Do the same motivations drive all contributors to public document repositories?

An empirical study

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November 16, 2005

Abstract:

Public document repositories comprise a major form of online forums on the Internet where people submit documents having content that is potentially useful to others, yet which is not specifically asked for by anyone. Among the various types of other forums such as listservs, bulletin boards, etc., there has been little research on repositories. Prior work has also mostly considered people contributing to such forums as a homogeneous group by treating them as being driven by the same motivations on average. In this study, we present a theoretical model of motivations that drive contributions to public document repositories, including how those motivations vary across two sub-groups of contributors. We test this model in a survey of 185 contributors to a large online repository of product reviews on the Internet. Results of the regression analysis show that the knowledge and utilitarian motives predict contribution to the repository as expected. Contrary to expectations, the ego-enhancement motive and evaluation apprehension are respectively negatively and positively associated with contribution. Our most interesting finding is that the knowledge motive is more strongly associated with contribution for non-regular contributors as compared to those individuals who contribute on a regular basis.
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**Introduction**

A variety of sites with useful content in different subject areas are available on the Internet. One type of online forum with such content is what we term as a *public document repository*. We define a public document repository as a forum that holds knowledge in the form of documents that are organized by subject and contributed by various individuals without specific requests from others. Some of these repositories involve contributors who do not have an affiliation to the same organization – e.g., medical practitioners contributing reviews at [www.cochrane.org](http://www.cochrane.org), individuals contributing knowledge on various topics at [www.wikipedia.org](http://www.wikipedia.org) and researchers offering solutions to problems faced by underserved communities at [www.thinkcycle.org](http://www.thinkcycle.org). There are also repositories built by business organizations to facilitate and promote usage of their own products or services or those of third parties – e.g., reviews of holiday cruises at [www.cruisereviews.com](http://www.cruisereviews.com), product reviews at [www.dooyoo.co.uk](http://www.dooyoo.co.uk) and [www.amazon.com](http://www.amazon.com). The content in such repositories is often considered central to the value delivered by online retailers. Thus, we see repositories being nurtured both by business organizations to improve customer loyalty and also by individuals associated with a particular cause or project.

In the IS literature, researchers have focused on participant behavior in online forums such as an email network (Constant et al. 1996), email lists (Butler 2001, Butler et al. 2002), bulletin-boards, e.g., Usenet newsgroups (Wasko and Faraj 2000; 2005) and open source software forums (Hann et al. 2004; Lakhani and Wolf 2005). Compared to such forums, repositories have some distinguishing characteristics. A key feature that distinguishes repository contributions is that they are usually made without any appeals or requests of help for information. In a repository context, individuals contribute content that relates to problems or issues that they have already dealt with in the past, and which they think might be useful to others. This is unlike what happens in an email network or discussion group where the focus is on problems of current interest to solution seekers, or in an open source project where the focus is on problems of current interest group members or the person who submits code. Public document repositories are also different from archives of content such as, e.g., open source projects where there is a coordinated effort to achieve goals.
Contributors play a critical role in the success of such repositories by submitting content to them. Individuals would arguably be driven by different motives when they decide to submit content as compared to those who do not choose to submit. However, a quick glance at any online repository site would show that even among the contributors there are widely varying levels of contribution activity. This suggests that there might be different motives operating even among contributors. A greater understanding of individual motivations to contribute content is a very important requirement for the successful implementation of document repositories. One facet we focus on in this study is the relative differences in motivations among contributors alone. Therefore, our first research question is: What motivations explain the varying extent to which individuals contribute content to public document repositories?

A study by Kankanhalli et al. (2005) is the only empirical study on electronic knowledge repositories that we are aware of to date that examines motivations of individual contributors. However, the repositories in their study are used in a within-organization context with incentives offered for their use. In addition, they use self-reported measures to assess individual contribution in their study.

While it is important to understand overall contributor motivations, it is also pertinent to understand the salience of those motivations among different types of contributors. In order to design repositories with features that serve those motivations well, it would be appropriate to learn which groups of individuals are driven by which motivations. Earlier work on online forums mostly tends to consider participants as homogeneous and as being driven by the same motivations (Butler et al. 2002 is an exception). In some types of forums, certain individuals are assigned or take upon themselves certain formal roles such as “moderator”, “group owner”, etc (e.g., in the email discussion lists studied in Butler et al. 2002). However, there are other sub-groups of participants who are not distinguished by formal roles but by factors such as pattern of contribution, nature of contributions, etc. Even a casual observation of online forum interactions would reveal a few individuals who make regular contributions versus the sporadic posts by others, and individuals who keep contributing over a long period of time versus others who are active only for the duration of a few posts. It is likely that individuals with such different patterns of contribution behavior are driven by different motives. Our current study therefore aims to
Motivations to contribute to public document repositories address a second research question: *What motivations have different salience across different sub-groups of contributors in explaining their varied contributions to a public document repository?*

This paper reports our research within a specific but widespread type of public document repositories, viz., product review sites. In the rest of the paper, we discuss the theoretical framework guiding our study and the hypotheses derived from it. We then describe our methodology, including the research site, data collection and analysis. Finally, we present our results, discuss their implications, and outline the limitations of the study and possible future research.

