CROWDWORKING - A NEW DIGITAL DIVIDE? IS DESIGN AND RESEARCH IMPLICATIONS

Xuefei (Nancy) Deng
California State University, ndeng@csudh.edu

Robert D. Galliers
Bentley University, rgalliers@bentley.edu

K.D. Joshi
Washington State University, joshi@wsu.edu

Follow this and additional works at: http://aisel.aisnet.org/ecis2016_rp

Recommended Citation
http://aisel.aisnet.org/ecis2016_rp/148
Crowdworking – a new digital divide?
IS design and research implications

Completed Research

Deng, Xuefei (Nancy), California State University, Dominguez Hills, Carson, California, U.S.A., ndeng@csudh.edu
Galliers, R. D., Bentley University, Waltham, Massachusetts, U.S.A.; Loughborough University, Loughborough, Leicestershire, UK, rgalliers@bentley.edu
Joshi, K. D., Washington State University, Pullman, Washington, U.S.A., joshi@wsu.edu

Abstract

The ubiquitous penetration of Internet technologies in modern societies has created new forms of working, one such being microtask crowdsourcing. This phenomenon requires further research, especially when the attendant ethical issues are considered. In this paper, we investigate crowdworking – the individual behaviors associated with microtask crowdsourcing work. In particular, we address two questions: (1) how do individuals participate in crowdworking? (2) do their participation behaviors differ? Our findings point to the emergence of a new digital divide – one that is present on our own doorstep, not in some distant land.

We analyze data collected from 150 crowdworkers registered on Amazon Mechanical Turk. A mixed research approach is adopted. Quantitative data analysis reveals significant differences in the degree of participation by individuals from different demographic backgrounds. Qualitative data analysis confirms prior studies in that job autonomy and workplace flexibility make crowdworking attractive but in addition we identify that disadvantaged groups (lower education; otherwise unemployed) perceive these attractions differently from more privileged groups. Our contributions include extending understanding of microtask crowdsourcing and our conceptualization of a new form of digital divide. We also offer ethical considerations with regard to the design of crowdworking platforms, to account for differences in the reported use and perceived value of the IT-enabled platforms for crowdworkers.

Key Words: Crowdworking, Job Autonomy, Workplace Flexibility, Digital Divide, Value-Oriented Design, Amazon Mechanical Turk, Mixed Methods Research.
1. Introduction

The ubiquitous penetration of the digital and social media technologies has created new forms of working beyond organizational boundaries. One of the new, boundaryless, forms of working is microtask crowdsourcing where individuals voluntarily engage in work posted by organizations or individuals on a web-based, third-party platform in exchange for monetary remuneration (Deng, Joshi & Galliers, 2016)\(^1\). Benefiting from pervasive Internet access, such digitally-mediated platforms have grown rapidly in recent years and host an increasing number of jobs, facilitating work-related transactions between those individuals and job requesters. The three largest online platforms for microtask crowdsourcing are: Amazon Mechanical Turk, MobileWorks\(^2\) and CrowdFlower. Together, these three platforms aggregate hundreds or thousands of tasks performed by a pool of approximately 400,000 registered workers in the U.S. alone (Kaganer et al., 2013). In Europe, crowdsourcing is becoming increasingly prevalent. Crowdsourcing Week (CSW), held in October 2015, is Europe’s major conference for practitioners\(^3\). Additionally, Clickworker is a crowdsourcing service from Germany that is similar to Amazon Mechanical Turk. According to 2015 statistics reported by the company, Clickworker has over 700,000 crowd workers registered on their platform, with 25% coming from Germany, 25% from other European countries, 25% from the U.S., and the remaining 25% from the rest of the world (e.g., Canada, Australia and South America)\(^4\). In light of this growth, researchers have attempted to understand what motivated the crowd to engage in micro work online. While motivational factors vary, work flexibility (i.e., what, where, when, and how) has emerged as a significant factor (e.g., Chandler & Kapelner, 2013; Deng & Joshi, 2013; Kauffman et al., 2011) in attracting individuals to microtask crowdsourcing.

Yet, the crowdsourcing workplace is a complex socio-technical phenomenon that calls for further research (Kittur et al. 2013). It is important to understand individual workers’ interests and capabilities in order to match them with posted tasks (Geiger and Schader, 2014). Moreover, ethical concerns have been raised; primary amongst these has been the low levels of payment to crowdworkers (e.g., Deng & Joshi, 2013; Williamson, 2014). More recently, focusing on a U.S. based worker population, Deng, Joshi & Galliers (2016) studied the value perceptions of crowd workers in microtask crowdsourcing. Their study shows that, while crowd workers appreciated the autonomy and flexibility of this kind of open source work, sharing feelings of empowerment as a result, they also expressed feelings of marginalization and being taken advantage of. Such studies as these all suggest the importance of considering crowd worker perspectives and the urgency of furthering our understanding of crowdworkers’ actual engagement in this new, digital workplace.

Thus, in this paper, we seek to understand individual engagement in microtask crowdsourcing work, which we refer to as crowdworking. In particular, we view crowdworking as enactment of individual behaviors (in relation to what, where, when, how) in performing microtask crowdsourcing work. Consistent with prior research (e.g., Deng, Joshi & Galliers, 2016), we define microtask crowdsourcing as the voluntary participation of individuals in online, third-party platforms to perform crowd work for monetary payment. In particular, we address two questions: (1) how do individuals participate in crowdworking? (2) do their participation behaviors differ? Findings arising from this exploratory study are intended to provide insights into guiding ethical platform design in this digital marketplace, and in furthering our conceptualization of this new form of digital divide.

