

Trait Motivations of Crowdsourcing and Task Choice: A Distal-Proximal Perspective

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Abstract

Research on crowdsourcing participation has identified the four primary motivators to be payment, job-market signaling, competence development, and fostering social affiliation. These motivators have mostly been understood in terms of the intrinsic-extrinsic perspective, and participation has been treated as a black box. This study extends understanding of the primary motivators by clarifying their differential effects in terms of the distal-proximal perspective of motivation, and distinguishing among participation in (i.e., choice of) unstructured tasks, high-commitment tasks, and interdependent tasks. Findings based on a survey of 283 crowdsourcing participants indicate that those motivated to develop competence (i.e., learn new knowledge and skills) tend to choose high-commitment tasks requiring more effort and therefore opportunities to improve ability, rather than focusing on task structuredness or interdependence. Those who are motivated to foster social affiliation tend to focus more on choosing highly interdependent tasks requiring coordination and collaboration with other participants. Those motivated by payment tend to focus on demonstrating competence relative to others and are therefore more likely to choose structured tasks with clear, comparable output. These findings enhance the conceptual clarity of different motivators, and inform crowdsourcing organizers on the motivator to focus on based on task characteristics.

Keywords: Crowdsourcing, motivation, task choice

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1. Introduction

Crowdsourcing is described as “the new pool of cheap labor: everyday people using their spare cycles to create content, solve problems, even do corporate R & D” (Howe, 2006, p. 1). Crowdsourcing tasks ranged from simply completing assembly-like piecework (e.g., data coding, transcription), to distributed problem solving enlisting a multitude of humans with varying knowledge and skills (e.g., research and development, accounting, product design, citizen journalism; Doan et al., 2011; Estellés-Arolas and González-Ladrón-de-Guevara, 2012; Saxton et al., 2013). Tasks are typically posted on intermediary platforms (e.g., Amazon Mechanical Turk, InnoCentive) or organization-hosted websites (e.g., My StarBucks Idea, LEGO Ideas) to access and harness a large and diverse crowd through the Internet (Saxton et al., 2013). Crowds’ participation and tasks are the *raison d’être* of crowdsourcing.

Crowds’ participation in crowdsourcing tasks is volitional and attracting participants requires an understanding of their motivation, which offers insight into why people behave as they do (Weiner, 2013). One has much freedom in choosing which crowdsourcing platform or website to use, which task to take up, and how much effort to expend on a task. Much research on crowdsourcing has focused on identifying what motivates participation (Hossain, 2012; Spindeldreher and Schlagwein, 2016). The seminal study by Brabham (2010) identified the four primary motivators to be the opportunity to make money, the opportunity to develop one’s skills, the potential opportunity to take up freelance or full-time work ultimately, and the love of community. The four primary motivators have been found to be significant in many subsequent studies (e.g., Hossain, 2012; Kaufmann et al., 2011; Kosonen et al., 2014; Rogstadius et al., 2011; Zhao and Zhu, 2014; Zheng et al., 2011).

The four motivators have also been found to be significant for participants using different crowdsourcing platforms, websites, or tasks. This suggests that the four motivators are generally stable and cross situational rather than being platform or task specific. In line with this, in this study we focus on trait motivation rather than state motivation. In motivation research, state motivation is circumstantial, variable, and often a result of fleeting emotions, while trait motivation is relatively more consistent, enduring, trans-situational individual difference in preferences (Gardner and Tremblay, 1994; Heggstad and Kanfer, 2000; Latham and Pinder, 2004). Trait motivation is reflected in the tendency of an individual to constantly think and behave in a particular way in many different situations and contexts. In this study’s context, for example, this means that we examine the opportunity to make money by participating in crowdsourcing as a whole, rather than in a specific website, platform, or task. Looking beyond a specific website, platform, or task is also consonant with the fact that participation is volitional. In the rest of this article, motivation refers to trait motivation, unless otherwise stated.

Although prior research has identified what motivate crowdsourcing participation, our understanding remains limited in two ways. First, there has been a lack of theoretical analysis

of the four primary motivators. They emerged from an analysis of interviews (Brabham, 2010) and most prior studies have broadly categorized them into intrinsic or extrinsic motivation (e.g., Kaufmann et al., 2011; Rogstadius et al., 2011; Zheng et al., 2011). This results in a list of factors that, though statistically significant, often appears to be ad hoc. Time is ripe to look beyond the intrinsic-extrinsic dichotomy to consider whether and how other human motivation theories could further our understanding of these motivators, and enrich the theoretical development of crowdsourcing participation motivation.

Second, although the nature of task, especially task complexity, is the most common aspect identified in conceptual taxonomies of crowdsourcing (Nakatsu et al., 2014), it has rarely been accounted for in research on crowdsourcing participation. The dependent variable of crowdsourcing participation has been treated as a single black box, measured interchangeably in terms of intention to participate, participation effort, or time spent (e.g., Kaufmann et al., 2011; Kosonen et al., 2014; Zhao and Zhu, 2014; Zheng et al., 2011). Participation in well-structured, simpler tasks has not been distinguished from participation in more interdependent, complex tasks (e.g., new product co-creation). It is generally assumed that payment and love of community motivate participation in these tasks similarly, though in practice those motivated by payment tend to choose simpler tasks to maximize success and the chance of receiving payment, while those motivated by love of community prefer interdependent tasks that offer opportunities for social interactions. Relying on a broad conceptualization of participation leaves several important questions unaddressed: Is payment useful for attracting participants to take up simple, structured tasks as well as complex, unstructured tasks? Which motivator is effective for attracting participants for interdependent tasks? Addressing questions like these is also useful for practice, since crowdsourcing organizers often have limited resources and it is not feasible to put all the four motivators in place.

As an attempt to bridge these gaps in research and understanding, this study opens up the black box of participation and accounts for task complexity by distinguishing among participation in (i.e., choice of) unstructured tasks, high-commitment tasks, and interdependent tasks (Nakatsu et al., 2014). This study proposes that participants driven by different (trait) motivators focus on different task characteristics in task choice, and explains the differences theoretically based on the distal-proximal perspective of motivation (Kanfer, 1990). The perspective recognizes that different motivators vary in their conceptual proximity to task choice. Proximal motivators are those that directly control the initiation and execution of tasks, while distal motivators are those that affect task choice indirectly, through goal choice (e.g., achievement goal of developing competence). The distal-proximal perspective offers a useful theoretical basis for understanding differences among the four primary crowdsourcing motivators and hypothesizing their differential effects. Overall, the research question addressed in this study is: How do the four primary trait motivators of crowdsourcing participation differentially influence task choice?

Findings based on a survey of 283 crowdsourcing participants indicate that those motivated by payment tend to focus on demonstrating competence relative to others and are therefore more likely to choose structured tasks with clear, comparable output. Those motivated to develop competence (i.e., learn new knowledge and skills) tend to choose high-commitment tasks requiring more effort and therefore opportunities to improve ability, rather than focusing on task structuredness or interdependence. Those who are motivated to foster social affiliation tend to focus more on choosing highly interdependent tasks requiring coordination and collaboration with other participants.

This study has four main contributions. First, it enriches the theorization of crowdsourcing participation motivation, by clarifying the conceptual differences among the four primary motivators identified in prior research based on the distal-proximal perspective of motivation. This study shows that the motivators of developing competence and foster social affiliation influence task choice more directly than payment. This adds new understanding to crowdsourcing research, which has mostly relied on the intrinsic-versus-extrinsic categorization of motivators. Second, this study accounts for the multi-dimensional nature of participation in terms of task complexity, which is one of the most common aspects of crowdsourcing conceptualizations (Nakatsu et al., 2014). Distinguishing among tendency to choose unstructured tasks, high-commitment tasks, and interdependent tasks affords the possibility of clarifying the differential effects of the crowdsourcing motivators. Third, the differential effects were tested in an empirical study, and this study is one of the first attempts to answer the calls for research on the differential effects of motivators. Specifically, Pedersen et al. (2013) have suggested further research to examine how motivation varies with task type; Finnerty et al. (2013) identified the need to systematically study how different rewards influence participants' performance for different types of tasks. Fourth, this study also contributes to practice by informing crowdsourcing organizers the motivators to emphasize for different types of task. High-commitment tasks could attract participants when the opportunity to develop competence and foster social affiliation (proximal motivators) are clarified; Interdependent tasks could attract participants when the opportunity to foster social affiliation is clarified; Offering high payment is not useful for attracting the take up of unstructured tasks.

