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User Satisfaction with Virtual Social Community: The Case of Bulletin Board Systems

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Abstract

Building upon expectation confirmation theory and elaboration likelihood model, this study proposed and empirically tested a research model of user satisfaction with virtual social community. An online questionnaire was posted in the Bulletin Board Systems of a local university in Mainland China. A total of 240 online questionnaires were collected, and the data was analyzed using partial least squares. The research model provided over 70 percent of variance explained in user satisfaction with virtual social community. Relevance and comprehensiveness of messages, and disconfirmations of relevance and accuracy of messages are found statistically significant. The dimensions of perceived source credibility (including source expertise and source trustworthiness) are not found significant, but their disconfirmations are found statistically significant. Implications of this study are noteworthy for both researchers and practitioners.

Keywords: Bulletin Board Systems, Satisfaction, Social Computing, Virtual Community

1. Introduction

The advance and proliferation of the Internet provides an infrastructure for communication and information exchange and overcomes geographic, organizational, or temporal boundaries. This new accessibility significantly expands the membership for many kinds of community, including those who are not IT experts.

The Bulletin Board System (BBS), one of the computer-mediated communication technologies, offers a virtual social community for people who have common interests or shared values to interact and reinforce their identities regardless of geographical separation (Wang and Chen 2004). There are many bulletin board systems for business in the world, but very few for education except in Mainland China. BBS has become the main form of virtual community among students of the educational institutions in

Mainland China since the first Chinese BBS started its operation in the educational Website in 1995. BBS provides a free virtual social space where users can interact, discuss, and share among each other.

Based on the work by Rogers (1995), Fishbein and Ajzen (1975) and others, past information systems research has largely sought to explore how users come to adopt a particular information system (IS). Similarly, research in virtual social community and computer-mediated communication technologies primarily focused on initial adoption. However, researchers (Bhattacharjee 2001; Cheung and Limayem 2005; Davis and Venkatesh 2004) argued that IS adoption is just the first step toward overall IS success. An IS implementation can truly be considered as “success” when users have moved beyond initial adoption and use the IS on a continued basis. Similarly, we believe that the success of virtual social community depend primarily on whether members are willing to continue to participate and share with others. In order to better understand the sustainability of virtual social community in general, and the sustainability of the BBS in particular, there is a need to propose a research model specific to post-adoption of the virtual social community. User satisfaction has been widely adopted as an important determinant of IS success and IS use (DeLone and McLean 1992; DeLone and McLean 2003; Zviran and Erlich 2003). In this study, the primary focus is on user satisfaction with virtual social community.

The paper begins with the theoretical background, research model and hypotheses. We then describe the research design and methodology. After discussing the findings, the paper highlights implications for both research and practice.

2. Theoretical Background

2.1 User Satisfaction

Satisfaction has been a core research topic of numerous studies from diverse theoretical perspectives. In the area of IS, researchers defined and studied user satisfaction broadly in two different ways. Some studies (e.g. Bailey and Pearson 1983; Doll and Torkzadeh 1988) construed satisfaction as an outcome resulting from the emotional response to the information/system attributes. These studies focused primarily on the factors affecting the formation of user satisfaction. In comparison, other studies (e.g. Bhattacharjee 2001; McKinney et al. 2002; Susarla et al. 2003), delineated user satisfaction based on the perceptual, evaluative, and psychological processes. These studies incorporating the expectation confirmation theory provided insights to user psychology and explained the processes of user satisfaction formation.

2.2 Expectation Confirmation Theory

The expectation-confirmation theory (ECT) has been the most widely adopted approach in research and managerial practice for understanding consumer satisfaction. Oliver (1976) was the pioneer to bring the adaptation-level theory into the consumer satisfaction research and explained the satisfaction formation in terms of expectation, performance, and disconfirmation. Expectations create a frame of reference as a comparative judgment, where a cognitive comparison of pre-purchase expectation level with product or service

performance (pre-usage expectation level with virtual social community) is then executed. If performance exceeds expectation (a positive disconfirmation), the user becomes satisfied. On the other hand, if performance falls below expectation (a negative disconfirmation), the user becomes dissatisfied.

