

## **Exploring the Antecedents of Solver's Sustained Participation in Crowdsourcing Tasks**

### *Research-in-Progress*

#### **Abstract**

Research which investigated crowdsourcing has primarily focused on the effects of different motivations on solver's initial participation in the online tasks, rather than on the solver's sustained participation. By integrating motivation theories and justice theory, our study proposes a research model to investigate the effects of solver's extrinsic and intrinsic motivations on their sustained participation in online crowdsourcing tasks. We seek to examine how four types of justice perceptions, i.e., distributive justice, procedural justice, interpersonal justice, and informational justice, can positively moderate these effects. We intend to test our hypotheses using survey data. With the findings, we anticipate several major theoretical and practical contributions.

**Keywords:** Crowdsourcing, sustained participation, motivation theories, justice theory

#### **Introduction**

As a socio-technical system enabled by Internet and Web 2.0 technologies, crowdsourcing has been widely adopted by many modern organizations in their process of product development and value co-creation with consumers and unidentified individuals (Ye & Kankanhalli, 2013). Crowdsourcing, defined as the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined network of people in the form of an open call (Howe 2006), allows organizations to gather valuable inputs from a variety of people (i.e., solvers) (Greengard, 2011), which accelerates their problem solving efficiency and enhances their competitive advantages (Bloodgood, 2013; Ye & Kankanhalli, 2015). Owing to such huge advantages, a plenty of online crowdsourcing platforms are established by organizations that crowdsource or by third-party platform providers (Zheng et al., 2011). Some popular online crowdsourcing platforms, such as the InnoCentive, Amazon Mechanical Turk, Threadless, and Taskcn.com, have attracted millions of solvers (Sun et al., 2012).

Despite the proliferation of task solvers, most of the existing crowdsourcing platforms are challenged by high turnover rates. As a huge number of solvers compete for the task rewards but only a handful of them succeed in the end, those who frequently lose in the competition may leave the platforms. For instance, it has been reported that Taskcn.com has over 2.8 million registered members, but merely less than 10% (about 0.24 million) continuously participate in crowdsourcing tasks (Sun et al., 2012). Furthermore, active solvers only consist of a tiny part of the total number of solvers in this platform. As the knowledge and expertise of task solvers present a precious wealth for those who crowdsource, maintaining the sustained participation of solvers becomes a key success factor for the crowdsourcing platform. Hence, both scholars and practitioners are striving to understand the influencing factors for sustained participation by task solvers. This objective constitutes the major research question of the present study.

Past literature on crowdsourcing has identified a variety of intrinsic (e.g., self-worth, enjoyment, altruism) and extrinsic (e.g., monetary reward, reputation, social identity) motivations leading to solvers' initial participation in crowdsourcing tasks (Chandler & Kapelner, 2013; Kaufmann et al., 2011). However, research on solvers' sustained participation in crowdsourcing tasks remains rare. Comparing to the initial participation, the motivations for continued participation behavior seem to be more complicated. The continued participation of solvers may not only be determined by their intrinsic and extrinsic motivations, but also hinge on their initial participation experience

(Sun et al., 2012). Motivators found to be critical for initial participation may be insufficient to explain continued participation. Research from general virtual community settings has discovered that the strength of motivations for initial participation in knowledge sharing may subside over time, and hence the initial motivations may be inadequate to sustain knowledge sharing (Fang & Neufeld, 2009). Extrapolating this logic to the context of crowdsourcing platform, there implies the existence of moderating factors between initial motivations and sustained participation in crowdsourcing tasks.

When solvers initially participate in crowdsourcing tasks in the platforms, they might develop justice perceptions towards the crowdsourcing platforms based on their initial participation experience. If the solvers perceive that they have received unfair treatments in their initial experience, they are less likely to participate in the tasks again, even though there are strong extrinsic or intrinsic motives for doing so. On contrary, even when solvers have weak extrinsic or intrinsic motivations to sustain participation, they might still engage in the crowdsourcing tasks again when they feel that they were fairly dealt with in their initial participation experience. Hence, we postulate that the justice perceptions are critical factors moderating the solvers' motivations and their decisions to sustain participations in the crowdsourcing tasks.