The next section reviews prior studies on motivation to participate in crowdsourcing and identifies gaps in research. This is followed by the theoretical background and development of our model and hypotheses. The research method, data analysis, and results are then explained. Implications of the findings for research and practice are also discussed.

2. Literature Review

Since our objective is to study the differential effects of the primary motivators of crowdsourcing participation on task choice, we reviewed the literature on these two topics. Before the review, we also provide a brief overview of the concept and development of crowdsourcing.

2.1. Crowdsourcing and its Development

The term crowdsourcing was coined by Howe (2006) to describe an approach that harnesses the creative solutions of a distributed network of individuals through an open call. Notable pioneers of crowdsourcing include Wikipedia (participants create encyclopedia entries collaboratively), InnoCentive (an intermediary platform where participants propose solutions to problems in exchange for money), Threadless (participants create T-shirt designs), Amazon Mechanical Turk (an intermediary platform where participants complete tasks in exchange for money), YouTube (participants create videos), Fiat Mio (participants suggest design ideas for a car), iStockphoto (participants create images for sale) and Flickr (participants upload and tag photographs). Applications of crowdsourcing continue to expand to different sectors and industries, including policy making (e.g., Challenge.gov), social innovation (e.g., OpenIDEO), healthcare (e.g., CrowdMed), and education (Cambridge Assessment's A-level question crowdsourcing). Crowdsourcing offers access to a wide variety of knowledge and skills to complete tasks and solve problems, often at a much lower cost compared to hiring employees or professionals. Realization of the value of crowdsourcing is predicated on whether people are willing to take up the tasks. This involves understanding what motivates the crowd to participate (Brabham, 2010).

2.2. Motivators of Crowdsourcing Participation

In one of the most-cited research study on motivations of crowdsourcing participation, Brabham (2010) concluded that the four primary motivators are the opportunity to make money (payment), the opportunity to develop one's skills (competence development), the potential opportunity to take up freelance or full-time work ultimately (job-market signaling), and the love of community (social affiliation). The significance of these four motivators has been supported by further research studies of participants using different platforms or websites, as discussed next (summarized in Table 1; e.g., Hossain, 2012; Kaufmann et al., 2011; Kosonen et al., 2014; Rogstadius et al., 2011; Zhao and Zhu, 2014; Zheng et al., 2011).

Payment has been consistently identified as a strong motivation for participating in crowdsourcing (Brabham, 2008; Brabham, 2010; Hossain, 2012; 2011; Leimeister et al., 2009; Rogstadius et al., 2011; Zhao and Zhu, 2014; Zheng et al., 2011). Many crowdsourcing task requesters compensate participants for their time and effort spent on completing tasks (Mao et al., 2013). Most tasks involve low wages and pay a small amount, often in cents (Rogstadius et al., 2011). Research has shown that increasing payment significantly increases the uptake of tasks or work output (Mason and Watts, 2009; Rogstadius et al., 2011). However, the review also shows that the effect of payment on the nature of task chosen (e.g., task complexity) has not been studied.

Job-market signaling is the sending of information about one's unobservable job-related capabilities to potential employers (Kaufmann et al., 2011; Spence, 1973). In most job markets, information about a job seeker's productive capabilities is not directly observable by employers when hiring decisions are made, and signaling is therefore necessary to reduce

the information asymmetry (Spence, 1973). Participating in crowdsourcing is viewed as one way of demonstrating capabilities and skills, and is regarded as a channel of self-advertisement for those seeking new job opportunities (Leimeister et al., 2009). A crowdsourcing participant may select tasks in order to show presence and increase the chance of getting noticed by potential employers (Kaufmann et al., 2011). Brabham (2010) observed that the opportunity to eventual employment is a key reason for participating in crowdsourcing, while Kaufmann et al. (2011) found that job-market signaling is strongly correlated with the time a participant spend on crowdsourcing.

Competence development is also a key motivating factor found significant in many studies (Brabham, 2008; Brabham, 2010; Kaufmann et al., 2011; Kosonen et al., 2014). The focus of competence development is on acquiring new knowledge to enhance existing skills or develop new skills. In crowdsourcing, this can occur as one accesses other participants' task output or receives feedback on one's work (Leimeister et al., 2009). Brabham (2010) observed that many crowdsourcing participants see improving one's skills within a supportive community as an end in itself.

Social affiliation is an especially relevant motivating factor of crowdsourcing participation because being part of a crowd provides many opportunities for individuals to reach and interact with others. It has been observed that participants of crowdsourcing are motivated by the sheer existence of a community that offers the possibility of fostering social ties, meeting new people, and getting involved in a social group (Albors et al., 2008; Brabham, 2010; Hossain, 2012; Pedersen et al., 2013).

We also observed that the majority of studies had focused on the effect of motivation on participation (see the sixth column of Table 1). Thus far, participation has largely been treated as a single black box, measured interchangeably in terms of intention to participate, participation effort, or time spent (e.g., Kaufmann et al., 2011; Kosonen et al., 2014; Zhao and Zhu, 2014; Zheng et al., 2011). This oversimplifies the concept of participation, as crowdsourcing taxonomies indicate that tasks vary greatly in requirements and complexity. Whether participation in tasks with different characteristics is affected by the same motivator remains questionable. One exception is the study by Rogstadius et al. (2011), which distinguishes between output accuracy and speed. However, the study did not examine whether they were influenced by different motivators. This study seeks to address the gaps in prior research by opening up the black box of participation and accounting for the complexity of task chosen.

Table 1. Motivations of Crowdsourcing Participation

Factor/ Study	Payment	Job-market signaling	Competence development	Social affiliation	Key Finding	Method and Final Sample
Baruch et al. (2016)				Contact with task coordinators*, altruism (concern for others)*	Altruism was a key motivator; Involvement was strongly linked to contact with coordinators	Mixed-method study (survey and interview) of Tomnod users
Brabham (2010)	To make money*	Eventual work opportunity*	To improve skill*	Love of and addiction to community*	Four primary motivators for participation emerged	Interview of 17 Threadless users
Hossain (2012)	Financial motivator*	Organizational motivator (marketing oneself etc.)*		Social motivator (collaboration, networking, etc.)*		Conceptual study that reviewed and classified factors and incentives in crowdsourcing
Kaufmann et al. (2011)	Payment*	Signaling*	Human capital advancement*	Community identification*, social contact	Extrinsic motivation had a strong effect on time spent, but intrinsic motivation was more important	Survey and correlation analysis of 431 Amazon Mechanical Turk users
Kosonen et al. (2014)		Recognition from host companies*	Learning benefits*	Social benefits*, recognition from peers	Social benefits, etc. affected knowledge-sharing intention	Survey of 244 IdeasProject participants
Leimeister et al. (2009)	Compensation*	Self-marketing*	Learning*	Social motives*	Incentives and motives of users supported the process of activation and consequently participation	Ranking of design elements by 32 SAPIens idea competition participants
Rogstadius et al. (2011)	Pay (extrinsic motivation)*			Help others (intrinsic motivation)*	Intrinsic motivation improved the output accuracy and speed	Experiment involving 158 Amazon Mechanical Turk workers
Spindeldreher and Schlagwein (2016)	Compensation*	Outward recognition*	Challenge*	Sense of community	Challenge, compensation, and outward recognition are important motivations for participation	Meta-analysis of 29 empirical studies
Zhao and Zhu (2014)	External motivation (financial rewards, income, etc.)*			Introjected motivation (recognition from others)*	Supporting of participants' motivational affordances strengthened the relationship between motivation and participation effort	Survey of 420 Taskcn and Zhubajie workers
Zheng et al. (2011)	To gain money*	To gain recognition			Intrinsic motivation was more important than extrinsic motivation in inducing participation	Survey of 283 Taskcn workers

* Factors found significant in the study

2.3. Task Choice in terms of Task Complexity

Research on crowdsourcing has examined task characteristics in various terms, such as complexity, autonomy, and variety (Finnerty et al., 2013; Nakatsu et al., 2014; Rouse, 2010; Schenk and Guittard, 2011; Zheng et al., 2011). Among them, task complexity is the most commonly studied. Given that our interest is in motivations, we choose to focus on task complexity because it determines the cognitive demands and knowledge requirements of a task and is therefore an important aspect of task design that participants evaluate vis-à-vis their motivations driving the decision to take up the task. Prior research has studied complexity as unidimensional (e.g., Sun et al., 2015) as well as multidimensional (e.g., Nakatsu et al., 2014; Zheng et al., 2011). The latter is more in line with our objective of investigating the differential effects of motivating factors. Based on a review of 100 well-known examples of crowdsourcing, Nakatsu et al. (2014) identified the key dimensions affecting task complexity to be task structuredness, task commitment, and task interdependence and validated them empirically.

