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EFFECTS OF EMPLOYEE MOTIVATION ON THE EXTENT OF PARTICIPATION  
IN A CROWDSOURCING CONTEXT

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## **ABSTRACT**

This study investigates the relationship between the motivation of employees and their participation in a crowdsourced wiki. An in-depth literature review was conducted that was consistent with the results found by the initial survey. A sample of 67 participants answered a survey designed to establish whether their behavioral motivation is intrinsic or extrinsic. This behavioral motivation was then linked to the extent to which they participated in a job-related wiki. Based on findings, intrinsic motivation was found to have a more positive effect on participation than extrinsic motivation.

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## Introduction

Wikipedia.com, an online collaborative free encyclopedia, has 17.9 million registered users on the English version with 28.8 million pages and 569.8 million edits (excluding non-English versions). The large majority (99.9%) of the content editors share their work for free. Due to the amount of work that is done on this site by a great amount of people, Wikipedia can be considered a crowdsourcing website. For the first five years of Wikipedia's existence, there were no paid employees. It was not until 2006 that Wikipedia started paying a person to manage the site (Wikipedia: About, 2012).

Understanding how Wikipedia users are motivated to work for free would be a useful concept to understand and apply in an organization. For example, supervisors could apply these concepts to their already paid employees to create useful job aids on a wiki of their own. An example of how much money could be saved through the application of these concepts can be seen in Amazon's Mechanical Turk, a crowdsourcing website that focuses on small tasks. Sunny Gupta ran a software company that created programs to provide technical support for large companies. Before Gupta discovered Mechanical Turk, he would pay his employees nearly \$2000.00 for a simple flow chart. When he presented the task to the users of Mechanical Turk, he received nearly the same flow chart for a fraction of the cost: only five dollars (Howe, 2006). This phenomenon of crowdsourcing, or nearly free quality labor, is an interesting topic that should be studied to gain a greater understanding of how crowdsourcing works and why people participate.

## **Literature Review**

There are two main questions that guide this literature review. The first, “what is crowdsourcing?” explores crowdsourcing by looking at the many different types and how the definition has evolved since its creation. The second, “why do people participate in crowdsourcing?” discovers and analyzes the motives of those who participate in crowdsourcing.

### **What is Crowdsourcing?**

The term crowdsourcing was first coined by Jeff Howe in his 2006 article in Wired magazine (Howe, 2006). It refers to a business model that allows a company (or person) to utilize the expertise and skills of crowds to complete tasks. Howe notes two requirements for a task to be considered crowdsourcing: it must be an open call to an undefined group of people. An open call refers to a request sent out to a large group of people (usually by posting it online) to solve a problem or to complete a task. Being sent to an undefined group of people means that there is not a limit restriction to who can participate in the request. More recently the definition has expanded. Stewart et al. (2009) says crowdsourcing seeks to tap into the collective intelligence of a crowd or community for accomplishing a specific task or solving a specific problem either inside or outside “the firewall” meaning only within an organization or open to the public. Stewart’s definition is basically the same as Howe’s but it includes both external and internal

resources which provide that the crowd does not need to be an open call to everyone and anyone. It could even be a task given to those within an organization. Erickson et al. (2012a) uses the definitions from Howe and Stewart to create a framework for crowdsourcing uses and key characteristics. Erickson et al. says the crowd is typically leveraged for four different reasons: cost reduction/productivity, product/service innovation, knowledge capture, and marketing/branding. Each use of crowdsourcing is matched to specific key characteristics such as; the motive for which crowdsourcing was initiated, the common tasks that were asked to be completed, the level of knowledge typically needed, whether the crowd is located inside or outside the firewall, challenges the organizer faces, and the value that is captured. Erickson et al. (2012b) found that generally an external crowd may be desirable over internal ones because an external crowd tends to be more diverse which fosters innovation. However, when the goal is knowledge capture, both internal and external crowds are appropriate.

To better understand what crowdsourcing is, below are four ways crowdsourcing has been used differently to produce four very distinct results. Each has different initiators and beneficiaries.

The first example, mentioned in the introduction, is a commonly known and used platform. Wikipedia was created by Jimmy Wales in January of 2001 as an encyclopedia of everything written by everybody. Wales did not have high-hopes for the product worrying that it would only produce “complete rubbish” but was pleasantly surprised when it took off and became the success it is today (Wikipedia: About, 2012). Wikipedia is an example of crowdsourcing where the crowd is utilized for the common good. Not

only does everyone help create the content for this tool but everyone can benefit from the information that is found on it.

