

ACTIVE PARTICIPATION IN PROBLEM SOLVING VIRTUAL COMMUNITIES: A LEARNING PERSPECTIVE

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Abstract

Active participation of members is considered essential to the success of virtual communities. We incorporated the Adaptive Structuration Theory and Expectancy-Value Theory to propose a conceptual model in explaining active participation in problem solving virtual communities from a learning perspective. In this model, learning orientation and learning expectancy were identified as predictors of active participation according to Expectancy-Value Theory. We further analyzed the influence of structural feature (community adaptivity) and structural spirits (leadership and conflict management) based on Adaptive Structuration Theory and suggested that they would affect active participation through learning expectancy. The theoretical model presented in this article provided a fresh perspective on problem solving virtual community and we hope the findings would suggest important implications for the design and management of problem solving virtual communities.

Keywords: Problem solving virtual communities, learning, adaptive structuration theory, expectancy-value theory.

1 INTRODUCTION

Problem solving is the process of devoting effort to reduce the difference between the current state and the goal state and achieve the goal (Schunk 2004). Problem solving virtual communities (PSVCs) are those virtual communities dedicated into solving problems in certain areas through collaborative network. They are also known as virtual communities of practice (Ardichvili et al. 2003), electronic networks of practice (Wasko and Faraj 2005) and field support system (Lakhani and von Hippel 2003). Problems under discussion include medical issues (e.g. <http://www.thedoctorslounge.net/>), programming issues (e.g. <http://www.experts-exchange.com/>), and pedagogical issues (e.g. <http://www.schoolhistory.co.uk/forum/>). Typically, PSVCs are characterized as open, large-scale, voluntary and responsive, and take the form of publicly accessible discussion forums. In PSVCs, the solutions are usually generated by members after interactions and discussions.

PSVCs flourish as an effective and efficient means for knowledge sharing. In PSVCs, members start new threads when they seek solutions for their problems. Then, all members can access the thread and those who are able to and are willing to answer the question can provide answers or solutions. Different or even contradictory answers and solutions may emerge, followed by extensive discussions. As a result, active participation, which is defined as posting and responding regularly to messages and other electronic media such as email and instant messaging in the PSVC, is essential to problem solving and hence to the growth of PSVCs.

However, despite the enormous number of participants, interesting findings show that lurkers, a term that refers to individuals whose primary behavior is that of observing, outnumber active participants dramatically (Rafaeli et al. 2004). Various studies have been carried out to examine motivations behind active participation, especially voluntary contributions. By incorporating self-interest perspective and public-good perspective, researchers proposed a comprehensive set of motivations for knowledge contribution in PSVCs (Yu et al. 2007). Empirical studies have examined the relationships between contribution behavior in PSVCs and most of the motivations except learning motive (Wasko and Faraj 2005). This is partly because learning motive is not salient in certain virtual communities such as community of transactions and community of fantasy. However, in the context PSVCs, learning motive is likely to play an essential role because PSVC can be seen as network model of knowledge management systems. Hence, this study applies expectancy-value theory to focus on the learning motive in active participation in PSVCs.

Furthermore, practitioners of virtual communities develop various mechanisms in hopes of encouraging members' participation and contribution. Nevertheless, due to the lack of theoretical foundation, it is not clear how these mechanisms actually affect members' contribution behavior. Hence, this study proposes structural features which represent the resources that agents can use of the advanced information technology, and structural spirits which reflect the rules to use these resources, as external factors based on adaptive structuration theory.

The rest of the paper is organized as follows. The theoretical bases are discussed in the second section. A conceptual model is then presented, followed by corresponding propositions. This paper concludes with a discussion of the theoretical and practical implications of this model and future research avenues are directed.

2 THEORETICAL FOUNDATION

This study proposes a theoretical model to explain the relationships between characteristics of PSVCs and their members' active participation through learning motivation. Expectancy-value theory explains two predictors of active participation motivated by learning goal: expectancy of learning motive (learning expectancy) and value of learning motive (learning orientation). We utilize adaptive

structuration theory to identify two groups of antecedents of learning motivation: structural features and structural spirits. We further applied expectancy-value theory to distinguish as predictors of active participation.