Task structuredness focuses on whether a task and its expected output are clearly defined (Nakatsu et al., 2014). Less-structured tasks are more complex and often have multiple solutions or multiple approaches to completion (e.g., suggest a new product idea, develop a computer algorithm for a particular problem). They tend to be more knowledge intensive and the output is more open ended and innovative. In contrast, structured tasks have clear solutions and the quality of participants' task output can be more easily and objectively evaluated.

Task commitment refers to the amount of effort and resources required to perform a task (Nakatsu et al., 2014). High-commitment tasks require participants to expend more time, more cognitive resources, or even invest tangible resources such as money (e.g., purchase software to carry out a task). Commitment and structure are distinct factors influencing complexity – although less-structured tasks tend to require high commitment, structured tasks are not necessarily low-commitment tasks. For example, determining the relevance of search engine results is a clearly defined, structured crowdsourcing task but is typically time consuming.

Task interdependence refers to how tightly coupled task activities of a crowd are (Nakatsu et al., 2014). Independent tasks are performed by individuals separately, with very little or no interaction with other participants. In contrast, interdependent tasks require participants to coordinate their activities, share and integrate knowledge, and collaborate to produce the output and is therefore more complex. It is necessary to “set aside their individual differences and competitive impulses” (Nakatsu et al., 2014, p. 831) when performing interdependent tasks. Examples of interdependent crowdsourcing tasks include co-authoring encyclopedia articles (Kittur et al., 2011) and coding software (Doan et al., 2011).

3. Theoretical Background and Development of Hypotheses

This study seeks to clarify the differential effects of the primary motivators of crowdsourcing participation (i.e., payment, job-market signaling, competence development, and fostering social affiliation) on participants' choice of task (in terms task structuredness, commitment, and interdependence). The proposed model of differential effects was developed by first (1) understanding the nature of motivators and then (2) understanding their relationships with task choice. These understanding are developed based on motivation theories. Specifically, goal theories suggest that two of the crowdsourcing motivators, competence development and fostering social affiliation, are important goals motivating behavior. Goal theories also indicate that payment, another crowdsourcing motivator, is an antecedent of goals. The relationship between goals, antecedents of goals, and task choice are clarified in the distal-proximal perspective of motivation (Kanfer, 1990): goals serve as proximal motivations and mediate the effects of distal motivators on task choice. Accordingly, the framework serves as a basis for hypothesizing relationships between motivators and participation. The following subsections detail the nature of each motivator and then hypothesize their differential relationships with task choice.

3.1. Nature of Motivators in terms of Goal Theories of Motivation

Motivation research suggests that two of the four crowdsourcing motivators, i.e., develop competence and foster social affiliation, are important goals motivating behavior. Specifically, they are identified in the achievement goal theory (Hulleman et al., 2010) and social goal theory (King and Watkins, 2012; Urdan and Maehr, 1995) respectively. Achievement goals and social goals are the most important and commonly studied goals (Pintrich, 2000). In general, goal theories focus on the purposes or reasons an individual pursues a task and is concerned with the energization of behavior (Barron and Harackiewicz, 2001). They are therefore relevant for understanding the nature of the motivators in this study. Goal theories have also been used in studies of the effect of goals on people's choice of tasks, persistence on those tasks, vigor in carrying them out, and performance on them.

An achievement goal is a future-focused cognitive representation that guides behavior to a desirable, competence-related end state (Hulleman et al., 2010). The achievement goal theory identifies mastery and performance as two different goal-directed achievement strivings. Those who strive for mastery judge competence with reference to their own past performance or knowledge (Nicholls, 1984). They have a task orientation, emphasize learning and challenge, and seek to *develop* their competence (Hulleman et al., 2010). In contrast, those who strive for performance judge competence as a capacity relative to that of others (Nicholls, 1984). They have an ego orientation, focus on relative ability, and seek to *demonstrate* their competence (Hulleman et al., 2010).

The social goal theory focuses on expected social end states that guide behavior (King and Watkins, 2012; Urdan and Maehr, 1995). Like the need for achievement, need for affiliation is a basic human need (McClelland, 1961) and fostering social affiliation is therefore

a very important social goal, among others such as social approval, social responsibility, and social status (Urdan and Maehr, 1995). The goal of fostering social affiliation focuses on the development and maintenance of mutually satisfying relationships (Allen, 2003). Individuals motivated by the goal engage in tasks for the opportunity to socialize and develop personal relationships with others.

Payment, another crowdsourcing motivator, has been identified as an antecedent of goals in research on goal theories. Locke et al. (1981) proposed that monetary incentives affect performance through goals by causing one to spontaneously set goals. Locke and Latham (1984) summarized the relationship between incentives, goals, and behavior in the context of organizations by stating “the most fundamental connection between money and goal setting is that paying employees for their services makes them willing to expend time and effort on the organization's behalf. Given this willingness to expend effort, goals tell the employee where to expend effort (direction)” (p. 113).

Job-market signaling has not been studied in terms of goal theories. Nevertheless, research on job-marketing signaling identifies demonstrating competence to be an important way of sending the signal (Spence, 1973). For example, certification examination is expected to reliably signal that one is adequately competent with a body of knowledge (Fertig, 2010; Lyons et al., 2012). As discussed before, demonstrating competence is an achievement goal. This suggests that job-market signaling could potentially be an antecedent of goals – those who seek to send job-market signals are likely to focus on the achievement goal of demonstrating competence.

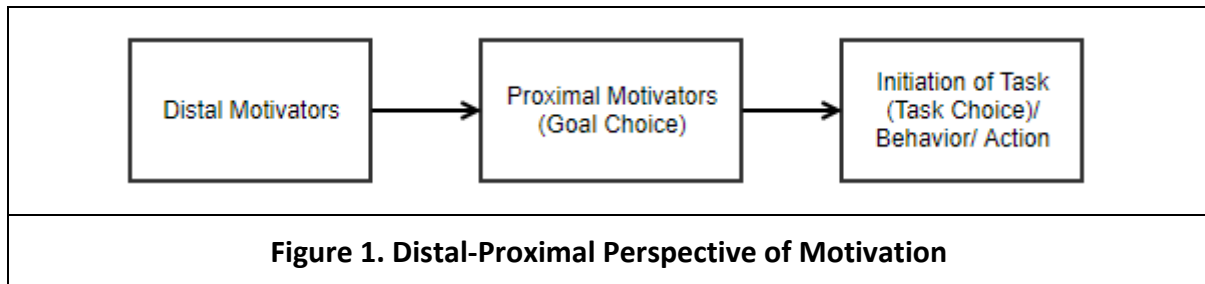
In sum, understanding the nature of crowdsourcing motivators in terms of goal theories indicate that the motivators of developing competence and fostering social affiliation are goals, while the other two motivators of payment and job-market signaling are antecedents of the goal of demonstrating competence. The relationship between goals, antecedents of goals, and task choice is explained in the distal-proximal perspective of motivation (Kanfer, 1990), as discussed next.

3.2. Effects of Motivators in terms of the Distal-Proximal Perspective of Motivation

The distal-proximal perspective of motivation (Kanfer, 1990) distinguishes among motivation factors based on their proximity to behavior and action. *Proximal* motivators are those that directly control the initiation, as well as execution of task actions. Proximal motivators are identified in goal-directed theories of behavior, such as achievement goals and social goals (Kanfer, 1990). Proximal motivators are especially important when a task requires sustained effort in the face of difficulties or distractions. This is in line with the Intentional View of Behavior (Dennett, 1978), in which an action is construed as a rational attempt to attain goals.

Distal motivators are those that have indirect effects on behavior and action, that is, they “emphasize motivational constructs and processes affecting goal choice” (Kanfer, 1990, p. 82). In other words, distal motivators affects task choice and sets the stage for task initiation and engagement through affecting goal choice (see Figure 1). Kanfer (1990) argued

that neither distal motivators nor proximal motivators alone are sufficient to explain the motivational bases of behavior. It is necessary to specify the proximal path along which the effect of distal motivators travel.



