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# Understanding Job Satisfaction of Crowd Workers: An Empirical Analysis of Its Determinants and Effects

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**Abstract.** Crowd work has emerged as new pattern of digitally mediated collaboration. In this paper, we focus on the determinants and effects of crowd workers' job satisfaction – a perspective that has been largely neglected by current crowdsourcing research. We report results from a survey of 161 crowd workers participating in crowdsourced software testing. Our research shows that job satisfaction mediates the effects of monetary rewards, hedonic value, and cognitive stimulation on the intention to participate in future testing tasks. By contrast, factors of work context (i.e., flexibility and provided information) have no effects. We contribute to the literature by unraveling job satisfaction as causal mechanism influencing future participation. For practice, our results help to design more effective tasks in crowd work.

**Keywords:** Crowdsourcing, Crowd Work, Job Satisfaction, Motivation.

## 1 Introduction

The rise of digitalization provides a shared new communication and collaboration infrastructure. Further it enables crowdsourcing as an alternative system of organizing. As one consequence, a novel form of digital work has emerged; i.e. *crowd work*. According to Durward et al. [1], crowd work reflects a digital form of gainful employment based on the crowdsourcing idea in which an undefined mass of people creates digital goods via an open call on IT-facilitated platforms. The potentials of crowd work for an individual include the opportunity to generate an additional income [2] on a full- or part-time-basis. Crowd work is gaining importance since the number of platforms and crowd workers has been growing continuously. Thus, it is not surprising that the World Bank estimates the total crowd work market to increase from \$4.8 billion in 2016 up to \$25 billion by 2020 [3].

Despite this rather growing importance, research on crowd work is still in its inception, in particular regarding the ones who perform the work, i.e. the crowd workers. Most of prior research focused only on the business perspective and analyzed underlying strategies, potential risks and benefits [e.g., 4] or incentive mechanisms [e.g., 5] in crowd work projects. However, the perceptions of individual

crowd workers are equally important and have been largely neglected in existing research [6]. Since a balanced evaluation of crowd work requires multiple perspectives of the involved stakeholders, we consider this to be a serious shortcoming. Current research lacks sufficient insights particularly with respect to issues that affect the behavior of crowd workers. One facet of experiencing work – which has long been analyzed especially within organizational behavior, psychology or ergonomics – has hitherto been completely neglected in crowd work contexts: i.e., *job satisfaction*. Hence, we intend to fill the outlined research gaps regarding the individual perspective by addressing the following research question:

*How do different motivations affect the job satisfaction of crowd workers?*

Therefore, we address two issues with our study: First, we dissect factors that might affect crowd workers' job satisfaction (i.e. *information provision; flexibility; hedonic value; cognitive stimulation; monetary reward; career-related benefit*) and second, we analyze the relationship between job satisfaction and continuance intention.

## **2 Theoretical Background**

### **2.1 Crowdsourcing and Crowd Work**

According to Blohm et al. [7], the fundamental idea of crowdsourcing is that a crowdsourcer (a company, an institution or a non-profit organization) proposes to an undefined group of contributors or crowd workers (individuals, formal or informal teams, other companies) the voluntary undertaking of a task presented in an open call. In addition, the ensuing interaction process unfolds over IT-based platforms (i.e. crowdsourcing intermediaries). Prior research has found important differences between the notions of crowdsourcing and crowd work [e.g., 1, 2]. According to Durward et al. [1] crowd work resembles a distinct type of labor that is located at the intersection of digital work and gainful employment. While crowd work is always paid, participation in crowdsourcing initiatives may have different motives and does not necessarily require financial remuneration. Thus, from an individual's perspective, crowd work reflects a kind of digital gainful employment that is based on crowdsourcing as organization principle.

In general, there are much less insights into individual crowd workers' perspectives. In recent studies, some promising approaches focused on demographic data [8] or environmental aspects [e.g., 6, 9]. In their qualitative study, Deng and Joshi [6] found task characteristics and a digitally enabled environment to shape crowd workers' continued participation. We intend to join this stream and expand this research by analyzing the perception of crowd work based on motivations and examining its effects on the individual crowd worker in a quantitative study.