2.1 Adaptive Structuration Theory

Adaptive Structuration Theory roots in structuration theory which emphasizes the mutual influence of structures and agents in social systems (Giddens 1984). Structure is “both medium and outcome of the reproduction of practices”, and a continuous ongoing process rather than a static property of social systems. Agents are embedded in the structures and draw upon the rules and resources of the structures. Structuration is consists of conditions governing the continuity or transformation of structures, and therefore the reproduction of systems. Structuration theory is very much at the philosophical and abstract level which is difficult to be applied to IS research.

Adaptive Structuration Theory, which is proposed by DeSanctis and Poole (1994), employs a social technology perspective that reconcile the conflict between decision-making school and institutional school. While decision-making school takes the technology-determinism view, institutional school believe that social factors play a more important role in every aspects of social progress such as adoption and diffusion of new technology. Adaptive Structuration Theory provides an applicable model for empirical studies in IS discipline. It proposes two ways in describing structures provided by an advanced information technology: features which are the specific capabilities of the system such as anonymous recording or codification mechanism, and spirit which is the “general intent with regard to values and goals underlying a given set of structural features”. Adaptive Structuration Theory also identifies several concrete concepts for features and spirits. However, some of them are not suitable for the PSVC context such as efficiency and decision process because in a voluntary community, there is no time pressure for solutions and members make decision individually.

To achieve parsimony, we choose community adaptivity as a conceptualization of structural features in PSVCs. Community adaptivity is defined as the dynamic capability of system to fit individual usage of members. It incorporates restrictiveness and comprehensiveness. In the Adaptive Structuration Theory, five spirits are suggested which are decision process, leadership, efficiency, conflict management and atmosphere. Decision process and efficiency are not applicable in PSVCs' context. Because problem solving process differs from the decision process in a group decision support system and most of times there is no time pressure. Atmosphere refers to ‘the relative formality or informal nature of interaction’. Since interactions in PSVCs take all forms from informal to formal, atmosphere does not play a role as spirit of social structures in PSVCs. Leadership and conflict management are representative for the spirits in PSVCs because the public discussion environment requires leaders and the process of problem solving always goes with different opinions which requires conflict management.

Adaptive Structuration Theory argues that both structural features and spirits would influence appropriation which refers to the manner in which structures are adapted by a group for its own use through structuration, wherein structures are continuously produced and reproduced (or confirmed) as the group's interaction process occurs (Gopal et al. 1992/93). One important aspect of appropriation is attitudes toward appropriation which is conceptualized as usefulness. Empirical studies support the relationship between structures of advanced information technology and usefulness. In the context of PSVC, learning serves as the key component of the system. As a result, learning expectancy, which refers to the extent to which members believe that they can learn by active participation in PSVCs, can be an adequate conceptualization of attitudes toward appropriation.

Although Adaptive Structuration Theory is proposed as a general model for studying the structures emerge from interactions between people and advanced technologies, most of the empirical studies focus on the context of Group Decision Support Systems (GDSS) and we hope this application would expand the applicability of Adaptive Structuration Theory.

2.2 Expectancy-value theory and Learning motive

Expectancy-value theory (Weiner 1992) explains human motivation to a goal as a combination of (a) expectancy, the degree to which people expect to succeed the goal, and (b) value, the degree to which they value the goal. Hence, the greater the belief that the goal will be attained and the higher the incentive value of that goal, the greater the tendency to engage in the appropriate instrumental behavior. This theory has been widely applied in a variety of contexts. For example, Lynd-Stevenson (1999) applied expectancy-value theory in employment studies. In that study, it is hypothesized that an individual with higher expectation of getting a job (job expectancy) and higher valuation of obtaining a job (job importance) would be highly motivated to get a job (job-seeking behavior).