As discussed in the previous section, the motivators of developing competence and fostering social affiliation are goals, while the other two motivators of payment and job-market signaling are antecedents of the goal of demonstrating competence. In terms of the distal-proximal perspective of motivation (Kanfer, 1990), the goals of developing competence and fostering social affiliation are proximal motivators, while payment and job-market signaling are distal motivators affecting task choice through the proximal motivator of demonstrating competence. Therefore, in our proposed model, we account for the proximal motivator of demonstrating competence to better discern the effects of payment and job-market signaling, even though demonstrating competence is not one of the four primary crowdsourcing motivators identified by Brabham (2010). Hypotheses in the proposed model are justified in the next two sections.

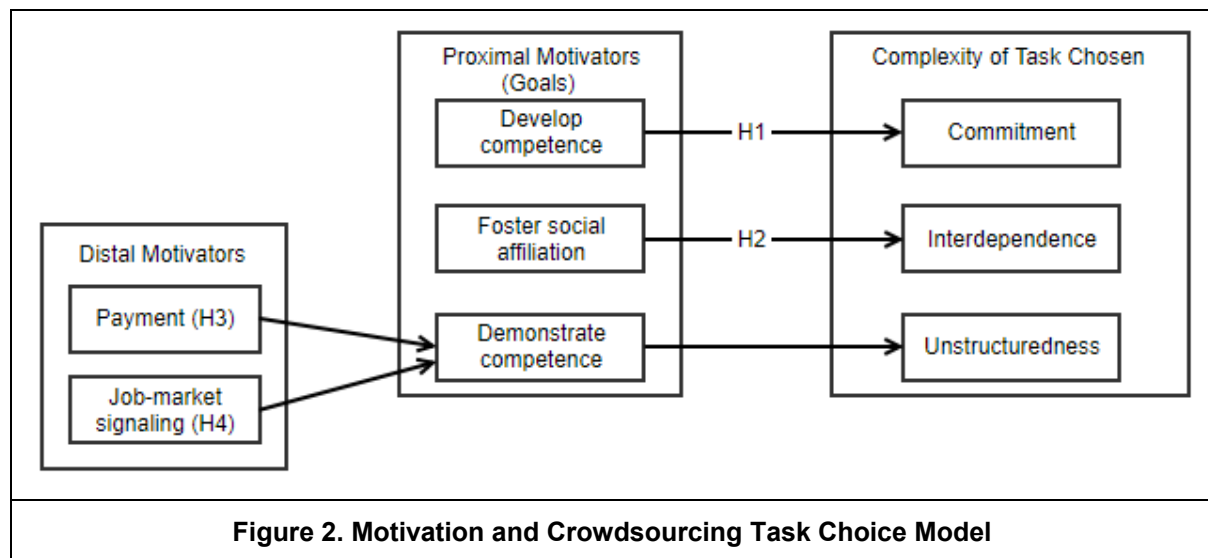
3.3. Hypotheses of Relationship between Proximal Motivators and Task Choice

As discussed earlier, developing competence and fostering social affiliation are proximal motivators because they are the key goals identified in theories of achievement goal and social goal, and goals are proximal motivators directly affecting task choice, according to the distal-proximal perspective of motivation (Kanfer, 1990). This study distinguishes among the choice of unstructured, high-commitment, and interdependent tasks.

Crowdsourcing participants driven by the motivator of developing competence aim to acquire new knowledge for enhancing their existing skills or developing new skills through participation in crowdsourcing, and tend to seek challenges and opportunities to learn (Hulleman et al., 2010; Nicholls, 1984). Learning is considered to be an intrinsic motivation of crowdsourcing (Hossain, 2012; Zhao and Zhu, 2014) in that it stems from one's inborn desire and from feelings of competence, rather than obvious tangible or external benefits (Leimeister et al., 2009). When individuals are intrinsically motivated to develop competence, they tend to be more interested in the task at hand and attempt to stretch their abilities (Utman, 1997). They consider ability to be a malleable attribute that can be developed by increasing effort (Dweck, 1986). Among the three task characteristics of structuredness, commitment, and interdependence, commitment is concerned with the amount of effort and resources required to perform a task (Nakatsu et al., 2014), while structuredness focuses on the clarity of expected output and interdependence focuses on interrelationships among

participants (see the literature review section). Accordingly, participants motivated by the goal of developing competence are likely to choose high-commitment tasks requiring more effort and thereby offering greater opportunity to improve ability. Therefore, it is expected that the motivator of developing competence is more strongly related to the choice of high-commitment tasks than the choice of unstructured or interdependent tasks (see Figure 2).

H1: Crowdsourcing participants motivated to develop competence focus more on choosing high-commitment tasks than unstructured or interdependent tasks.



Individuals seeking to foster social affiliation want to engender feelings of belonging within groups and feel isolated or rejected if affiliative desires are not met (Dowson and McInerney, 2001; King and Watkins, 2012). They value and are oriented toward group memberships and relationships with others, and tend to gain gratification from harmonious relationships and from a sense of communion with others (Wiesenfeld et al., 2001). They tend to want to help others so that the group can stay together and may even participate in group activities that they personally do not like much (Dowson and McInerney, 2001). Need for social affiliation is reflected in one's avoidance to work alone and attempt to work in a group rather than individually (Steers and Braunstein, 1976). By implication, they are likely to choose crowdsourcing tasks that allow them to work with others cooperatively, in order to express and satisfy the desire for social affiliation. When choosing tasks, they are likely to focus on the task characteristic of interdependence rather than unstructuredness or commitment required, because interdependence emphasizes interrelationships among participants. It follows that the motivator of fostering social affiliation is more strongly related to the choice of highly interdependent tasks than the choice of unstructured or high-commitment tasks.

H2: Crowdsourcing participants motivated to foster social affiliation focus more on choosing highly interdependent tasks than unstructured or high-commitment tasks.

3.4. Hypotheses of Relationship between Distal Motivators and Task Choice

Distal motivators influence task choice through proximal motivators, according to the distal-proximal perspective of motivation (Kanfer, 1990). Proximal motivators are goals identified in

goal theories (Kanfer, 1990), which includes the achievement goals of developing competence and demonstrating competence, and the social goal of fostering social affiliation (Hulleman et al., 2010; King and Watkins, 2012; Urdan and Maehr, 1995). These goals are the most important because need for achievement and need for affiliation are basic human needs (McClelland, 1961).

This study proposes that the motivator of payment is a distal motivator affecting task choice through the achievement goal of demonstrating competence. This is indirectly supported by prior research in several ways. First, research on goal theories has identified payment to be a distal motivator. For example, Locke et al. (1981) explained that monetary incentives affect performance through goals by causing one to spontaneously set goals. Focusing on employees, Mitchell and Mickel (1999, p. 575) concluded that “in terms of its impact on behavior, the evaluation of money is more distal than proximal. It is always there in the background... money influences goal acceptance”. Second, there is evidence that payment affects the achievement goal of demonstrating competence more strongly than the goals of developing competence or fostering social affiliation. To receive payment for a crowdsourcing task, a participant needs to complete the task as required successfully (Geiger et al., 2011). Therefore, a participant motivated by payment is likely to focus on completing the task rather than other aspects that are not compensated. To increase the chance of receiving payment, the participant would need to show the worth for receiving payment among participants by demonstrating one’s competence relative to others. Those motivated by payment also tend to want to maximize payment by completing as many tasks as possible given the amount of time and level of cognitive resource available (Horton and Chilton, 2010; Mao et al., 2013). Therefore, they are likely to focus their effort on paid aspects of a tasks rather than other aspects such as developing competence or fostering social affiliation. Accordingly, we hypothesize that those who are motivated by payment are likely to focus more on demonstrating their competence relative to others than on developing their competence or fostering social affiliation in crowdsourcing.

H3a: Individuals motivated by payment seek to demonstrate competence more strongly than to develop competence or foster social affiliation in crowdsourcing.

