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UNDERSTANDING USERS' CONTINUANCE INTENTION TO ANSWER QUESTIONS IN ONLINE QUESTION ANSWERING COMMUNITIES

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Abstract

This study develops a research model to investigate the antecedents of users' continuance intention to answer questions in online question answering (Q&A) communities based on the literature of knowledge contribution and behavioral continuance. The research model is tested by using the data collected from 241 users of a famous online Q&A community in China (i.e., "Yahoo! Answers China"). The results indicate that satisfaction is the key determinant of continuance intention to answer questions. Satisfaction is, in turn, influenced by reputation enhancement, enjoyment in helping others and advancement of the online community. This study has implications for both theory and practice on the management and design of online Q&A communities.

Keywords: Knowledge Contribution, Continuance, Online Q&A Communities, Satisfaction, Outcome Performance

Introduction

Due to the rapid development of the Internet, bidirectional community-based question answering (Q&A) services have taken the place of traditional unidirectional Q&A services and have become the dominant approach of Q&A services. Distinguished from previous unidirectional Q&A platforms where consumers ask questions and the experts that are employed by the website answer the questions, bidirectional community-based Q&A services (i.e., online Q&A communities) are community-driven platforms dedicated for users to ask questions of and answer questions from fellow users without the intervention of experts or authorities in the field of interest [1].

There is growing evidence that a successful online Q&A community is beneficial to both individual users and community practitioners [2]. However, without definitive answers, online Q&A communities are of little value. Clearly, the biggest challenge in fostering an online Q&A community is the persistent supply of answers or knowledge, namely, the willingness of users to continue

answering questions and help others. It is thus important to understand why individuals choose to continue answering questions in an online Q&A community.

It is undoubtedly believed that the long-term sustainability of an online Q&A community depends on the sustained voluntary contribution of answers by community members. Nevertheless, little empirical work has been carried out regarding this issue. Motivated by the practical and theoretical considerations, this study empirically investigates the factors that influence users' intention to continue answering questions in online Q&A communities. The purpose of this study is to empirically examine the factors influencing users' continuance intention to answer questions in online Q&A communities. Specially, we focus on a reputed online Q&A community in China—"Yahoo! Answers China" (available at <http://ks.cn.yahoo.com/>). Identifying the factors that drive individuals' willingness to continue answering questions in online Q&A communities helps both academics and practitioners to gain insights into how to stimulate knowledge persistent contributions in these online communities.

The rest of the paper is organized as below. First, a review on the theories that can help to explain knowledge contribution continuance is provided. Based on the theoretical background, the research model and hypotheses are then introduced. Next, the research methodology and statistical results are described. Finally, the findings and implications for both research and practice are discussed.

Theoretical Background

With the increasing popularity of online Q&A communities, research on them has become more and more important. In order to understand the sustainability of online Q&A communities in general, and users' continuance intention to answer questions in particular, we provide a review on the literature of knowledge contribution and behavioral continuance.

Knowledge Contribution and Perceived outcome performances (i.e., perceived benefits)

Based on the social exchange theory, the social capital theory and others, previous researchers have

largely sought to explore why people contribute their knowledge in online communities (e.g., [3] [4] [5]). This study found that knowledge contributors exchange their knowledge with knowledge seekers for some new values [6]. This indicates that perceived benefits from knowledge contribution in online communities can motivate individuals to continue doing so in the absence of personal acquaintance, similarity, or the likelihood of direct reciprocity [7]. The values received in return for knowledge contribution might be not just tangible benefits, such as gifts or money, but also intangible benefits, such as reputation or reciprocal help in the future. Based on a literature review of prior research on knowledge contribution in online communities, this study highlights several plausible outcome performance resulting from contribution in online communities, namely, extrinsic reward, reputation enhancement, reciprocity, enjoyment in helping others and advancement of the online community.