Learning motive in volunteering depicts the belief that volunteering helps individuals to learn about the cause and to explore one's own strength (Clary et al. 1998). While in the context of active participation in PSVCs, it refers to the belief that knowledge contribution would be beneficial to self-knowledge gaining through learning from others and critical thinking. It may be confusing how the "give-out" act of contribution equal to the "take-in" act of learning. This is because the learning motive actually explains the contribution behavior while the contributors anticipate learning something new in the near future in a problem solving process.

Problem solving process can be complicated. The Information Process Model (Newell and Simon 1972) explained in detail how solutions are generated for complex task. In this model, a problem space consists of an initial state, a goal state and possible routes connecting the initial state and the goal state through subgoals. The problem solver defines the initial state and the goal state of the problem and then performs operations to reduce the discrepancy between them. This model revealed that complex task can be divided into several small tasks, and finding a solution for complex task can be achieved by achieving subgoals sequentially. Although the Information Process Model is proposed for single problem solvers, it also applied to collaborative environment where multiple problem solvers cooperate to seek solutions. Individually, they may not be able to provide direct methods to achieve ultimate goal, but they may provide solution to certain intermediary subgoals. By achieving certain subgoals, other contributors may provide solutions from subgoals to ultimate goal. This incremental process not only solves the problem but also helps these knowledge contributors learn. Participants also learn from explaining their ideas to others and develop skills in working collaboratively with others, providing feedback and evaluating their own learning (Boud et al. 2001).

Exploratory studies have shown that learning performs as a motive to contribute knowledge in virtual communities. Wasko and Faraj (2000) found that people participated in computer-related Usenet newsgroups to share information and knowledge because this kept them up-to-date with current ideas and innovations. Studies on open source projects also explain that participation allows developers to gain market-required technical skills and developers may perceive the participation as an investment in training (Hann et al. 2002). Since learning serves as a motive in active participation in PSVCs, we can apply the expectancy-value theory to propose the value of learning and expectancy of learning as predictors of active participation.

3 THEORETICAL MODEL

In this study, we incorporate Adaptive Structuration Theory and expectancy-value theory to explain the active participation in PSVC context from a learning perspective. Expectancy-value theory reveals two antecedents of active participation: learning orientation and learning expectancy. Adaptive Structuration Theory further provides predictors of learning expectancy which are structural features and structural spirits. Figure 1 illustrates this theoretical model.