The concept of the digital divide has, until now, been focused on “the gap separating those individuals who have access to new forms of information technology from those who do not” (Gunkel, 2003, p. 499, emphasis added). In this study, we extend the notion of the digital divide by drawing attention, not to issues associated with access solely, but to issues related to the power imbalance between job

\(^1\) http://www.misq.org/skin/frontend/default/misq/pdf/Abstracts/13017_SI_RA_DengAbstract.pdf
\(^2\) The company was founded in 2011 as MobileWorks, but it changed its name to LeadGenius in 2013. The website is www.leadgenius.com
\(^3\) http://crowdsourcingweek.com/csw-europe-2015/
requesters and those members of society who rely on crowdworking, not only to supplement their income, but in many cases, as their sole source of income (Deng et al., 2016; Williamson, 2014). We, thus, identify a new, extended form of the digital divide.

To achieve our research objectives, we conducted an exploratory study of the Amazon Mechanical Turk (MTurk) marketplace from the perspective of the crowdworkers themselves. MTurk is a suitable context for our investigation as it is a well-established and popular crowdsourcing marketplace offering access to a large number of crowd workers and micro tasks (Kittur et al., 2013; Ross et al., 2010). We adopted a mixed methods approach, combining qualitative and quantitative analyses, which allowed us to explore linkages across variables systematically and to provide a rich account of worker perceptions and backgrounds (cf. Mingers, 2001).

Our quantitative data analysis of 150 registered MTurk workers reveals that significant differences exist in the degree of participation by individuals from different demographic backgrounds: females have significantly longer tenure on MTurk than males; people with lower educational qualifications (below associate degree\(^6\)) and people with no other means of employment spend significantly longer hours crowdworking. Moreover, our analysis of the crowdworkers’ narratives reveals that disadvantaged groups (e.g., lower education, or otherwise unemployed) perceive job autonomy and workplace flexibility – two attractive features of crowdworking – differently to more privileged groups (higher education, otherwise employed). Triangulating the findings from both quantitative and qualitative data analyses, we identify the presence of what we term a new digital divide in this Internet-enabled marketplace. Rather than the dichotomous notion associated with the digital divide in prior studies, which relates to whether or not individuals have access to information and communications technology (ICT), we uncover a different digital divide in crowdworking, which is related to the differences in the participation behaviors in, and the potential consequences arising from, crowdworking engagement. Our study is informed by prior microtask crowdsourcing studies and by the theoretical framework of value-oriented design for ICT, which is outlined next.

2. Theoretical Background

2.1 Microtask Crowdsourcing

Crowdsourcing is a new sourcing form of work enabled by the digital and social media technologies. It is said to be based on voluntary\(^6\) participation (Howe, 2006) and consists of three key stakeholders: the crowd, the initiator, and the intermediaries (Estellés-Arolas & González-Ladrón-de-Guevara, 2012). The crowdsourcing of microtasks focuses on the on-demand work completed on a micro scale (e.g., earning 10 cents for a minute’s work). Consistent with this prior research, we consider microtask crowdsourcing as digitally-mediated sourcing where individuals take on work posted by organizations or individuals on a web-based, third-party platform in exchange for monetary remuneration (Deng et al., 2016). In this paper, we refer to the individuals who perform micro tasks for payment as “crowdworkers” and micro tasks as “crowdwork”. Hence, crowdwork comprises of simplified tasks that are often incremental aspects of a more complex task. Considering microtask crowdsourcing as human computation operations, corporations and individuals alike recruit crowdworkers from platforms such as MTurk to conduct tasks such as labeling medical images, assessing the relevance of information retrieval, verifying search results, and proofreading texts (Alonso & Mizzaro, 2012; Chandler & Kapelner, 2013).

In recent years, researchers have begun to pay attention to this new workforce, attempting to understand its composition and motivations. For example, Ross and colleagues (2010) surveyed registered crowdworkers on MTurk and found that the worker population has changed over time, shifting from a primarily moderate-income, U.S.-based workforce towards an increasingly international workforce dominated by young, well-educated Indian workers. Adopting classic

---

\(^5\) Equivalent to diploma level.
\(^6\) Although, note that for many, this form of work is their only employment.
motivation theory (Ryan & Deci, 2000), Kauffman and colleagues (2011) studied the motivations of 431 crowdworkers on MTurk and found that extrinsic motivational categories (immediate payoffs, delayed payoffs, social motivation) have a strong effect on time spent on the platform. Schulze and colleagues (2011) also collected data from crowdworkers on MTurk to understand workers’ task choices and found little relation between task properties and their demographics (age and gender) and education background. Although insightful, our understanding of the crowd’s actual engagement in performing these human computation tasks from such prior studies as these remains limited. In light of this and in responding to calls for further research (Kittur et al., 2013) into this complex socio-technical system, we conducted an exploratory study of crowdworking by adopting the viewpoint of the crowdworker. In addition, we sought to understand design implications of crowdworking by referring to the framework of value-sensitive design of ICT, to which we now turn.

2.2 Value-Sensitive Design of ICT

Value sensitive design (VSD) is a design approach commonly adopted by researchers in the field of Human-Computer Interaction (HCI). According to Friedman and colleagues (e.g., Friedman 1996; Friedman & Khan 2003), VSD is a “theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner” (Friedman et al. 2006, p. 2). In capturing and prioritizing human values in design, VSD proposes a three-part methodology that includes conceptual, empirical and technical investigations to guide design (Friedman & Khan 2003; Friedman et al. 2006). Conceptual investigations focus on theoretically and philosophically informed analyses of central constructs and issues, which result in working conceptualizations of the values under investigation. Empirical investigations seek to understand human responses to technical artifacts and to the larger social context of technology use. Technical investigations examine the technology through retrospective analyses of existing technologies or proactive design of systems to support values identified in the conceptual or empirical investigations. In this study, we focus on empirical investigation of crowdworking technology by understanding workers’ usage behavior and perceived values.