Extrinsic reward refers to the perception of tangible incentive (gift or money) provided for answering questions in online Q&A communities [3] [5]. Reputation enhancement means the perception of status and respect obtained from answering questions in online Q&A communities [4]. Reciprocity captures the perception that previous behavior of answering questions and helping others in online Q&A communities have influenced the contributor in receiving answers and helping in the future [8] [4]. Enjoyment in helping others reflects the feelings of pleasure obtained from helping others through answering questions in online Q&A communities [3]. Finally, advancement of the online community is reviewed as the belief of increasing the welfare of the community as a whole by answering questions in online Q&A communities [8] [7].

Continuance and User Satisfaction

According to the literature of continuance such as information systems continuance and repurchase, satisfaction is considered as a key construct in predicting continuance intentions [9] [10] [11]. Empirically, the amount of continuance variance explained by satisfaction generally exceeds levels of variance explained by ex-post perceived performance (i.e., perceived benefits). We therefore expect that satisfaction will be more strongly associated with continuance intention to answer questions in online Q&A communities than perceived benefits. Further, we posit that satisfaction can be explained by ex-post perceptions of benefits. For these two reasons, in the context of knowledge contribution continuance, we expect that satisfaction will mediate the relationship between individual perceptions of benefits from knowledge contribution continuance and continuance intention of knowledge contribution.

User satisfaction has received substantial

attention in the past information systems (IS) research for a variety of reasons, including the intrinsic desirability of user satisfaction and its strong relationship with IS success and continuance [12] [13] [10]. User satisfaction has been broadly defined in previous IS studies. In this study, we define satisfaction as users' internal affective psychological responses to their behavior of answering questions in online Q&A communities.

Decades of IS research on user satisfaction has resulted in a sound understanding of how perceptions of performance (e.g., personal cognitive beliefs) affect users' level of satisfaction (refer to [14] and [15] for a review) and how user satisfaction, in turn, influences a variety of important IS behaviors (e.g., IS continued usage). For the most part, user satisfaction is thus positioned either as a determinant of behaviors (e.g., an independent variable) or as a desirable outcome in its own right (i.e., a dependent variable). While we recognize the intrinsic value of these two perspectives, we argue in this paper that an additional important role of user satisfaction lies in its role as mediator of the relationships between various cognitive beliefs and related outcomes.

Research Model

Based on the theoretical background, we propose a research model to investigate why people continue answering questions in online Q&A communities (see Figure 1).

Continuance Intention to Answer Questions

"Continuance" answering, distinct from first-time answering, means repeated answering or answering again after initial answering. Regarding the definition of "continuance" [10] and "intention" [16] [17], users' continuance intention to answer questions in online Q&A communities is defined as an individual's subjective likelihood of continuing to conduct question answering actions in an online Q&A community.

User Satisfaction

The relationship between satisfaction and IS continuance intention has been widely demonstrated in previous studies (e.g., [10] [18] [19]). Satisfaction is the main explanation of a common situation in business organizations where IS with good attributes still fail to motivate users' repeated use. Online consumer satisfaction has also drawn the attention of both researchers and practitioners along with the growth of the Internet due to the strong effect of satisfaction on customer or member retention and the high costs of acquiring new customers or members [20] [21]. In the context of online communities, satisfaction captures a member's post-participation affections resulting from a cognitive appraisal of the disconfirmations of need expectations [10]. It has