### **2.2 Job Satisfaction**

Within the organizational behavior and psychology literature, job satisfaction plays a significant role and is defined by various researchers, [e.g., 10] as an attitude of

employees towards their work or as a positive emotional state that is caused during the experiences at work. In IS context, researchers propose that satisfaction correlates with attributes such as flexibility, empowerment or involvement [11]. Several studies find empirical support for these attribute models of satisfaction in IS [12], and address the essential questions of the elements that need to be focused on. Since these models depend on which attributes are examined, they must be developed for every new kind of IS artifact or aspect: i.e., crowd work.

Motivations are predominant constructs in analyzing satisfaction, since they act as drivers, which impel individuals toward action [13]. On this basis, IS researchers propose models that posit satisfaction as a response to judgments about goals and their level of achievement [14]. This offers a practical basis for the motivation concept, whose nature is not yet fully understood, and has been empirically supported by studies in IS research [14].

Against this background, we address certain motivational dimensions to be considered as antecedents of crowd workers` satisfaction. Further, according to Deng and Joshi [6], we also include the work context as affecting environmental dimension. Since crowd work represents a new form of digital gainful employment, we propose an aggregate view by drawing on well-established perspectives in IS [e.g., 13, 14] to analyze job satisfaction of crowd workers.

### 3 Research Model and Hypotheses Development

Drawing on motivation theories, we develop our research model to discover the black box of certain effects on job satisfaction in crowd work initiatives. Figure 1 depicts our research model, in which intrinsic and extrinsic motivation as well as the work context positively affect crowd workers` satisfaction and indirectly continuance intention.

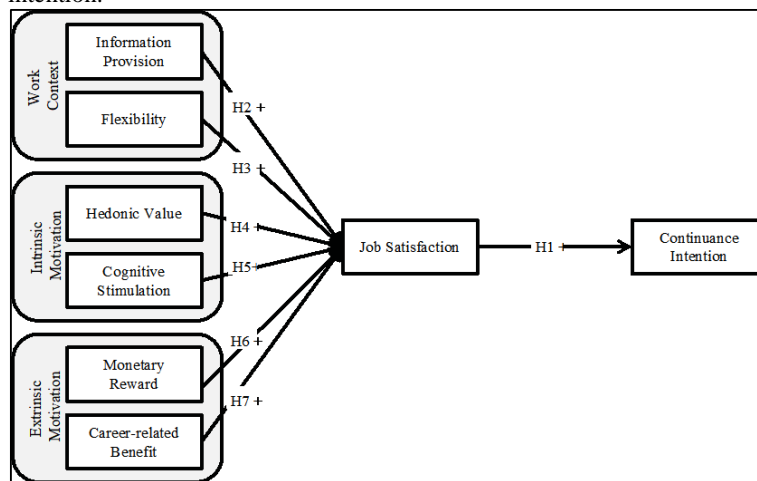


Figure 1. Research Model

### **3.1 Continuance Intention**

Satisfaction is a positive emotion, which arises from an evaluation of an object or activity and represents, particularly in IS research, a critical factor for understanding users' IS continuance or post-adoption behavior [15]. Besides, Sun et al. [16] notes that satisfaction with prior task participation experience, directly effects the continuous task participation of people in online working-context. Hence, we assume that job satisfaction is positively associated with the crowd workers' intention to work for the crowdsourcing intermediary in the future.

- *H1: Job satisfaction positively affects crowd workers' continuance intention.*

### **3.2 Work Context**

A certain aspect of work environment includes the concept of user information satisfaction that is defined as the extent to which users believe the information system available to them meets their information requirements [17]. A study of Ang & Soh [18] indicated that job satisfaction and user information satisfaction were highly correlated. Due to the fact, that crowd work tasks are often processed independently, this comprises informational requirements essential for task fulfilment. Hence, we assume that contentment with the information provided has an influence on a crowd workers' job satisfaction.

- *H2: Information provision positively affects crowd workers' job satisfaction.*

Since the rise of new IT applications and communication networks the perceptions of work have changed and made it possible to work at any location at any time [19]. Researchers found that this emerging flexibility or the access to flexible work arrangements is, inter alia, associated with higher levels of job satisfaction and engagement [e.g., 20]. Concerning crowd workers, this flexibility addresses the opportunity of self-selection and freedoms in task processing. Therefore, we assume that flexibility in this new work context is a relevant antecedent of satisfaction.

