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## Drivers of Knowledge Contribution in Open Fora: Findings from Wikipedians

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### ABSTRACT

Today's social computing platforms include many open content fora where users voluntarily create and edit content online. This has opened up a new mechanism for knowledge acquisition raising related research questions, including identification of the reasons why people contribute to open fora. While altruism is mentioned most frequently, it has been suggested that there may be additional drivers in play. To explore this possibility, we examine contribution behavior in the Wikipedia context using qualitative data from two focus groups of Wikipedians. Content analysis of the data reveals a number of different drivers of contributor behavior which we then map into the Motivation-Ability-Opportunity (MAO) theoretical framework developed in the organizational behavior literature on work performance. The mapping can provide a theoretical basis for quantitative examination of contributor behavior and lead to more effective methods of managing collective knowledge in other open forum settings, such as corporate wikis.

### Keywords

Wikipedia, open-content, focus-group, contribution, ability, motivation, opportunity.

### INTRODUCTION

Today's social computing platforms include many open content fora where users voluntarily create and edit content online. Applications such as blogs, mashups, social bookmarking, wikis, etc have allowed users to participate in content creation rather than being passive consumers of content. The unprecedented growth of Wikipedia as a public online encyclopedia shows that open content can be a viable alternative to more traditionally generated content. The social computing phenomenon has spawned many research questions (Parameswaran and Whinston, 2007). Business organizations are recognizing their potential for a variety of purposes including employee interaction, product development, innovation, marketing and customer service (Dearstyne, 2007; Cook, 2008). Open fora raise many issues relevant to knowledge management (Roman 2009). Given that there is no monetary compensation, one central issue is '*what are the factors which lead people to contribute to such open fora?*'. Better understanding of contribution behavior in open fora has implications for knowledge management as these platforms are being increasingly employed to generate and manipulate different types of knowledge (Bonabeau 2009). In this study, we look specifically at the open forum Wikipedia. Using qualitative data from two focus group meetings, we identify several drivers of contributions to Wikipedia while drawing from literature on knowledge management, open source and Wikipedia studies. We map these drivers to the Motivation-Ability-Opportunity (MAO) model developed in the organizational behavior literature. Implications for knowledge management and avenues of further inquiry are discussed in conclusion.

### BACKGROUND

We review three categories of literature that are relevant to making contributions to online content repositories in general and Wikipedia in particular.

## Knowledge Sharing

The knowledge management literature offers a natural starting point. One can view explicit organizational knowledge as a public good from which people can benefit regardless of whether or not they contribute to its creation (Cabrera and Cabrera, 2002). Contribution behavior in this literature has been theorized as resulting from self-enhancement, intrinsic motivation, exchange motivation and/or extrinsic motivation (Chiu et al., 2006; Nov, 2007; Cook, 2008; Hsu and Lin, 2008; Olivera et al., 2008; Marks et al. 2008; Wu et. al. 2009). Self enhancement arises from perceived positive beliefs about oneself or identification with another entity, while intrinsic motivation includes altruism, joy of helping others and pleasure from conduct of the task itself. Exchange motivation refers to expectations of future reciprocity leading to a feeling of equitable relations. Finally, extrinsic motivation encompasses monetary, professional and non-monetary benefits, public recognition and peer or superior appreciation. The extent of knowledge sharing by individuals is moderated by contextual factors in the organization such as governance and decision making structure, information culture, trust, norms, rewards and incentives, strength of ties and identification with the group or organization (Garud and Kumaraswamy, 2005; Chiu et al., 2006).

## Open Source

While open content fora, such as Wikipedia, differ from open source projects (Stvilia, et. al. 2008), there are similarities, especially in the democratization of knowledge creation. The open source phenomenon has been studied through a variety of lenses and factors motivating contributors has been of considerable importance (von Krogh and von Hippel, 2006; von Krogh and Spaeth, 2007; Xu, et al., 2009). Cognitive, affective and social identity play a role in open source contributions (Bagozzi and Dholakia, 2006). The possibility of creating something and experiencing a sense of satisfaction and achievement and intrinsic motivation leading to a sense of autonomy, control or competence are important motivators (Roberts, et al. 2006). Recent literature has also compared the open source software and content environments to understand the relative importance of different motivators such as reputation, self-development and altruism in these two contexts (Oreg and Nov, 2008).

## Wikipedia

Wikipedia claims to have democratized knowledge creation (Hasan and Pfaff, 2007). While the Wiki mechanism enables rapid creation and timely maintenance of content, Wikipedia content is not without risks (Denning, et al., 2005). Lack of accuracy, diversity of motives, uncertain credibility of contributors, volatility of content, focus on coverage of specific areas of interest and questionable sources of content are some of the risks identified.