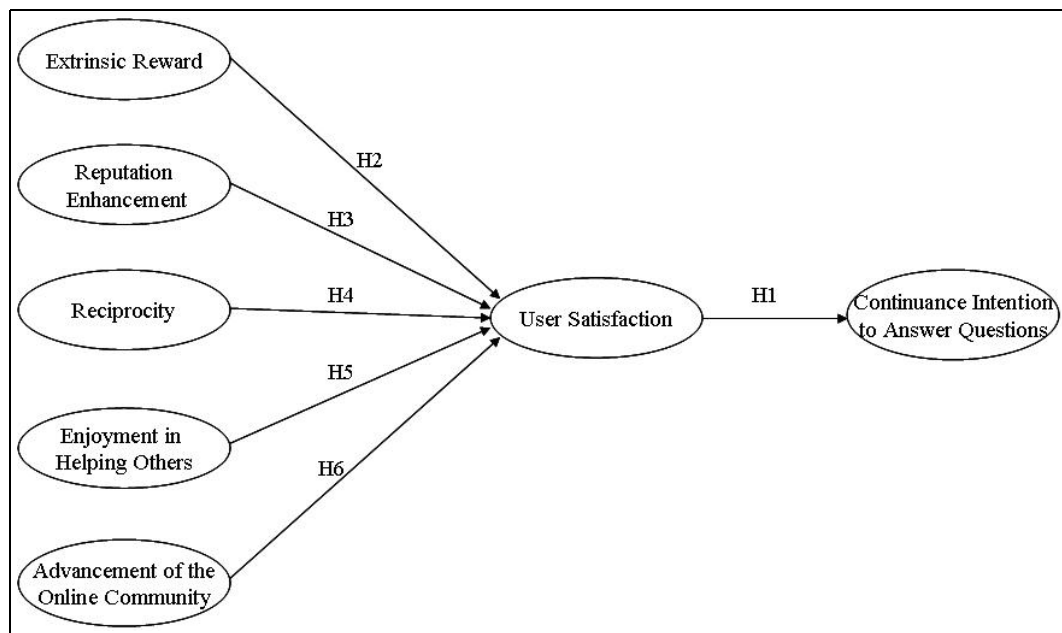


Figure 1 Research Model

been validated to be a key determinant of one's continuance intention to participate in an online community [22]. Consistent with these studies, we infer that users' level of satisfaction with prior behavior of answering questions in an online Q&A community has a strong and positive impact on their continuance intention to answer questions in this online community. This leads to the following hypothesis:

H1: User satisfaction with prior behavior of answering questions in an online Q&A community has a positive impact on users' continuance intention to answer questions in the online Q&A community.

Perceived Performance and Satisfaction

As reference to [23], perceived performance is conceptualized as the perceived positive outcome from a particular behavior (e.g., answering questions in online Q&A communities). It has been found to be an essential determinant of satisfaction in different research areas. As is shown in a study of consumer behavior released by [24], satisfaction is more likely to depend on outcome performance rather than disconfirmations of pre-purchase-expectations. Further, previous studies in the area of information systems research have found that, compared to initial expectations and disconfirmations of initial expectations, perceived performance of IS use is of the greatest importance to satisfaction [25] [26]. Similarly, it has been found that perceived outcome performance of knowledge sharing is the key determinant of satisfaction [27] [28]. In consequence,

the emphasis that an individual places on different types of received benefits is important to predict satisfaction. The most commonly investigated perceived performance of knowledge sharing in online communities in previous studies include extrinsic reward, reputation enhancement, reciprocity, enjoyment in helping others and advancement of the online community. This leads to the following hypotheses:

H2: Extrinsic reward has a positive effect on user satisfaction with prior behavior of answering questions in an online Q&A community.

H3: Reputation enhancement has a positive effect on user satisfaction with prior behavior of answering questions in an online Q&A community.

H4: Reciprocity has a positive effect on user satisfaction with prior behavior of answering questions in an online Q&A community.

H5: Enjoyment in helping others has a positive effect on user satisfaction with prior behavior of answering questions in an online Q&A community.

H6: Advancement of the online community has a positive effect on user satisfaction with prior behavior of answering questions in an online Q&A community.

Research Design

The research model was empirically tested in "Yahoo!

Answers China”, one of the largest Chinese-language websites devoted to questions and answers. It is browsed more than 54 billion times every week; it had more than 38 million solved questions by September 2008. Virtually any question is allowed, except ones that violate the “Yahoo! Answers China” community guidelines. Questions in “Yahoo! Answers China” are categorized according to special interests and goals. It has 13 top-level and 155 lower-level categories, ranging from health care and hospitals, to science and mathematics, or to parenting. It is the place to ask questions and get real answers from real people, that is, a service that allows users to post questions and/or answer questions asked by other members of the community. In addition, “Yahoo! Answers China” facilitates the preservation and retrieval of answered questions aimed at building an online knowledge base. People in China thus view “Yahoo! Answers China” as a human-driven search engine.