**Theoretical perspective**

Contributing to a document repository can be viewed as benefiting others whether or not there are any benefits for the contributing individual. A rich stream of research in social psychology has studied such a class of activities called prosocial behavior. Prosocial behavior covers the broad range of actions intended to benefit one or more people other than oneself – behaviors such as helping, comforting, sharing, and cooperation (Batson, 1998). Much of the research on prosocial behavior has studied situations in which an individual is unexpectedly called upon to help for a brief amount of time, often called spontaneous helping. The literature has also examined planned helping in the context of kinship relationships, and other situations such as donating to one’s alma mater, donating blood and, in particular, volunteering.

Butler (2004) suggests that it would be fruitful to examine the behavior of online communities by considering them as voluntary associations. From this perspective, individuals contributing to public document repositories are volunteers engaged in helping others in need of information. Like the millions of people who donate their time and effort to activities such as tutoring the illiterate, caring for the elderly, etc., contributing to document repositories can be viewed as planned helping. Individuals actively seek out a particular repository to contribute to and make a commitment to contribute on an ongoing basis. There are people with varied areas of interest and expertise and repositories in need of contributors on different subjects. The Internet allows for such a matching of interests between potential contributors and various repositories maintaining content on different subjects.
Clary et al. (1998) outline various motivations that might be driving individuals to do volunteering activities. We draw upon their work to propose a theoretical model to explain why individuals contribute to public knowledge repositories. Most of the motives that have been discussed in prior literature on motivations to participate in online communities can be identified as part of this framework. A similar, though not as comprehensive, view of motivations is provided by Butler et al. (2002) who categorize them as “social” (social adjustive), “informational” (utilitarian), “visibility” (ego-enhancement) and “altruistic” (value expression). What is missing in prior studies is the knowledge function (described below) that can be served by doing an activity.

**Functionalist perspective on motivations**

In the spirit of viewing contribution activity at a repository as being similar to volunteering activity, we follow Clary et al (1998) in apply the functionalist perspective to identify motivations that drive contribution behavior. In the functionalist tradition in psychology, people are viewed as performing a certain activity because it serves one or more functions (Snyder and Cantor, 1998; Clary et al, 1998): a) Knowledge function: By engaging in particular task, an individual might have a new learning experience, and be able to exercise one’s knowledge, skills and other abilities; b) Value-expressive function: An activity may allow an individual to express his / her personal values and to his / her concept of self (Katz, 1960, p. 170); c) Social adjustive function: Doing a certain thing may lead an individual to better fit in with his / her peer group; d) Utilitarian function: A certain behavior may result in rewards from the person’s external environment (Katz 1960); e) Ego-enhancement function: Doing a certain task may provide a way to support one’s ego; and f) Ego-defensive function: Engaging in a particular activity may protect against negative feelings about oneself.

The functionalist framework directly addresses the motivational concern of our first research question. The central task is to identify the various drivers that make individuals contribute to a document repository of their own accord. By providing an overarching framework, it allows one to focus on the different functions that repository contribution might serve. We now discuss the
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various functions that contribution activity potentially serves for individuals by applying the above framework:

a. Knowledge function: By writing content for a repository, individuals might have a new learning experience, and be able to exercise their knowledge, skills and other abilities. They can enhance their knowledge by reflecting on what they have experienced (Schon, 1983). This involves using higher level concepts or metaphors to organize what one has experienced (Nonaka 1994). Given such potential benefits, individuals might contribute to a repository to enhance their own learning. Hence we hypothesize that,

   \( H1a: \text{The knowledge motive of an individual will be positively associated with the level of contribution to a public document repository.} \)

b. Value-expressive function: Contributing to a repository can be a way of expressing one’s values about altruistic concern for others (Katz, 1960, p. 170). Altruism involves empathizing with and helping others in need without expecting anything in return. Earlier studies on online communities such as Usenet discussion groups (Wasko and Faraj 2000) indicate that a sense of altruism drives individuals to participate. Similarly, we expect that

   \( H1b: \text{The altruistic motive of an individual will be positively associated with the level of contribution to a public document repository.} \)

c. Social adjustive function: Engaging in contribution activity may lead individuals to better fit in with their peer group. Contributing to a repository, for example, can offer a way for individuals to socialize with other contributors. Contributing due to norms, in particular that of reciprocity, is another way of fitting into one’s peer group. Prior work in other online forums has found evidence that development of relational capital is associated with contribution activity (Wasko and Faraj 2005). Hence we propose that,