2.3 Elaboration Likelihood Model

Elaboration Likelihood Model (ELM) suggests that the central and peripheral routes are two underlying elaboration dimension. The central route occurs when recipients carefully consider the messages themselves, whereas the peripheral route occurs when recipients use other simple decision rules to evaluate the messages. Sussman and Siegal (2003) built upon the ELM and proposed a model of information adoption. The model suggested that the quality of argument is the central route where message recipients cognitively elaborate on, whilst the peripheral cues are informational indicators that people use to assess content other than the content itself. The impacts of these two constructs in turn affect recipients' perception about information usefulness, and information usefulness is the critical and directly determinant of information adoption.

3. Research Model

User satisfaction is defined as an overall affective evaluation a user has regarding his or her experience related with the information systems. In this study, user satisfaction with virtual social community is examined based on Elaboration Likelihood Model (ELM) and Expectation Confirmation Theory (ECT).

Building upon the Elaboration Likelihood Model, it is believed that user evaluates virtual social community based on the quality of information/messages (the quality of argument), as well as the source of the messages (source credibility). Expectation Confirmation Theory further suggests that user satisfaction is a function of perception, expectation, and disconfirmation. Thus, user satisfaction is expected to be a function of perceived quality of argument, perceived source credibility, disconfirmation of quality of argument, as well as disconfirmation of source credibility in the current study. Figure 1 depicts the research model of user satisfaction with virtual social community.

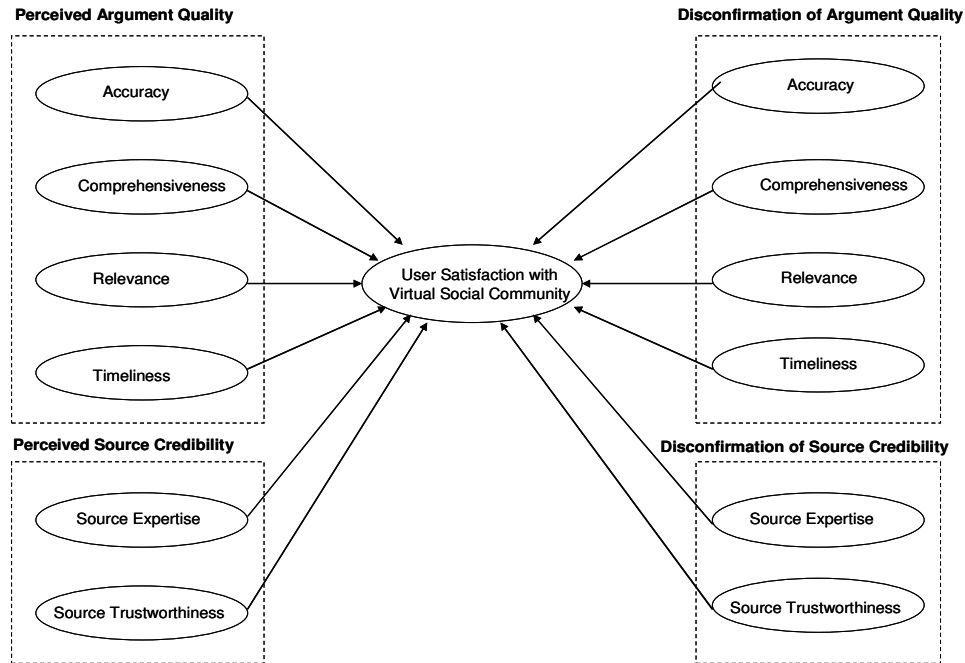


Figure 1. The Research Model

3.1 Quality of Argument

In the current study of user satisfaction with virtual social community, it is believed that argument quality would share similar attributes as information quality. Thus, four commonly used dimensions of information quality, including *accuracy*, *comprehensiveness*, *relevance*, and *timeliness* Lee et al. (2002), are included in the research model. High information quality has long been found associated with system use, user satisfaction, and net benefits (DeLone and McLean 1992; DeLone and McLean 2003). Moreover, ECT suggests that user satisfaction is a function of performance, expectation, and confirmation. Apart from the direct impact of the argument quality on user satisfaction, it is expected that the disconfirmation of argument quality would have significant impacts on user satisfaction with virtual social community. The hypotheses of these four dimensions will be demonstrated in the next four paragraphs.