Third, as an achievement goal, the goal of demonstrating competence is likely to influence task choice, according to the achievement goal theory (Hulleman et al., 2010), the Intentional View of Behavior (Dennett, 1978), and the distal-proximal perspective of motivation (Kanfer, 1990). Those pursuing the goal of demonstrating competence are inclined to take up tasks that allow them to show their individual capabilities relative to others (Hulleman et al., 2010; Nicholls, 1984) and choose tasks that have clearly defined outputs for comparing different participants, i.e., structured tasks. Therefore, they are likely to focus on the task characteristic of structuredness rather than commitment required or interdependence and choose structured tasks with clearly defined expected outputs. In sum, since payment leads one to focus on the goal of demonstrating competence and in turn choose tasks that are structured, we hypothesize the following mediating relationship:

H3b: Individuals motivated by payment focus more on choosing structured tasks (i.e., low in unstructuredness) than high-commitment tasks or interdependent tasks because they seek to demonstrate competence (i.e., mediating relationship).

This study also considers the motivator of job-market signaling to be a distal motivator affecting task choice through the achievement goal of demonstrating competence. First, research on job-market signaling indicates that it motivates individuals to demonstrate competence. To send an effective job-market signal to potential employers, one needs to provide observable information that can communicate one's competence. Past work experience is a common form of signal sent by job seekers (Spence, 1973). The amount of work experience and the type of work done may indicate potential productivity (Weiss et al., 2014) and thus be associated with employment. Accordingly, those motivated by job-market signaling are likely to focus on demonstrating their competence to potential employers rather than on developing competence or fostering social affiliation. Second, like payment, job-market signaling is a form of extrinsic motivation (Brabham, 2010; Hossain, 2012; Kaufmann et al., 2011). Extrinsic motivation drives individuals with rewards and evaluations that are external to the task itself. Motivation theories (e.g., Deci and Ryan, 1985) state that when extrinsically motivated, individuals feel compelled to behave or achieve by external forces (Utman, 1997) and do not focus on mastery and skill development. This further supports the idea that that job-marketing signaling is less strongly related to the goal of developing competence.

H4a: Individuals motivated by job-market signaling seek to demonstrate competence more strongly than to develop competence or foster social affiliation in crowdsourcing

As discussed in the justification for hypothesis H3b, those who seek to demonstrate competence tend to focus on choosing tasks that are structured rather than high-commitment or interdependent tasks. Taking this and the preceding justification for H4a together, we hypothesize and test the following mediating relationship:

H4b: Individuals motivated by job-market signaling focus more on choosing structured tasks (i.e., low in unstructuredness) than high-commitment tasks or interdependent tasks because they seek to demonstrate competence (i.e., mediating relationship).

4. Research Method

Data on crowdsourcing participants' motivations and task choice were collected through a survey based on two considerations. First, motivation to participate in crowdsourcing is a subjective, internal psychological drive (Singh, 2011). Only the person involved can report his or her own motivation and it can neither be observed nor inferred. Second, the primary motivator of "develop competence" is intrinsic (Hossain, 2012; McClelland, 1961; Zhao and Zhu, 2014) and by definition difficult, if not impossible, to manipulate in experiments. The survey instrument's development, data collection procedure, and sample demography are described next.

4.1. Instrument Development

Constructs in the proposed model were measured by adapting existing scales as much as possible. The achievement goals of developing competence and demonstrating competence were measured with items adapted from the scale of achievement goals developed by Elliot and McGregor (2001). In line with their definitions, the measure of demonstrating competence focuses on one's competence relative to other crowdsourcing participants, while the measure of developing competence uses one's own past performance or knowledge as the reference. The social goal of fostering social affiliation was measured with items from the social goal scale developed by Dowson and McInerney (2001).

Payment was measured with items adapted from Baruch et al. (2016) and Kaufmann et al. (2011). One item measured payment in the form of monetary reward, while another measured non-monetary rewards. To ensure that respondents understood the meaning of non-monetary rewards, the item listed some common examples of such reward. Another item measuring non-monetary rewards (without listing examples) was added to capture other possible, albeit less common forms of non-monetary rewards. Job-market signaling was measured with items adapted from Kosonen et al. (2014), Zhao and Zhu (2014), and Zheng et al. (2011). Two additional items were developed based on the description of Leimeister et al. (2009) to capture the notion of showing skills and knowledge to potential employers.

Task unstructuredness was measured with items from the scales validated by Tatikonda and Rosenthal (2000). They measure the extent to which task process and outputs are well defined. Task commitment was measured with items developed based on the description provided by Nakatsu et al. (2014). They assess the effort, time, and resources required to complete a chosen task. Task interdependence was measured with items adapted from the scale of task interdependence validated by Pearce and Gregersen (1991).

The instrument was validated in a pretest involving 50 workers on Amazon Mechanical Turk before the full-scale survey. The instrument was further refined to improve its reliability and validity before the full-scale survey.

4.2. Data Collection Procedure

Since our objective is to understand the differential effects of motivators on task choice, the target population is individuals who have experience participating in crowdsourcing. As mentioned earlier, this study accounts for the fact that crowdsourcing participation is volitional and one has the freedom of taking up tasks from different platforms or websites. Therefore, we focus on one's trait motivation (i.e., general, cross situational) rather than state motivation (i.e., platform or task specific; Gardner and Tremblay, 1994). Ideally, the sample should include participants of different crowdsourcing websites.

A two-stage survey was conducted to access crowdsourcing participants who had experience with different crowdsourcing websites. In the first stage, we contacted participants of Amazon Mechanical Turk (MTurk), a popular crowdsourcing platform. MTurk

hosts a large variety of tasks, including data verification, language translation, and audio transcription (Mao et al., 2013). Respondents were asked to indicate the crowdsourcing platforms and websites they had participated in, and responded to measurement items about their (trait) motivations to participate in crowdsourcing. Respondents who indicated that they had participated in more than one crowdsourcing website were invited to complete the second-stage survey conducted three weeks later. The survey measured the key characteristics of tasks chosen in the past three weeks (i.e., weeks after the first-stage survey) and reflects their tendency of choosing tasks that are unstructured, high commitment, and interdependent.

The two-stage design also provided a stronger test of causal relationships in the proposed model and helped to reduce common method bias. The predictor variables (hypothesized causes) were measured weeks before the criterion variables (hypothesized effects). The temporal separation also helped to reduce common method bias related to consistency motifs and demand characteristics. In addition, we employed several ex-ante strategies suggested by Podsakoff et al. (2003) to minimize common method bias. First, the survey questions were measured using only positive values rather than bipolar values (e.g., -3 to +3) to avoid acquiescence bias. Second, respondents were assured of their anonymity and instructed to select the responses that best described their opinions and perceptions rather than the “correct” response. Third, survey questions were pretested to ensure that wordings were clear to respondents. Combining multiple strategies offered greater confidence for limiting common method bias than employing only one of them (Craighead et al., 2011).

4.3. Sample Demography

A total of 885 responses were received in the first-stage survey. Among them, 378 respondents indicated that they participated in other crowdsourcing websites different from Amazon Mechanical Turk, including HackerOne, TopCoder, OneSpace, CrowdAnalytix, CrowdFlower, CrowdSpring, CrowdTrans, DesignCrowd, Innocentive, and Rainforest. The tasks on these websites vary in complexity, with the most complex (i.e., unstructured, high-commitment, interdependent) being software development, vulnerability coordination, and product design. These respondents were contacted for the second-stage survey and 283 of them responded, constituting the final sample.

In the sample, most respondents were male (67.5%) between 20-40 years old (77.7%) and completed tertiary education (73.1%). The majority was either employed (64%) or self-employed (23.3%). Most had participated in crowdsourcing for more than one year (89%) and spent more than 10 hours on crowdsourcing tasks per week. We controlled for the effects of these variables in hypothesis testing.

Table 2. Sample Demography					
Characteristic	Frequency	Percentage*	Characteristic	Frequency	Percentage*
Age			Employment Status		
20 to 30	109	38.5	Unemployed	36	12.7
31 to 40	111	39.2	Employed	181	64.0
41 to 50	42	14.8	Self-employed	66	23.3
>50	21	7.4	Number of years in crowdsourcing		
Gender			<1	31	11.0
Female	92	32.5	1 to 2	67	23.7
Male	191	67.5	2.1 to 4	75	26.5
Education			>4	110	38.9
Pre-primary/ Primary	4	1.4	Time spent on crowdsourcing per week		
Secondary	29	10.2	<1 hour	25	8.8
Post-secondary (non-tertiary)	37	13.1	1 to 5 hours	75	26.5
Tertiary (Bachelor's degree)	207	73.1	5.1 to 10 hours	64	22.6
Post-graduate	6	2.1	>10 hours	119	42.0
*Sum might not be exactly 100% due to rounding					

5. Data Analysis

The proposed model was assessed using the Partial Least Squares (PLS) approach of structural equation modeling because the phenomenon investigated is relatively new and the measurement models were adapted from other contexts (Chin and Newsted, 1999). The proposed model is also quite complex, with 8 latent variables and 25 indicator variables. The PLS approach is adequate for causal modeling whose purpose is prediction and theory building (Henseler et al., 2009), which is in line with our research objective.