   \( H1c: \text{The social-adjustive motive of an individual will be positively associated with the level of contribution to a public document repository.} \)
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d. Utilitarian function: By contributing to a repository, individuals may obtain rewards from their external environment (Katz 1960). The sources of such rewards may lie outside the context of the repository, e.g., potential employers who may value the contribution experience. For example in online contexts such as open source software forums, individuals contribute for economic / extrinsic-based motivation linked to improved salaries on their jobs (Hann et al. 2004, Lakhani and Wolf 2005). Therefore, we hypothesize that

\[ H1d: \text{The utilitarian motive of an individual will be positively associated with the level of contribution to a public document repository.} \]

e. Ego-enhancement function: Contributing content to a repository may provide a way to support one’s ego. For example, an individual contributing to a repository might gain some reputation as an expert in a particular domain. Research among participants at discussion groups, for example, has identified reputational benefits as a motivation for contribution (Wasko and Faraj 2005). Thus, we propose that

\[ H1e: \text{The ego-enhancement motive of an individual will be positively associated with the level of contribution to a public document repository.} \]

f. Ego-defensive function: Doing an activity may serve the ego-defensive function by allowing an individual to protect oneself against negative feelings about oneself. In the context of document repositories, this may involve the activity of making fewer contributions due to evaluation apprehension. Evaluation apprehension reflects a person’s concern that he / she may be evaluated negatively (Irmer et al., 2002). Potential contributors to a repository might feel anxious that their contribution may not be considered useful by others, or that it may be viewed negatively. It is likely that this can adversely affect the level of contribution to repositories, since contributions create a permanent written record of individuals’ views (Irmer et al., 2002). This leads to the following hypothesis:

\[ H1f: \text{The ego-defensive motive of an individual will be positively associated with the level of contribution to a public document repository.} \]
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\[ H1f: \text{The ego-defensive motive of an individual will be negatively associated with the level of contribution to a public document repository.} \]

Control factors

We include three control variables that might also potentially account for different levels of contributions among contributors to a repository. They are: \textit{competence, time availability and composition skill}. We do not propose specific hypotheses for them since we do not develop theory about the nature of their effects on contribution behavior. We include them in the model to assess the level of support for our hypotheses over and above the effects attributable to the control variables.

Competence: Prior research indicates that competence is related to helping (e.g., Clary and Orenstein, 1991). The mere perception of competence in an individual increases the likelihood of helping.

Time availability: Writing reviews is time consuming. In a study of employees at a consulting firm, Cabrera and Cabrera (2002) found that a perceived lack of time was one reason for people not sharing knowledge. Similarly, Weiss (1999) identified time limitations as one of the reasons why people do not contribute to knowledge repositories.

Composition skill: The level of composition skills needed to make contributions is an important factor. Writing a contribution requires skill in composing in addition to the expertise in the subject area.

We next turn to a discussion of motivations that might differ across different sub-groups of contributors to a repository.

Different types of contributors and different salience of motivations

Self vs. other-oriented motives

Individuals driven by a certain motive will derive satisfaction from doing an activity if that activity provides the benefits sought by the motive. For example, people driven by the altruistic
motive will be satisfied with an activity if they see that the recipients of their help have benefited. In their study on volunteers, Clary et al. (1998) found that people were more likely to join a volunteering group if the task was described in terms that matched their motives. In the IS literature, Bhattacherjee (2001) found that user satisfaction with usage of a technology is influenced by a confirmation of their expectation from prior use.

Individuals have a variety of motives – other-oriented or self-oriented - that are driving their contributions to a document repository. We define a self-oriented motive as one that motivates an individual to do an activity without requiring the presence of other people. On the other hand, an “other-oriented” motive is one that requires the presence of one or more other individuals for the focal person to be driven by it. For example, we suggest that the altruistic motive is other-oriented since it is directed toward helping others. Those driven by the other-oriented altruistic motive would want to help others who may need their knowledge. However, contributors submit content without anyone asking for it. In some repositories, readers may give feedback on the usefulness of the contribution. Even here, the chance that a certain person’s contribution receives positive feedback is uncertain. Thus, the contributor is not sure if the content has helped anyone. We can thus expect that this person’s satisfaction with the experience of contributing content would vary across time. As a result, his or her contribution level is also likely to vary depending on the level of positive feedback received for past contributions. Similarly, individuals driven by the social adjustive, utilitarian, ego-enhancement and ego-defensive motives depend on the activities of others to achieve satisfaction from a fulfillment of the respective functions they serve. Individuals driven by these motives will have to depend on the vagaries of the reactions of other contributors and readers. So, even their contribution level is likely to vary across time.

On the other hand, for an individual driven by the knowledge motive, contributing provides an opportunity to document and organize one’s thoughts on a subject. We propose that the knowledge motive is self-oriented since it does not depend for its fulfillment on the actions of other individuals. Once the individual finds it a satisfying experience, he or she is likely to find it rewarding to continue the activity of contributing content. The individual’s satisfaction does not depend on the action or inaction of other people. If the individual sees that learning has become stagnant in a certain topic within the overall domain of the repository, he or she can begin
contributing on a different topic. Therefore, such a person is likely to have lesser variation in the level of contribution across time. So we propose the following hypothesis:

**H2**: The *knowledge motive* will be more positively associated with level of contribution in the case of regular contributors to a repository as compared to irregular contributors.

