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The Trustworthiness of Online Reference Group and Participation Behavior of Crowd in Crowdsourcing e-Market

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Abstract: Crowdsourcing e-market provides a lot of advantages to solve problems of organizations, companies and individuals. As a result, it's important to develop an understanding of online reference group and participation behavior of crowd. The authors argue that reference group can obtain trustworthiness in the eyes of the crowd, such as integrity trustworthiness and ability trustworthiness. The trustworthiness of online reference group has influence on the participation behaviors of crowd. The authors test these ideas by examining the crowdsourcing process on zhubajie e-market in March 2012. When the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness. When the perceived uncertainty is low, the effect of ability trustworthiness on participation behavior is greater than integrity trustworthiness.

Keywords: two-sided market; trustworthiness; perceived uncertainty; participation behavior

1. INTRODUCTION

The concept of crowdsourcing is firstly put forward by Howe in wired magazine^[1], and with the development of society, crowdsourcing is used to accomplish a variety of tasks. The Oxford English Dictionary (OED) may provide one of the earliest examples of crowdsourcing. An open call was made to the community for contributions by volunteers to identify all words in the English language and provide example quotations of their usages for each one. They received over 6 million submissions over a period of 70 years^[2]. Facebook has invited the public to translate the web page into various languages by crowdsourcing, which has obtained good effect^[3]. The advent of the Internet and other communication technologies has produced crowdsourcing as a widespread business models to get innovative ideas/designs or cooperation^{[4][5]}. Such as the famous crowdsourcing platform InnoCentive, the annual income is up to \$120 million in 2012, our country crowdsourcing platform website (zhubajie.com) annual income is 707 million yuan in 2012 ((InnoCentive and zhubajie.com).

The characteristics of crowdsourcing e-market are unique. It's a two-sided market made up of crowdsourcers, the crowd, and the intermediaries^{[6][7]}. The crowd participates in the crowdsourcing process and contributes to the crowdsourcing, and they are the foundation of the crowdsourcing⁶. In crowdsourcing the focal agent broadcasts the problem to the crowd, in the form of open call, potential solvers of the crowd self-select to solve the problem without an ex ante contract, and at least one potential solver needs to be good enough to solve the problem or one of its modules^[8].

The biggest obstacle for the crowd to participate in the crowdsourcing process is the existence of risks^[9]. On the one hand, risk comes from crowdsourcers, because of the incomplete of the security system, crowdsourcers may only get the solution of the problem but don't pay the reward. On the other hand, risk appears in the peers of the crowd, so many people bid for a crowdsourcing process, it is high possibility that the solution or idea doesn't be accepted. Because of the existence of the risks, the crowdsourcing e-market doesn't have the ability to attract enough people to participate in the crowdsourcing process, and the crowdsourcing

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e-market recedes from view at last.

The crowd needs to obtain the trustworthiness information from the market to lessen the risks and make decisions. Previous researches mainly explore why and when crowdsourcing a feasible option for organization^{[11][12]}, how to attract the crowd participate in the outsourcing process, but rarely research analyze the influence factors of the crowd participation behavior, especially from the aspect of reference group. The reference group consists of the crowd who contributed to the crowdsourcing process. Robert K. Merton (2004) developed a theory of the reference group (i.e., the group to which individuals compare themselves, which is not necessarily a group to which those individuals belong)^[13]. According to social learning theory, when there is uncertainty in market, the characteristics of reference group can provide trustworthiness information. For example, the reference group has effect on consumer preference^[14], self-brand connections among Chinese consumers^[15], product and brand purchase decisions^[16].

In order to find out the relationship between trustworthiness of online reference group and participation behavior, we develop our conceptual model and make three important contributions. First, we find empirical support for participation behaviors of the crowd, we believe that the participation behaviors of the crowd have significant influence on the outsourcing e-market. So we can provide an efficient way for the crowdsourcing e-market to attract crowd participate in. Second, from the study, we know that when the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness. And uncertainty of the crowd is not a temporal phenomenon, it is always. Thus as a crowdsourcing e-market, increase the integrity trustworthiness of the reference group is a must. The reference group on the platform consists of the crowd who contributed to the crowdsourcing process, and the integrity trustworthiness is mainly evaluated by the crowdsourcing e-market. That is to say, the crowdsourcing e-market can formulate relevant rules to increase the integrity trustworthiness of the crowd. Third, perceived uncertainty has significance influence on the participation behavior of observer. In order to make the crowd participate in crowdsourcing at ease, it's the crowdsourcing e-market's responsibility to lessen the existence of uncertainty.