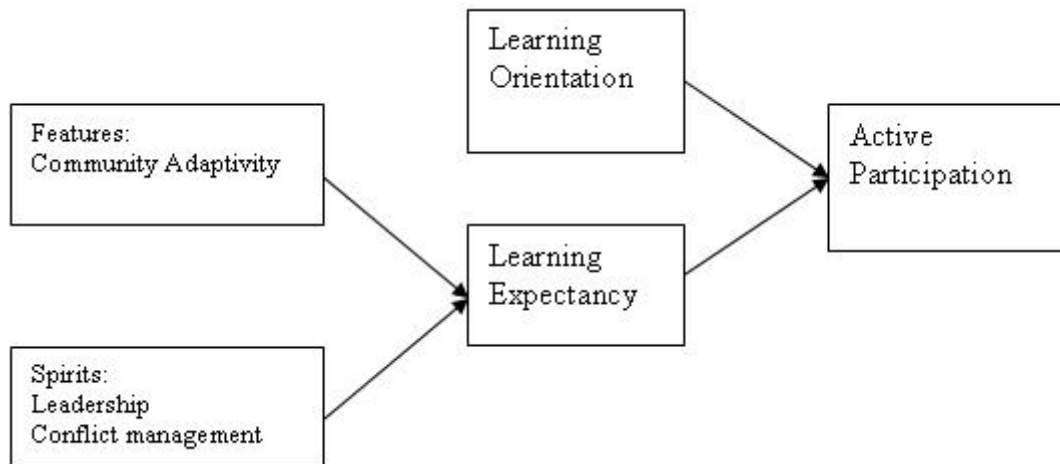


Figure 1. Theoretical Model

3.1 Features

Structural features are “the specific types of rules and resources, or capabilities, offered by the system”(DeSanctis and Poole 1994). In the original model of Adaptive Structuration Theory, three features are identified which are restrictiveness, comprehensiveness and level of sophistication. Restrictiveness refers to the level of restrains imposed on users by the system. The more restrictive the technology, the less possible actions users may take by using this technology. Comprehensiveness is the richness of the structural feature set of the system. A more comprehensive system will provide greater number and variety of features to users. In the context of virtual communities, community adaptivity is proposed that incorporates both concepts. Community adaptivity refers to the ability of systems to change the rules, structures and contents of a virtual community. More specifically, it includes the changing of interface design and features and customization of personal contents (Teo et al. 2003). The higher community adaptivity means less restrictive and more comprehensive which leads to more flexible system features. It is argued that flexible system features that facilitate navigation and information retrieval will affect the perception of usefulness (Culnan 1984). Empirical study has supported that community adaptivity is positively related with perceived usefulness of virtual communities (Teo et al. 2003). In our research context, the usefulness of a PSVC is the likelihood that members can learn from participation in the PSVC. From the members’ perspective, learning expectancy represents their perceived usefulness of PSVCs. As a result, it is reasonable to argue that community adaptivity is positively related with learning expectancy.

However, level of sophistication is restricted to group decision support system which is the context of the original Adaptive Structuration Theory. In the Adaptive Structuration Theory, three levels are identified, e.g. level 2 systems provide decision modeling which is not applicable in the context of PSVCs. As a result, level of sophistication does not applied as a structural feature in this study. Hence, we propose that:

P1: Members with higher perceived community adaptivity of PSVCs will have higher learning expectancy of that PSVC.

3.2 Spirits

Spirit is another form of representation of social structures of an advanced information technology. It is defined as the general intent with regard to values and goals underlying a given set of structural features (DeSanctis and Poole 1994). As discussed in the theoretical foundation part, we only investigate the leadership and conflict management as spirits in PSVCs.

Leadership and conflict management are related to the management of PSVCs and they reflect the spirits of social structures of PSVCs. Empirical study reveals that successful virtual community management teams ensure that most of the community members that are affected by community rules are able to participate in modifying these rules by contributing to the virtual community management team, which leads to higher participation (Panhoff 2007). This means that when a virtual community is managed in a more autonomy way, it is more welcomed and members will more actively participate in the virtual community. In the context of virtual community of interests, it is argued that active site management is essential for the success of virtual communities because it facilitates intermediation and maintains the rules. However, too much site management may destroy the trust and relationship building among members, and lead to polarization (Rothaermel and Sugiyama 2001). We can infer that when the social structures deviate from the appropriate level, either too little or too much, there will be a need for correction (Brown and Eisenhardt 1998).

Both leadership and conflict management reflect the self-correction mechanisms, which can direct deviations back to the normal track. An autonomic leadership means that leaders are selected by other members through certain procedures while an arbitrary leadership means that leaders are picked by system administrators. In an autonomic leadership, the leaders perform to maintain the interest of the majority of members because once the leader act for his other self-interests, the rest can reelect leaders according to certain procedures, while an arbitrary leadership lacks such self-correct function. Since in PSVCs, the main interest of members is problem solving and learning from the process, an autonomic leadership is more appropriate for such interest. As a result, members feel more likely to learn from an autonomic leadership situation than that from an arbitrary leadership situation.

Similarly, an autonomic conflict management allows different viewpoints or even opposite opinions while an arbitrary conflict management may forbid different viewpoints and even delete postings from opposite viewpoints. During a discussion in PSVCs, different or even contradictory ideas often emerge. Under an autonomic conflict management, different viewpoints are presented and discrepancies are gradually minimized through ordered interactions. If the discrepancy is too large to eliminate, management will emphasize conflict awareness and prevent fierce arguments or flaming. However, in an arbitrary conflict management situation, the opposing viewpoint may be brutally deleted and forbidden which results polarization in discussion. As a result, it is more likely to learn in an autonomic conflict management situation than that from an arbitrary conflict management situation. Hence, we propose that:

P2a: Members will have higher learning expectancy under an autonomic leadership than under an arbitrary leadership.