**Self vs. other-oriented benefits**

As discussed earlier, an individual who begins making contributions to a repository potentially has expectations about various types of motives that might be satisfied by contributing to a repository. However, there is another aspect to an individual’s performance of an activity. The *benefits* that arise out of an activity could be either *other-oriented* or *self-oriented* with respect to the individual doing the activity. An other-oriented benefit is one wherein the benefit goes to one or more individuals other than the one doing the activity. A self-oriented benefit is one that accrues to the individual doing the activity.

By contributing content to a repository, an individual could express an altruistic value of helping other individuals who might read it. In this, the individual expects no benefit to oneself. The altruistic motive is thus tied to other-oriented benefits. On the other hand, motives such as utilitarian, social adjustive, ego-enhancement, ego-defensive or the knowledge motive lead to benefits to the individual doing the activity. In contrast to the altruistic motive, the primary aim of the individual driven by these latter motives is to benefit oneself.

According to social learning theory (Bandura 1977), individuals driven by motives with self-oriented benefits would appreciate these benefits only after engaging in the contributing activity for some time. They will watch other contributors, imitate them and experience benefits from one’s contribution activity over time. This has also been noted in anecdotal evidence when one of the product reviewers whom we interviewed mentioned that he had started out with altruistic intentions but now writes reviews for other motivations such as utilitarian benefits. As the importance of non-altruistic motives increases, one can expect that the relative importance of the altruistic motive would decrease as the individual continues to contribute to the repository. Thus, we hypothesize that
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H3: The altruistic motive will be more positively associated with level of contribution in the case of individuals who have recently begun to contribute as compared to those who have been contributing for a long time.

Methodology

Research site

To empirically test the above hypotheses, we surveyed contributors to the large public repository of product reviews at Amazon.com. About 1.3 million individuals have submitted reviews of various products such as books, music, movies, toys, electronic goods, etc. Readers of reviews can vote to indicate whether a particular review was helpful or not to them. Amazon.com recognizes reviewers by a ranking system based on the number and helpfulness of reviews written by each individual. Amazon.com does not provide any monetary compensation to individuals contributing reviews.

Data collection

In order to ensure validity and reliability of the survey items, we followed the procedure of Moore and Benbasat (1991) and conducted three stages of a card-sorting exercise. Each card had one item on it and we asked judges to sort them into categories to reflect items that were similar to each other. In each round, we used four judges three of whom were graduate students in information systems and other disciplines, and one was an administrative staff member. Each round had different judges. In the first round, we asked judges to define categories to group the various items. In the second and third rounds, we provided them definitions of each construct and asked them to place the items in either a predefined construct or an “other” category. We refined the survey items after each round based on the feedback we obtained.

The Amazon.com website has a profile page for each reviewer providing details such as the number of reviews contributed, number of helpful votes, the reviewer’s name, and the reviewer’s email address (if he or she discloses one). We collected these details for all the reviewers listed there resulting in a list of 1,354,388 reviewers. The website also organizes the reviews submitted
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by each reviewer along with submission dates under a set of related pages for each reviewer. We obtained details of review contribution dates only for the reviewers who responded to our survey.

Since the research reported in this paper is focused on those individuals who contribute reviews, we defined our population to include only those who had submitted ten or more reviews at the time of our data collection. Our target population included 47,428 reviewers who met this criterion. Of these, 13,601 reviewers had disclosed their email addresses on their profile pages. They included eight reviewers who were employees of Amazon.com, whose emails we dropped from our list.

We also conducted pilot-tests of the survey instrument by administering it on a website and inviting eleven graduate students and sixty-five Amazon.com reviewers (from our target population) to take the survey. We further refined the instrument based on the feedback and comments.

For the actual survey, we set aside those reviewers whom we had invited to participate in the pilot test and also reviewers who had submitted reviews at Barnes and Noble.com, another prominent site that hosts product reviews. This resulted in a list of 12,965 reviewers. We sent out 3500 email invitations to reviewers picked at random from this set. Each survey invitation contained a link that would take a respondent to the survey hosted on a website. To avoid spurious and multiple responses, each invitation included a unique pass code that was linked to each reviewer’s email address. We promised the reviewers that their responses would be kept confidential and only be accessible to the researchers. As an incentive to participate, we offered reviewers a chance to win one of twenty $25 gift certificates if they completed the survey.

Out of the 3500 emails we had sent to respondents with invitations to take the survey, 753 were returned as undeliverable. Of the remaining 2747 potential respondents with valid emails, 216 responded for a response rate of about 8%. We then deleted 31 responses since they contained missing data, thus yielding a set of 185 responses that we analyzed. Our response rate is consistent with the lower response rates that researchers have obtained for web-based or email
surveys as compared to paper-based mail surveys (e.g., Cole 2005; Couper 2000; Witmer et al. 1999).

In order to check for any response bias, we compared the respondents to our survey with the reviewers in our target population on the following parameters – number of reviews, number of helpful votes and reviewer rank. The following table shows the comparison.