Data collection and Responses

The target subjects of this study were all users of “Yahoo! Answers China” who had ever answered questions. We sent a message with a link to the online survey to the users of “Yahoo! Answers China.” To encourage participation in the online survey, incentives of an “Amazon” coupon were offered as lucky draw prizes among respondents. A preventive measure was taken to avoid repetitive completion of the questionnaire from the same respondents by rejecting two pieces of data with the same IP address. The data collection was closed when there were no more new responses. A total of

241 responses were collected.

As shown in Table 1, among the 241 respondents, 61.4 percent were male and 38.6 percent were female. The male female ratio was a little higher than that of the whole Internet population in China (51.5:48.5). More than half of the respondents were aged between 21 years and 30 years, and 8.3 percent were aged under 20. As for the educational level, 53.5 percent of the respondents had a bachelor degree, and 6.6 percent had a graduate or higher degree. The respondents came from diverse industries: 14.1 percent were manufacturers, 8.7 percent were business people, and 10 percent were teaching staff, etc.

Measures

The constructs in the research model were all measured by using multiple-item scales drawn from previous studies with minor modifications to ensure contextual consistency. Appendix shows the measures used in this study. Satisfaction was measured using the items from [10]. Items for measuring extrinsic reward were adapted from [29]. Measures for reputation enhancement were adapted from [4] [3]. Reciprocity was measured using items from [3]. Advancement of the online community was measured using the items from [8]. Continuance intention to answer questions in online Q&A communities was measured using the items adapted from [10]. The scale items used seven-point semantic differential scales anchored from “strongly disagree” to “strongly agree.”

Table 1 Profile of the Respondents Who Have Answered Questions

Demographic Variables	Category	Frequency (n=241)	Percentage
Gender	Male	148	61.4
	Female	93	38.6
Age	12-20	20	8.3
	21-30	129	53.5
	31-40	54	22.4
	41-65	38	15.8
Education level	High school certificate or below	35	14.5
	Vocational/ Technical school	61	25.3
	Undergraduate degree	129	53.5
	Postgraduate or higher degree	16	6.6
Industry	Manufacturing	34	14.1
	Banking, securities and insurance	12	5.0
	Service industry	16	6.6
	Transportation	9	3.7
	Business	21	8.7
	Student	42	17.4
	Teaching staff	24	10
	Civil service	17	7.1
Others	66	27.4	

Results

Data analysis is performed using Partial Least Squares (PLS), a structural equation modeling technique which has been widely used in IS studies in recent years. Following [30] and [31], we carried out the data analysis in two stages. First, we validated the measurement model by conducting confirmatory factor analysis; second, we examined the structural relationships by a bootstrapping procedure of PLS.

Measurement Model

Convergent validity, which indicates the extent to which the items of a scale that are theoretically related to each other relate to each other in reality, was verified by examining the composite reliability (CR) and the average variance extracted (AVE).

Acceptable values of CR and AVE should be greater than 0.70 and 0.50 respectively [32]. As Table 2 shows, all CR and AVE values of the items meet the recommended thresholds.

Discriminant validity measures whether a given construct is different from other constructs. It was assessed by one criterion: the square root of AVE for each construct should exceed the correlations between this construct and other constructs [32]. It is shown in Table 3 that the square root of AVE for each construct exceeds the correlations between the constructs and all other constructs (i.e., the off-diagonal elements in the corresponding rows and columns), demonstrating adequate discriminant validity of all the constructs.