- *H3: Flexibility positively affects crowd workers' job satisfaction.*

### **3.3 Intrinsic Motivation**

Intrinsic motivation refers to the pleasure associated with the activity itself so that in IS an intrinsically motivated user is driven by benefits that derive from the interaction with the system per se [21]. In this regard, hedonic value in the field of IS specifies the extent to which fun can be derived from using the system as such [22]. Due to the freelance and voluntary nature of online work such as crowd work, particularly the hedonic value by working on interesting tasks can satisfy individuals [23] and give important insights regarding participation. Hence, in crowd work initiatives, it is essential to analyze perceived enjoyment that satisfies crowd workers in a hedonic intrinsic manner.

- *H4: Hedonic value positively affects crowd workers' job satisfaction.*

With their study on motivations in open source software projects, Lakhani and Wolf [24] have identified, inter alia, the intellectual stimulation derived from writing code as a main goal for participation. By processing splitted subtasks via the Internet and perceiving cognitive challenges, particularly in collaboration-based initiatives, crowd workers can also attain this intrinsic goal by participation. Hence, we assume that cognitive stimulation of an individuals` intellect is an essential goal of crowd workers and can be an antecedent of their satisfaction.

*-H5: Cognitive stimulation positively affects crowd workers` job satisfaction.*

### **3.4 Extrinsic motivation**

Extrinsic motivation refers to the value an individual places on the ends of an action and the probability of reaching these ends [25]. Here, the underlying motives result directly from external stimuli that are perceived from the situational context. Particularly financial rewards affect the perceived fairness and job satisfaction [26], in almost any type of work arrangement. Although, the amount of compensation varies greatly in crowd work, it tends to be a key motive of participating and needs to be analyzed regarding satisfaction. Hence, we assume monetary reward to be a major factor in crowd work context with significant influence on the crowd workers.

*- H6: Monetary reward positively affects crowd workers` job satisfaction.*

Career decisions are related to specific jobs, and the attributes of the specific jobs can exert strong influences on these decisions [27]. Within open source software development, academic research has posited that external motivational factors in the form of better job opportunities or career advancement are the main goals of effort [24]. Career theories collectively provide a valuable framework for examining crowd workers` career pathway since they identify the critical work factors that drive the individuals to become a crowd worker [27]. Thus, we examine whether potential career advantages in crowd work initiatives are goals to be attained and further satisfy the testers.

*- H7: Career-related benefit positively affects crowd workers` job satisfaction.*

## **4 Research Method**

### **4.1 Research Context and Data Collection**

To empirically test our research model, we conducted a survey to collect data from crowd workers on a crowdsourcing platform in Germany. For our study, we chose a German start-up intermediary called testIO (<https://test.io/de/>) – former testcloud – that offers software testing services for companies intending to partly or fully outsource their testing activities to a certain crowd (in sum over 20,000 testers). testIO`s crowd workers were informed about our survey via personal mails. For motivating testOI`s crowd workers to take part in our study, we communicated to the crowd that we would donate two euros at “betterplace.org” for a charitable project for

each complete survey. A total of 161 crowd workers provided a fully completed questionnaire.

In the following, we outline only some key characteristics of the sample: In the sample of the 161 crowd workers, 69% are males, whereas 86% of the participants are from Germany, 7% from India and 7% from other countries (Switzerland, Austria, etc.). 66.7% of the interviewees have a higher education degree. The “average crowd worker” of our sample is 34 years old, has about four and a half years of experience with software testing and has been registered at testIO for about 7 months.

## **4.2 Measures**

All scales used in our study were adapted from previous studies and modified to fit these specific testing tasks in crowd work. We therefore had to modify the wordings of the existing items and adjust them to the study context. We used a seven-point Likert scale for all items. To measure hedonic value, we adapted the scale used by Sun et al. [16]. Cognitive stimulation was measured using the scale provided by Ke and Zhang [28]. Items to measure monetary reward were adapted from Spector [10], whereas career-related benefits was measured with the scale used by Clary et al. [29]. Measures for information provision were adapted from Borg [30] and for flexibility we adapted the scale used by Rimann and Udris [31]. Finally, for measuring job satisfaction and continuance intention, we adapted the items provided by Lim [32].

