisfaction.

¹ There are also some differences between the knowledge exchange in TVC and general commercial activities: 1) commercial activity may not be always knowledge-intensive; 2) the object exchanged in TVC is more like a service rather than a product; 3) knowledge exchange in TVC is based on a reverse-auction in which the roles of buyers and sellers are reversed. However, these differences are not the focus of this study, we stress on the comparison between TVCs and RVCs.

3 HYPOTHESES DEVELOPMENT

The economic exchange nature of knowledge exchange in TVCs makes us to analyze solvers' satisfaction from a benefit-cost trade-off perspective (in Figure 1). Because extrinsic and intrinsic benefits are two major components of benefit in terms of motivation theories (Kankanhalli et al. 2005), and actual and opportunity costs are two key measures of the cost concept in economics (Buchanan 1987), we specify extrinsic and intrinsic benefit as two types of benefits and actual and opportunity cost as two types of costs associated with the knowledge exchange behavior in TVCs.

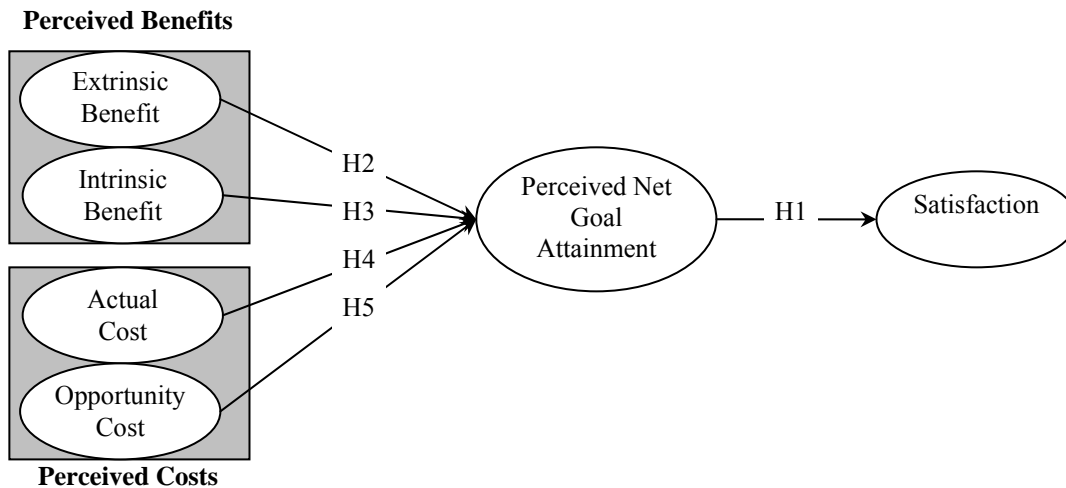


Figure 1. Research Model

3.1 PNGA and satisfaction

Goal attainment is a cognitive appraisal of the trade-off between benefits and costs (Reinig 2003). According to the cognitive appraisal → emotional response → coping behaviour paradigm (Bagozzi 1992), PNGA, as an overall cognitive appraisal of the participation behavior can positively influence solver satisfaction which is regarded as an emotional response (Briggs et al. 2006; Reinig 2003). Besides goal attainment, other disciplines use other terms to describe the trade-off between benefits and costs, such as *perceived value* in marketing research, *net benefit*, *net equity*, or *equitable needs fulfilment* in decision making research (Au et al. 2008). These studies also confirm the positive relationship between the trade-off concept and satisfaction. Therefore, we propose that

H1: PNGA is positively associated with solver satisfaction in transactional virtual communities.

3.2 Perceived Benefits

Prior studies on knowledge sharing have reasoned that extrinsic benefit and intrinsic benefit as two motivators that give rise to knowledge contribution behavior in various research contexts including organizational environment (Bock et al. 2005; Kankanhalli et al. 2005; Wasko & Faraj 2005) and relational virtual communities (Chiu et al. 2006; Hsu et al. 2007; Wasko & Faraj 2000).

In our research context, the extrinsic benefits mainly refer to the monetary rewards provided by seekers as compensation for solvers' time and effort expended on online tasks, whereas the intrinsic benefits, according to the definition of intrinsic motivation, refer to the benefits inherently residing in the online task participation process, such as the perceived enjoyment and sense of self-worth. In this study, we consider these two types of benefit as factors influencing solvers' perceptions about the goal attainment.