The next example is a tool that was created to make it easy for anyone to take advantage of crowdsourcing. Amazon's Mechanical Turk is an internet marketplace where "requesters" post small tasks online that are processed by "workers" for a small fee. These tasks can be content generation, transcription, image labeling, or web research and are referred to as HITs (Human Intelligence Tasks). Using Mechanical Turk, anyone can utilize the crowd for the benefit of one person. Whether you are an undergraduate student or a corporate executive, you can post a task that will be completed quickly with little expense and effort on your part. Many researchers use this tool for quick and rich datasets (Kaufmann, 2011).

For the third example, a big company seeks the help of the crowd in the form of a competition with a monetary reward of significant value. General Electric (GE) has submitted two "quests" that ask the world to solve efficiency issues with their airline and health care divisions. The airline quest seeks a usable and scalable algorithm that delivers a real-time flight profile to the pilot, helping him or her make flights more efficient and reliably on time. The health care quest focuses on operational solutions to GE's health care system to provide an improved experience for patients and family. The first place winners of the airline and health care competitions receive 100,000 dollars. The GE Quests show us that crowdsourcing can be a big company utilizing the crowd for a direct benefit of that company ("Let the quests begin!," 2013).

The last example can be considered creative crowdsourcing. Eric Whitacre is one of today's most famous classical choral composers. He did a revolutionary experiment

with one of his songs, *Lux Aurumque*. On his blog, he asked people to upload videos of them singing one of eight voice parts to his song. He got an amazing response of almost 200 videos. He stitched each video together to play simultaneously to create a Virtual Choir. The result was better than he could have ever expected; the completed video went viral with one million views in the first month. People were eager to participate again on a Virtual Choir 2.0 project. On September 22nd 2010, Whitacre posted on his blog the call for uploads. This time the song was *Sleep* and his goal was to get 900 videos. He uploaded a silent video of himself conducting the piece and later added a piano track to help keep everyone on key. He set the last day to upload a video as December 31st, 2011. By the time Christmas arrived, he had reached and surpassed his goal of 900 videos. He decided to extend the deadline to January 10th because videos were still being uploaded and when the new deadline arrived, a total of 2052 videos were uploaded from 58 countries. This example shows that crowdsourcing can be for the pleasure of an art instead of a task or problem that needs a solution (Whitacre, 2011).

Crowdsourcing's definition is being expanded by each year that passes as new forms of using the crowd and technologies are discovered. In summation, crowdsourcing is an open call within an organization or to the world to complete a task, find a solution to a problem, or to create a piece of art. The initiators and the beneficiaries can be a company or organization, a single person, or the crowd itself.

### **Why do People Participate in Crowdsourcing?**

From the examples given, it is clear that many people participate in many different forms of crowdsourcing, but what is the motivation for this participation? There are two types of motivation relevant to this paper: intrinsic and extrinsic. Intrinsic motivation refers to how a participant inwardly feels about a task; an internal interest or enjoyment exists in the individual rather than being forced to contribute due to an external factor (Amabile et al., 1994). The external factor would be called extrinsic motivation. Being monetarily compensated for the completion of a task is an example of extrinsic motivation. Given that contributors are paid for their performance, Mechanical Turk and GE's Quests gives an example of a form of extrinsic motivation whereas Wikipedia's contributors and Eric Whitacre's singers are unpaid with little social recognition therefore their participation is an example of a form of intrinsic motivation.

Kaufmann et al. (2011) developed a model from classic motivation theory, work motivation theory and Open Source Software Development and connects the model to crowdsourcing. The developed model is tested with a survey of 431 workers on Mechanical Turk. Kaufmann et al. find that the workers are both intrinsically and extrinsically motivated. Intrinsically a person may be motivated because of enjoyment (pastime, boredom, etc.) or community based (social contact, community identification). Extrinsically Kaufmann finds three motivation types; immediate payoffs (monetary payment), delayed payoff (skills acquired), and social motivations. It is concluded that many intrinsic motivation factors seem to dominate the extrinsic ones.