## **5 Data Analysis and Results**

### **5.1 Construct Validation**

In order to confirm validity and reliability of our measures, we applied exploratory and confirmatory factor analysis using SPSS 19 and SmartPLS 2.0 (cf. Table 1). The Measure of Sampling Adequacy was 0.91, indicating excellent applicability of exploratory factor analysis [33]. We extracted 8 factors that could be clearly interpreted. Alphas of at least 0.831 suggest good reliability of factors. However, we eliminated one item from our hedonic value scale as it did not load unambiguously on one factor. In confirmatory factor analysis, Composite Reliabilities (CR) exceeded values of 0.5, and the Average Variance Extracted (AVE) for each factor surpassed 0.5. Thus, convergent validity could be assumed [34]. According to Kline [35] factor loading values higher than the threshold value of 0.5 are adequate. The discriminant validity was checked by using the Fornell-Larcker criterion, which claims that the square root of one factor’s AVE should be higher than its correlation with every other factor [36]. Thus, discriminant validity could be assumed (cf. Table 2).

**Table 1.** Exploratory and Confirmatory Factor Analysis

Label	Factors								Factor Loading	CR	AVE	$\alpha$
	MR	CS	CB	IP	FL	CI	HV	JS				
MR1	<b>.888</b>	.077	.110	.171	.133	.156	.132	.114	.931**	.948	.821	.851
MR2	<b>.872</b>	.141	.142	.224	.108	.121	.103	.172	.944**			
MR3	<b>.748</b>	.203	.163	.181	.226	.245	.074	.115	.844*			
MR4	<b>.683</b>	.045	.170	.241	.136	.292	.166	.222	.862**			
CS2	.170	<b>.877</b>	.215	.107	.068	.098	.113	.183	.935**	.956	.878	.931
CS1	.138	<b>.867</b>	.162	.077	.164	.119	.171	.107	.954**			
CS3	.054	<b>.818</b>	.234	.221	.162	.159	.090	.145	.924**			
CB1	.123	.210	<b>.878</b>	.136	.165	.037	.013	.024	.909**	.942	.844	.908
CB2	.112	.282	<b>.862</b>	.135	.135	.011	.055	.138	.935**			
CB3	.221	.096	<b>.787</b>	.164	.144	.070	.134	.288	.911**			
IP3	.197	.166	.182	<b>.816</b>	.201	.161	.059	.148	.909**	.942	.843	.907
IP1	.276	.132	.137	<b>.807</b>	.235	.130	.053	.087	.918**			
IP2	.229	.125	.153	<b>.796</b>	.175	.152	.204	.142	.928**			
FL1	.103	.074	.192	.147	<b>.812</b>	.133	.226	.074	.854*	.899	.747	.831
FL2	.178	.308	.173	.222	<b>.737</b>	.036	.123	.105	.872**			
FL3	.259	.083	.140	.306	<b>.690</b>	.214	.077	.171	.867**			
CI2	.338	.115	.129	.185	.047	<b>.738</b>	-.022	.270	.915**	.910	.772	.851
CI1	.267	.163	-.052	.246	.251	<b>.715</b>	.347	.080	.824*			
CI3	.222	.212	.036	.115	.172	<b>.714</b>	.425	.057	.895**			
HV3	.116	.188	.130	.123	.160	.172	<b>.856</b>	.146	.911**	.922	.855	.832
HV1	.293	.179	.045	.153	.315	.309	<b>.655</b>	.203	.939**			
JS3	.262	.245	.263	.268	.128	.191	.145	<b>.695</b>	.904**	.929	.813	.885
JS2	.288	.289	.375	.145	.256	.141	.163	<b>.635</b>	.914**			
JS1	.383	.293	.127	.168	.163	.245	.325	<b>.594</b>	.904**			
Eigen-value	11.44	2.29	1.69	1.43	1.13	.900	.686	.611				

n = 161; \*\* p < 0.01; \* p < 0.05  
<sup>a</sup>MSA = 0.91; Bartlett-test of sphericity:  $\chi^2 = 1422.74$ , p = 0.000; principal component analysis; varimax-rotation; The bold values indicate the attribution of the variables to one of the four factors.  
MR = Monetary Reward, CS= Cognitive Stimulation; CB = Career-related Benefit, IP = Information Provision, FL = Flexibility, CI = Continuance Intention, HV = Hedonic Value, JS = Job Satisfaction, CR = Composite Reliability, AVE = Average Variance Extracted