VSD adopts the viewpoint of ICT users and seeks to understand how human values can be accounted for in the design of computer technologies. For example, the study of a groupware system by Miller et al. (2007) revealed three values: privacy, awareness, and reputation. Likewise, Le Dantec and colleagues (2009) studied mobile technology use by homeless people and identified users’ value of independence and of staying connected with family and friends. This discovery of values highlights the importance of attending to and incorporating local expressions of values (the values present in the technology use context) in ICT design. Values are not facts, but are derived subjectively from the interests and desires of human beings (Friedman et al. 2008). The HCI literature provides a classification of values, (referred to as a collection of twelve “human values with ethical import”) including: human welfare; ownership and property; privacy; freedom from bias; universal usability; trust; autonomy; informed consent; accountability; identity; calmness, and environmental sustainability (Friedman & Kahn, 2003). Although the set of human values is commonly adopted and emphasized in the design of ICT, the attention paid to the contextual characteristics of ICT users remains limited. For example, while appreciating the positive impact of VSD on technology design, Le Dantec and colleagues (2009) point to the limitations of VSD and argue that user values should be empirically revealed before being used to design or refine systems. In particular, they view VSD as a design methodology that “promulgate[es] an agenda of design on a largely fixed classification of values, rather than inquiring about the values present in a given context and responding to those values – being sensitive to those values – through design” (p. 1143). Thus, consistent with this argument, we conducted this exploratory study to reveal crowd worker values that can be embodied in the design of the crowdworking platform. We now turn to the research methods used in this study.

3. Research Methods

3.1 Mixed Methods: Quantitative & Qualitative Analyses
The objective of our exploratory study is to improve our understanding of the crowdworking phenomenon and its implications on IS design and on the IS research community. Following Mingers (2001) and Mingers et al. (2013), we adopted a mixed methods approach – combining quantitative and qualitative analyses – to better understand the phenomenon under investigation. Quantitative and qualitative methods complement each other and have the potential to provide a richer exploration of the associations across variables (Mingers, 2001), such as associations in our study being between demographic backgrounds of crowdworkers and variables of crowdworking participation. In particular, we argue that this approach is appropriate for our investigation for two reasons. First, there has, as yet, been no conclusive evidence regarding the presence of a digital divide in the crowdworking context. Second, the crowdworking context for our research inquiry is significantly different from the context of Internet use by households and individuals, which has been investigated by Information Systems (IS) scholars of the digital divide. In conducting this mixed methods research, we followed the guidelines proposed by Venkatesh and colleagues (2013). Although relatively less frequently used in the IS field, mixed methods have been adopted by a number of IS scholars in their research, including Newell and Edelman (2008) in their investigation of effective mechanisms in cross-project learning and Deng and colleagues (2015) in their exploration of customer-oriented citizenship behaviors by IS personnel. By combining quantitative and qualitative analyses in this study, we hoped to better understand the emerging phenomenon of crowdworking, particularly from the perspective of the crowdworkers themselves.

3.2 Data Collection

We collected data from MTurk workers by posting a survey HIT7 on MTurk for payment. The survey asked questions on individuals’ participation in crowdworking, including tenure (months working on MTurk) and participation effort (hours worked and HITs on a weekly basis). We also collected demographic information related to respondents’ gender, age, highest educational level achieved, household income, and employment status. We required the crowd workers to be located in a single country – the U.S. – in an effort to control for confounding factors inherent in different cultural or economic contexts.

3.3 Sample Characteristics

Of the 150 crowdworkers in our sample, 53.3% were females and 46.7% were males. The average age of the workers was 33.4 years (SD 11.1), with the youngest being 18 and the oldest, 66. Nearly one third of the workers (27.3%) were in the 25-30 age group, with the remainder in the following age groups: 18-24 years, 24%; 31-40 years, 22%; 41-50 years, 18.7%; and 51+ years, 8%. Overall, 51.3% were between 18 and 30 years old, similar to the percentage of young U.S. workers (20-35 years) in the Ipeirotis’ (2010) data sample. The demographics of our sample are consistent with the sample in Ross et al. (2010), with the exception of one age group: 24% in the 18-24 year group as compared to their 40%.

The respondents’ average tenure with MTurk was 15.8 months (SD 17.3). On average, they completed 881 HITs (SD 1407) and spent 26.4 hours (SD 15.8) on MTurk on a weekly basis. Of the 150 respondents, 38.7% had a household income of $25,000–49,999, with the reminder in the following categories: < $25,000, 20.7%; $50,000–74,999, 22%; $75,000–99,999, 12.7%; and > $100,000, 6%. More than one third had earned bachelor’s degree. The distribution of education levels is: some high school, 0.7%; high school graduate, 12.7%; some college but no degree, 28%; associate degree, 12%; bachelor’s degree, 36.6%; and graduate degree, 10%. The respondents’ employment status was: 32% employed full-time, 24% employed part-time, 28% otherwise unemployed, and 16% ‘other’ (e.g., retired, students). Table 1 below summarizes these background demographic data.