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Reviewers with Email addresses</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reviews</td>
<td>Votes</td>
<td>Rank</td>
</tr>
<tr>
<td>Mean</td>
<td>34.84</td>
<td>156.23</td>
<td>232839.36</td>
</tr>
<tr>
<td>Median</td>
<td>17</td>
<td>57</td>
<td>27339</td>
</tr>
<tr>
<td>Max</td>
<td>8956</td>
<td>48569</td>
<td>888888</td>
</tr>
<tr>
<td>Min</td>
<td>10</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

(Table 1: Comparison of population, reviewers with email addresses and survey respondents)

Respondents to our survey were thus fairly representative of our target population though on average they tended to among those with a higher rank, number of reviews and number of helpful votes.

*Measures*

We adapted scales from Clary et al. (1998) for the knowledge, altruistic, utilitarian, social-adjustive, and ego-enhancement motives. We drew upon the scale used by Irmer et al. (2002) for the evaluation apprehension construct. Finally, we developed items for the competency, time availability and composition skill constructs. Each construct had a minimum of three items and maximum of five items, leading to a 34-item survey instrument for the nine constructs. All items for the independent variables were measured on a 1-7 likert-type scale (appendix 1 lists the items for each construct).

Unlike the independent variables, we measured the dependent and moderating variables using data that we obtained from reviewer pages on the Amazon.com website. We measured a reviewer’s level of contribution by taking the number of reviews submitted by him or her from the first review till the date on which we collected data and dividing it by the number of months over which those reviews were submitted. We counted the number of months over which
reviews were submitted as the *tenure of contribution*. We then divided the respondents into two groups (long and short tenure) by considering those whose tenure of contribution was in the top and bottom third of values. We operationalized *regularity of contribution* by calculating the variance of monthly contributions for the months over which an individual had been submitting reviews. We obtained the most regular and most irregular reviewers by considering the bottom and top third of values respectively.

*Analysis*

During the card-sorting exercise to refine the instrument, we calculated Cohen’s kappa and item-placement ratios (Moore and Benbasat 1991) to assess the reliability and validity of the items.

For the survey data, we assessed the reliability of the items measuring the various constructs by calculating the Cronbach alpha scores. We also conducted a factor analysis with principal-components analysis and varimax rotation to assess the validity of the constructs.

We used a log transformation to correct for the skewness of the dependent variable, *level of contribution*.

We used multiple regression analysis to test the hypotheses. First, we entered the nine constructs in hypotheses H1a to H1f and the three control variables in the regression to test for the significance of the coefficients. In two additional regression analyses, membership of regular vs. irregular contributors (for hypothesis H2) and long vs. short tenure contributors (for hypothesis H3) were represented as dummy variables. We also added a multiplicative term in each equation by multiplying the dummy variable value and value of the construct of interest (knowledge motive for H2 and altruistic motive for H3).

*Results*

The following tables list the agreement ratios and item-placement ratios we obtained as a result of our refinement process of the survey items using the card-sorting exercise.
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<table>
<thead>
<tr>
<th>Agreement measure</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw agreement</td>
<td>0.73</td>
<td>0.89</td>
<td>0.85</td>
</tr>
<tr>
<td>Cohen’s Kappa</td>
<td>0.69</td>
<td>0.88</td>
<td>0.83</td>
</tr>
</tbody>
</table>

(Table2: Agreement ratios for three-rounds of the card-sorting exercise, averaged across six pairs among the four judges)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge motive</td>
<td>90</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Altruistic motive</td>
<td>100</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Social adjustive motive</td>
<td>62.50</td>
<td>68.75</td>
<td>93.75</td>
</tr>
<tr>
<td>Utilitarian</td>
<td>91.67</td>
<td>91.67</td>
<td>91.67</td>
</tr>
<tr>
<td>Ego-enhancement</td>
<td>87.50</td>
<td>93.75</td>
<td>93.75</td>
</tr>
<tr>
<td>Evaluation apprehension</td>
<td>66.67</td>
<td>100</td>
<td>83.33</td>
</tr>
<tr>
<td>Competence</td>
<td>41.67</td>
<td>91.67</td>
<td>83.33</td>
</tr>
<tr>
<td>Time availability</td>
<td>91.67</td>
<td>91.67</td>
<td>66.67</td>
</tr>
<tr>
<td>Composition skill</td>
<td>75.00</td>
<td>100</td>
<td>91.67</td>
</tr>
</tbody>
</table>

(Table 3: Item placement ratios in percentages)

These tables show adequate improvement in measurement properties for the constructs as a result of the card-sorting exercise.