To sum up, in order to address the research question of what factors influence the solvers' sustain participation, we propose an innovative approach that integrates the justice theory into motivation theories. Drawing on motivation theories (Deci & Ryan, 1985), we delineate the extrinsic and intrinsic motivational factors that could influence the sustained participation behavior by solvers. Justice perceptions, which incorporate the solvers' perceived fairness in different aspects of crowdsourcing activities (e.g., reward distribution, policies and procedures, and information provided by crowdsourcer), serve as the moderators between motivational factors and sustained participation. Solvers are theorized to develop justice perceptions toward the crowdsourcing activities in the continued participation stage through their own experience. In this study, it is suggested that this justice perception construction process may change the explanatory mechanisms through which motivational factors affect continued participation behavior.

## **Literature Review**

### *Participation in Crowdsourcing Platforms*

A crowdsourcing platform is defined by Doan et al. (2011) as a system that “enlists a crowd of humans to help solve a problem defined by the system owners.” Crowdsourcing platforms have long been understood, as well as practiced, as an Internet-based space for value co-creation (Zheng et al., 2011), where a firm outsources its internal business tasks to a group of crowd (Howe, 2006). In the crowdsourcing platforms, virtually everyone has a potential to plug in valuable information to the platforms (Greengard, 2011), and the crowdsourcers (i.e., firms that outsource their tasks to the crowd) seek to mobilize the competence and expertise that are distributed among the crowd (Zhao & Zhu, 2014). A typical crowdsourcing process effects in the following way. An organization identifies tasks and releases them online to a crowd of outsiders who are interested in solving the tasks on the organization's behalf, for a stipulated fee or any other incentives. A huge number of individuals then volunteer to undertake the tasks individually or in a collaborative way. Upon completion, the individuals involved submit their work to the crowdsourcing platforms, and the organizations then evaluate the quality of the work (Riedl et al., 2010). It is worth noting that not all the crowdsourcing platforms have a clear format for compensating valuable contributors. In some crowdsourcing cases, such as Wikipedia or Dell's Ideastrom, the contributors are not compensated with monetary rewards. To avoid potential

conflicting results emerged from the contextual difference (Zhao & Zhu, 2014), the current study choose to focus on crowdsourcing platforms with monetary compensation systems (e.g., Amazon Mechanical Turk, Istockphoto, Taskcn.com).

The majority of prior studies on crowdsourcing have centered on the motives of initial participation in crowdsourcing tasks by solvers. Past research has adopted different theoretical lens (e.g., Self-Determination Theory, Social Cognitive Theory, Social Relational Theory, Social Identity Theory, and Uses and Gratifications Theory) to unravel a range of extrinsic motivational factors (e.g., extrinsic reward, self-reputation and social identity) and intrinsic motivational factors (e.g., sense of self-worth, learning, fun, enjoyment and altruism towards others or the communities) influencing the initial participation by solvers (Brabham, 2010; DiPalantino & Vojnovic, 2009; Fuller, 2010; Lakhani et al., 2007). Prior studies offer a well-grounded understanding of why solvers initially participate in the online crowdsourcing tasks (e.g., Brabham, 2010; Chandler & Kapelner, 2013; Kaufmann et al., 2011). Nevertheless, there is thus far no research discussing about the motivations of sustained participation in crowdsourcing platforms. Although there are a handful research on the sustained participation in transaction-based virtually communities (TVC) (Sun et al., 2012), it is worth noting that crowdsourcing platform presents a special type of transaction-based virtual community with some distinctive characteristics. First, unlike normal transaction-based virtual communities where monetary rewards are paid to all the pre-determined and contracted sellers, monetary rewards are typically paid to a selection of solvers based on the quality of solutions submitted. Second, seekers in crowdsourcing platforms have to clearly specify to all the participants regarding the evaluation criteria for solutions and rules for reward distributions among winners before or after the online tasks are completed, which is not necessary for normal transaction-based virtual communities. Third, some of the crowdsourcing tasks require the solvers to work collaboratively with other solvers or with the seekers, whereas in normal transaction-based virtual communities the tasks are typically done independently by individual sellers. Bearing such distinctive traits, however, our knowledge on the sustained participation in the crowdsourcing context is still lacking. Thus, it is imperative to (1) learn the extent to which important motivational factors for initial participation in crowdsourcing tasks remain applicable for the sustained participation, and (2) identify influencing factors for sustained participation that are distinctive to the crowdsourcing context. Next, distinctions between initial participation and sustained participation are discussed.