P2b: Members will have higher learning expectancy in an autonomic conflict management PSVC than in an arbitrary conflict management PSVC.

3.3 Learning Orientation

According to the educational psychology literature, there are two types of dispositional goal orientation (Dweck and Leggett 1988). One is learning orientation which refers to the belief that the competence of individuals can be improved while the other is performance orientation which refers to the belief that competence of individuals is not likely to change. Learning orientation of members represents their value of learning in PSVCs. Individuals with a strong learning orientation exhibit persistence and escalating effort in solution-oriented self-instruction, as well as enjoyment of the challenge (Tan and Zhao 2003). The empirical study of VandeWalle and Cummings (1997) showed that learning orientation had a positive influence on feedback seeking frequency in the context of organization, which meant that individuals with higher learning orientation would be more active participators. Empirical studies also support the positive relationship between learning orientation and willingness to inquire for technical information (Tan and Zhao 2003) or knowledge seeking behavior (Gray and Meister 2004). In the context of PSVCs, members with higher learning orientation believe

that learning can improve their competence and they are more likely to actively participate in the discussions. Hence, we propose that:

P3: Members with higher learning orientation will more actively participate in PSVCs.

3.4 Learning Expectancy

According to the expectancy-value theory, the other important part of motivation toward a goal is the likelihood of achieving that goal, which is labeled as expectancy. In the context of PSVC, learning expectancy refers to the extent to which members believe that they can learn by active participation in PSVCs. When the members of PSVCs have higher learning expectancy, it means that they feel the possibility of learning through active participation is higher, and as a result, they will more likely to actively participate in PSVCs. Hence, we propose that:

P4: Members with higher learning expectancy will more actively participate in PSVCs.

3.5 Dependent Variable: Active participation

Here in this study, we use active participation instead of contribution and participation which are commonly investigated as dependent variable in previous studies (Bock et al. 2005; Kankanhalli et al. 2005). Because contributors are often mistaken as problem solvers and participation are not clear to distinguish from those lurkers who are mainly observing. We define active participation in a topic as “observing most, if not the whole process while at least contribute one posting”.

It is important to study active participation in the context of PSVCs. First, these active members contribute to the problem solving process and collectively form problem solver. Hence, they are the key value of the PSVCs and worth noticing. Second, they are the glue of virtual communities. Active participation attracts lurkers who outnumber active participants dramatically, and influences lurkers to more active engaged in PSVCs and gradually turns them into active members.

4 CONCLUSION

This study is a good attempt of applying Adaptive Structuration Theory into the new context of PSVCs. We proposed a parsimonious model combining Adaptive Structuration Theory with Expectancy-value theory to explain active participation in PSVCs from a learning perspective. Since previous studies stress individual motivations to knowledge contribution such as reciprocity and knowledge efficacy (Bock et al. 2005; Kankanhalli et al. 2005), this study provided an additional learning perspective that enriched current studies on active participation in virtual communities.

For PSVC administrators, our research model exhibits a few practical implications to encourage active participation. Administrators would be better to provide more adaptive functions such as search facilities, dynamic content generation, and personalized favorite topics. Meanwhile, they can also adjust their leadership and conflict management to more autonomic styles. By doing so, members will feel more involved in the PSVCs and active participations are encouraged through increased learning expectancy. Future studies could carry out empirical testing on this conceptual model. Both qualitative and quantitative methodologies can be applied. For qualitative study, we can arrange interviews from a certain PSVC to study evolution of both structural features and spirits, and their effects on learning expectancy and active participation. For quantitative study, a well designed Internet survey can be carried out to verify the model. Items measuring these constructs need to be designed in a rigorous way. Both reliability and validity of these items need to be ensured through process suggested by Moore and Benbasat (1992). PLS method can be used to analyse the data and verify this model.

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