5.1. Measurement Model Analysis

The measurement model was tested for reliability, convergent validity, and discriminant validity (Wetzels et al., 2009). These tests were appropriate as all the constructs in our study are reflective, that is, they share a common cause (MacKenzie et al., 2005). A reflective-indicator measurement model explicitly predicts that the measures should be strongly correlated with each other (i.e., they all reflect the same latent construct). To evaluate reliability, Cronbach's alpha and composite reliability were calculated (see Table 3). We found that all the values meet the requirement of 0.70. Convergent validity was assessed by calculating average variance extracted (AVE). All the AVEs exceeded the recommended value of 0.50. Discriminant validity was assessed by examining square root of AVE. For all the constructs, the square root of AVE (italic, diagonal entries in Table 4) exceeded corresponding correlations with other constructs (non-diagonal entries in Table 4). Additional support for discriminant validity comes through inspection of the cross loadings, which were low compared with the loadings. Multi-collinearity among items was assessed using variance inflation factor (VIF). All exogenous constructs had VIF that was less than 1.45, below the recommended threshold of 3.33. Overall, the measurement model was satisfactory.

Construct	Item	Loading*	Construct	Item	Loading*
Job-market signaling (JM) $\alpha=.98$; CR=.99; AVE=.95	JM1	0.97	Unstructuredness (UNS) $\alpha=.70$; CR=.84; AVE=.63	UNS1	0.80
	JM2	0.98		UNS2	0.75
	JM3	0.98		UNS3	0.82
	JM4	0.98	Commitment (COM) $\alpha=.83$; CR=.90; AVE=.74	COM1	0.88
Demonstrate competence (DEMO) $\alpha=.87$; CR=.92; AVE=.79	DEMO1	0.87		COM2	0.82
	DEMO2	0.87		COM3	0.88
	DEMO3	0.92	Interdependence (INT) $\alpha=.93$; CR=.95; AVE=.87	INT1	0.93
Develop competence (DEV) $\alpha=.95$; CR=.97; AVE=.91	DEV1	0.95		INT2	0.94
	DEV2	0.96		INT3	0.94
	DEV3	0.94	Payment $\alpha=.86$, CR=.92, AVE=.79	PA1	0.91
Foster social affiliation (SOC) $\alpha=.97$; CR=.98; AVE=.94	SOC1	0.97		PA2	0.84
	SOC2	0.97		PA3	0.91
	SOC3	0.97			

α : Cronbach's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted;
* All item loadings were significant at $p<0.001$; ^All item weights were significant at $p<0.01$

	Mean	SD	PA	JM	DEMO	DEV	SOC	UNS	COM	INT
PA	6.03	1.03	0.89							
JM	4.46	2.20	-0.01	0.98						
DEMO	5.30	1.31	0.27	-0.08	0.89					
DEV	5.14	1.77	-0.04	-0.05	0.33	0.95				
SOC	3.43	1.96	-0.01	0.01	0.29	0.49	0.97			
UNS	5.99	1.78	-0.28	0.08	-0.26	-0.11	-0.10	0.79		
COM	4.12	1.50	0.03	-0.05	0.18	0.47	0.46	-0.08	0.86	
INT	4.43	1.44	0.08	-0.01	0.14	0.33	0.50	-0.03	0.47	0.93

SD: Standard deviation; * $p<0.05$; ** $p<0.01$

5.2. Structural Model Analysis

The hypotheses were tested in the structural model analysis. In addition to factors in the hypotheses, demographic variables and participants' ability (i.e., self efficacy) and opportunity (i.e., time available) to participate in crowdsourcing were included as control variables in data analysis. A model with only control variables was first assessed. Among them, gender and the number of years in crowdsourcing significantly affected task choice. They were included in the subsequent analyses and the others were excluded to improve model parsimony.

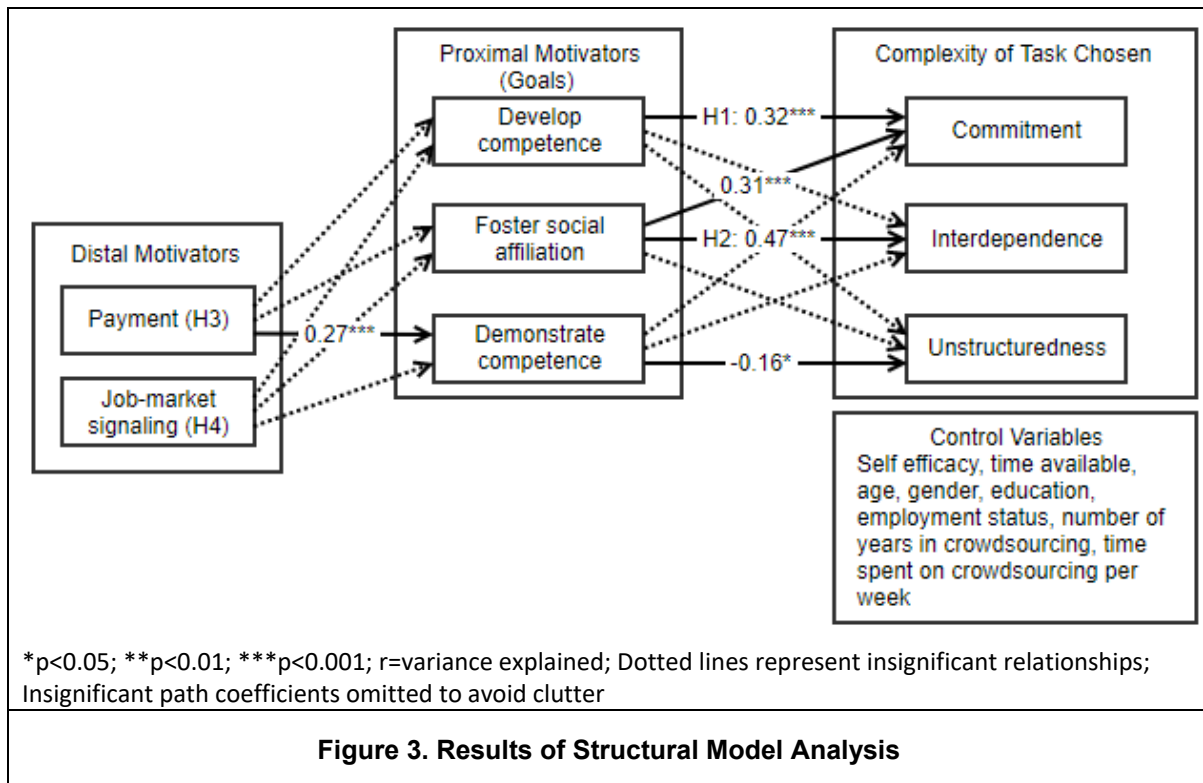
Table 5. Results of Hypothesis Testing				
Relationship/Difference Tested	Path Coefficient/Difference	T Statistic	P Value	Result
a) Develop competence → Task commitment	0.32	4.22	<0.001***	H1 was supported
b) Develop competence → Task unstructuredness	-0.03	0.45	0.654	
c) Develop competence → Task interdependence	0.13	1.91	0.057	
a > b	0.29	39.90 [^]	<0.001***	
a > c	0.19	25.73	<0.001***	
d) Foster social affiliation → Task interdependence	0.47	7.35	<0.001***	
e) Foster social affiliation → Task unstructuredness	-0.03	0.45	0.656	
f) Foster social affiliation → Task commitment	0.31	4.71	<0.001***	
d > e	0.44	72.86	<0.001***	
d > f	0.16	26.86	<0.001***	
g) Payment → Demonstrate competence	0.27	4.71	<0.001***	H3a and H3b were supported
h) Payment → Develop competence	-0.04	0.72	0.469	
i) Payment → Foster social affiliation	-0.01	0.13	0.896	
g > h	0.23	51.02	<0.001***	
g > i	0.26	38.41	<0.001***	
j) Demonstrate competence → Task unstructuredness	-0.16	2.22	0.027*	
k) Demonstrate competence → Task commitment	-0.03	0.55	0.582	
l) Demonstrate competence → Task interdependence	-0.06	0.91	0.363	
j > k	0.13	21.72	<0.001***	
j > l	0.10	14.76	<0.001***	
m) Payment → Task unstructuredness	-0.23	4.12	<0.001***	H4a and H4b were not supported
n) Job-market signaling → Demonstrate competence [#]	-0.08	1.37	0.172	
o) Job-market signaling → Develop competence [#]	-0.05	0.87	0.385	
p) Job-market signaling → Foster social affiliation [#]	0.01	0.10	0.917	
q) Job-market signaling → Task unstructuredness	0.07	1.19	0.233	
r) Gender → Task unstructuredness	0.15	2.53	0.011*	Significant control variables
s) Years in crowdsourcing → Task unstructuredness	-0.15	2.98	0.003**	