Unlike scientific communities, cycle of credit may not exist in Wikipedia (Forte and Bruckman, 2005), even though there still exists a strong need to be acknowledged as an active contributor (Wu, et. al. 2009) especially if the contributor wants to be elected as an administrator (Okoli and Oh, 2007).

## METHODOLOGY

To explore the question ‘what factors drive contribution behavior in Wikipedia?’ we chose to use a focus group approach (Litosseliti, 2005) where active Wikipedians would elaborate on their experiences in becoming and remaining contributors. Two reasons drive our choice. First, contribution behavior is likely to be an outcome of individual, technological, and network factors acting simultaneously. While the motivation to contribute is specific to individuals, issues such as features offered by the social computing platform, or interactions resulting from a network of participants, are not. Such interactions surface when participants engage in an active discussion on the topic of their common interest – Wikipedia. Second, understanding contribution behavior requires access to the experiences of contributors (Forte and Buckman, 2008). Contribution is an evolutionary process. It begins with an individual being a seeker of information and transforming into a contributor who gradually ramps up his/her contribution activity. Each individual’s initiation into the forum and his/her movement from a seeker to an amateur contributor and to an active contributor may pass through assorted paths of evolution. A qualitative research methodology aimed at revealing these paths would be appropriate (Denzin and Lincoln, 2000). When the phenomenon under study is the behavior of contributors on a network-based forum, it is also important to allow collective testimonies to emerge. We therefore chose to use the focus group approach

### *Choice of Wikipedians*

A convenience sampling of Wikipedians yielded nine participants for one group and six for the second. The two group meetings were conducted in two different states within India with distinct native languages. Both languages have their own Wikipedia sites but the majority of participants were primarily contributing to the English Wikipedia. Some were also active in translating articles from the English to their native language Wikipedia. Participants were identified based on the profile and location specified in their user pages and a request for participation was sent through Wikipedia email. A conscious

attempt was made to invite Wikipedians from diverse streams of professional life and who were active. A summary of participant demographics is provided in Tables 1 and 2 below.

Age Group	Focus Group 1	Focus Group 2	Total
21-25	4	2	6
25-30	3	1	4
30-40	1	2	3
>40	1	1	2

**Table 1. Demographic Details of Participants – Age**

Primary Profession/Occupation	Focus Group 1	Focus Group 2	Total
Academician	1(also writer)	1	2
Doctor (Practitioner of Medicine)	1	1	2
Graduate Student in Law	1		1
Graduate Student in Engineering		2	2
Graduate Student in Management	6		6
Journalist		1	1
IT Professional		1	1

**Table 2. Participants' Current Profession**

### Focus Group Process

During recruitment, participants were sent a description of the study and the broad topic of the meeting. No explicit monetary or non-monetary incentive was offered for participation. A duration of three hours was specified but actual discussions lasted longer. The discussion began with a self-introduction and a narration of how each participant was initiated into Wikipedia. Participants were then asked to comment on what they felt motivated Wikipedians and their own experiences with Wikipedia. To engage them in an active discussion, the facilitator intervened at appropriate stages with questions on individual contribution behavior on Wikipedia.

### ANALYSIS

The discussions were transcribed and coded using a minimal set of initial codes. Codes were added, deleted and combined where necessary. As opposed to standard “pure” grounded theory approach which suggests using open coding (Strauss and Corbin, 1990), we adopted a hybrid method called “template analysis” coding procedure. Template coding recommends coding with a research template. Codes are added, deleted or shifted from one category or hierarchical level to another. While frequency counts were not used, repeated appearance of codes was highlighted to emphasize importance. Coding was done by one of the authors and was further validated by two independent experts who were not part of the research team but were familiar with the constructs field.

Content validity of constructs was derived by applying constructs developed in previous studies in the literature. Internal and external validity was established by using two focus groups for replication and by attempting to identify inconsistencies or contradictory narratives in the data. Although it is difficult to establish reliability given that the data being collected are perceptions and views, we did review consistency of opinions of individual participants through the entire discussion. Based on the analysis, a hierarchical set of factors was created akin to factor analysis and then mapped into three broad constructs as described below.