2. THEORETICAL BACKGROUND AND FRAMEWORK

2.1 Crowdsourcing

Crowdsourcing has become a way to problem solving, and more and more people pay attention to it. Ogawa and Piller (2006) were among the first to provide anecdotal, real-world evidence indicating that user ideas generated in the course of a crowdsourcing process might also hold commercial potential⁴. Tucci and Afuah (2012) has made introduction and review of outsourcing theory, and called for academic scholars strengthen the study of the crowdsourcing⁸.

2.2 Perceived Uncertainty

Perceived uncertainty assessed the general perception that social relationships are unpredictable and therefore it is uncertain whether other people can be trusted not to exploit or exclude one from important relationships or groups; this kind of perception has been reported to be strongly associated with a heightened need for perceived fairness in social relationships^[17]. The perceived uncertainty will hinder the participation of crowd.

2.3 Trustworthiness

Several theories have emerged that describe mechanisms for minimizing the risk inherent in transaction relationships. The trustworthiness of one party is a way to reduce the risk. Ring and VandeVen (1992) argued that because of the risk in transactions, managers must concern themselves with the trustworthiness of the other party^[18]. Ability and integrity are the factors of trustworthiness^[19]. Integrity trustworthiness refers to the consistency of the party's past actions, credible communications about the trustee from other parties, believe that

the trustee has a strong sense of justice, and the extent to which the party's actions are congruent with his or her words all affect the degree to which the party is judged to have integrity. Ability trustworthiness refers to group of skills, competencies, and characteristics, these characteristics enable a party to have influence within some specific domain.

Figure 1 presents a conceptual framework that includes the key factors to be considered—namely, the integrity trustworthiness versus ability trustworthiness of the reference group, perceived uncertainty, and the participation behavior of the observations.

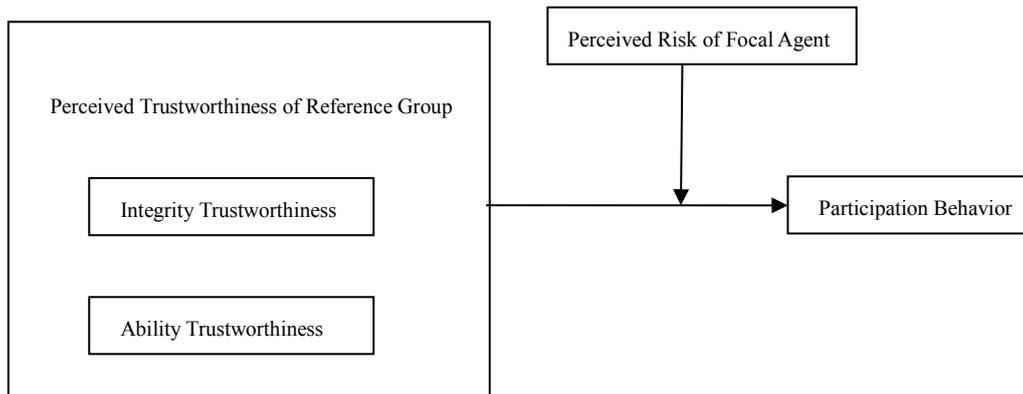


Figure 1. Conceptual framework

3. HYPOTHESIS

McFall (1987) illustrated why both the adherence to and acceptability of the principles are important^[20]. Bases on integrity trustworthiness, reference group adhere to a set of principles that the crowd finds it acceptable, so the crowd can get the single that the reference group is trustworthiness, therefore, the effect of integrity trustworthiness on participation behavior, we put forward the following hypotheses.

H1: In a two-sided market, integrity trustworthiness has a positive effect on participation behavior.

Ability is that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain. Based on ability trustworthiness, if reference group is highly competent in some technical area, crowd may afford trust on tasks related to that area¹⁸. Therefore, the effect of ability trustworthiness on participation behavior, we put forward the following hypotheses.

H2: In a two-sided market, ability trustworthiness has a positive effect on participation behavior.