*p<0.05; **p<0.01; ***p<0.001; #Path differences were not tested because none of the paths were significant; ^Path differences were tested following Efron and Tibshirani (1994)

To test the hypothesized effects of proximal motivators on task choice, it was necessary to assess the effects of all proximal motivators on all task-choice constructs. For instance, to test H1 (participants motivated to develop competence focus more on choosing high-commitment tasks than unstructured or interdependent tasks), we assessed develop competence → task commitment as well as develop competence → task unstructuredness and develop competence → task interdependence to see whether develop competence → task commitment has the strongest relationship as hypothesized. Similarly, the effects of all distal motivators on all proximal motivators were assessed to test hypotheses H3 and H4. Therefore, we tested a structured model that related all distal motivators to all proximal motivators, and all proximal motivators to all task choice constructs.

Analysis of the model showed that all the hypotheses were supported, except for H4a and H4b (see Table 5 and Figure 3). Contrary to the hypothesis, job-market signaling did not have a significant effect on task choice through the goal of demonstrating competence. It also did not have any significant effect on other goals. Although the proximal motivator of fostering social affiliation was significantly related to the choice of interdependent tasks and high-commitment tasks, it was significantly more strongly related to the former, as hypothesized ($T=28.86$, $p<0.0001$; Chin and Dibbern, 2010). The analysis of control variables also revealed that male participants and those who had less years of experience in crowdsourcing tended to choose less structured (and therefore more complex) crowdsourcing tasks. The model explained 17.1%, 30.3%, and 27.4% of the variances in choice of unstructured task, high-commitment task, and interdependent task respectively.

We only assessed the mediating relationship involving the distal motivator of payment (i.e., H3b), since job-market signaling did not have any significant effect. The significance of the mediating relationship was tested with Sobel mediation test statistic and its variations (i.e., Aroian's test statistic and Goodman's test statistic) as suggested by Edwards and Lambert (2007). A mediation is considered significant if two or more of these test statistics are significant. Results indicate that all three statistics were significant at $p<0.05$ (Sobel=2.01; Aroian=1.97; Goodman=2.04) and we concluded that the mediating relationship was significant as hypothesized. We also observed that the goal of demonstrating competence partially mediated the effect of payment on task choice, as the direct effect of payment → task unstructuredness remained significant with the mediated effect.



6. Discussion

Addressing the research objective of understanding the differential effects of motivators on task choice, this study showed that there are significant differences and clarified them based on the distal-proximal perspective of motivation (Kanfer, 1990) and goal theories (King and Watkins, 2012; Urdan and Maehr, 1995). We found that those motivated by payment, an important motivating factor identified in many studies on crowdsourcing, tend to focus on demonstrating competence relative to others and are therefore more likely to choose structured tasks with clear, comparable output. Further, the payment motivator is not significantly related to the goals of developing competence or fostering social affiliation. Those motivated to develop competence (i.e., learn new knowledge and skills) tend to choose high-commitment tasks requiring more effort and therefore opportunities to improve ability, rather than focusing on task structuredness or interdependence. Those who are motivated to foster social affiliation through participating in crowdsourcing tend to focus more on choosing highly interdependent tasks requiring coordination and collaboration with other participants. Overall, these findings enhance our theoretical understanding of the motivations of crowdsourcing by clarifying their differential effects on task choice.

Unexpectedly, those who are motivated to foster social affiliation through participating in crowdsourcing also tend to choose high-commitment tasks, though the effect is significantly weaker compared to the choice of interdependent tasks. A plausible explanation is that high-commitment tasks require more effort and time to complete and offer opportunities for participants to seek help and support from others to cope with the demands, thereby creating opportunities for fostering social affiliation. In line with this, studies on help-seeking behavior recognize that when dealing with difficulties encountered in learning

situations (Gall, 1985), individuals often consider seeking help from their social network. The social network is viewed as a resource that can be utilized to cope with cognitive challenges. Further studies are needed to test this explanation.

Contrary to our hypothesis, those motivated by job-market signaling did not focus on demonstrating competence. They also did not focus on the other goals of developing competence or fostering social affiliation. The motivator also did not affect task choice. This somewhat contradicts prior studies, which showed that job-market signaling affects participation in crowdsourcing (Brabham, 2010; Hossain, 2012; Kaufmann et al., 2011). This suggests that it might be necessary to consider moderating factors. An important factor might be employment status. Job-market signaling might affect task choice more strongly for those who are unemployed. We analyzed this post-hoc since we measured employment status as a control variable. The results indicate that employment status did not have a significant moderating effect. Other moderators should be explored in future studies to better understand the effect of job-market signaling.

6.1. Implications for Research and Theoretical Development

This study contributes to research on motivation of crowdsourcing participants in several ways (summarized in Table 6). First and most importantly, this study has clarified the differential effects of the primary motivators found statistically significant in prior studies and thereby enriched our conceptual understanding of the motivators. We found that crowdsourcing participants motivated by payment tend to focus on demonstrating competence and therefore choose structured task, those motivated by competence development tend to choose high-commitment tasks, and those motivated by social affiliation tend to choose interdependent tasks. The differential effects are explained based on the distal-proximal perspective of motivation and goal theories of motivation, adding to the intrinsic-extrinsic perspective of motivation that most prior studies have adopted. Although we also drew on the intrinsic-extrinsic perspective in our justification of hypotheses H1 and H4, the perspective alone is not sufficient for distinguishing among all the motivators. For example, both payment and fostering social affiliation are extrinsic motivators and the intrinsic-extrinsic perspective is not as useful for understanding their differential effects as the distal-proximal perspective.

Second, this study opens up the black box of crowdsourcing participation. Although it is recognized that crowdsourcing tasks vary widely in complexity in various crowdsourcing taxonomies (Nakatsu et al., 2014), prior studies of crowdsourcing motivation have mostly treated it as a unidimensional. This study sheds light into the black box and shows that distinguishing among participation in (choice of) unstructured tasks, high-commitment tasks, and interdependent tasks allows a deeper understanding of participation motivation. As research on “what motivate crowdsourcing” matures, the time is ripe to turn to the “how” question. The conceptualization and measurement of task choice in this study can be used to support further research on the topic.

Table 6. Summary of This Study's Contributions			
State of the Literature and Practice	This Study	Relevance	
		Theory/ Empirics	Practice
Identified primary motivators of participation in crowdsourcing (i.e., "what" motivate participation in crowdsourcing?)	Clarified the differential effects of the primary motivators and provided theory-grounded explanations (i.e., "how" do the motivators differentially affect task choice?)	✓	
	Offered crowdsourcing organizers suggestions for focusing on appropriate motivators according to task unstructuredness, commitment, and interdependence to attract suitable participants		✓
<ul style="list-style-type: none"> - Studies of motivators have treated participation as a black box - Identified task characteristic (especially task complexity) to be a key aspect of the conceptualization of crowdsourcing - Complexity of crowdsourcing tasks can be characterized in terms of unstructuredness, commitment, and interdependence (Nakatsu et al., 2014) 	<ul style="list-style-type: none"> - Illuminated the black box of participation and distinguished among participation in (choice of) unstructured task, high-commitment tasks, and interdependent tasks - Validated scales for measuring task choice in finer granularity 	✓	
Motivators of crowdsourcing have been studied based on the intrinsic-extrinsic perspective	<ul style="list-style-type: none"> - Showed that the distal-proximal perspective of motivation is useful for understanding crowdsourcing - Shed light on the differential effects of crowdsourcing motivators and reveal their differences in proximity to task choice 	✓	

Third, for the referent theory, distal-proximal perspective of motivation (Kanfer, 1990), this study shows that it is useful for understanding crowdsourcing motivation and extends its applicability to a new context. This study's findings suggest that this theoretical perspective could be used to inform the theoretical development of crowdsourcing motivation, along with the intrinsic-extrinsic motivation framework used in prior crowdsourcing studies. Further, this study also demonstrates that considering different task choice behaviors when applying the distal-proximal perspective of motivation creates an opportunity for understanding differential effects of motivators. Future studies could account for not just multiple distal (antecedents of goals) and proximal motivators (goals), but also multiple task choice

behaviors to attain a more comprehensive understanding of the phenomenon of study when applying the theory.