### DISCUSSION

The analysis revealed multiple factors which influenced contribution behavior. These have been combined under three broad categories - Motivation, Ability and Opportunity (MAO) drawing from the theory of work performance (Blumberg and Pringle, 1982). Motivation is the willingness to exert high levels of effort towards a goal, while ability is an individual's

capacity to perform a particular task. Opportunity can be described as conditions external to the individual which facilitate the behavior. The MAO framework has been applied and studied in varied contexts including behavioral IS research (Hughes, 2006) and knowledge sharing behavior (Tedjamulia, et.al., 2005; Siemsen, et.al., 2008). In the following sections we examine each of the three construct and their influence on contribution behavior in the context of Wikipedia. Snippets from the focus group discussions are shown in italics to highlight different factors.

### Motivation and Contribution Behavior

The absence of monetary or other tangible benefits makes it interesting to analyze sources of motivation in social computing phenomena (Parameswaran and Whinston, 2007). Our focus group data revealed certain motivators including altruism, reputation, reciprocity, power, personal experience, identification, individual expression and neutral perspective. Contributing in Wikipedia allows altruistic tendencies of people to surface (Peddibhotla and Subramani, 2007).

*What about knowledge being accessible to more common people.....For me it is a motivating factor. The more available my knowledge is, I feel I am doing better.*

Contributors feel motivated when they perceive that their contribution makes a visible impact on the overall outcome of the forum. Building a reputation as an active contributor and being appreciated has also been an important factor. Reputation effect is an important factor in being recognized, first as an active editor and then as a potential administrator (Forte and Bruckman, 2005). Authors have viewed the receipt of administrator privileges as akin to receiving a promotion to manager status in an organization (Okoli and Oh, 2007).

*From the contributors side, I also get stars for good contributions. The editors are looking for stars and stuff. It's a sign that I am being appreciated*

*It is very easy to become a moderator on other forums, to have powers etc. because the number of people are so less. At wiki, it is very tough to be elected a moderator. There is much more quality around you. Especially if you put up a contentious articles.*

A feeling of reciprocity may also result in giving back to a common cause from which one has gained in some manner (Chiu et al., 2006). Such a feeling was also seen amongst our participants.

*If you have gotten something, then you feel like giving back something. You have got free information, then you feel like giving back something. That is actually how I started!*

Association with a movement can be a source of motivation (Hertel et al., 2003) - . It arises from similarity of values or ideological convictions (Bagozzi and Dholakia, 2006), and from attachment to a particular topic especially in the case of an open content forum like Wikipedia.

*I was related to a particular <<topic>>.... There wasn't much on google. And on wiki there was a very small article. People don't know about it. Since I am attached to the <<topic>>, I felt I should write more about it. I have read books on it, I should be contributing to it.*

The prospect of learning new things, and exercising their knowledge was a motivator for contributors (Nov, 2007). Moreover, a forum like Wikipedia can also provide a platform for individual expression (Parameswaran and Whinston, 2007). Being disputed or argued against is often seen as a means of showing interest. Contributors view this as a process of developing consensus while providing a context for expressing themselves.

*I go to wikipedia when I need to have an argument over something and clear my own thoughts on something. I have all muddled up thoughts on something. I go into some online forum where I can discuss... And then I can form one consolidated thought process of my own.*

Wikipedia encourages contributors to adopt neutral perspectives while also providing the freedom to present their own viewpoint. A sense of fairness prevails, which encourages contributors to present their understanding of a topic as part of an article.

*This is also what the net is doing. All this obscure information is being made a lot more available. Wikipedia is a big step in that direction.*

*Knowledge so far has been one-sided. There are so many things that we didn't know about an event in history. Wikipedia enables us to get to know the two sides of the story.... facts that are not easily available in domain*

### Ability And Contribution Behavior

An individual's capacity to perform a task by virtue of age, health, knowledge, skill and education impacts his or her work performance (Blumberg and Pringle, 1982). In an open content platform, individuals must also have the "time" to contribute and this incurs opportunity cost (Lerner and Tirole, 2002).

Individuals are more likely to contribute if they feel they are experts in a particular domain (Wasko and Faraj, 2005). This is applicable to Wikipedia as many contributors view it as a forum for which they "work". Moreover, some Wikipedians also believe that they are in a better position to contribute on a particular topic since they have the domain knowledge and/or significant experience.

*(When I started using Wikipedia....) I found that there were several articles, that obviously I was in a very well placed situation to contribute to – which absolutely nobody in the world .. for example the Admission system in <<XYZ Institutes>>. I saw an article on that. I have been involved in the <<test>> for many years now. There are probably 5 people in the world who can contribute as much as I, in terms of what I know about the <<test>>. It seemed to me that there is really an audience which is looking for this information.*

Open content fora like Wikipedia can also benefit from contributors who may not be domain experts but who have the ability to synthesize and organize content contributed by others. It reflects the different roles that contributors can assume including "adders", "synthesizers" or "multiplexers" (Majchrzak, et al., 2006).