When perceived uncertainty is high, crowd has no confident in the trade and they don't trust the exchange. The effect of integrity on trust will be most salient early in the relationship¹⁸, that is to say, if a stranger want to make relationship with another person, he or she will consider the integrity trustworthiness firstly. Thus the influence of integrity trustworthiness on the crowd' participation behavior is much more significant. Therefore, the effect of integrity trustworthiness on participation behavior, we put forward the following hypotheses.

H3: In a two-sided market, when the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness.

The reputation mechanism of crowdsourcers and the crowd can be established through market transactions and market evaluation system. It is evaluated by focal agent who has exchanged with the referent agent. Thus their ability mainly measures the competencies of successfully fulfilling the task. When the perceived uncertainty of the focal agent is low, the crowd can make decision from the ability trustworthiness of the

reference group. Thus the influence of ability trustworthiness on the crowd' participation behavior is much more significant. Therefore, the effect of ability trustworthiness on participation behavior, we put forward the following hypotheses.

H4: In a two-sided market, when the perceived uncertainty is low, the effect of ability trustworthiness on participation behavior is greater than integrity trustworthiness.

4. METHODOLOGY

4.1 Data

We collected data about crowdsourcing on zhubajie e-market in March 2012. For each crowdsourcing process, we obtained crowdsourcing characteristics such as the completed type of crowdsourcing, the release time of crowdsourcing, the completed time of crowdsourcing, the level of crowdsourcers, the ability level of the reference group, whether there is xuangao guarantee and so on.

We use zhubajie as the main data source for the following reasons. First, it's the largest online service trading platform in our country, aiming to provide employers and providers with the most reliable marketplace. The number of the crowd on the platform is as many as 5 million, the annual income is more than 500 million yuan. Second, there are various types of tasks, from the web site design to market promotion, and application development is also included, the web site is highly representative. Third, the crowdsourcing information from zhubajie has been increasingly used in recent research^[21].

4.2 Measurement

Participation Behavior (PB). This construct measures the extent to which the crowd participate in the crowdsourcing process. We chose the number of crowdsourcing contributions in data from zhubajie to reflect the PB. The higher number got by a crowdsourcing, it means the more crowd contributed to the crowdsourcing.

Integrity Trustworthiness (IT). Integrity trustworthiness refers to the reference group adhere to a set of principles, such as according to the platform authentication rules, the reference group earn the real-name identification, mobile phone identification, e-mail identification, and so on. To measure the integrity trustworthiness of reference group, the average number of the authentication principles is a suitable choice. It is evaluated by platform. The more reference group carry on authentication of the platform, the integrity trustworthiness of reference group is much higher.

Ability Trustworthiness (AT). Ability trustworthiness refers to the reference group is highly competent in some technical area and the crowd is easily trust them. Generally speaking, the ability level of reference group is obtained by themselves through participating in the crowdsourcing process. To measure the integrity trustworthiness of reference group, the average ability level of reference group is a suitable choice.

Perceived Uncertainty (PU). Perceived uncertainty is a concept to measure the risk which comes from the crowdsourcers. In zhubajie e-market, when there is a xuangao guarantee, it is a guarantee that the crowdsourcers will choose the problem solution from the contributions of the crowd, and it refers to the perceived uncertainty is low, otherwise, the perceived uncertainty of the crowdsourcer is high.

As Table 1 shows, we summarize the constructs discussed above, as well as their respectively operating variables and abbreviations.

Table 1. Construct, operational variables and abbreviations

Construct	Operational variables	Abbreviations.
Participation Behavior	The number of crowdsourcing contributions	PB
Integrity Trustworthiness	Authentication of platform	IT
Ability Trustworthiness	Ability level	AT

Perceived Uncertainty	Xuangao guarantee	PU
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4.3 Analysis Model

To examine the impacts of trustworthiness of reference group on participation behavior or main effect, we use the estimated equation (1); to further explore how perceived uncertainty may play a role, we use the equation (2), just as follows:

$$(1) PB = c + \beta_1 IT + \beta_2 AT + \varepsilon$$

$$(2) PB = c + \beta_1' IT + \beta_2' AT + \beta_3 PU + \beta_4 IT \times PU + \beta_5 AT \times PU + \varepsilon$$

Where c is the constant; β_i ($i=1\sim5$) and β_i' , β_2' are regression coefficients; ε is the residual error.