In transactional virtual communities, knowledge exchange is considered as an economic exchange rather than a social exchange, so the role of extrinsic benefit should be highlighted. Regarding

knowledge as a private good, people tend to exchange knowledge through market mechanisms in order to receive commensurate benefits (Wasko & Faraj 2000). Self-interest such as extrinsic benefit becomes a major motivator for knowledge contribution behavior (Wasko & Faraj 2000). Therefore, we argue that in TVCs, extrinsic benefit is an important aspect when solvers form their perception of goal attainment. Since people tend to maximize benefits and minimize costs in exchange (Briggs et al. 2006; Reinig 2003), when extrinsic benefit are high, solvers will perceive high net goal attainment too. Thus, we propose,

H2: Extrinsic benefit (i.e., monetary rewards) is positively associated with PNGA in transactional virtual communities.

Besides extrinsic benefits, there are several intrinsic benefits that are brought by participating in the online tasks too. Prior studies in the RVC context show that intrinsic benefits such as knowledge self-efficacy, enjoyment in helping others (Kankanhalli et al. 2005; Lin 2007), and sense of self-worth (Bock et al. 2005) have positive influences on knowledge exchange motivation or behavior. We propose that intrinsic benefit is still an important factor that influences solvers' perception of goal attainment due to two major reasons. First, solvers participate in online tasks since these tasks are inherently interesting. Although the knowledge exchange in TVCs is an economic exchange, task participation behavior is still voluntary, and not forced by someone else. Thus, solvers can freely choose the tasks that they are interested in, indicating an intrinsic motivator of their behavior. Second, task participation can bring solvers a sense of self-worth, or achievement. Similar with knowledge contributors in RVCs, solvers participate in online tasks not only for getting extrinsic rewards, but also to exhibit their ability to solve problems. Therefore, we argue that intrinsic benefit positively influences solvers' perceived net goal attainment.

H3: Intrinsic benefit is positively associated with PNGA in transactional virtual communities.

3.3 Perceived Costs

Perceived costs are a factor that has been largely neglected by prior studies on knowledge sharing behavior for a long time (Kankanhalli et al. 2005; McDougall & Levesque 2000; Patterson & Spreng 1997; Ravald & Gronroos 1996) in the RVC context. To better understand the role of perceived costs in the TVC context, we identify two concepts of cost usually used in the human decision making process: actual cost and opportunity cost (Molm 1997). Actual cost is the value of resources that have been really used for doing something. In contrast, the concept of opportunity cost is firstly articulated in economic research, where it is defined as the value of the next best alternative forgone as the result of making a decision (McConnell & Brue 2005).

Both actual cost and opportunity cost are factors to assess the losses that solvers suffer when participating in online tasks. According to the goal attainment theory (Briggs et al. 2006; Reinig 2003), people tend to maximize benefits and minimize costs in order to get more net benefits which are presented as perceived net goal attainment (PNGA), so actual cost and opportunity cost should be negatively associated with perceived net goal attainment. Therefore,

H4: Actual cost is negatively associated with PNGA in transactional virtual communities.

H5: Opportunity cost is negatively associated with PNGA in transactional virtual communities.

However, the impacts of actual cost and opportunity cost on PNGA may be different. In economics and accounting, actual cost is directly measured by the money or other explicitly measurable resources, while opportunity cost is the possible value generated by these resources if they are invested in other activities, reflecting an implicit hidden cost (Buchanan 1987). Since people tend to achieve the optimal economic efficiency and most efficiently use the resources, when they make decision on whether to participate in online tasks, the subjective value that the objective resources can bring to them should be more important than the objective resources. Therefore, opportunity costs are preferred in economic analysis since they assess the true cost of any course of action (Buchanan 1987). Similarly, in our research context, knowledge exchange is considered as an economic exchange activity and solvers would like to best use their time and effort, so opportunity cost should play a

more important role than actual cost when solvers form their value perceptions (e.g., goal attainment). Thus, we propose that

H6: Opportunity cost has a stronger influence on PNGA than actual cost.

4 METHODOLOGY

4.1 Setting and Participants

Data was collected through a field survey in a TVC in China where they are called as Witkey websites. Although there are many types of tasks posted on Taskcn.com, such as design, programming, strategic planning, writing, we only focus on the IT-relevant tasks, i.e., the final product should be an IT artifact (e.g., an website, a program, or a computer-aided Logo design). The IT-relevant tasks are more knowledge-intensive, requiring solvers to invest many resources, such as knowledge, time, and effort, in the task fulfillment process. This is consistent with our research objective of understanding the knowledge exchange behavior in the TVCs. Several other tasks, such as naming a baby, require little knowledge, and are not suitable for this study. Thus, only solvers who have experience in the IT-related tasks are eligible for participating in the survey.