7 HIT stands for “Human Intelligence Tasks,” the micro tasks transacted on MTurk. HITs on MTurk classifies HITS under seven main categories, including data processing, categorization, sentiment, tagging, content, business feedback, and academic research.
The respondents reported performing a variety of micro tasks. Among the seven categories of HITs available on MTurk, the respondents most frequently worked on academic survey, categorization and business feedback tasks. However, all of them did multiple types of HITs. 85% of them performed at least six types of HIT while only 5% performed three or fewer types of HITs. None did only academic or categorization HITs.

Females tended to become involved in MTurk work earlier than males, but they spent similar numbers of hours each week on MTurk. The descriptive statistics on participation show that individuals who engage more actively (i.e., weekly hours) on MTurk are those: (1) with less education: some high school, high school, some college; (2) who are otherwise unemployed or are retired, stay-at-home moms, students; (3) with less household income (<$25,000, and $25000-$49,999); or (4) who are older (41-50 years, and 50+ years).

We also asked respondents to identify the top five MTurk features (from a list of 14) that attracted them to engage in crowdworking, and we encouraged them to provide examples to illustrate their number one choice. The majority of the respondents (65%) rated “job autonomy” or “workplace flexibility” as the most attractive features of crowdworking, followed, at some distance, by “task significance” (5.3%), task variety (5.3%), and personal enjoyment (4.7%).

### Table 1. Descriptive Statistics: Crowdworking Participation by Demographics Factors

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Tenure (months)</th>
<th>SD</th>
<th>Weekly Hours</th>
<th>SD</th>
<th>Weekly HITs</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grand Total</strong></td>
<td>150</td>
<td>15.8</td>
<td>17.3</td>
<td>26.4</td>
<td>15.8</td>
<td>881</td>
<td>1407</td>
</tr>
<tr>
<td><strong>By Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>80</td>
<td>19.4</td>
<td>19.5</td>
<td>26.4</td>
<td>14.9</td>
<td>885</td>
<td>1527</td>
</tr>
<tr>
<td>Male</td>
<td>70</td>
<td>11.5</td>
<td>13.3</td>
<td>26.3</td>
<td>16.8</td>
<td>878</td>
<td>1267</td>
</tr>
<tr>
<td><strong>By Education level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Some High School</td>
<td>1</td>
<td>13.0</td>
<td>NA</td>
<td>45.0</td>
<td>NA</td>
<td>1000</td>
<td>NA</td>
</tr>
<tr>
<td>2-High School Graduate</td>
<td>19</td>
<td>16.9</td>
<td>17.5</td>
<td>32.4</td>
<td>11.6</td>
<td>1519</td>
<td>2793</td>
</tr>
<tr>
<td>3-Some college, no degree</td>
<td>42</td>
<td>15.4</td>
<td>18.5</td>
<td>30.9</td>
<td>17.4</td>
<td>725</td>
<td>854</td>
</tr>
<tr>
<td>4-Associate degree</td>
<td>18</td>
<td>15.6</td>
<td>14.5</td>
<td>23.4</td>
<td>15.8</td>
<td>592</td>
<td>852</td>
</tr>
<tr>
<td>5-Bachelor degree</td>
<td>55</td>
<td>15.9</td>
<td>18.8</td>
<td>22.0</td>
<td>13.5</td>
<td>842</td>
<td>1180</td>
</tr>
<tr>
<td>6-Graduate degree (Masters, PhD)</td>
<td>15</td>
<td>15.3</td>
<td>12.8</td>
<td>24.3</td>
<td>18.6</td>
<td>999</td>
<td>1379</td>
</tr>
<tr>
<td><strong>By Employment Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Employed Full-Time</td>
<td>48</td>
<td>15.0</td>
<td>17.3</td>
<td>22.1</td>
<td>14.7</td>
<td>883</td>
<td>1101</td>
</tr>
<tr>
<td>2-Employed Part-Time</td>
<td>36</td>
<td>17.3</td>
<td>19.6</td>
<td>23.9</td>
<td>12.3</td>
<td>597</td>
<td>820</td>
</tr>
<tr>
<td>3-Unemployed</td>
<td>42</td>
<td>11.7</td>
<td>12.6</td>
<td>29.8</td>
<td>17.7</td>
<td>698</td>
<td>1035</td>
</tr>
<tr>
<td>4-Other</td>
<td>24</td>
<td>22.1</td>
<td>19.4</td>
<td>32.6</td>
<td>16.3</td>
<td>1626</td>
<td>2579</td>
</tr>
<tr>
<td><strong>By Household Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Less than $25,000</td>
<td>31</td>
<td>11.9</td>
<td>15.7</td>
<td>31.3</td>
<td>20.3</td>
<td>737</td>
<td>1121</td>
</tr>
<tr>
<td>2-$25,000 - $49,999</td>
<td>58</td>
<td>17.0</td>
<td>18.7</td>
<td>28.8</td>
<td>14.1</td>
<td>1246</td>
<td>1900</td>
</tr>
<tr>
<td>3-$50,000 - $74,999</td>
<td>33</td>
<td>22.4</td>
<td>19.3</td>
<td>20.6</td>
<td>11.2</td>
<td>697</td>
<td>945</td>
</tr>
<tr>
<td>4-$75,000 - $99,999</td>
<td>19</td>
<td>8.6</td>
<td>9.5</td>
<td>27.6</td>
<td>16.2</td>
<td>673</td>
<td>650</td>
</tr>
<tr>
<td>5-$100,000 or More</td>
<td>9</td>
<td>11.4</td>
<td>8.3</td>
<td>12.7</td>
<td>8.6</td>
<td>145</td>
<td>172</td>
</tr>
<tr>
<td><strong>By Age Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24 Years</td>
<td>36</td>
<td>9.0</td>
<td>10.0</td>
<td>21.9</td>
<td>14.5</td>
<td>517</td>
<td>631</td>
</tr>
<tr>
<td>25-30 Years</td>
<td>41</td>
<td>11.8</td>
<td>13.8</td>
<td>26.2</td>
<td>14.0</td>
<td>1196</td>
<td>2115</td>
</tr>
<tr>
<td>31-40 Years</td>
<td>33</td>
<td>20.1</td>
<td>22.0</td>
<td>25.3</td>
<td>14.2</td>
<td>759</td>
<td>1015</td>
</tr>
<tr>
<td>41-50 Years</td>
<td>28</td>
<td>22.0</td>
<td>18.7</td>
<td>31.8</td>
<td>20.7</td>
<td>1123</td>
<td>1387</td>
</tr>
<tr>
<td>50+ Years</td>
<td>12</td>
<td>22.8</td>
<td>18.9</td>
<td>30.4</td>
<td>13.2</td>
<td>675</td>
<td>725</td>
</tr>
</tbody>
</table>