5. ANALYSIS AND RESULTS

5.1 Descriptive Statistics and Correlative Analysis

After the analysis of operating variables from the collected 272 items: The number of crowdsourcing contributions(PB), Authentication of platform(IT), Ability level(AT), we could get the descriptive statistics and correlative analysis result as showed in table 2:

From table 2, we could see that: the data range of PB reach to 159 contributions, standard error 33.228, which implicates that there is a big difference in participation behavior from one crowdsourcing process to another, so we could try to enhance the participation behavior of the observations by explore the trustworthiness of reference group; similarly, IT and AT also show a big difference in their sample values.

Table 2. Descriptive Statistics and Correlative Analysis

	Min	Max	Mean	Sd Error	PB	IT	AT
PB	0	159	31.29	33.228	1		
IT	0	1.25	0.8213	0.19073	0.162*	1	
AT	0	4	2.0694	0.93443	0.170*	0.068	1

* $p < .05$. ** $p < .01$.

The result of variable correlative analysis shows the correlative coefficients are weak (lower than 0.5), so we get the condition to go further study.

5.2 Regression Analysis

According to our estimated equations, we utilize SPSS17.0 to conduct liner regression analysis of all samples. The results are showed as follows:

Table 3. Regression result

PU		Usd. Coefficient		Sd Coefficient	T Value	Probability
		B	Sd Error	Beat		
0	IT	62.274	27.765	0.657	2.243	0.037
	AT	-13.361	6.951	-0.563	-1.922	0.07
1	IT	-0.46	22.925	-0.002	-0.02	0.984
	AT	8.819	3.967	0.24	2.223	0.028

$p < .10$. ** $p < .05$. *** $p < .01$ (hypothesized effects are one-tailed tested).

Table 3 shows us that perceived uncertainty can moderate the effect of trustworthiness of reference group. On the one hand, when the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness ($\beta_4=0.657$, $p=0.037$). On the other hand, when the perceived

uncertainty is low, the effect of **ability trustworthiness** on participation behavior is greater than integrity trustworthiness ($\beta_5=0.24$, $p=0.028$).

6. DISCUSSION

6.1 Summary of Findings

Current studies explore crowdsourcing e-market mainly from the aspect of qualitative and seat^{[22][23]}, rarely research explores the outsourcing from the point of quantitate. Our study empirically explores the crowdsourcing from the aspect of trustworthiness of reference group, and we find that, the trustworthiness of the reference group has significance influence on the participation behavior of the crowd. When the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness. When the perceived uncertainty is low, the effect of ability trustworthiness on participation behavior is greater than integrity trustworthiness.

6.2 Managerial Implications

The results of this study offer some noteworthy implications for crowdsourcing e-market platform in managing the crowdsourcers and the crowd. First, from the empirical study, we know the influence factors of participation behaviors of the crowd. As a crowdsourcing e-market, it's important to own enough users^[24], and the main users on the crowdsourcing e-market are the crowdsourcers and the crowd. So the study provides an efficient way for the crowdsourcing e-market to attract crowd to participate. Second, from the study, we know that when the perceived uncertainty is high, the effect of integrity trustworthiness on participation behavior is greater than ability trustworthiness. And uncertainty of the crowd is not temporal, it is always. Thus as a crowdsourcing e-market, increase the integrity trustworthiness of the reference group is a must. The reference group on the platform consists of the crowd who contributed to the crowdsourcing process, and the integrity trustworthiness is mainly evaluated by the crowdsourcing e-market. That is to say, the crowdsourcing e-market can formulate relevant rules to increase the integrity trustworthiness of the crowd. Third, perceived uncertainty has significance influence on the participation behavior of observer. In order to make the crowd participate in crowdsourcing at ease, it's the crowdsourcing e-market's responsibility to lessen the existence of uncertainty.

6.3 Limits and Further Direction

As with many early studies in an area, this study suffers from several limitations, some of which offer interesting avenues to further research. There are several ways to extend this research. First, in the crowdsourcing e-market setting we study, we only focus on the participation behaviors of crowd, but it would be very interesting to investigate the value of the crowdsourcers. Second, we only explore the trustworthiness of reference group, there are other dimensions we could further explore, such as the legitimacy of reference group. Third, we explore influence factors of participation behavior from trustworthiness of reference group, this is not enough, further study about other factors that may affect participation behavior of crowd can be made.

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