Subjects were recruited through two channels. First, we took the survey as an online task and posted it on the Taskcn.com website. In the task description, we introduced the objective of the study and the requirements of the participants. Solvers with experience in IT design tasks (e.g., logo design, graphic design, website design, and program design) were eligible to participate in the survey. The URL of the questionnaire webpage was also shown in the description. A lucky draw with a rate of 10 percent would be conducted, and each winner could gain RMB20 (about 3 USD). The second channel for collecting data was through sending e-mails to solvers with experience in IT design tasks. In the e-mail, solvers were informed of the objective of the study, the URL of the survey task webpage on Taskcn.com, and the questionnaire webpage. We totally got 286 responses and 205 usable responses after removing the ineligible participants. About 75% of subjects are male; 90% are around 21-35 (age); 80% with a bachelor degree; and 60% with over 4 years of computer experience.

4.2 Instrument

Instruments for most of constructs were adapted from prior relevant studies except opportunity cost. Slight wording modifications were applied to fit the Witkey research context, and all measures used seven-point Likert scale. The instruments of extrinsic benefit and actual cost were adapted from Kankanhalli et al. (2005). Items for intrinsic benefits were adapted from Ke and Zhang (2009) and Roberts et al. (2006). We measured PNGA by using the items that describes the extent to which solvers' benefits gained from online tasks are worth their time and effort (Briggs et al. 2006). Satisfaction was measured by four items adapted from (Bhattacharjee 2001).

Due to the lack of the instrument of opportunity cost in prior studies, we developed it according to its definition by ourselves. Since opportunity cost is assessed in terms of the value brought by alternative activities, we consider three major aspects as alternative activities of online task participation activity: work vs. leisure, work-family conflict, and investment alternatives. These three items are described as: 1) "I cannot have a good rest because of participating in the tasks on the Taskcn.com;" 2) "I cannot enjoy the happy time with my friends and family because of participating in the tasks on the Taskcn.com;" 3) "I cannot earn more money by doing other things because of participating in the tasks on the Taskcn.com."

5 DATA ANALYSIS

The proposed model was examined by using structural equation modelling (SEM), which is a powerful second-generation statistical technique for testing causal relationships between multiple

variables. Following the two-step analytical procedures (Anderson & Gerbing 1988), we examined the measurement model (e.g., construct reliability and validity) and structural model (e.g., causal relationships between the theoretical constructs) in turn. In our study, LISREL 8.70 was used as the software to assess these two models

5.1 Measurement Model

The measurement model was tested using confirmatory factor analysis (CFA) where the relationships between items and constructs were specified. The evaluation on the measurement model could help to identify the reliability and validity of constructs and generate validated measures of constructs before conducting structural model analysis. The CFA results showed that the third item of extrinsic benefit EXB3 was not a good indicator since its loading was 0.42 (<0.50) and error variance was 0.82, so it was removed from the model and not considered in later analysis.

Reliability which refers to consistency of measurement can be examined by composite reliability (CR) and average variance extracted (AVE) (Fornell & Larcker 1981). The results showed that CR (e.g., ranged from .66 to .94) and AVE (e.g., ranged from .50 to .81) for all constructs exceeded the threshold value 0.60 and 0.50 respectively (Fornell & Larcker 1981), exhibiting good construct reliability. All factor loadings for the indicators are above .60 and statistically significant ($p < .001$), indicating good convergent validity. Discriminant validity is assessed by comparing the square root of AVE and the correlations relevant to the construct. As shown in Table 1, all square roots of AVE were greater than the correlations, indicating good discriminant validity.

	Loading	CR	AVE	1	2	3	4	5	6
1. Satisfaction	.84-.94	.94	.81	.90					
2. PNGA	.82-.85	.90	.69	.73	.83				
3. Extrinsic benefit	.65-.75	.66	.50	.36	.51	.70			
4. Intrinsic benefit	.75-.81	.86	.61	.49	.60	.53	.78		
5. Actual cost	.62-.91	.86	.67	.10	.20	.16	.39	.82	
6. Opportunity cost	.81-.95	.91	.76	-.19	-.18	-.01	-.14	.42	.87

Note: The boldfaced numbers in the diagonal row are square roots of the average variance extracted.