As both the dependent and the independent variables were measured by means of a survey, we carefully checked the extent of common method variance. First, we applied Harman's single factor test applying principal component analysis. This approach suggests the occurrence of common method bias in case one factor accounts



or the majority of variance of all included items [37]. In our case, one factor emerged reflecting a considerable part of the covariance. However, as this factor did not account for the majority of covariance, there is no indication of substantial common method bias. Second, we inspected the correlation matrix (cf. Table 2). The highest correlation is 0.674. The evidence of common method bias would have resulted in extremely high correlations (>0.9) [38]. Finally, we followed the suggestions of Lindell and Whitney [39] who propose to test for common method bias by assessing the correlation between a theoretical unrelated construct (i.e. a marker variable) with the principal study constructs. Common method bias can be assumed if these correlations are substantial. We applied a modified test in which we assessed the correlation between our study variables and a weakly related construct as we did not measure completely unrelated constructs in order to economize on survey items [38]. In our case, we measured agreeableness as central personality trait of crowd workers as these might reflect a central prerequisite for online collaboration. The highest correlation between agreeableness and the other study constructs is -0.1 (n.s.) indicating that our data does not suffer from substantial common method variance.

## 5.2 Hypotheses Test

We use Partial Least Square (PLS) analysis using SmartPLS 2.0 to test our research model. We have chosen PLS as it does not require assumptions of normally distributed data and works well for complex models even with smaller sample sizes [40]. Table 2 contains correlations, means, and standard deviation of our central study variables. We tested our hypotheses with 500 bootstrapping resamples and 161 cases.

**Table 2.** Descriptives and Correlations

Variable	Min	Max	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) MR	<b>1.0</b>	7.0	4.751	1.367	<b>.906</b>							
(2) CS	<b>1.0</b>	7.0	4.983	1.313	.399*	<b>.937</b>						
(3) CB	<b>1.0</b>	7.0	3.824	1.497	.429**	.501**	<b>.919</b>					
(4) IP	<b>1.0</b>	7.0	4.990	1.372	.581**	.424**	.443**	<b>.918</b>				
(5) FL	<b>1.0</b>	7.0	5.217	1.245	.517**	.452**	.470**	.591**	<b>.864</b>			
(6) CI	<b>1.0</b>	7.0	5.694	1.145	.637**	.441**	.278*	.526**	.500**	<b>.879</b>		
(7) HV	<b>1.0</b>	7.0	5.643	1.166	.669**	.606**	.594**	.579**	.569**	.612**	<b>.925</b>	
(8) JS	<b>1.0</b>	7.0	4.787	1.206	.507**	.462**	.330*	.445**	.560**	.646**	.606**	<b>.902</b>

n = 161; \*\* p < 0.01; \* p < 0.05

The bold values indicate the squared AVE for each factor for assessing discriminant validity. MR = Monetary Reward, CS= Cognitive Stimulation; CB = Career-related Benefit, IP = Information Provision, FL = Flexibility, CI = Continuance Intention, HV = Hedonic Value, JS = Job Satisfaction, SD = Standard Deviation

Applying PLS analysis, we found a positive and significant effect of job satisfaction on continuance intention ( $\beta = .617$ ,  $p < 0.01$ ) supporting H1. Our work context variables, information provision and flexibility had no statistically significant

influence on job satisfaction such that we reject H2 and H3. Our data indicates that hedonic value ( $\beta = .233, p < .01$ ), cognitive stimulation ( $\beta = .217, p < .01$ ), monetary reward ( $\beta = .303, p < .01$ ) and career-related benefits ( $\beta = .225, p < .01$ ) are positively and statistically significant associated with job satisfaction. Therefore, H4, H5, H6 and H7 are supported by our study as Figure 3 illustrates.