The respondents reported performing a variety of micro tasks. Among the seven categories of HITs available on MTurk, the respondents most frequently worked on academic survey, categorization and business feedback tasks. However, all of them did multiple types of HITs. 85% of them performed at least six types of HIT while only 5% performed three or fewer types of HITs. None did only academic or categorization HITs.

Females tended to become involved in MTurk work earlier than males, but they spent similar numbers of hours each week on MTurk. The descriptive statistics on participation show that individuals who engage more actively (i.e., weekly hours) on MTurk are those: (1) with less education: some high school, high school, some college; (2) who are otherwise unemployed or are retired, stay-at-home moms, students; (3) with less household income (<$25,000, and $25000-$49,999); or (4) who are older (41-50 years, and 50+ years).

We also asked respondents to identify the top five MTurk features (from a list of 14) that attracted them to engage in crowdworking, and we encouraged them to provide examples to illustrate their number one choice. The majority of the respondents (65%) rated “job autonomy” or “workplace flexibility” as the most attractive features of crowdworking, followed, at some distance, by “task significance” (5.3%), task variety (5.3%), and personal enjoyment (4.7%).
4. **Quantitative Data Analysis and Results**

We first performed ANOVA analysis to understand the associations between the key demographics of the crowdworkers and their crowdworking involvement in terms of MTurk tenure and weekly hours. In summary, the ANOVA analysis reveals that a crowdworker’s involvement in crowdworking is significantly associated with the worker’s demographic background. The analyses and findings are reported below.

### 4.1 Crowdworking Tenure and Demographics Factors

Two demographics – age and gender – are significantly associated with the extent of an individual’s crowdworking experience (or tenure in months). First, age groups differ significantly in their MTurk tenure ($F=4.194, p=0.003$). On average, the 18-24 year group has significantly shorter crowdworking experience (9.04 months) than those groups 31 years or older (20.1 - 22.75 months). The second significant factor is gender ($F=3.97, p=0.0098$). On average, female crowdworkers have longer MTurk tenure (19.4 months) than their male counterparts (11.5 months). However, the analysis shows that there is no significant association between MTurk tenure and the three remaining demographic factors: education level, household income, and employment status.

### 4.2 Crowdworking Participation and Demographics Factors

Although gender and age are significantly associated with crowdworking tenure, they do not seem to influence the extent to which individuals engage in crowdworking. We measured participation level by the weekly hours that crowdworkers spend on searching for and performing HITs on MTurk. Among the five demographic factors, employment status and education level show significant association with weekly hours. Our ANOVA analysis suggests that employment status is a significant factor influencing an individual’s involvement in crowdworking ($F=3.21; p=0.0252$); on average, those who are otherwise unemployed or ‘others’ (e.g., retired, students, stay-at-home mums) spend more hours (30-33 hours) per week on MTurk, than those employed full-time (22.3 hours) or part-time (23.9 hours). Similarly, education level is found to influence the respondents’ involvement in crowdworking ($F=3.877; p=0.0052$). The mean hours spent by those with some college education (30.9 hours per week) and high school graduates (33.1 hours) are significantly higher than the weekly hours of those with a bachelor’s degree (20.4 hours).

5. **Qualitative Analysis: Crowd Worker Values of Workplace Flexibility and Job Autonomy**

Rather than to hypothesize or test cause-and-effect relationships, our research objective was to investigate how human actors behaved in this digitally-mediated, new work environment. This is consistent with interpretive approaches to IS research outlined by Galliers and Land (1987) and Orlikowski and Barouli (1991), and championed by Walsham (2006) for example. Using a semi-structured protocol we asked our survey respondents open-ended questions on their MTurk participation, and to describe how they scheduled their work, what features of crowdworking attracted them the most, and their values associated with crowdworking. Detailed, written narratives were received and analyzed, based on the well-accepted qualitative research methods articulated by Miles and Huberman (1994). For example, we started with open coding and codes suggested by the literature, then revised codes as we refined and clarified our theoretical interpretation. Our analysis identified two aspects of crowdworking that are particularly attractive – job autonomy and workplace flexibility.