Stewart (2009) describes the design principle used for implementing crowdsourcing within the enterprise. As a guide of how to implement a crowdsourcing initiative, Stewart notes that “ideal crowdsourcing should be similar to open-source communities where participants are passionate about the activity and simply participate for the fun of it (not necessarily driven by monetary gains).”

Brabham (2008) surveys users of iStockphoto, a website that allows amateur artists to sell photographs and animations at very affordable prices while iStockphoto takes a portion of the profits, and asks why they participate. The results show that the strongest motivators were: to make money (89.9%), develop individual skills (79.1%), and as a creative outlet (76.9%). The majority of participants responded “yes” to more intrinsic motivators than extrinsic motivators on the question about why they participate at iStockphoto. Brabham’s (2009) article about Threadless.com, a t-shirt company that crowdsources the design process through an ongoing online competition, finds similar conclusions for motivations to participate in crowdsourcing through a series of online interviews.

These sources provide that intrinsic motivation factors are stronger than the extrinsic ones. This strength is a preferred form of crowdsourcing though it may be difficult or impossible to purposely motivate people intrinsically.

## **Methodology**

To understand the purpose of this paper, it is important to first understand the part-time IT support job in which it refers. Lab Consulting Services at the Pennsylvania State University provides technical support for the computer labs and kiosk/printer locations around the University Park campus. The supervisors provide a wiki available to the employees that they use to answer questions that have been posed by users in the labs. The employees are encouraged to update and add pages to make the information presented more accurate. Often times, the supervisors have difficulties motivating their subordinates to effectively edit the wiki. A wiki is a website that is developed collaboratively by a community of users that allows each member to add and edit content. The organization offers primarily extrinsic incentives to their employees through receiving a salary; however, supervisors attempt to create an environment conducive to making employees motivated intrinsically to get the task done right. For example, a supervisor may encourage an employee to make a wiki page about a difficulty the employee had and explain how this would benefit the organization by making it easier for the next person looking for an answer to the same difficulty. Therefore, the purpose of this paper is to investigate the relationship between the motivation of employees and their participation in a crowdsourcing tool (i.e. the wiki). Understanding this concept will directly affect those working at Lab Consulting Services in a positive way and indirectly those who request the help of a Lab Consultant. With complete and accurate information on the wiki, the Lab Consultants will be able to do their job in the most efficient and

informed way possible. Since the Lab Consultants are more efficient and informed those who request the Lab Consultant's help will get their question answered faster and more accurately. This study can be useful to similar organizations to increase their technical support effectiveness.

*Hypothesis.* People who are intrinsically motivated will have a stronger positive relationship with extent of participation in a crowdsourcing wiki than those who are extrinsically motivated.

### **Participants**

Data was sampled from the employees of Penn State's Lab Consulting Services division of the Information Technology Services department. All 170 employees were asked to participate in the study with the extrinsic incentive of being entered into a drawing to win a gift card to a local store. Of the 67 who responded, 83 percent are between the ages of 18 and 21, 14 percent are between the ages of 22 and 25, 2 percent are between 26 and 30, and 1 percent are between 31 and 40. 59 percent of the respondents were male and 41 percent female. Just over half of the respondents, at 56 percent, work 10 hours or less per week at their part-time job, while 31 percent work between 11 and 20 hours, 8 percent work between 21 and 30, and 5 percent work between 31 and 40. In response to the question "Are you pursuing or have you completed an IT-related degree?" 53 percent said no, 41 percent said yes, and 6 percent responded with other.

### **Procedure**

Throughout the months of September and October 2012, participation data was collected from the crowdsourcing tool (wiki) used by Lab Consulting Services. This wiki enables all users of the tool to view the edits and contributions of each individual based on their university-given user ID. The number of edits each user made during the two month time period was tracked using this tool.