Fourth, we tested the differential effects empirically through a two-stage survey. The findings supported most of our hypotheses. This study is one of the first attempts to answer the calls of researchers for studies on the differential effects of motivators. Specifically, Pedersen et al. (2013) suggested future research to examine how motivation varies with task type; Finnerty et al. (2013) identified the need to systematically study how different rewards influence participants' performance for different types of tasks.

6.2. Limitations and Further Research

Several limitations should be taken into consideration when interpreting the findings. They also suggest directions for further research. First, the proposed model was tested with one sample and the generalizability of findings requires further testing with more samples. Second, the hypotheses were tested with data collected in a survey and using other research methods, such as experiments, could help to establish the robustness of findings. Experiments are especially useful for further testing the effects of extrinsic motivators, such as payment. Third, our objective is to examine the differential effects of the primary motivators, identified in the seminal study by Brabham (2010) and tested in many further studies. The set of primary motivators, though significant, might not be comprehensive. For example, studies on motivators have begun to recognize the importance of hedonic motivators, such as curiosity and fun (e.g., Kosonen et al., 2014; Marian, 2017). It might be valuable to study how hedonic motivators differentially affect task choice, in terms of appropriate characteristics such as task variety (i.e., extent to which a task is not repetitive and boring). Fourth, this study focuses on trait motivation, considering that the four primary motivators have been found to be significant in different crowdsourcing websites, platforms, or tasks (e.g., Hossain, 2012; Kaufmann et al., 2011; Kosonen et al., 2014; Rogstadius et al., 2011; Zhao and Zhu, 2014; Zheng et al., 2011). There remains an opportunity to compare trait motivation with state motivation, that is, motivators that are situational and variable. For example, hedonic motivators are likely to be state rather than trait based in nature.

Other than addressing the limitations and replicating this study, our findings highlight several opportunities for further research. First, this study shows that it is fruitful to examine the differential effects of motivators. We focused on the primary motivators identified by Brabham (2010) and further studies might consider expanding the scope to new motivators identified in more recent studies, such as gaining peer recognition (Zhao and Zhu, 2014). Second, going beyond a unidimensional conceptualization of crowdsourcing participation enriches our theoretical understanding of the concept and motivators. More studies that examine participation in finer granularity are therefore likely to be valuable. For example, it might be useful to consider the frequency, duration, and breadth of crowdsourcing participation and investigate whether motivators have differential effects. Third, in our analysis of control variables, we observed that gender and years of experience in crowdsourcing significantly affected task choice, in that male and less experienced

participants tend to choose less structured tasks. Given that some studies have examined the demographic characteristics of crowdsourcing participants (Ross et al., 2010), it may be of interest to uncover theoretical mechanisms underlying the differences.

6.3. Implications for Practice

Our findings indicate that crowdsourcing organizers can use different motivation strategies to attract participants for different tasks, based on task characteristics. Since participants tend to choose more structured tasks when they are motivated by payment, organizers can increase participation in structured tasks by offering payments. Organizers can promote participation in a high-commitment task by clarifying upfront how the task facilitates the development of participants' competence, in terms of learning new knowledge and skills. Participation in a high-interdependence task can be boosted by identifying opportunities for fostering social affiliation in the task description. These suggestions help organizers focus their resources on the most effective motivation strategies according to task characteristics. For instance, it would not be effective to focus on payment when attracting participants for tasks requiring high commitment or are highly interdependent. Understanding the differential effects of different motivators helps crowdsourcing organizers select the most effective motivators to focus on when attracting participants for their crowdsourcing tasks and avoid wasting resources on ineffective motivators or attracting the wrong crowd.

7. Conclusion

Motivation of crowdsourcing participants is one of the most commonly studied topic in crowdsourcing research and the time is ripe to look beyond "what" motivate to "how" each motivator affects participation in greater theoretical depth. This study has shown that payment, competence development, and fostering social affiliation have differential effects on task choice and represents a step advancing this stream of research.

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Appendix. Survey Instrument

Construct	Scale and Source
Payment	<p>How important is the following in your decision to participate in a crowdsourcing task (not important at all – very important)?</p> <p>PA1: Amount of monetary reward (adapted from Kaufmann et al., 2011)</p> <p>PA2: Value of non-monetary reward (adapted from Baruch et al., 2016)</p> <p>PA3: Value of points, credits, or badges offered (developed based on Baruch et al., 2016)</p>
Job-market signaling	<p>How important is the following in your decision to participate in a crowdsourcing task?</p> <p>JM1: Opportunity to show ability to potential employers (developed based on Leimeister et al., 2009)</p> <p>JM2: Opportunity to present skills and knowledge to potential employers (developed based on Leimeister et al., 2009)</p> <p>JM3: Opportunity to show how good you are to potential employers (developed based on Kosonen et al., 2014; Zhao and Zhu, 2014; Zheng et al., 2011)</p> <p>JM4: Opportunity to gain recognition by potential employers (developed based on Zhao and Zhu, 2014; Zheng et al., 2011)</p>
Demonstrate competence	<p>Please indicate the extent to which you agree with the following statements:</p> <p>DEMO1: My goal in crowdsourcing is to perform better than most other participants (adapted from Elliot and McGregor, 2001).</p> <p>DEMO2: I expect to do well compared to most other crowdsourcing participants (adapted from Elliot and McGregor, 2001).</p> <p>DEMO3: I seek to produce output that is better than that produced by most other crowdsourcing participants (adapted from Elliot and McGregor, 2001).</p>
Develop competence	<p>DEV1: My goal in crowdsourcing is to become more knowledgeable than before (developed based on Elliot and McGregor, 2001; Nicholls, 1984)</p> <p>DEV2: I expect to become more skillful than before after participating in crowdsourcing (developed based on Elliot and McGregor, 2001; Nicholls, 1984)</p> <p>DEV3: I seek to fully understand how a task is completed after participating in crowdsourcing (adapted from Elliot and McGregor, 2001).</p>

Construct	Scale and Source
Foster social affiliation	<p>SOC1: My goal in crowdsourcing is to become affiliated with a social group (developed based on Dowson and McInerney, 2001).</p> <p>SOC2: I expect to be part of a social group after participating in crowdsourcing (developed based on Dowson and McInerney, 2001).</p> <p>SOC3: I seek to develop a strong sense of belonging to a social group after participating in crowdsourcing (developed based on Dowson and McInerney, 2001).</p>
Task Complexity - Unstructuredness	<p>I tended to choose crowdsourcing tasks (reverse coded) ...</p> <p>UNS1: that have clearly defined outputs (developed based on Nakatsu et al., 2014; Tatikonda and Rosenthal, 2000)</p> <p>UNS2: whose output can be objectively evaluated (developed based on Nakatsu et al., 2014; Tatikonda and Rosenthal, 2000)</p> <p>UNS3: that have a clear procedure/approach to completion (developed based on Nakatsu et al., 2014; Tatikonda and Rosenthal, 2000)</p>
Task Complexity - Commitment	<p>I tended to choose crowdsourcing tasks that require me to ...</p> <p>COM1: commit much effort to complete (developed based on Nakatsu et al., 2014)</p> <p>COM2: commit much time to complete (developed based on Nakatsu et al., 2014)</p> <p>COM3: commit much resource to complete (developed based on Nakatsu et al., 2014)</p>
Task Complexity - Interdependence	<p>I tended to choose crowdsourcing tasks that ...</p> <p>INT1: are interdependent with the tasks of other participants (developed based on Nakatsu et al., 2014; Pearce and Gregersen, 1991)</p> <p>INT2: require coordination with other participants (developed based on Nakatsu et al., 2014; Pearce and Gregersen, 1991)</p> <p>INT3: require collaboration with other participants (developed based on Nakatsu et al., 2014; Pearce and Gregersen, 1991)</p>