### 5.1 Job Autonomy in Crowdworking
We define job autonomy in crowdworking as the degree to which the work provides substantial freedom, independence and discretion in choosing work activities and in determining the procedures to be used in carrying these out. Job autonomy allows crowdworkers to manage their work activities in a way that is most convenient to them: an individual can exercise free will and self-control on the job, thus making job autonomy a number one attraction of crowdworking. However, this was perceived differently by individuals under different circumstances. For most respondents, autonomy means the ability to exercise free will in selecting or rejecting a work, as reflected below:

*The independence is pretty clear [as a number one priority], I choose the work I will do and I can choose to stop or return any HIT at any time.* (Female, 45 years; bachelor’s degree, $25,000 - $49,999; otherwise unemployed)

For those in full-time employment or with higher education backgrounds, crowdworking allows them the freedom to pick and choose the HITs that match their skills/interests. As the income from crowdworking is only supplemental to them, they become selective in choosing specific types of HITs. For example, one worker found ‘creative’ HITs (e.g., writing a funny a story or essay) a major attraction to her:

*I’m very satisfied with crowd sourcing jobs on Mechanical Turk [as this] allows me to choose the jobs I want to complete. I only work on jobs that offer an excellent wage and ... encourage me to think about the subject matter before responding to the questions asked.* (Female, 26 years, bachelor’s degree, $50,000 - $74,999; employed full-time)

Similarly, other informants appreciated a sense of freedom in crowdworking, finding the act of applying their expertise (e.g., writing and editing) in crowdworking very satisfying, e.g.:

*I can work from home in an ergonomic environment which allows me to take breaks to rest and rehab my back. MTurk work also allows me to utilize my skills with writing and editing English to make money, which is very satisfying.* (Male, 46 years, bachelor’s degree, $75,000 - $99,999; employed full-time)

Autonomy also means financial independence as crowdworking provides supplemental income to those who may be in financial need, particularly those in part-time employment:

*It [crowdworking] helps me be independent and make the money I need to survive and help me save a bit for the future. It gives me time to concentrate on my writing while not losing too much money since the writing doesn’t pay very much.* (Male, 33 years, bachelor’s degree; $25,000 - $49,999; employed part-time)

For those who are experiencing financial difficulties (e.g., otherwise unemployed or currently staying at home), crowd work has become an important source of income for them. In this regard, crowdworking afforded a certain level of financial independence, as expressed below by a young mother:

*It’s definitely not the quickest way to earn money, and I make well below minimum wage if I actually calculate it. But I get to enjoy the convenience of working from home and raising my daughter. It definitely isn’t a way to ‘make a living’ per se, but it will pay a couple of the bills or put some food on the table.* (Female, 23 years, associate degree, $25,000 - $49,999; employment: other – stay-at-home mum)

### 5.2 Workplace Flexibility in Crowdworking

We adopt the following definition of workplace flexibility: “the ability of workers to make choices influencing when, where, and for how long they engage in work-related tasks” (Hill et al. 2008, p. 152). Our analysis reveals crowdworking flexibility in two aspects: flexible work schedule and work
location. In other words, crowdworking provides flexibility in determining the when, where and whom aspects of work. For those respondents such as stay-at-home moms, the flexibility to work at home and the ability to care for family needs is a necessity, e.g.:

*I need to be able to do this work at home, that is most important, as well as in my own time because I have children to care for ... Because I do crowd sourcing jobs, I’m able to stay with my children while I work. This is the number one important thing that I value. I can stop to care for them in the way they need and resume work when I can.* (Female, 34 years; associate degree; <$25,000; employment: other)

One important aspect of workplace flexibility is a flexible work schedule. According to Hill et al. (2008), this flexibility refers to a work schedule that enables employees to have flexibility in determining, within certain limits, when their regular workday begins and ends, while keeping the total hours worked each day the same. In crowdworking, each individual can set up their work schedules every day, depending on their personal circumstances. Below, three informants explained their work schedules and the rationale behind each:

*Any time that I feel like it and I don’t have a prior obligation. Other than that, I try to work throughout the day, because that’s when there are the most jobs available. I think the first priority is very straightforward. Being able to make my own schedule is so convenient and comfortable, so I’ll never have that ‘sick to my stomach about getting up to go to work’ feeling.* (Male, 24 years, high school graduate; <$25,000; otherwise unemployed)

*I usually work from around 7am to 3pm. I found that this is a good window where there are usually good HITs, but not a lot of people online to take them all.* (Male, 19, high school graduate; $75,000 - $99,999; employment: other)

*I usually do it in the evenings, when I have extra time. Or I do it when it's slow at work. On days, that I don't work, I like to do it in the afternoon. Whenever I usually would surf the Internet for a while, I'll get on MTurk instead.* (Female, 29 years, associate degree, $50,000 - $74,999; employed full-time)

A compressed work-week is defined as a work schedule that compresses the standard eight-hour day, five-day work-week into fewer, longer days, typically 40 hours worked in four days or sometimes 80 hours spread out over nine days (Hill et al., 2008). Rather than compressing their work-week, some crowdworkers extended it to include weekends. As someone employed full-time explained:

*Morning - before work, during lunch and breaks, after work in the evenings and on at least one weekend day.* (Female, 41 years, bachelor’s degree; $25,000 - $49,999; employed full-time)

One of the respondents with a disability who was otherwise unemployed reported longer work-weeks and work hours to make up for MTurk’s low payment rates:

*6:00 AM to 9:00 PM ... I have to keep at it for long hours to earn enough to pay the basics needed to survive. Many requesters put out HITs early. Since they are first-come-first-served, I need to be there to do them. Competition is tough. People jump on good HITs like a bear on a salmon.* (Male, 49 years, some college; <$25,000; employed other: disabled)