Table 1. Reliability and Validity

5.2 Structural Model

The results showed that PNGA had significant positive effect on solver satisfaction ($\beta=0.71$, $p < 0.01$), supporting **H1**. The R-square explained by PNGA was .51. The results also supported the significant effects of extrinsic benefit ($\beta=0.31$, $p < 0.01$), intrinsic benefit ($\beta=0.49$, $p < 0.01$), and opportunity cost ($\beta=-0.18$, $p < 0.01$), but insignificant effect of actual cost ($\beta=0.08$, $p > 0.1$) on PNGA. Thereby, **H2**, **H3**, **H5** were supported, while **H4** was not supported. The R-square explained by these factors was .38. The results also showed that $\chi^2/d.f.=2.36$, GFI=.84, AGFI=.80, NFI=.92, NNFI=.94, CFI=.95 and RMSEA=.082, indicating good fit measures for the structural model.

According to Baron and Kenny (1986), mediation effect can be tested by comparing two models: the model with only direct effects (model I), and the model with both direct and indirect effects (model II). The results showed that extrinsic and intrinsic benefits as well as opportunity cost had significant effects on satisfaction ($\beta=0.18$, $t=2.76$; $\beta=0.42$, $t=5.52$; $\beta=-0.16$, $t=-2.33$, respectively). However, actual cost had no significant direct effect on satisfaction ($\beta=0$, $t=-0.03$), which ruled out actual cost from the remaining mediation analysis. In model II, extrinsic benefit, intrinsic benefit and opportunity cost significantly influence PNGA ($\beta=0.31$, $t=3.40$; $\beta=0.48$, $t=6.13$; $\beta=-0.17$, $t=-2.60$, respectively) but insignificantly influence satisfaction ($\beta=0.01$, $t=0.15$; $\beta=0.09$, $t=1.26$; $\beta=-0.04$, $t=-0.64$, respectively), suggesting the mediating effect of PNGA.

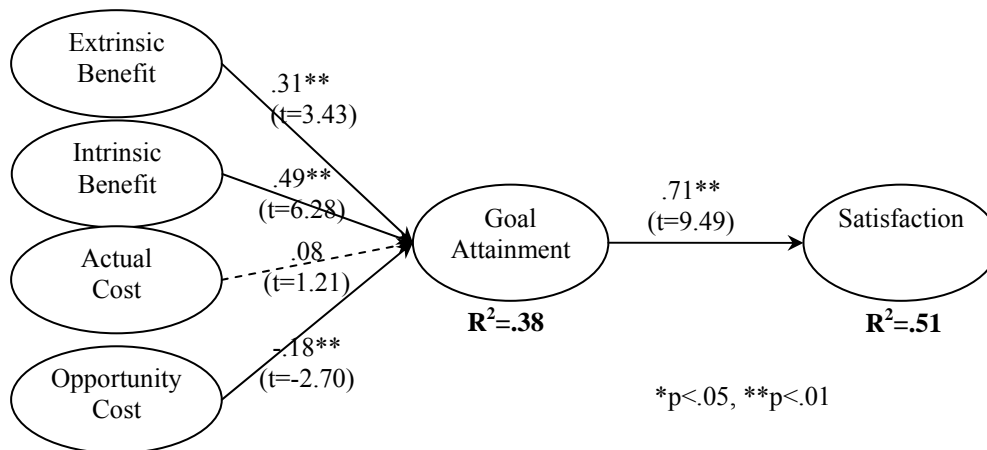


Figure 2. LISREL Results

To examine the different effects of actual cost and opportunity cost on PNGA, we employ the constraint test as suggested by Byrne (1998). In the first step, the proposed research model is fitted (Model I). In the second step, the structural paths of actual cost and opportunity cost to PNGA are set as equal (Model IV). If the goodness of fit of the constrained model significantly becomes worse, we can assume that these two antecedents are of unequal effect on PNGA. The results showed that when the structural paths were constrained, the Chi-squares increased from 389.74 to 392.80 with an increase of degree of freedom 1, i.e., $\Delta \chi^2=3.06$, $\Delta df=1$, $p=.08$, marginally supporting **H6**.

6 DISCUSSIONS

6.1 Theoretical Implications

This study contributes to existent literature in three aspects. **First**, to our best knowledge, this is the first study theorizing the knowledge sharing behavior of solvers in the TVC context. Most prior studies on knowledge sharing in virtual communities are conducted in the RVC context where knowledge is considered as a public good, and knowledge exchange as a social exchange activity. In this context, most prior studies stress on the roles of social factors and motivators (e.g., perceived benefits), but the cost issue is rarely addressed. However, as we elaborated earlier in the paper, the distinctions between TVCs and RVCs require use of an alternative theoretical angle to determine factors affecting participants' satisfaction with their knowledge sharing behavior. In this regard, our study contributes by using goal attainment theory to identify important factors related to not only benefits but also costs as the major sources of solver satisfaction with their knowledge sharing behavior.