#### *Initial Participation versus Sustained Participation*

Sustainability is an important criterion for gauging the success of crowdsourcing platforms. A sound crowdsourcing platform should retain its solvers and sustain their participation (Sun et al., 2012). However, solvers may initially participate in a crowdsourcing platform and later leave without intending to return. Different from initial solvers, sustained solvers have a certain amount of participation experience which may influence their subsequent perceptions towards the platforms and future ongoing behaviors through an instant learning process. This learning process may render the motivational factors that effect in the initial participation stage lose their power in sustained participation. For instance, solvers may initially participate in some specific online crowdsourcing tasks when they are motivated by high monetary rewards (i.e., initial perception of high extrinsic rewards). However, after participating in these tasks, these initial participants may withdraw from these tasks if they perceive that the distributions of rewards are not fair. In contrast, if these initial participants feel that the reward distributions are fair, they would be encouraged to continue participating in the online tasks.

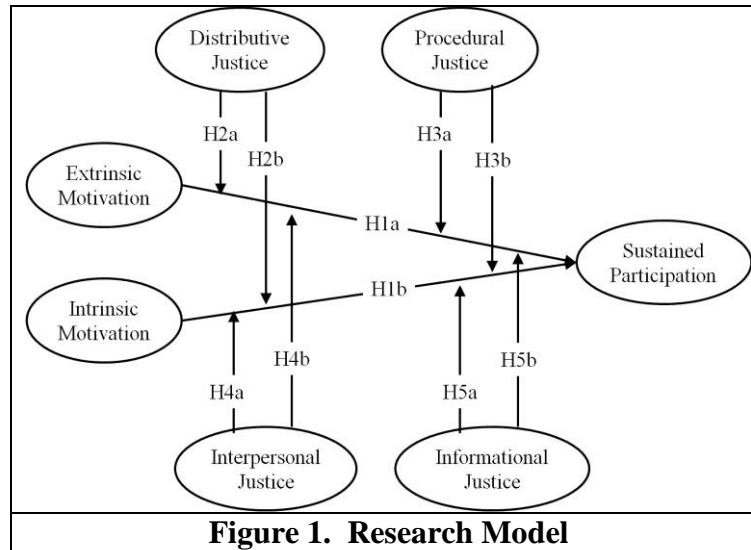
### *Justice Theory*

Justice denotes perceptions of fairness and assessment regarding the appropriateness of performance outcomes or processes (Cropanzano & Greenberg, 1997), and has been examined by much organizational research. Recent theoretical development concerning justice has centered on identifying and distinguishing different dimensions of justice to incorporate distributive justice, procedural justice, interpersonal justice, and informational justice (Greenberg, 1993).

Distributive justice focuses on evaluations of the fairness of outcomes that an individual receives (Adams, 1965), while procedural justice concerns with the processes by which outcomes are allocated or distributed among the parties to an exchange (Thibaut & Walker, 1975). Bies and Moag (1986) extracted the interactional aspect of procedural justice and conceptualized it as interactional justice. Later, Greenberg (1993) further separated the interactional justice into two subcategories: interpersonal justice and informational justice. Interpersonal justice refers to the degree to which individuals are treated by others with politeness, dignity, friendliness, and respect, whereas informational justice reflects the extent to which individuals are offered with information or rationale as to how decisions are made and how outcomes are distributed. Prior studies predominantly examined the impact of these four dimensions of justice in various organizational environments. Most of these studies adopted the uncertain management theory and argued that justice perceptions are effective and readily mechanisms for individuals to build trust and satisfaction in uncertain organizational circumstance (Kernan & Hanges, 2002; Van den Bos & Lind, 2002). These trust and satisfaction can, in turn, enhance individuals' reciprocity and loyalty towards the organizations (Chiu et al., 2009). There have been a few studies discussing the justice perceptions of individuals in virtual communities which typify the uncertain context. Researchers on virtual communities have found that community members' fairness perceptions towards the procedures, outcome and interpersonal treatment can induce their faith in the ability, integrity, and benevolence of the community management, which motivate them to continuously participate in the communities and share their knowledge (Chiu et al., 2011; Fang & Chiu, 2010). However, whether the justice perceptions enhance individuals' continued participation in crowdsourcing platforms (which is a distinctive type of virtual community) remains unexplored.