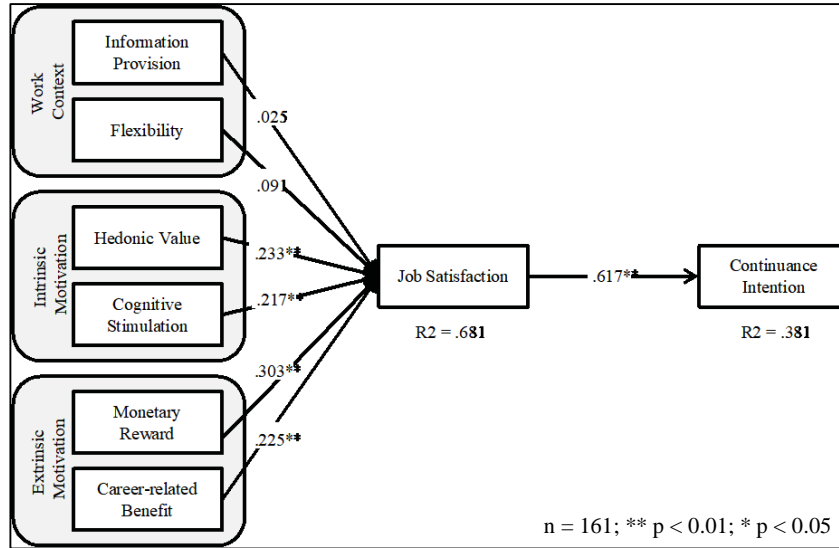


Figure 2. PLS Analysis

## 6 Discussion

### 6.1 Theoretical Implications

In line with existing research, our study shows that crowd workers are not only motivated by financial compensation, but also by non-financial motives [e.g., 8]. These results have important theoretical implications. First, our results show that besides financial compensation other internal as well as external motivations seem to be relevant to crowd workers. In line with Deng and Joshi [6] we found antecedences of crowd workers satisfaction as well as continued participation. Second, besides external motivation, we particularly extend prior research on internal motivation like hedonic value [23] and cognitive stimulation [24], since we found these to satisfy crowd workers in testing contexts as well. Thus, satisfaction and continuance intention are invoked by hedonic value and cognitive stimulation crowd workers experience while solving testing tasks. However, since crowd work resembles a financially remunerated form of digital employment on a full- or part-time basis [1], monetary rewards seems to have a major effect on crowd workers` job satisfaction and intention to take over tasks in future.

Finally, our study contributes to the systematic design of tasks – a pivotal success factor for the application of crowd work [7]. Neither, the systematic provision of information about the task and its context, nor the flexibility of the work context had a positive impact on job satisfaction or continuance intention. As a consequence, the flexibility may rather reflect a hygiene factor mitigating dissatisfaction and central prerequisite for participation, than an antecedent of job satisfaction. Similarly, our results indicate that crowd workers' needs of information in testing projects play a tangential role. As a consequence, crowdsourcers may reduce the provision of information to a minimum that is required for solving a given task without having to fear negative consequences of unwanted information spillovers.

## **6.2 Practical Implications**

The present study has significant practical implications. First, monetary reward tends to be the most important factor on job satisfaction and continuance intention. Although, compensation varies greatly the intermediaries should consider about adequate payment models to their crowd to ensure further participation. There are various ways to pay the crowd, inter alia, fixed fee or revenue participation in the subsequent product. In addition, the career prospects tend to be an important extrinsic motivation that affects the crowd workers' job satisfaction and continuance intention. Hence, it could be essential to the intermediaries to invest in the professional future of their crowd. Further education and career opportunities can be realized, inter alia, by training programs or recruitment options. There is practical evidence by platforms, which already offer their crowd career opportunities. After they have worked successfully on several projects, the crowd workers can qualify for positions in quality control or as a consultant on the platform. Hence, a sort of crowd-recruitment arises that deserves future attention in practice and should be institutionalized.

## **7 Conclusion**

Given the lack of empirical research on crowd workers' perspective, our primary objective was to achieve a better understanding of the factors that affect crowd workers' job satisfaction. Based on prior literature, we develop and test a research model that has both theoretical and practical contributions. Theoretically, this study introduces motivational constructs and their impact on job satisfaction and further continuance intention. Practically, our study contributes several guidelines for crowdsourcing intermediaries, especially in the field of software testing. However, we also recognize that our research has some limitations since the survey exclusively focused only on the testIO platform, mainly on German crowd workers and include only one survey. Thus, these facts are limiting the generalizability of our results with regard to other nationalities, cultures and platforms.

In conclusion, our study considered crowd work to be a new facet of digital gainful employment that deserves future theoretical and practical attention.

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