Accuracy of messages is concerned with the reliability of messages in the BBSes. According to the media richness theory Daft and Lengel (1986), the quality, accuracy, and reliability of the information exchanged are important across a medium.

Hypothesis 1: Accuracy of messages has significant effect on user satisfaction with bulletin board systems

Hypothesis 2: Disconfirmation of accuracy of messages has significant effect on user satisfaction with bulletin board systems

Comprehensiveness of messages refers to the completeness of messages in the BBSes. Sullivan (1999) suggested that the more detailed the information, the higher the breadth

of user categories and user-orientation of that website, and thus results in a greater likelihood of user acquisition and retention.

Hypothesis 3: *Comprehensiveness of messages has significant effect on user satisfaction with bulletin board systems*

Hypothesis 4: *Disconfirmation of comprehensiveness of messages has significant effect on user satisfaction with bulletin board systems*

Relevance of messages is important as most Internet users are conscious of their time. Madu and Madu (2002) urged that Internet users rarely read web pages in detail but rather scan the pages to find the information they needed. Users want to find the information that they want quickly and with little effort (Nah and Davis 2002). It is therefore important to deliver relevant information on the website.

Hypothesis 5: *Relevance of messages has significant effect on user satisfaction with bulletin board systems*

Hypothesis 6: *Disconfirmation of relevance of messages has significant effect on user satisfaction with bulletin board systems*

Timeliness of messages concerns about whether the messages in the BBSes is up-to-dated. Madu and Madu (2002) urged that when the website is not updated promptly, the website cannot deliver the expected performance and therefore provide no added value to users.

Hypothesis 7: *Timeliness of messages has significant effect on user satisfaction with bulletin board systems*

Hypothesis 8: *Disconfirmation of timeliness of messages has significant effect on user satisfaction with bulletin board systems*

3.2 Source Credibility

Elaboration Likelihood Model suggests that information processing involves a complex mixture of both central and peripheral route processes. Apart from the central cues, such as the quality of argument, the model suggests that there is a need to consider the peripheral cues in understanding user information processing. Indeed Sussman and Siegal (2003) argued that the peripheral cues are of particular important in the context of internet and computer-mediated communication technologies. Past research suggests that individuals following the peripheral route can be influenced by the source's attractiveness, likeability, and credibility. In the current study, source expertise and source trustworthiness are the two key dimensions of source credibility for in-depth investigation. Furthermore, the disconfirmation of source expertise and source trustworthiness are also have significant effects on satisfaction. Hence:

Hypothesis 9: *Source expertise has significant effect on user satisfaction with bulletin board systems*

Hypothesis 10: *Source trustworthiness has significant effect on user satisfaction with bulletin board systems*

Hypothesis 11: Disconfirmation of source expertise has significant effect on user satisfaction with bulletin board systems

Hypothesis 12: Disconfirmation of source trustworthiness has significant effect on user satisfaction with bulletin board systems

4. Research Design

This study aims at investigating user satisfaction with virtual social community. The BBS of a local university in Mainland China was chosen for investigation.