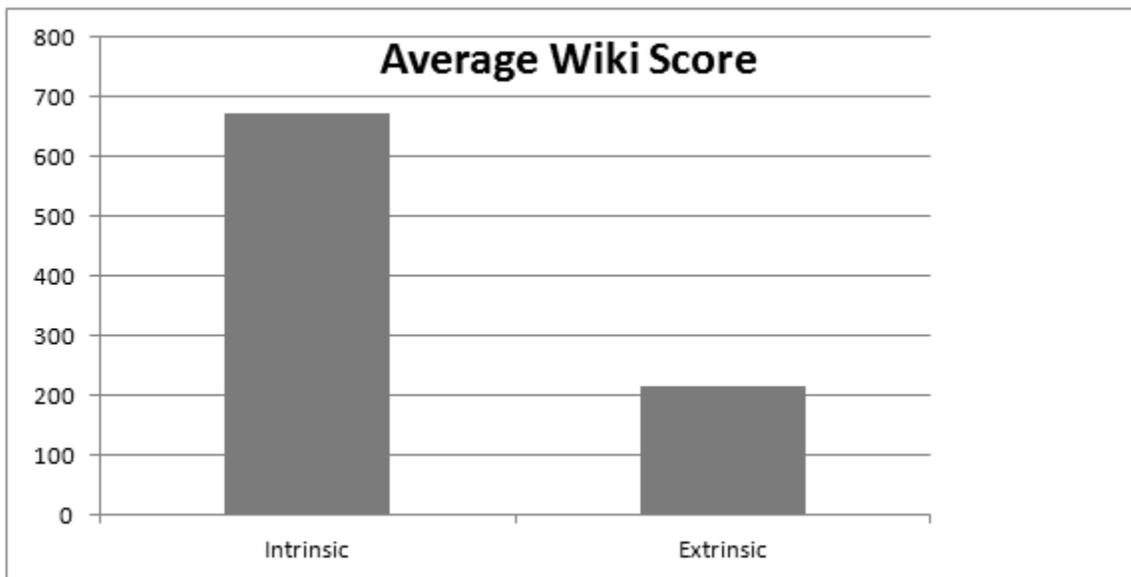
After collecting the wiki data, an email was sent to the employees over a listserv used by the managers to convey important work-related information. The email asked the recipients to fill out the survey and described the potential benefit of participation. The email briefly described the study and provided a link to the online survey hosted at SurveyMonkey.com.

### **Measures**

Items from the Work Preference Inventory (Amabile et al., 1994) were used to create the survey to measure the independent variable of motivation. A Likert scale was used from 1 to 4 with 1 being “never true of me” and 4 being “always true of me.” (See Appendix for items in the survey.) Some questions focused on determining intrinsic motivation while others focused on extrinsic motivation. The dependent variable of participation was measured using the data gathered from the wiki. Two categories were analyzed: characters added and characters deleted. These raw numbers were added to create a wiki score. Those who had higher numbers in the two categories will have a higher extent of participation than those who have a lower amount.

## Results

Of the 67 respondents, 40 are intrinsically motivated, 16 are extrinsically motivated, 3 are equally intrinsically and extrinsically motivated, and 8 did not complete the survey. Those who are intrinsically motivated have an average wiki score of 673 while those who are extrinsically motivated have an average wiki score of 216.



**Figure 1: Average Wiki Score**

## **Discussion**

In this survey, the average wiki score for the intrinsically motivated individuals is three times higher than the average wiki score of the extrinsically motivated individuals. This result is consistent with the hypothesis that those who are intrinsically motivated are more likely to contribute a greater amount than those who are extrinsically motivated. From the literature review and context of the survey wiki based crowdsourcing seems to be mostly leveraged for knowledge capture. The context of the survey places this knowledge capture within an organization or firewall. Erickson et al. (2012b) confirms that an internal crowd is effective when the goal is knowledge capture. The initiators of this wiki are the managers of the Information Technology Services organization at Penn State but it benefits both the organization and indirectly those who are helped by the Lab Consulting Services. Kaufmann (2011), Stewart (2009), and Brabhams (2008, 2009) all conclude that intrinsic motivation factors are preferred to the extrinsic ones which is the ideal form of crowdsourcing to those who are trying to capture knowledge inside the firewall.

## **Limitations**

Given that the subjects received the survey from an email address that is directly related to their job, they could experience some level of evaluation apprehension (Cook & Campbell, 1976). The participants may attempt to depict themselves in a way that they

believe is more desirable to their superior. This construct validity problem becomes more of an issue if they can also guess the hypothesis being studied. The threat of this is low because the survey is designed to ensure the responders cannot guess what is being studied. However, if the participants do understand that their intrinsic and extrinsic motivation is being related to the extent in which they participate in the wiki, they may believe it is better to be perceived as intrinsically motivated because it shows a certain level of commitment to the job. Alternately, they may believe the results of the survey will affect how much the position is paid. If the participants believe they will get paid more if the study shows that everyone is extrinsically motivated, they may try to depict themselves as such. Future researchers should conduct this study outside of the work environment to minimize the amount of evaluation apprehension.