Table 2 Assessment of Internal Consistency and Convergent Validity

Constructs	Number of Questions	Composite Reliability	Average Variance Extracted
Extrinsic reward (ER)	3	0.96	0.88
Reputation (REP)	4	0.92	0.73
Enjoyment in helping others (EHO)	4	0.94	0.81
Reciprocity (REC)	4	0.94	0.79
Advancement of the online community (ATC)	4	0.93	0.78
Satisfaction (SAT)	4	0.95	0.83
Continuance intention (CI)	3	0.89	0.74

Table 3 Correlations between Constructs

	ER	REP	EHO	REC	ATC	SAT	CI
ER	0.94						
REP	0.18	0.85					
EHO	-0.19	0.42	0.9				
REC	0.02	0.38	0.49	0.89			
ATC	0.02	0.36	0.47	0.53	0.88		
SAT	-0.08	0.37	0.47	0.38	0.40	0.91	
CI	-0.05	0.28	0.46	0.35	0.39	0.66	0.86

Structural Model

The examination of the structural model involves estimating the path coefficients and the R-square values. Path coefficients represent the strengths of the relationships between the dependent and independent variables, and R-square values stand for the amount of variance of dependent variables explained by their antecedents. Together, the R-square values and the path coefficients (i.e., loadings and significance) demonstrate how well the

data validates the research model. Tests of significance of all paths were performed using the bootstrap re-sampling procedure of PLS. All statistical tests were assessed at 5 percent level of significance using one-tailed t-tests because our hypotheses and corollaries are unidirectional in nature.

As show in Figure 2, 44 percent of the variance in continuance intention was explained by satisfaction. The path between user satisfaction and continuance intention is positive and significant ($\beta=0.66, p<0.001$), suggesting that user satisfaction is a salient determinant of users' intention to continue participating in "Yahoo! Answers China." Satisfaction is, in turn influenced by reputation enhancement ($\beta=0.17, p<0.05$), enjoyment in helping others ($\beta=0.26, p<0.01$) and advancement of the online community ($\beta=0.16, p<0.05$). Overall, these three types of outcome performance can explain 30% of the R-squares of satisfaction.

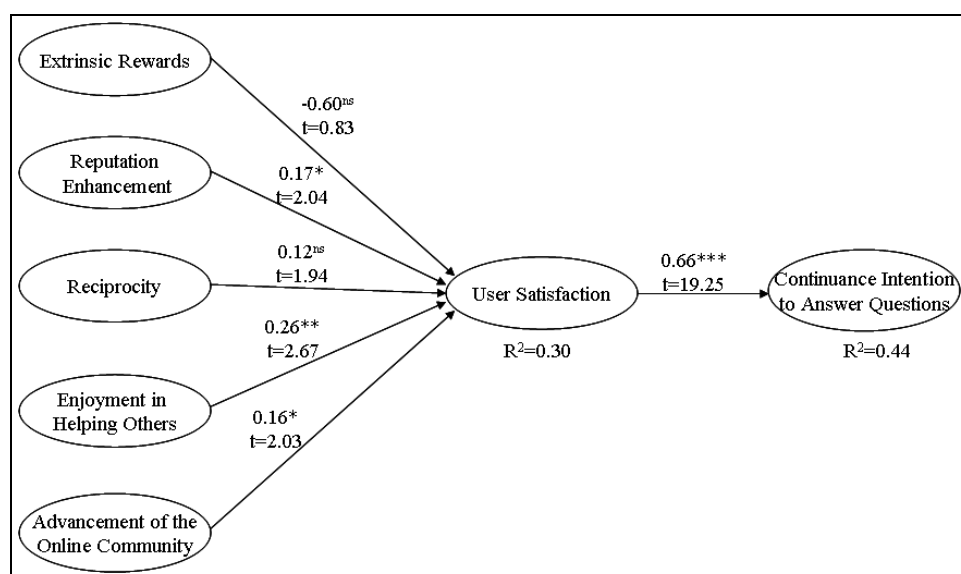


Figure 2 PLS results of the research model

Discussion and Conclusion

This study sought to investigate users' continuance intention to answer questions in online Q&A communities based on the literature of knowledge contribution and continuance. In particular, this paper investigates the roles of satisfaction and question answering benefits in influencing continuance intention to answer questions. The results show that the measurement model is validated with adequate levels convergent and discriminant validities. The results also provide sufficient support to the fundamental research propositions and the proposed conceptual framework (see Figure 2).