4.1 Data Collection

A self-administrative online questionnaire was posted in three sub-categories for information exchange of the BBS, with the permission of the BBS administrators. Online survey design has the advantages of speeding up large amount of data collection and allowing for electronic data entry (Parasuraman and Zinkhan 2002). In addition, it helps reduce response bias (Boyer et al. 2002). Participation in this study was entirely voluntary. To encourage more participation, incentives of USB memory drives were offered as lucky draw prizes. A total of 240 usable questionnaires were collected in two-week time. Among the respondents, 77% are males and 23% are female. This ratio is similar to the ratio of male and female students of the university. A majority of the respondents aged between 21 and 25 and had a bachelor degree or above. They were also frequent and experienced users of the BBS, around 80% of them visited the BBS everyday and the average usage experience with the BBS was 3.4 years.

4.2 Measures

Appendix A shows the measures of this study. All the items had been validated in prior research and with modifications to fit this particular context of virtual social community. Measures for accuracy, comprehensiveness, relevance, and timeliness were borrowed from Lee et al. (2002). Measures for source likeability and source trustworthiness were borrowed from Sussman and Siegal (2003). Measures for disconfirmation and satisfaction were adopted from Bhattacharjee (2004) and Chin and Lee (2000).

5. Results

Both psychometric properties and model testing were examined using Partial Least Squares (PLS). The PLS procedure (Wold 1989) has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of non-normality and small to medium sample sizes. It allows one to both specify the relationships among the conceptual factors of interest and the measures underlying each construct, resulting in a simultaneous analysis of 1) how well the measures relate to each construct and 2) whether the hypothesized relationships at the theoretical level are empirically true.

Following the two-step analytical procedures (Hair et al. 1998), we first assess the measurement model, then the structural model. The rationale of this two-step approach is to ensure our conclusion on structural relationship drawn from a set of measurement instrument with desirable psychometric properties.

5.1 Assessment of the Measurement Model

Convergent validity indicates the extent to which the items of a scale that are theoretically related should be related in reality. A composite reliability of 0.70 or above and an average variance extracted of more than 0.50 are deemed acceptable (Fornell and Larcker 1987). Table 1 summarizes the factor loadings, composite reliability, and average variance extracted of the measures of the research model. All items have significant path loadings at the 0.01 level and fulfill the recommended levels of the composite reliability and average variance extracted.

| | Item Loading | Standard Error | t-statistics |
|---|--------------|----------------|--------------|
| Accuracy CR = 0.927 AVE = 0.809 | | | |
| ACC1 | 0.900 | 0.017 | 53.118 |
| ACC2 | 0.901 | 0.018 | 50.013 |
| ACC3 | 0.867 | 0.020 | 46.005 |
| Comprehensiveness CR = 0.940 AVE = 0.796 | | | |
| COMP1 | 0.885 | 0.016 | 55.474 |
| COMP2 | 0.909 | 0.014 | 65.244 |
| COMP3 | 0.918 | 0.012 | 80.002 |
| COMP4 | 0.855 | 0.027 | 31.615 |
| Relevance CR = 0.947 AVE = 0.855 | | | |
| RELE1 | 0.915 | 0.015 | 59.699 |
| RELE2 | 0.932 | 0.013 | 69.578 |
| RELE3 | 0.927 | 0.012 | 79.066 |
| Timeliness CR = 0.934 AVE = 0.825 | | | |
| TIME1 | 0.885 | 0.024 | 36.558 |
| TIME2 | 0.904 | 0.018 | 50.422 |
| TIME3 | 0.936 | 0.010 | 94.522 |
| Source Expertise CR = 0.915 AVE = 0.844 | | | |
| EXPERT1 | 0.917 | 0.014 | 67.704 |
| EXPERT2 | 0.920 | 0.014 | 66.145 |
| Source Trustworthiness CR = 0.935 AVE = 0.878 | | | |
| TRUST1 | 0.939 | 0.013 | 71.853 |
| TRUST2 | 0.935 | 0.014 | 65.493 |
| Disconfirmation-Accuracy CR = 0.913 AVE = 0.779 | | | |
| DACC1 | 0.860 | 0.030 | 28.528 |
| DACC2 | 0.925 | 0.013 | 71.838 |
| DACC3 | 0.861 | 0.030 | 29.127 |
| Disconfirmation-Comprehensiveness CR = 0.924 AVE = 0.753 | | | |
| DCOMP1 | 0.856 | 0.020 | 42.239 |
| DCOMP2 | 0.898 | 0.017 | 54.030 |
| DCOMP3 | 0.880 | 0.017 | 53.414 |
| DCOMP4 | 0.836 | 0.028 | 29.383 |
| Disconfirmation-Relevance CR = 0.923 AVE = 0.801 | | | |
| DRELE1 | 0.895 | 0.018 | 49.773 |
| DRELE2 | 0.917 | 0.015 | 62.863 |