Many edits to the wiki occur when something has changed about the job that requires a change in instructions. Some employees only edit the wiki if something big has changed (e.g. policy change, hardware/software changes, lab hours) and ignore grammatical errors. If nothing big changes during the two month period in which data is collected, those subjects may not have a reason to edit the wiki which creates a threat to the external validity of interaction of time and treatment (Cook & Campbell, 1979). If a researcher was to replicate this study in the future, they should change the length of time in which data is collected. Collecting data for about a year would provide information on the typical number of changes in one year and would increase the external validity of the study.

The sample size of my research is smaller than optimal. Cohen (1992) says that as the sample size gets larger, the easier it will be to find statistical significance in the data.

The inverse of this fact is also true; as the sample size gets smaller, the harder it is to show statistical significance of the results. Since my sample is only at 67 participants, it is relatively difficult to show the statistical significance of the relationship. This hardship could lead to a type 2 error if the null hypothesis is false and I am unable to show a strong enough significance to reject it.

## **Conclusion**

Through an in-depth literature review and a survey of 67 part-time employees who participate in a work related wiki, the relationship between the motivation of employees and their participation in a crowdsourced wiki was investigated. It was found that those who are intrinsically motivated have participated more in the knowledge capture aspect of crowdsourcing (wiki) than those who are motivated extrinsically.

This thesis provides a greater amount of information on the topic of crowdsourcing with a focus on the knowledge capture aspect. With this additional information and data, future researchers can target their research to explore other areas of crowdsourcing with a stronger knowledge of the one reviewed here. Additionally, organizations can look at the type of crowdsourcing that they want to do and make an educated choice of how to go about it using what was learned in this thesis.

**Appendix**  
**Motivation Survey Questions**

The respondents were to respond to each statement below using a Likert scale from 1 to 4 with 1 being “never true of me” and 4 being “always true of me.”

Key: EM = Extrinsic Motivator, IM = Intrinsic Motivator, R = reverse scored

1. I am not that concerned about what other people think of my work. (R-EM)
2. I prefer having someone set clear goals for me in my work. (EM)
3. The more difficult the problem, the more I enjoy trying to solve it. (IM)
4. I am keenly aware of the goals I have for getting good grades. (EM)
5. I want my work to provide me with opportunities for increasing my knowledge and skills. (IM)
6. To me, success means doing better than other people. (EM)
7. I prefer to figure things out for myself. (IM)
8. No matter what the outcome of a project, I am satisfied if I feel I gained a new experience. (IM)
9. I enjoy relatively simple, straightforward tasks. (R-IM)
10. I am keenly aware of the GPA (grade point average) goals I have for myself.  
(EM)
11. Curiosity is the driving force behind much of what I do. (IM)
12. I'm less concerned with what work I do than what I get for it. (EM)

13. I enjoy tackling problems that are completely new to me. (IM)
14. I prefer work I know I can do well over work that stretches my abilities. (R-IM)
15. I'm concerned about how other people are going to react to my ideas. (EM)
16. I seldom think about grades and awards. (R-EM)
17. I'm more comfortable when I can set my own goals. (IM)
18. I believe that there is no point in doing a good job if nobody else knows about it.  
(EM)
19. I am strongly motivated by the grades I can earn. (EM)
20. It is important for me to be able to do what I most enjoy. (IM)
21. I prefer working on projects with clearly specified procedures. (EM)
22. As long as I can do what I enjoy, I'm not that concerned about exactly what  
grades or awards I can earn. (R-EM)
23. I enjoy doing work that is so absorbing that I forget about everything else. (IM)
24. I am strongly motivated by the recognition I can earn from other people. (EM)
25. I have to feel that I'm earning something for what I do. (EM)
26. I enjoy trying to solve complex problems. (IM)
27. It is important for me to have an outlet for self-expression. (IM)
28. I want to find out how good I really can be at my work. (IM)
29. I want other people to find out how good I really can be at my work. (EM)
30. What matters most to me is enjoying what I do. (IM)

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Freddie Mac, Architecture & Data Services Analyst Intern, summer 2012, McLean, VA

Residence Life, Resident Assistant, Penn State University, 2011-2013, University Park, PA

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