Key Findings

The primary insights this research provides are as follows: First, satisfaction is a key determinant of users' intention to continue answering questions in online question answering communities (e.g., "Yahoo! Answers China"). This finding is consistent with prior studies of IS continuance (e.g., [10] [18] [19] [33]). Satisfaction is thus anticipated to be an important predictor of actual continuance behavior of answering questions in online Q&A communities. Second, this study shows that the primary antecedents of satisfaction are reputation enhancement, enjoyment in helping others and advancement of the online community. Extrinsic reward and reciprocity, however, are found to be non-significantly related to either satisfaction. These findings suggest that extrinsic reward and reciprocity may be of little importance to user satisfaction with prior behavior of answering questions in an online Q&A community. In previous studies, the importance of extrinsic reward and reciprocity to

knowledge contribution in online communities has been disputed. Some studies show that these two factors are vital motivations of knowledge contribution, while others have varying results. This suggests that the roles of extrinsic reward and reciprocity in online communities depend on the contexts and features of online communities.

Implications for Research

This study contributes to theory in terms of the following aspects. First, while past studies have largely focused on users' past activities in online communities, this study moves a step forward and identifies the factors that influence users' future intention of continued usage of online communities for knowledge contribution. Prior models of knowledge contribution have explained users' past behavior of knowledge contribution by addressing the motivations or outcome performance for knowledge contribution. They, however, do not explain users' further intention of knowledge contribution. In order to fill this research gap, this study integrates theories concerning knowledge contribution and continuance with the specific focus on satisfaction and five types of outcome performance. This study highlights satisfaction as mediators between motivations and continuance intention. It suggests that whether or not users want to contribute their knowledge again depends directly on their satisfaction rather than on motivations which are the key direct predictors of users' initial or past knowledge contribution behavior. In consequence, our theoretical structure serves as an example for future attempts to integrate theories for investigating users' further intentions after initial participation in online communities.

Second, it is surprisingly to find that

extrinsic reward and reciprocity have little impact on user satisfaction. This indicates that extrinsic motivations such as extrinsic reward and reciprocity play a small role in predicting users' continuance intention to answer question in online Q&A communities. One of the explanations may be that it is really hard for users to get extrinsic rewards in online Q&A communities (e.g., users in Yahoo! Answers should have millions of points to exchange a gift.). Moreover, users who do not answer questions can also get answers freely from online Q&A communities. Reciprocity is, hence, insignificant in this context. Future research should play more attention on social motivations such as advancement of the online community, and intrinsic motivations such as reputation and enjoyment when studying knowledge contribution continuance in online Q&A communities.

Implications for Practice

Web 2.0-based search engines, such as Yahoo, Google and Baidu, have invested considerably in online Q&A communities. Moreover, companies and organizations have changed their way of Q&A services to community-based Q&A services where the community members, rather than their employees, are responsible for the answers. This evidence points out that online Q&A communities are becoming more and more important. The research findings in this article could have significant implications for organizers of online Q&A communities in community management and design.

User satisfaction remains as the most important factor in determining users' intention to continue answering questions. It serves as an important measure for the sustainability of online Q&A communities, and thus, community managers should closely monitor changes in user satisfaction levels by conducting user satisfaction surveys.

Users' sense of satisfaction can be increased by the benefits that they obtain from answering questions in online Q&A communities. The community managers should thus offer some benefits or value to the answerers, such as enhancing their reputation according to the extent of contribution, increasing their feelings of enjoyment by praising their contribution in the community, and showing the users how important their contribution is to the whole community.