Another important aspect of workplace flexibility is a flexible work location. With crowdworking, an individual can work in a location other than normal worksite (e.g., home, coffee bar, train) as long as there is an Internet connection. In a traditional workplace, telecommuting is defined as an arrangement in which an employee works at a location other than the normal worksite such as at home or a satellite office, which may occur on a regular basis or on an as-needed, occasional basis (Hill et al., 2008). In other words, crowdworking affords telecommuting by design. Moreover, the decision to
crowdwork is at the individual’s discretion; one can choose the most convenient locations to meet personal circumstances, as noted in the following:

*I usually work on them [MTurk HITs] when I’m traveling. My job requires me to travel to different locations … My best skills are in the field of math and programing. I like the extra cash from the work – it’s easy and I can do it while traveling for my job.* (Male, 41 years, graduate degree; $50,000 - $74,999; employed full-time)

5.3 A Power Imbalance

Thus far we have spoken of the positive aspects of crowdworking as perceived by the crowdworkers, but some negative perceptions were also raised by our respondents. Our respondents expressed frustration concerning low levels of remuneration and scams, for example. These impact the otherwise unemployed and those with lower education levels more than other respondent groups, as it is the former who rely on crowdworking for their living. This frustration about scams and low payment is reflected below:

*I would like to be able to ignore the HITs that I can’t do. There are a lot of scammers and I cannot get rid of them.* (Male, 22 years; some college; $50,000 - $74,999; unemployed)

Some companies/individuals are fair in their payment, but for the most part I would say that most requestors expect very complicated work done … for about a penny or two a pop. This goes beyond ‘cheap’ all the way to being a Scrooge. I and many others rely on this work because we are home bound and need a way to pay the bills. At times, a penny per task is okay if the task is quick and easy to do, but if it takes a full minute to do it, then that’s working for 60 cents an hour or less, depending on circumstances. (Female, 34 years; associate’s degree; <$25,000; employment: other)

6. Discussion: Crowdworking—Differences in Perceived Values and a New Digital Divide

A key aspect of our study was to examine the crowdworking engagement behaviors by crowd workers from different backgrounds. Analysis of the sample of 150 workers revealed the perceived value of workplace flexibility and job autonomy. Moreover, our findings indicate differences in crowdworking engagement by people with different educational backgrounds and with different employment status.

First, our results indicate that job autonomy and workplace flexibility have become an integral work-life strategy for people with different demographic backgrounds. For example, a stay-at-home mother appreciated the flexible work schedule on MTurk to make supplemental income because this allowed her to care for her baby at home. An otherwise unemployed man valued the financial security provided by crowdworking because the limited income received helped to pay the bills. A graduate in full-time employment found crowdworking to his liking because he could work on tasks that utilize his expertise and enable him reflect on interesting topics. Understanding the ways in which the perceived value of job autonomy and workplace flexibility vary by demographic factors can facilitate the design of the crowdworking platforms and the development of effective crowdworking policies that meet crowd workers’ needs. Hill et al. (2006) conclude that workplace flexibility in organizations is considered an integral strategy to maintain work-life balance to meet changing personal needs. Our study extends prior research on workplace flexibility beyond organizational boundaries to boundaryless, digital work environments. Although these new digital work environments are more flexible by design (e.g., open access, freedom to take or return HITs), they tend to encroach on certain other values that crowd workers are sensitive to, such as injustices in form of scams, work being rejected without any rationale, getting unjustified bad ratings for their work that hinders future work. These work environments need to be designed in a holistic manner where the values of work...
flexibility and jobs autonomy are not achieved by compromising on other important human values such as fairness, respect and dignity (Deng et al. 2016).

Second, when analyzing the personal narratives of individuals engaging in crowdworking, we explored the reported use and perceived values of workers in general, and how perceptions of job autonomy and workplace flexibility differ by gender, age, employment status, and education level. Our analysis reveals work behavior differences among crowd workers, with the less advantaged (otherwise unemployed, lower educational backgrounds) willing to work longer hours, accepting low wages, being less fussy about the nature of HIT being worked on, and generally accepting of their status where they have low bargaining power than the platform providers and job requesters. This silent acquiescence reveals a new type of digital divide that arises in this context. Till now, the digital divide has tended to refer to whether individuals have access to ICT. We argue that this notion is outdated in Western contexts. Selwyn (2004) differentiates between ‘access to’ and ‘use of’ ICT, and considers the consequences of engagement with the technology. We extend this work by pointing to the power imbalances between platform providers and job requesters and those who rely on crowdworking as their (sole or partial) source of income.

In the crowdworking context, although people from all backgrounds have the same level of access to new work opportunities posted, their use of this technology-enabled new work form differs (e.g., different degrees of participation) and the consequences of their engagement with crowdworking may differ (e.g., the set of skills required and non-transferable job experience). Further, as we have seen, a power imbalance emerges between crowd workers and job requesters in the microtask crowdsourcing marketplace, with the unemployed and those with lower education levels who rely on crowdworking for their living being affected the most.

In this regard, the digital divide is no longer a matter of having access to ICT (e.g., Internet) but a matter of ICT’s consequences on people’s work and life. We thus now consider the implications of our findings for IS research in this context in general, and for IS design in particular.

7. Implication for IS Research

This study extends prior research on by updating the conceptualization of the digital divide in the crowdworking context. The dichotomous notion of the digital divide based on access to and ownership of computers and other electronic devices, and access to the Internet, is outdated and misses the point in the crowdworking context. Our study reveals differences in the participation behaviors and perceived values of crowdworkers with different backgrounds. Prior studies on microtask crowdworking (e.g., Deng & Joshi, 2013; Deng et al., 2016; Kauffman et al., 2011) has focused on motivational factors of crowdworkers in the U.S. Further research is needed to examine motivational differences among individuals with different demographic backgrounds and from different cultures, for two reasons. One, crowdworking platforms (e.g., MTurk) have attracted an international labor force (e.g., Ross et al., 2010; Schulze et al., 2011). Two, crowdsourcing is gaining momentum in continents beyond the Americas. For example, challenges and opportunities have arisen from Chinese crowdsourcing (To & Lai, 2015), and there has been an explosion of crowdworking in India (Gupta et al., 2014). We have already noted the growth in crowdworking in Europe. Thus, similar studies can usefully be undertaken in different parts of Europe (East-West; North-South) so that the nature of this extended notion of the digital divide can be understood more fully.