### **Research Model and Hypotheses**

Our research model is founded on the integration of motivation theories and justice theory (Fig. 1). Extrinsic and intrinsic motivations are two value-relevant factors that are often adopted in motivation theories such as the self-determination theory (Deci & Ryan, 1985). More specifically, individuals are motivated to conduct a particular behavior due to their expectations to attain a certain value to satisfy their innate needs (Ryan & Deci, 2000). Value can be produced by outcomes (i.e., instrumental value) or process (i.e., experiential value). These two values correspond to extrinsic and intrinsic motivations in the self-determination theory. Hence in this study, we use the extrinsic and intrinsic motivations as the direct predictors of solvers' sustained participation in crowdsourcing tasks.



The four dimensions of justice perceptions are viewed as the experience-relevant factors. After their initial participation in online crowdsourcing tasks, solvers will form their own perceptions of the fairness in different aspects of the crowdsourcing processes, such as the task description, interaction with seekers/peers, solution evaluation, and reward distribution. These perceptions, which are based on solvers' first-hand experience rather than on initial perceptions arising from mere observation or imagination, may prove to be more accurate in capturing solvers' perceptions of the trustfulness and integrity of the crowdsourcing parties (i.e., crowdsourcers and the management of the platforms), and subsequently be more predictable to their sustained participation.

#### *Extrinsic and Intrinsic Motivations*

Motivation theories such as self-determination theory have articulated two basic behavioral motivations: extrinsic motivation and intrinsic motivation. Extrinsic motivation refers to conducting a behavior because it leads to a separate outcome, while intrinsic motivation concerns with conducting a behavior because it is internally interesting and enjoyable (Ryan & Deci, 2000). In the current research context, extrinsic motivation primarily denotes the monetary rewards offered by seekers as compensation for solvers' time and effort expended on the tasks, whereas intrinsic motivation reflects the enjoyment and sense of self-worth induced by participating in the online tasks.

Typically in the crowdsourcing platforms, solvers participate in crowdsourcing tasks and exchange their knowledge and work for commensurate benefits, typically in the form of monetary rewards (Sun et al., 2012). Therefore, solvers will base their decision on whether or not to continue participating in an online task by considering the value of behavioral outcomes caused by task participation (Vroom, 1964). Extrinsic rewards, as a critical source of solvers' value perception, could have a positive effect on solvers' sustained participation. Hence, we propose:

*H1a: Extrinsic motivation is positively associated with solvers' sustained participation.*

Apart from extrinsic motivation, intrinsic motivation is also viewed as a determinant of solvers' sustained participation. As per the self-determination theory, individual behavior will be triggered when people recognize that the behavior can fulfill their needs for competence (Ryan & Deci, 2000). Prior studies in online community context have found that people will engage in knowledge sharing when they experience a sense of self-worth and achievement (Lin, 2007). As aforementioned, a crowdsourcing platform is typically managed through a competition-based

reward system, solvers can acquire a sense of achievement when they compete with other solvers and win the rewards. Therefore, intrinsic motivation posits a positive effect on solvers' sustained participation as well. Hence, we propose:

*H1b: Intrinsic motivation is positively associated with solvers' sustained participation.*

*Moderating Effects of Justice Perceptions*

Distributive justice is defined as a solver's perception of fairness about returns or outcomes in terms of his or her participation, based on the principle of equity. Specifically, a solver in the crowdsourcing platform may evaluate the equity of monetary rewards he/she received in relation to what he/she has contributed in terms of effort made, time spent, and solution provided. If such a solver considers a particular monetary reward to be unfair, this perception will likely affect that solver's reaction (e.g., distrust to the seekers) to the crowdsourcing platform, and ultimately his/her behaviors. Wasko and Faraj (2000) have found that knowledge sharing in electronic networks of practice can be enhanced by a strong sense of fairness in terms of the favours given and received. Similarly, Chiu et al. (2009) have also discovered that distributive justice posits a significant influence on customer's satisfaction and loyalty in online shopping context. Extrapolating to the crowdsourcing context, after initial participation, a positive interaction effect exists between extrinsic motivation and distributive justice perception. When solvers' have low fairness perception regarding the distribution of monetary reward, even if extrinsic rewards are high, solvers may still not participate in the tasks again. In contrast, when the solvers perceive the reward distribution as fair, even low extrinsic rewards may motivate the solvers to participate in the tasks again. However, as the distributive justice perception primarily stems from reward distribution results, it does not affect the relationship between solver's intrinsic motivation and sustained participation. Hence, we propose:

*H2a: Distributive justice positively moderates the relationship between extrinsic motivation and sustained participation.*

*H2b: Distributive justice does not moderate the relationship between intrinsic motivation and sustained participation.*

Procedural justice refers to solvers' perceived fairness of policies and procedures used in the crowdsourcing processes. Prior research has demonstrated that procedural justice might attenuate the effects of unsatisfactory outcomes (Brockner & Wiesenfeld, 1996). The process by which outcomes are settled might be more important to an individual than the final decisions (Folger & Greenberg, 1985). In the crowdsourcing platforms, solvers may feel satisfied when platform hosts/crowdsourcers carefully and impartially evaluate (based on fair policies and procedures) all the submissions and resolve all the conflicts. According to Konovsky & Pugh (1994), procedural justice enhances an individual's trust toward the management, which in turn drives his/her citizenship behaviors (i.e., voluntary cooperation). In the context of crowdsourcing, when solvers experience unfair procedures and policies in initial participation, they might not participate again in the online tasks even if the extrinsic monetary rewards are high, as they might distrust the hosts/crowdsourcers. On the contrary, when the crowdsourcing policies and procedures are equal to everyone, solvers might sustain their participation in the online tasks even when the monetary rewards are low. Similarly, there is a positive interaction effect between intrinsic motivation and procedural justice perception on solvers' sustained participation, as the solvers may expect a better environment for them to attain the sense of self worth and enjoyment. Hence, we propose:

*H3a: Procedural justice positively moderates the relationship between extrinsic motivation and sustained participation.*

*H3b: Procedural justice positively moderates the relationship between intrinsic motivation and sustained participation.*

Interpersonal justice in the crowdsourcing context means that solvers are treated with politeness, dignity, friendliness, and respect. Individuals normally use holistic impressions of fair treatment as a proxy for interpersonal trust (Lind, 2001). In the crowdsourcing platform, solvers who are treated rudely or insulted by another may consider such behavior unfair and undesirable. As per social exchange perspective, interpersonal justice lead to the development of trust, which ultimately motivate positive behaviors such as citizenship behavior (Konovsky & Pugh, 1994). When solvers experience a low level of interpersonal justice, they might feel insulted and leave the platform as the impoliteness and disrespect will reduce solvers' expectation for self worth and enjoyment. In contrast, when solvers feel that they are treated with politeness and respect by the hosts and crowdsourcers, they will expect higher level of intrinsic benefits and are more likely to stay with the platform. Therefore, there exists a positive interaction effect between intrinsic motivation and interpersonal justice perception on solvers' sustained participation. However, interpersonal justice may not influence the relationship between extrinsic motivation and sustained participation, as the quality of interpersonal interaction does not affect the solvers' perception of monetary rewards. Hence, we propose:

*H4a: Interpersonal justice does not moderate the relationship between extrinsic motivation and sustained participation.*

*H4b: Interpersonal justice positively moderates the relationship between intrinsic motivation and sustained participation.*

Informational justice concerns with whether the information needed by the solvers are provided thoroughly and on a timely basis. Prior studies have suggested that informational justice is positively associated with trust in management (Kernan & Hanges, 2002). If the hosts and crowdsourcers can timely respond to solvers' inquiries and clarify how final decisions are made, the solvers will perceive a minimal cost of information search, and are hence more strongly motivated by the high monetary rewards. In contrast, if inquiries are not promptly responded and if information about the final decision making is not clearly provided, solvers will doubt the conscientiousness of the hosts and crowdsourcers, and never return back to the platform. Therefore, there might be a positive interaction effect between extrinsic motivation and informational justice on solvers' sustained participation. In a similar vein, when the information is not provided in a timely and concrete manner, the sense of enjoyment of the solvers will be reduced, which may refrain them from sustained participation. Hence, we propose:

*H5a: Informational justice positively moderates the relationship between extrinsic motivation and sustained participation.*

*H5b: Informational justice positively moderates the relationship between intrinsic motivation and sustained participation.*

### **Research Design and Current Status**

We plan to first conduct a field study to verify our research model. By conducting in depth semi-structured interviews with seekers, solvers and platform hosts from different crowdsourcing platforms, we hope to understand what the justice perceptions of solvers actually are after their initial participation in the online tasks, and whether and how these justice perceptions in practice will moderate the effects of solvers' extrinsic and intrinsic motivations on their sustained participation intention. The interviews will be used to provide deep and multi-faceted insights to the actual interaction effects between the motivations and justice perceptions on solvers' sustained participation. After refining the model, we hope to test the hypotheses using survey.