A factor analysis of the survey items with principal components analysis (varimax rotation) showed that all items (except one) loaded adequately on the intended constructs (see table 4 below). One item (AM5) for the altruistic motive construct had loadings on multiple constructs and was dropped from further analysis.
<table>
<thead>
<tr>
<th>Item</th>
<th>Knowledge motive</th>
<th>Altruistic motive</th>
<th>Social motive</th>
<th>Utilitarian motive</th>
<th>Ego-motive</th>
<th>Evaluation motive</th>
<th>Apprehension motive</th>
<th>Time availability</th>
<th>Competence</th>
<th>Composition motive</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM1</td>
<td>0.71</td>
<td>0.04</td>
<td>0.19</td>
<td>0.29</td>
<td>0.14</td>
<td>-0.06</td>
<td>0.03</td>
<td>-0.08</td>
<td>-0.14</td>
<td>KM2</td>
</tr>
<tr>
<td>KM2</td>
<td>0.72</td>
<td>0.03</td>
<td>0.06</td>
<td>0.15</td>
<td>0.18</td>
<td>0.00</td>
<td>0.32</td>
<td>0.21</td>
<td>0.00</td>
<td>KM3</td>
</tr>
<tr>
<td>KM3</td>
<td>0.84</td>
<td>0.04</td>
<td>0.19</td>
<td>0.10</td>
<td>0.21</td>
<td>0.04</td>
<td>0.05</td>
<td>0.12</td>
<td>0.12</td>
<td>KM4</td>
</tr>
<tr>
<td>KM4</td>
<td>0.83</td>
<td>0.08</td>
<td>0.22</td>
<td>0.23</td>
<td>0.19</td>
<td>0.03</td>
<td>-0.05</td>
<td>0.06</td>
<td>-0.02</td>
<td>KM5</td>
</tr>
<tr>
<td>KM5</td>
<td>0.78</td>
<td>0.12</td>
<td>0.06</td>
<td>0.22</td>
<td>0.19</td>
<td>0.04</td>
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<td>AM1</td>
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(Table 4: Principal component analysis with varimax rotation)
Motivations to contribute to public document repositories

The Cronbach alpha values for each of the nine constructs indicate adequate reliability of measurement. The following two tables 5 and 6 show the descriptive statistics and correlations.

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*(Table 5: Descriptive statistics, and collinearity and reliability indicators) (*: a log-transformation was applied on this measure of level of contribution, in the regression analysis)*
Motivations to contribute to public document repositories

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(Table 6: Correlation of constructs)

The results of the regression analysis are shown in table 7. The overall adjusted R² value of the regression is 0.05 (F=2.14, p < 0.05). We see that coefficient for the utilitarian motive is weakly significant at p < 0.1 (partially supporting hypothesis H1d) and the coefficient for the knowledge motive is marginally significant (p=0.10), partially supporting hypothesis H1a. Both show a positive association as expected. The higher the utilitarian motive, the greater is the proportional change (or elasticity) in reviews per month since we took the log of reviews per month as the dependent variable. A similar interpretation can be applied to the association of the knowledge motive. These results provide support for our earlier argument that a self-oriented motive such as the knowledge motive will be an important determinant of the level of contribution in a repository context, which by its very nature has fewer occasions for interactions with other individuals. The utilitarian motive also seems a crucial factor for a contributor since such benefits can accrue from sources (e.g., potential employers, sponsor of the repository, etc.) apart from other participants at the repository.
Motivations to contribute to public document repositories

Table 7: Multiple regression analysis results

Contrary to expectations, the ego-enhancement motive is significant (p<0.01) in equation 1 but with a negative association with the level of contribution. Research on other forums, e.g., in an online discussion group (Wasko and Faraj 2005), has shown that individuals contribute when they see it as enhancing their reputation. In a within-organization repository context (Kankanhalli et al. 2005), however, image has been found to have a negative though non-significant effect on level of contribution. These conflicting results have probably to do with the nature of the content being contributed and the feedback mechanism that is present at the site. At
the online discussion group that Wasko and Faraj (2005) studied, the messages dealt with legal matters written by individuals who possessed specific expertise, the participants belonged to the same profession, they probably knew many other participants even outside the online context and, most importantly, received repeated attention from the same set of other lawyers for their postings in a given legal subject. This may explain the significant association of reputation benefits with level of contribution in that study. In the repository context that Kankanhalli et al. (2005) studied, on the other hand, the content mainly involved best practices, case studies, etc. that are generated as part of the job. There are probably not many responses from readers of such content and therefore little positive excitement about who the contributors are. Hence the non-significant effect of image as a driver of level of contribution. Similarly at the Amazon.com repository of product reviews, such paucity of direct responses from readers of reviews might lead to a non-positive association between the ego-enhancement motive and level of contribution. Further, readers of reviews can give negative votes to reviews they do not consider helpful. So, individuals who are driven by the ego-enhancement motive are likely to be easily discouraged when they receive negative votes and therefore hold back on submitting their reviews. This might explain the negative association between the ego-enhancement motive and level of contribution.

Again unexpectedly, evaluation apprehension is weakly significant (p<0.1) but with a positive association with the level of contribution. This counters the finding of Irmer et al. (2002) where there is a negative association between evaluation apprehension and intention to share knowledge via a database. A possible explanation is that while the prior study measured intention to contribute, the current study looks at actual level of contribution. As individuals contribute more content, there is a higher chance for readers to comment negatively about the contributions and therefore increase evaluation apprehension.

The other variables in the regression do not have a significant effect on the level of contribution in equation 1. Thus we do not find support for hypotheses H1b, H1c, and also for the control variables. The reviewers share relatively similar levels of the altruistic and social adjustive motives with respect to their contribution levels. They also have relatively similar self-rated expertise on subjects on which they contribute, facility with composing their contributions, and availability of time to work on their contributions. It is interesting to note that while individual
self-rated expertise had no effect on level of contribution, we had a marginally significant positive association of the knowledge motive with level of contribution. This indicates that even with adequate knowledge of the subject matter, it is those individuals with the urge to build on or organize their knowledge who contribute more.