Moreover, our study reveals a power imbalance between platform owners and job requesters on one hand, and the crowdworkers on the other. Some scholars attribute the uneven distribution of power (e.g., greater amount of power for requesters than for crowdworkers) to labor market frictions caused primarily by incomplete information and uncompetitive wage posted (Kingsley et al., 2015). In this regard, one remedy would be to provide an outlet for crowdworkers to share experiences with job requesters (especially unfavorable ones) and to seek mutual support from their fellow crowdworkers.
Turkopticon is just such a platform developed to allow crowdworkers to review and rate a job requester for whom an individual crowdworker has worked (Irani & Silberman, 2013).

8. Implications for IS Design

Our study confirms that the microtask crowdworking provides flexibility by affording crowdworkers with the freedom to choose where, how and when they work, but goes further in identifying that their preferences for this flexibility vary. Some can afford to look for tasks that meet their interests, which are having a positive impact on society, whereas others have to accept any type of task that is made available in order to meet their minimal, pressing income requirements. Our results show that work-life balance or job crafting is achieved through the attained value of job autonomy and workplace flexibility but at the expense of other values such as unreasonable low payment or risk of task scamming. Crowdworkers have expressed a set of values associated with their microtask crowdsourcing work (Deng et al, 2015). The exploratory study reported here suggests that for certain groups of crowdworkers (e.g., those under-privileged with low education levels and otherwise unemployed), the crowdworkers may have to give up other important values simply to achieve work flexibility and autonomy. Future designs of crowdworking platforms need to consider the power imbalance so as to enable crowdworkers to achieve a better work-life balance. In this regard, future work needs to focus on conceptual investigations of this design structure by paying attention to ways to better manage work-life conflicts and better support job crafting (Wrzesniewski & Dutton 2001) in the crowdworking context.

Gregor and Hevner (2013) state that useful knowledge of design science research can be divided into two distinct types – descriptive and prescriptive knowledge – both being required to build a comprehensive knowledge base for a particular design science research domain. The descriptive is the “what” knowledge about phenomena, whereas prescriptive knowledge is the “how” knowledge of building artifacts. By providing an analysis of differences in usage behaviors and preference for crowdworking autonomy and flexibility, we contribute to design science research by extending the descriptive body of knowledge about the ethical design and use of crowdworking of micro tasks. This knowledge can offer insights into building new (and/or refining the existing) microtask crowdsourcing artifacts, generating prescriptive knowledge of design for the technology-enabled crowd work platform. Future designs should focus on balancing the values instead of fulfilling some values by infringing on other more basic human values with ethical import.

9. Concluding Remarks

This study contributes to research by extending the literature on crowdwork design and updating the conceptualization of digital divide in this new context, offering implications on designing crowdworking platforms to account for differences in reported use and perceived value of the IT-enabled platforms for crowdworkers. There are, of course, many limitations to the study. First, the results, while promising, are derived from crowdworkers based in the U.S. alone, on a single crowdsourcing platform (MTurk) that focuses on micro tasks. Our results, therefore, should be applied with caution in other crowdworking contexts (e.g., Innocentive.com for solving scientific and technological problems) or in other cultures (e.g., Europe, Asia). Second, we focused on job motivational characteristics (e.g., job autonomy, workplace flexibility) that crowd workers value; we did not examine the influences of these factors over time. Future research could well generate new insights by focusing on three promising avenues arising from this preliminary work: (1) conducting a longitudinal study of crowd workers regarding their continued participation; (2) adopting a cross-cultural perspective in crowdworking as values may be perceived differently in different cultural contexts and on different crowdworking platforms that can attract an international labor force; and (3) exploring participation practices in crowdworkers’ online communities (e.g., Turker Nation, /r/mturk) to see if their information sharing and learning from their community influence in any way the power imbalances on a crowdworking platform.
Limitations notwithstanding, our exploratory study offers insight into the human values of crowdworkers in this digitally-mediated, boundaryless workplace and begins to provide considerations for ethical design of platforms and related governance issues in this context as well as a reconceptualization of the digital divide as it relates to the power imbalances we have identified. As such, the study responds to calls for further research specific to crowdworking (e.g., Kittur et al. 2013) and on-going concerns about the incorporation of human values in IS design (e.g., Friedman, 1997; Friedman & Kahn, 2003; Friedman et al., 2006; 2008), as well as to similar calls (e.g., Desouza et al., 2006, 2007; Mingers and Walsham, 2010) for IS researchers to take societal and ethical impacts of ICT generally more seriously.

Acknowledgement

This research is partially funded by the Faculty Research Scholarly and Creative Activity (RSCA) Grant by the Office of Graduate Studies and Research, California State University, Dominguez Hills. The first author appreciated the support to the research project from Dean Dorota Huizinga and Mr. Craig Geber at the Office of Graduate Studies and Research, California State University, Dominguez Hills.

References


Twenty-Fourth European Conference on Information Systems (ECIS), İstanbul, Turkey, 2016
Deng et al. / Crowdsourcing – A New Digital Divide?