| | | | |
|--|-------|-------|--------|
| DRELE3 | 0.872 | 0.026 | 33.716 |
| Disconfirmation-Timeliness CR = 0.921 AVE = 0.795 | | | |
| DTIME1 | 0.896 | 0.020 | 44.301 |
| DTIME2 | 0.907 | 0.020 | 45.354 |
| DTIME3 | 0.873 | 0.023 | 38.118 |
| Disconfirmation-Source Expertise CR = 0.919 AVE = 0.851 | | | |
| DEXPERT1 | 0.930 | 0.010 | 95.420 |
| DEXPERT2 | 0.914 | 0.017 | 54.973 |
| Disconfirmation-Source Trustworthiness CR = 0.908 AVE = 0.832 | | | |
| DTRUST1 | 0.904 | 0.022 | 41.690 |
| DTRUST2 | 0.921 | 0.014 | 66.773 |

Table 1: Psychometric Properties of Measures

Note: CR – Composite Reliability, AVE – Average Variance Extracted

Overall, these results provide empirical support for the reliability and convergent validity of the scales of the research model.

5.2 Assessment of the Structural Model

Figure 2 presents the results of our study with overall explanatory power, estimated path coefficients (all significant paths are indicated with an asterisk), and associated t-value of the paths. Tests of significance of all paths were performed using the bootstrap resampling procedure. As shown in Figure 2, the model explained 72.7% variance of user satisfaction with virtual social community. Relevance and comprehensiveness, and disconfirmations of relevance and accuracy of messages are found statistically significant. The dimensions of perceived source credibility (including source expertise and source trustworthiness) are not found significant, but disconfirmations of source expertise and source trustworthiness are found statistically significant at 99% significance level.