*If I am expert on Classical music, I can do content editing for pages on classical music. But since I also know the <<English>> language well, I can also edit pages on mechanical engineering, which may be badly written. It's just that all the data is available but it is just not presented well. Now, you don't find this in print-media editing. You kind of do the same kind of editing. It's very sort of downstream.*

Time is an opportunity cost for contributors (Lerner and Tirole, 2002) and varies by individual. It is therefore seen as an 'ability'. However, several members of the focus groups felt that availability of time was not a major barrier, especially if one has the enthusiasm and interest to contribute.

*....anything you do online, it is mostly because you have enough time left after your offline activities. Whatever you are doing...studies, work, etc.*

*I had to do some net research for some study. I was reading on the topic, so I could make edits without much extra efforts..... I would have otherwise never made a change on <<book>>. Just happened to <<read something>>, may be get on the net for half an hour, look up certain things, make some edits. Time factor is totally variable thing.*

### Opportunity And Contribution Behavior

Opportunity captures the external facilitators and barriers placed by an individual's environment on their performance of the task (Blumberg and Pringle, 1982). For technology-based tasks, characteristics of the technology, the tools and facilities it provides, may in themselves facilitate performance (Venkatesh et al., 2003).

Knowledge of features, ease of use of the technology, conceptual linkages between sections of Wikipedia, and the basic rules of contributing represent hurdles during a Wikipedian's initial stages of contribution. It matters that the features in Wiki-text are simple enough that the incremental effort required to learn to use them is not significantly high. Such effort expectancy (Venkatesh, et.al., 2003) impacts contribution behavior of Wikipedians. Perceptions of lower learning efforts and the potential to choose the appropriate level of sophistication act as enticements to interested contributors.

*The fact that adding text is so simple is a factor which attracts me. I may not have bothered writing it, if it was more complicated*

A more experienced contributor in the focus group noted:

*There are different kinds of editing.... Some people do line edits, some people do copy edits, some content edits, some do structure edits. The level of editing in Wikipedia is analogous to <<different kinds of editing possible in the manual editing of an encyclopedia>>.. You could go in and correct all the wrong uses of articles. Or you can*

*go in and correct factual error.... You could correct for structure, the page is badly formatted.... You need to know about the language, you need to know how to write.*

The immediate availability of output, something that is not possible in the print encyclopedia presents an opportunity to serious contributors.

*I read something and I click on something and I go to something totally differently.... You get these chains of free association. In the process you come across this page about which you knew nothing, to which you can contribute. So you desperately logon and you contribute. It's a lot more immediate than you would get in any other media. I have worked with print encyclopedias as well. They are enormously time consuming. They require huge amounts of overheads and they take years to produce.*

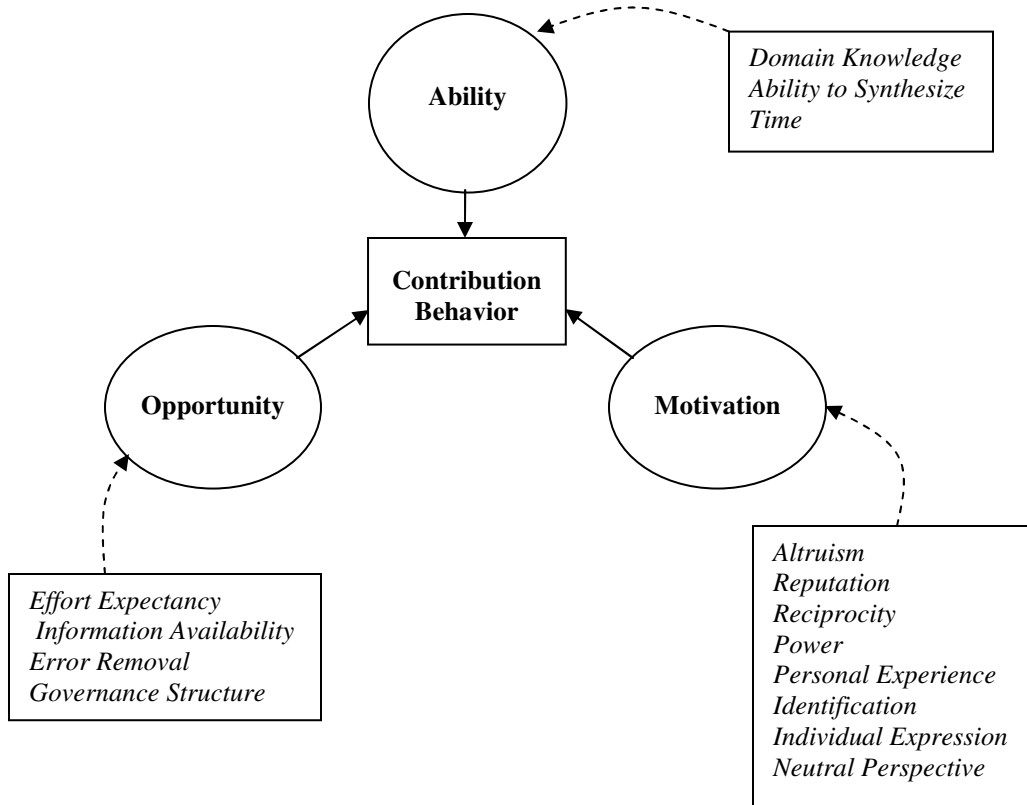
Passion for Wikipedia and its philosophy of open content access proves to be attractive. Such passion also results in the view that information available on Wikipedia should be complete and adequate. This often is in itself an opportunity for further contribution by other Wikipedians.