Currently, we have designed a preliminary questionnaire based on reviews of prior relevant literature. The survey instruments were developed either by adapting existing measures to the research context, or by converting the conceptions of the constructs into a questionnaire format. For the instruments of extrinsic and intrinsic motivations, we adapt Sun et al. (2012)'s measurements for extrinsic and intrinsic motivations in transaction-based virtual communities (TVC) and rephrase them to reflect the distinctive context of crowdsourcing platforms. For the instruments of the four justice perceptions, we adapt Fang and Chiu (2010)'s scales for the same four justice perceptions of members in online knowledge communities and reword them to fit into the crowdsourcing context. For the sustained participation, we also adapt the scales used by Sun et al. (2012) in their study of TVC. Besides the main constructs, we would also incorporate measures for several control variables (e.g., age, gender, Internet experience, task complexity, time span of the task, etc) to account for solver-specific and task-specific effects. We will refine these measurements after the field study and will pretest the questionnaire with a pilot study.

The unit of analysis is solver in the crowdsourcing platform. We hope to collect data from about 300 solvers from different crowdsourcing platforms in China (e.g., Taskcn.com, [zbj.com](http://zbj.com), vikecn.com). Our target respondents are solvers who have at least participated in online crowdsourcing tasks once.

To run the data analysis, we intend to use the moderated multiple regression analysis (MMR) (Kankanhalli et al., 2005) because it is considered as "one of the most popular, if not the most popular, approach for testing hypothesis about interaction effects" (Aguinis & Gottfredson, 2011). Compared to other analysis methods (e.g., SEM), MMR is more suitable for models with multiple moderators and multiple moderating effects (Kankanhalli et al., 2005). Since we are still in the process of refining measures and identifying potential respondents to initiate the main large scale survey, we certainly welcome any comments and feedbacks on this research-in-progress paper.

### **Potential Contributions**

Motivated by inadequacies and inconsistencies in extant crowdsourcing studies, our research hopes to contribute to the crowdsourcing field in these two ways. First, unlike prior studies primarily focusing on antecedents of solvers' initial participation in crowdsourcing tasks, our research examines antecedents of solvers' sustained participation. Inspired by motivation theories (i.e., self-determination theory), we propose a theoretical model to investigate the impact of extrinsic and intrinsic motivations on solvers' sustained participation in crowdsourcing tasks. Prior studies mainly examined the effects of extrinsic and intrinsic motivations on solvers' initial participation, but whether and to what extent these motivational factors still posit an influence on solvers' sustained participation remains unexplored. Second, our research further advance that the relationships between solvers' motivations and sustained participation are contingent on solvers' justice perception emerged from their initial participation experience. Utilizing a contingency perspective (Lawrence and Lorsch 1967), this study helps to address the question of why a number of solvers who are motivated to participate in online tasks no longer continue their participation in the crowdsourcing tasks. This insight is attained by theoretically identifying and empirically examining the boundary conditions of the effects of extrinsic and intrinsic motivations (i.e., explaining when extrinsic and intrinsic motivations do or do not predict sustained participation in crowdsourcing tasks by identifying justice perceptions as being critical moderating factors). Third, our research also reveals the diverse and idiosyncratic moderating effects of different justice perceptions on the links between motivations and sustain participation.



Aside from the theoretical contributions, our study seeks to offer practical and important implications to two groups of stakeholders: seekers (i.e., crowdsourcers), and the hosts (i.e. web sponsors) of crowdsourcing platforms. On one hand, seekers can learn from our findings that apart from providing appropriate incentives that meet the solvers' external and internal needs, they should also spare sufficient efforts to ensure enough fairness in the distribution of task rewards, the crowdsourcing policies and procedures, the way they interact with the solvers, and the information provided to the solvers regarding how the final decisions are made. On the other hand, hosts of the platform can also take away from our findings by paying enough attentions to the fairness elements of the crowdsourcing processes held in their platforms, and providing necessary help for seekers to sustain valuable participants.

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