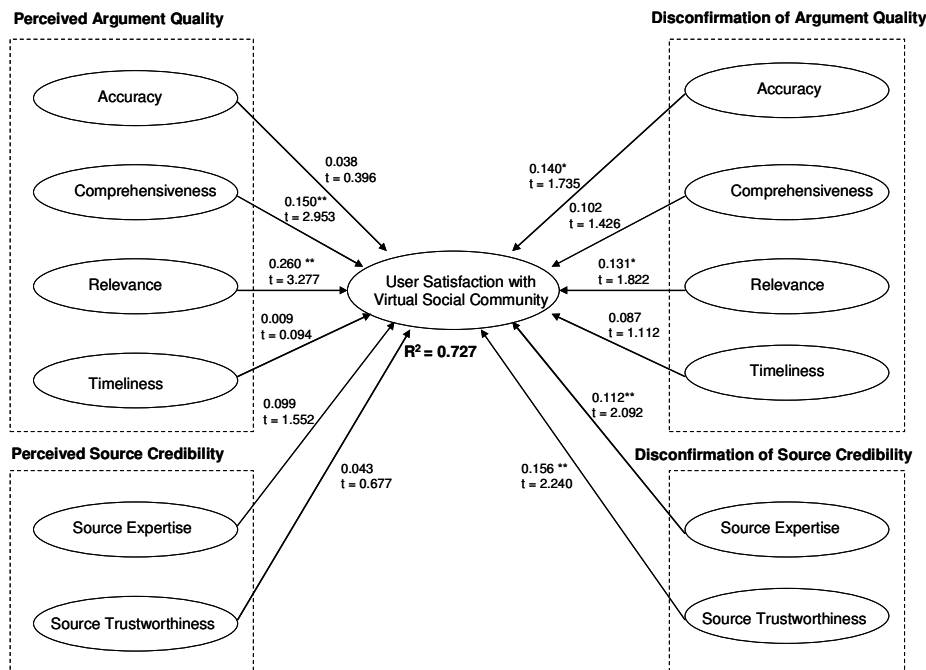


Figure 2: PLS Result

5.3 Discussions of the Results

The results presented in the section above provide powerful support for the theoretical model. The relevance of information is the most significant determinant of user satisfaction with virtual social community. In addition, comprehensiveness and the disconfirmation of relevance, accuracy, source expertise, and source trustworthiness all have significant but less salient effects on the dependent variable. In contrast, source expertise and source worthiness did not significant affect on user satisfaction with virtual communities. This may due to the characteristics of our research site. When people first adopt a virtual social community, they have no idea about the personal information of other users. Consequently, disconfirmation of source expertise and trustworthiness are much more important than their first expectation of these two constructs. The expectation and disconfirmation of information quality are both important determinants of user satisfaction with virtual communities. However, accuracy, timeliness, disconfirmation of timeliness and comprehensiveness are not confirmed by our results. Future research is needed to testify these.

6. Conclusion

This research addresses an important and intricate area in the virtual social community. Motivated by the need to better understand the drivers of user satisfaction with virtual social community (BBS), this research applied both ELM and ECT to develop a research model. The measurement model is confirmed with adequate psychometric properties of all measures. The structural model provides over 70 percent of variance explained in user satisfaction. This paper contributes to the conceptual and empirical understanding of user satisfaction with virtual social community.

6.1 Implications for Research

The main theoretical contribution of this research is that whilst past studies on virtual social community have focused largely on initial adoption and usage, this study moves forward and further identifies the factors that drive user satisfaction with virtual social community. Our research model explains user satisfaction by including direct variables (argument quality and source credibility) from the elaboration likelihood model, as well as their disconfirmations adopted from Expectation Confirmation Theory. The variables in the research model provide a significant proportion of variance of user satisfaction with virtual social community.

It is interesting to note that argument quality and source credibility play different roles in the formation of user satisfaction. The quality of argument remains as the central route where users cognitively elaborate on. Thus, the two dimensions of argument quality are found statistically significant in the research model. On the other hand, the direct impact of source credibility is not significant but their disconfirmation has significant effect on user satisfaction with virtual social community. This result suggests that there is a need to incorporate the expectation confirmation theory into the study of user satisfaction with virtual social community.

6.2 Implications for Practice

Understanding user satisfaction with virtual social community is particularly important because a high level of satisfaction is associated with several key outcomes (e.g., continued usage, positive word-of-mouth, and else). The analysis of this study implies that to increase user satisfaction with virtual social community, moderators of virtual community need to first understand that both the argument quality and the source credibility play different roles in enhancing user experience with the community.

The quality of argument, in particular, the relevance and comprehensiveness of messages have direct impacts on user satisfaction. The moderators of virtual community should identify and include a wide variety of areas in the virtual community for member discussion.

The disconfirmation of source credibility plays a critical role in determining user satisfaction with virtual community. The moderators should implement a comprehensive monitoring system so as to provide members with more references about the sources of messages. For instance, the virtual social community may provide a mechanism where people who have provided useful suggestions to other members are identified and informed that they have helped others. They may also provide a recognition mechanism, where they can get recognized for their expertise during their participation and contribution. Finally, the virtual social community may provide features that increase their familiarity with other users. For example, by giving them an option to post personal profile information.