So far, we have looked at motives that differentiate individuals with respect to their levels of contribution in the entire group of contributors as a whole. Next we examine two factors that might distinguish individuals with different relative importance of motives in determining their level of contributions: regularity and tenure of contribution.

In equation 2, we divided the respondents into two groups having values in the top-third and bottom third of values for the variance of monthly contribution, yielding two groups of 62 respondents each. Those with values in the bottom third were assigned a dummy variable with value 1 and those in the top third were assigned a dummy variable with value 0 and pooled together into a group of 124 respondents. We then created a interaction term by multiplying the dummy variable value with the value of the knowledge motive score. With dummy variable and the multiplicative term along with the earlier variables, we find that the coefficient for the multiplicative term is significant at $p < 0.1$. However, the effect is negative, implying that the knowledge motive is more strongly associated with level of contribution for irregular contributors as compared to regular contributors. Those who are driven by the knowledge motive may tend to be relatively irregular since their satisfaction from the contribution experience depends solely on themselves. They need to push themselves to submit reviews at Amazon.com. They are unlike those driven by other-oriented (altruistic, utilitarian, social adjustive, or ego-enhancement) motives who are prodded by, for example, helpful votes or positive emails from readers, extrinsic benefits, etc. Such external prods seem more likely to occur more commonly across time as compared to an individual’s own inner strivings to document, organize and improve on one’s own knowledge.

We next test hypothesis H3 in regression equation 3 using a similar analysis as for equation 2. Here, we have two sub-groups of 63 respondents each for short and long tenure based on the bottom and top-third of the tenure values. However, we do not find any significant differences in the association of the altruistic motive with level of contribution for long versus short-tenure
Motivations to contribute to public document repositories

Contributors as the multiplicative term is not significant. Our finding signifies that the altruistic motive is a relatively stable determinant driving individuals to contribute to the repository. Just as it encourages their efforts to contribute when they first start out, it continues to sustain their energies even after they have submitted contributions over a long period of time.

**Discussion, limitations and future research**

Our findings need to be interpreted in the light of certain limitations of the study. One limitation is the use of a single public repository of product reviews for collecting data. Research at multiple sites of product reviews would enable our insights to be more generalized. The results of the study must also be interpreted within the context of product review repositories. Further studies need to be conducted on sites where individuals contributed other kinds of content.

We were also restricted to sampling from among only those reviewers who had provided their email addresses at the site. However, as described earlier, the reviewers who had provided email addresses and the respondents to our survey were fairly typical of our population.

Another limitation is that we treat product reviews to be homogeneous on aspects such as depth and breadth of knowledge that is embedded in each, whether they were positive or negative, brief or extensive, etc. Further studies could distinguish different types and the levels of contributions of each type and the motivations that drive them.

Despite these limitations, our study makes a number of contributions. First, it identifies motives that play an important role with respect to contribution behavior in public document repositories, an online context that has received little attention to date and which is a major forum of online knowledge exchange.

Second, our paper makes two theoretical contributions to the literature. We propose and apply a framework for studying individual motivations called the functionalist perspective. While prior studies in online forums have identified a variety of motivations, we believe the functionalist perspective offers a tool to identify motives that are applicable to different contexts in a systematic fashion. We also classify motives in terms of the locus of the driving force – others vs. oneself and thus classify them into self-oriented and other-oriented motives. We also
highlight two different targets of the benefits of intended behavior – others vs. oneself and classify motives into those that provide self-oriented and other-oriented benefits.

Third, our empirical findings make some interesting contributions to the literature on online communities. We show a self-oriented motive that we term the knowledge motive as being positively associated with the level of contribution that an individual makes to a repository. As noted earlier, this motive is especially salient in a repository context in which there is much lesser scope for interaction as compared to other online forums in prior research. While it has been masked under the overall category of intrinsic motivation in the literature, our paper specifies its nature explicitly. Consistent with prior research that has examined economic incentives, we also find the utilitarian motive to be another major reason why individuals tend to make increased contributions to a repository.

Interestingly, the social adjustive and altruistic motives were not found to be associated with varied levels of contribution to the repository. Prior studies on online communities (e.g., Wasko and Faraj 2000; Wasko and Faraj 2005; Constant et al. 1996; Lakhani and Wolf 2005) have identified motives associated with a sense of community or affiliation, and also altruism as being major reasons why individuals participate. However, such studies have mainly examined the existence of such motives. While these motives may distinguish participants from non-participants, our study shows that they do not distinguish among contributors at high vs. low levels. They are more or less equally shared among contributors. In this light, our finding that the knowledge motive and utilitarian motive are able distinguish among contributors appears more intriguing.