Second, this study advances theoretical understanding of perceived costs by including opportunity cost as an important component of cost. We differentiate two types of cost (actual vs. opportunity cost) and examine their respective role in shaping solver satisfaction. Although the concept of opportunity cost is widely used in economic research (McConnell & Brue 2005) under the research context of organizational investment decision making, it is rarely discussed in knowledge sharing. TVC provides a suitable context for us to examine the role of opportunity cost regarding knowledge exchange as an economic exchange activity. Since opportunity cost, compared to actual cost, better capture the cost concept, when opportunity cost is considered, actual cost's effects on PNGA and satisfaction become insignificant.

Third, this study is among the few studies that establish perceived net gain attainment (PNGA) between benefits and costs as the mediator between perceived benefits, perceived costs and satisfaction (Briggs et al. 2006; Reinig 2003) in TVC context. It has meaningful theoretical implications for figuring out these mediation effects, since it reveals that before benefit and cost

perceptions influence satisfaction, an overall balance or tradeoff between benefits and costs has to be formed firstly. It means that neither benefits nor costs are sufficient to predict satisfaction, and an overall cognitive appraisal integrating both benefits and costs is a necessary mediator between sub-cognitive appraisals (e.g., benefits and costs) and emotional response (e.g., satisfaction). Recognizing the mediating role of PNGA contributes to prior understanding about satisfaction by revealing the underlying mechanism about how perceived benefits and costs influence satisfaction.

6.2 Practical Implications

Several practical implications can be derived from this study. With respect to seekers, there are two major implications. **First**, seekers should pay attention to the fit between task rewards and resources needed to fulfill the tasks. Because the effects of benefits and costs on satisfaction are fully mediated by PNGA, whether task rewards are fit with costs become a criterion for solvers to make decision on whether or not to participate in online tasks. **Second**, when assessing costs, seekers should recognize the individual difference. The results show that opportunity cost rather than actual cost influences PNGA and satisfaction, indicating that opportunity cost is better measure than actual cost to capture the cost perception. Since actual cost is easy to be identified while opportunity cost varies across individuals, the assessment of opportunity cost calls for seekers' recognition of potential solvers who will participate in the tasks. For example, the seekers who want to attain a Logo design may have different requirements for quality. High quality Logo may be designed only by solvers with high expertise, while low quality Logo can be designed by solvers with high or low expertise. However, the opportunity cost of the same design task is different for solvers with low or high expertise: the opportunity cost for solvers with high expertise should be higher because participating in the task has high value forgone. Therefore, if a seeker wants to get a high quality product, s/he should provide rewards that are contingent with the opportunity cost of solvers with high expertise.

6.3 Limitations and Future Research

Despite valuable implications obtained from the results, there are some limitations of this study. **First**, the study focuses on IT-relevant tasks, such as website design, programming, and Logo design and so on. However, there are various task types on TVC websites. Besides IT-relevant tasks, tasks relevant to business strategic plan, translation, and writing are also available on the website. It still calls for future investigation to examine the generalizability of the results. **Second**, the study was conducted in a specific TVC website in China. However, prior studies on culture postulate that individuals with different cultural background have different behavioral motivations (Hofstede 1980). Therefore, the effects of extrinsic and intrinsic benefit on PNGA and satisfaction may vary across countries with different culture. Future studies should pay attention to the cross-culture issue and compare the results in different cultural contexts based on our proposed research model.

7 CONCLUSION

As an early study on knowledge sharing behavior in the TVC context, this paper establishes the distinctions between RVCs and TVCs, and provides a fresh understanding about solver satisfaction by using goal attainment theory. Regarding that knowledge exchange has been transformed from a social exchange activity to an economic exchange activity, the influential factors in the TVC context are also different from those in the RVC context. Specifically, perceived benefits still play an important role, while perceived costs also become no longer negligible in TVCs. Further, PNGA which is regarded as a tradeoff between benefits and costs is confirmed to be a necessary mediator linking perceived benefits, perceived costs, and solver satisfaction. This study contributes to theories by extending prior understanding on knowledge sharing in RVCs to TVCs, and theorizing the important roles of cost and PNGA in this new context. Practitioners, such as seekers and TVC websites, can learn from this study in order to improve their practical activities. For example, seekers can pay attention to the fit between rewards and costs when pricing tasks and TVC websites also can provide tools to help seekers to achieve this fit.

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