In summary, this study provides new insight in understanding user satisfaction with virtual social community. Future research should continue to enrich this line of research area by extending the investigation in different types of virtual communities

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Appendix A Measures

Source Credibility (SC)

Based on your experience of using the BBS of USTC, please provide your evaluation of the people who write messages in terms of the following features:

Source Trustworthiness

- a. (Scale: Not trustworthy (-3) and Trustworthy (3))
- b. (Scale: Not reliable (-3) and Reliable (3))

Source Expertise

- a. (Scale: Not very knowledgeable (-3) and Very knowledgeable (3))
- b. (Scale: Not Expert (-3) and Expert (3))

Argument Quality (AQ)

Based on your experience of using the BBS, please provide your evaluation of the quality of information the BBS of USTC.

Relevance

- a. (Scale: Irrelevant (-3) and Relevant (3), Neither(0) in the middle)
- b. (Scale: Inappropriate (-3) and Very Appropriate (3), Neither(0) in the middle)
- c. (Scale: Inapplicable (-3) and Very

Disconfirmation of Source Credibility (SC)

We are interested in knowing how evaluation of the people who write messages in the BBS of USTC compared to your expectations in terms of the following features:

Disconfirmation of Trustworthiness

- a. To be trustworthy
- b. To be reliable

Disconfirmation of Source Expertise

- a. To be knowledgeable
 - b. To be expert
- Scale: -3,0,3, much lower than your expectation, just same as your expectation, much higher than your expectation

Disconfirmation of Argument Quality (D-AQ)

We are interested in knowing how your perceived quality of messages in the BBS of USTC compared to your expectations in terms of the following features:

Disconfirmation of Relevance

- a. The information in the BBS of USTC is relevant.
- b. The information in the BBS of USTC is appropriate.
- c. The information in the BBS of USTC

Applicable(3, Neither(0) in the middle))

Timeliness

a. (Scale: Out-date (-3) and Current (3), Neither(0) in the middle)

b. (Scale: Insufficiently timely (-3) and Sufficiently timely (3, Neither(0) in the middle))

c. (Scale sufficiently out-of-date (-3) and Sufficiently up-to-date (3), Neither(0) in the middle)

Accuracy

a. (Scale: inaccurate (-3) and Accurate (3), Neither(0) in the middle)

b. (Scale: incorrect (-3) and Correct (3), Neither(0) in the middle)

c. (Scale: unreliable (-3) and Reliable (3), Neither(0) in the middle)

Comprehensiveness

a. The information in the BBS of USTC is sufficiently complete for my needs.

b. The information in the BBS of USTC includes all necessary values.

c. The information in the BBS of USTC covers my need.

d. The information in the BBS of USTC has sufficient breadth and depth.

(Question j to m: Scale: Anchored by Strongly Disagree (-3) and Strongly Agree (3), with Neither (0) in the middle)

Satisfaction (SAT)

1. How do you feel the overall experience with the BBS of USTC?

a. (Scale: Strongly dissatisfied (-3) and Strongly satisfied (3), with Neither (0) in the middle)

b. (Scale: Strongly displeased (-3) and Strongly pleased (3), with Neither (0) in the middle)

c. (Scale: Strongly frustrated (-3) and Strongly contended (3), with Neither (0) in the middle)

d. (Scale: Absolutely terrible (-3) and Absolutely delighted (3), with Neither (0) in the middle)

is applicable

Disconfirmation of Timeliness

a. The information in the BBS of USTC is sufficiently current.

b. The information in the BBS of USTC is sufficiently timely

c. The information in the BBS of USTC is sufficiently up-to-date.

Disconfirmation of Accuracy

a. The information in the BBS of USTC is accurate.

b. The information in the BBS of USTC is correct.

c. The information in the BBS of USTC is reliable

Disconfirmation of Comprehensiveness

a. The information in the BBS of USTC is sufficiently complete for my needs.

b. The information in the BBS of USTC includes all necessary values.

c. The information in the BBS of USTC covers my need.

d. The information in the BBS of USTC has sufficient breadth and depth.

(Scale: Much lower than your expectation (-3), the same as your expectation (0) and Much higher than your expectation (3))