Our results also indicated that the ego-enhancement motive had negative association with level of contribution. This is in the opposite direction to what we had hypothesized in our study and what we find in some prior work (e.g., Wasko and Faraj 2005). However, this is consistent with the finding of Kankanhalli et al. (2005), who also studied repositories (in an organizational context). As discussed earlier, this is likely because of the nature of the repository context wherein there is little scope for reputation building as compared to other more-interactive forums. Going beyond reputation, the ego-enhancement motive also involves a feeling of having
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affected others positively and feeling needed. Such feelings appear to be less likely in a repository context where there are fewer person-to-person interactions as compared to, say, an online discussion group (e.g., as studied in Wasko and Faraj 2005).

The current study is also among the earliest to study a motivational factor that might discourage an individual from contributing content to an online forum. The finding that the ego-defensive motive is stronger for those with higher contribution levels suggests that there is a potential threat to contribution activity among prolific contributors. While they continue to be driven to contribute content, it is possible for such activity to diminish in future in the presence of adverse criticism or comments.

In addition to the impact of motivations for the overall group of individuals, our paper also looked at variation in motivation across subgroups. As noted earlier, much of prior research has treated participants at online forums as a homogeneous group. In this study, we highlighted the varied importance of the knowledge motive among regular versus irregular contributors with respect to its association with the level of contribution. Our findings failed to observe any significant difference in altruistic motive among recent vs. long-time contributors. The result indicates that this motive is consistently present across time.

Fourthly, our study also has implications for administrators of online repositories. In general, the varied functionalist motives require different facilities that will appeal to different individuals. For example, some individuals driven by the social adjustive motive will need to be induced to contribute content with features in the forum that allow people to socialize and build friendship networks. In particular, since we found the knowledge and utilitarian motives to be associated with different contribution levels, administrators could probably focus on satisfying these two motives. At the same time, individuals driven by the knowledge motive need even more focus since they tend to be irregular contributors.

This paper has focused only on significant contributors to a single public document repository. Further work might study contributors across different kinds of repository contexts. This will not only test the findings of the current study, but also identify differences in motivations depending
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on the unique features that are tied to context. For example, a product-review website other than Amazon.com may not provide contributors a way to project their individual identity the way Amazon.com does. This may lead to different motivations being salient as compared to Amazon.com.

The vast majority of contributors make only a few contributions, or just a single contribution. A fruitful avenue for future research would be to study this group of people in order to understand motivations behind what hinders them from contributing and what stops them after their initial efforts.
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Appendix 1
Survey items

To what extent do you agree with the following statements?
(On a scale of 1 to 7 with 1: Strongly disagree; 4: Neither agree nor disagree; 7: Strongly agree)

Knowledge motive

1. By writing reviews, I learn more about the subjects on which I write (KM1).
2. Writing reviews lets me sharpen and clarify my thoughts about the subjects on which I write (KM2).
3. By writing reviews, I gain new perspectives on topics on which I write (KM3).
4. By writing reviews, I develop my knowledge of the topics on which I write (KM4).
5. By writing reviews, I learn how to organize my knowledge about the areas in which I write (KM5).

Altruism

6. Writing reviews allows me to assist buyers of books, CDs, etc. (AM1)
7. I empathize with people who are looking for information / guidance on purchasing a book, CD etc. (AM2)
8. I am genuinely concerned about people who may need advice to purchase a book, CD, etc. (AM3)
9. I feel it is important to help others. (AM4)
10. I am concerned about those who do not know as much as I do about the books, CDs etc. that I review. (AM5)

Social adjustment

11. Writing reviews is an important activity to the people I know best (SAM1).
12. People I know share an interest in writing product reviews at Amazon (SAM2).
13. Others with whom I am close place a high value on writing reviews (SAM3).

Utilitarian

14. Writing reviews is useful for my current or future career (UM1).
15. Writing reviews will help me to succeed in my chosen profession (UM2).
16. My review writing experience will look good on my resume (UM3).
17. Writing reviews can help me to get my foot in the door at a place where I would like to work (UM4).
18. Writing reviews allows me to develop new contacts for my business or career (UM5).

Ego-enhancement

19. Writing reviews makes me feel better about myself (EEM1).
20. Writing reviews makes me feel important (EEM2).
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21. Writing reviews increases my self-esteem (EEM3).
22. Writing reviews makes me feel needed (EEM4).

Evaluation apprehension (Ego-defensive motive)

23. I worry that my reviews may be negatively evaluated (EA1).
24. I feel uneasy about writing reviews because they may be rated or analyzed (EA2).
25. I am bothered by having others see my reviews and comment on them (EA3).

Control factors:

Competence

26. I possess sufficient knowledge on the topics on which I write reviews (CMP1).
27. I have detailed information about the products for which I write reviews (CMP2).
28. I consider myself an expert on the topics on which I write reviews (CMP3).

Time availability

29. My reviewing activity fits in well with my daily schedule (TA1).
30. Review writing fits in my everyday routine easily (TA2).
31. I generally find time to write reviews (TA3).

Composition skill

32. It is easy for me to compose the text in the reviews that I write (CS1).
33. I have good skills in formulating the content of the reviews that I write (CS2).
34. I do not find any difficulty in putting down in words what I wish to write in my reviews (CS3).