*When you see something wrong, or you know something is not there, you tend to work on it.*

*Sometimes, I do not find adequate information on Wiki on a particular topic. But I would like Wiki to have that information. So I create a page and let some body else add to it and then I get more information. This is an incentive for me.*

In open content fora, removing factual errors is seen as something that must be done to maintain credibility of the platform and is viewed by Wikipedians, especially administrators, as their central concern (Schroer and Hertel, 2009).

*This is an advantage Wikipedia has over the print media. It's always in process.... You have been warned as a reader about certain things that this is a work in progress, that you should exercise your judgment when you use that. To remove error is the biggest motivation for me.*



**Figure 1: Contribution Behavior in Wikipedia**

Sustainability of open-content models has been an intriguing issue. It is believed that a significant reason for the success of some open source projects is the varying roles and levels of hierarchy in the project. Importance of core contributors has been recognized in the case of Wikipedia where admins and sysops were found to contribute in larger quantities (Kittur et al., 2007).

*The role of admins is very important. Even though there is anarchy, it is still within an organized structure. People know what they have to work towards. If all that was not there, wikipedia would have just been full of chaos. It's almost organized anarchy.*

The apparent absence of hierarchy has resulted in the peer production of knowledge through organized anarchy (Forte and Bruckman, 2008). It is a process of functioning through social negotiations rather than just voting. This in turn created an opportunity for people to get and feel involved.

## CONCLUSIONS

Altruism and reputation have been identified in the literature as being the dominant causes for contribution to open content fora (Prasarnphanich and Wagner 2009). Using focus groups, this paper reveals the presence of factors such as personal experience, individual expression, identification, source of power, effort expectancy, information availability, error removal, governance structure, ability to synthesize and time in leading to contribution behavior. A plausible structure for these factors has been presented in the form of an MAO model drawing from the OB literature. One contribution of this model is to lend a structure to the phenomenon of contribution in an open content forum like Wikipedia. It goes beyond just motivation to emphasize the role of contributor capacity and the opportunity the platform provides. This structure can provide a basis for more quantitative testing and analysis of the open forum contribution phenomenon. A second potential contribution is the prescriptive implication for development of similar platforms. The model suggests that to replicate Wikipedia success in a corporate context necessitates attention to abilities of potential contributors including knowledge and



interest areas, expectations in terms of effort and time, technology complexity, heterogeneity in level of sophistication of use; and governance structure. These factors could be used in building an effective open-content platform.

While our model directly links motivation, ability and opportunity to contribution behavior, it is possible that there are interactions among the three constructs (Blumberg and Pringle, 1982). For example, while we treat effort expectancy as an opportunity, it is also subtly linked to the ability of the contributor. It is also possible that a moderating relationship or constraining factor model may be applicable (Siemsen, et al., 2008). In order to validate such relationships it is necessary to have quantitative data. The framework can be easily applied to other forms of contemporary digital open fora. For instance in the context of a forum like Facebook, the domain knowledge variable would be in reference to one's experiences, memories, ability to communicate thoughts and experiences. On the other hand, in a forum like Twitter, strength of opinions and the ability to package thoughts into short crisp messages tend to attract contributions to that platform. One must remember though that the basic constructs of Motivation-Ability-Opportunity would remain relevant irrespective of the open fora to which it is applied. This would include corporate contexts where the openness of the forum is only limited by the inherent nature of the task allocated to the contributor. In such situations, while ability and motivation would be dominant constructs, the opportunity construct would be somewhat more subdued in its impact on contribution behavior.

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