Limitations and Directions for Future Research

Appendix Construct Items

Construct	Items	Sources
Extrinsic rewards (ER)	Answering questions in "yahoo! Answers China" helps me obtain material rewards (gift or money).	Developed from [29]
	I have obtained material rewards (gift or money) in return for	

This study has several empirical and theoretical limitations which call for additional research. First, most respondents have used the focused online Q&A community for years and intend to continue using it. The responses from the continuers may be biased in contrast to discontinuers. Hence, a longitudinal study of the new users should be conducted in future research. Second, we have selected only one particular online Q&A community in China ("Yahoo! Answers") as our research site. The research results could have been affected by the culture of China and the background of "Yahoo! Answers China." Future research that examines different types of online Q&A communities in different countries and compares the results would enhance the generalization of our research model. Third, from the results of our study, only 44% of the variance of users' continuance intention to answering questions in "Yahoo! Answers China" is explained by the research model. There must be other predictors of continuance intention that are unexplored in this study. Some related social factors (e.g., social capital, group norm, etc.) may be useful in explaining intention to continue answering questions in online Q&A communities. Future research should take social factors into account. Finally, our study has only examined the motivations for question answerers' continued usage of online Q&A communities. It is anticipated that future research studying the factors motivating information seekers to continue asking questions in online Q&A communities would help us realize another aspect of online Q&A community sustainability.

Conclusions

The goal of this study is to explore the antecedents of users' intention to continue answering questions in online Q&A communities based on theories regarding knowledge contribution and continuance. Data collected from an online survey among "Yahoo! Answers China" users provides empirical support for the research model and the hypotheses. This study increases our understanding of the factors predicting users' continuance intention to select an online Q&A community as a channel of knowledge contribution. Future research should continue to enrich this line of research by extending the investigation into other types of Internet-based media that support online communities in different cultures, and by examining the diverse motivations for continued usage of online communities by different kinds of users (including both information seekers and contributors).

	answering questions in "Yahoo! Answers China."	
	I obtained material rewards (gift or money) by answering questions in "Yahoo! Answers China."	
Reputation enhancement (RE)	Answering questions has enhanced my status in "Yahoo! Answers China."	Adapted from [4]
	I have earned respect from others by answering questions in "Yahoo! Answers China."	
	My reputation in "Yahoo! Answers China" has increased as a result of answering questions in the community.	
	Answering questions in "Yahoo! Answers China" has improved other members' recognition of me.	Adapted from [3]
Enjoyment in helping others (EHO)	I feel enjoyable after answering questions in "Yahoo! Answers China."	Developed based on [3]
	I feel good to help others by answering questions in "Yahoo! Answers."	
	Answering questions in "Yahoo! Answers China" makes me feel pleasant.	
	Answering questions in "Yahoo! Answers China" gives me enjoyment.	
Reciprocity (REC)	My queries for answers are responded after I answered others' questions in "Yahoo! Answers China".	Developed based on [3]
	Answering questions in "Yahoo! Answers China" has increased the degree of reciprocity (e.g., get more answers when I am in need).	
	Answering questions in "Yahoo! Answers" makes me get more answers when I ask questions.	
	When I answer questions in "yahoo! Answers China", I believe that my questions will be answered in future.	
Advancement of the online community (ATC)	My answers are helpful to the successful functioning of "Yahoo! Answers China".	Adapted from [8]
	My answers help "Yahoo! Answers China" continue its operation in the future.	
	My answers help "Yahoo! Answers China" accumulate or enrich knowledge.	
	My answers help "Yahoo! Answers" grow.	
	I have the expertise needed to provide valuable knowledge.	
	It does not really make any difference whether I add to the knowledge others are likely to share within "Yahoo! Answers China."	
Satisfaction (SAT)	I feel very satisfied with my previous experience of answering questions in "Yahoo! Answers China".	Adapted from [10]
	I feel very pleased with my previous experience of answering questions in "Yahoo! Answers China".	
	I feel very contented with my previous experience of answering questions in "Yahoo! Answers China".	
	I feel absolutely delighted with my previous experience of answering questions in "Yahoo! Answers China".	
Continuance Intention (CI)	I intend to continue answering questions in "Yahoo! Answers China."	Adapted from [10]
	My intentions are to continue answering questions in "Yahoo! Answers China" rather than any alternative means.	
	I would like to discontinue answering questions in "Yahoo! Answers China."	

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