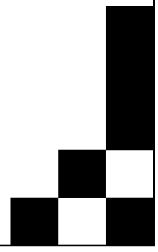
Motivations and Contribution Behaviour in Social Bookmarking Systems: An Empirical Investigation

RAQUEL BENBUNAN-FICH AND MARIOS KOUFARIS



A b s t r a c t

Social bookmarking sites allow users to store and tag bookmarks in order to access them later. Also, tagged bookmarks designated as public by their contributors are available to all users. In this paper, we explore the relationships between user motivations and contribution characteristics to understand why users contribute to the public repository of tagged bookmarks when it is not mandatory to do so. We find that users' self-oriented motives are associated with the quantity and quality of contributions for self, but other-oriented motives are associated only with the quality of contributions for others. In other words, users contribute tagged resources for other users only if they believe they will be useful for those users. Moreover, higher quality contributions for others do not diminish the quantity of such contributions. We also find that there is a spill-over effect from quality of contributions for self to quality of contributions for others.

Keywords: social bookmarking, tagging, social networks

A u t h o r s

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INTRODUCTION

In today's Web 2.0 environment, a plethora of applications allow users to upload their own content and share it with others. This content can vary, ranging from videos (YouTube) and photographs (Flickr) to knowledge on a specific subject (Wikipedia). Users not only post content, but also organize and filter the aggregated content through the use of user-generated meta-information. For example, social bookmarking systems, such as del.icio.us, Furl, Spurl, Simpy and Ma.gnolia, allow users to store their web bookmarks on a central server, label them with descriptive words (tags) of their choice, and share the bookmarks and their tags with the other users of the system (Marlow *et al*. 2006).

The efforts of those individual users who make their tagged resources available to others create online public repositories of catalogued bookmarks, similar to a grass-roots classification system for the web (Green and Hof 2005). Using these repositories, users can easily find their own bookmarks using their tags and can also discover bookmarks stored by other users by searching the pool of public tags in the system (Golder and Huberman 2006). This serendipity effect, where users discover or find unexpected collocated resources sharing the same tag, is a significant collective benefit of social bookmarking systems (Riddle 2005).

In an earlier paper (Arakji *et al.* 2006) we explored the motivations of users of social bookmarking systems for sharing their tagged resources in order to explain the current sustainability of these sites. We tested two alternative explanations. The first is that users primarily tag resources for themselves and sometimes share those tagged resources with other users. The second explanation is that in addition to their own tagged resources, users intentionally tag resources solely for others though they have no personal use for them, thus making voluntary contributions to the repository. We found that the second explanation was true. User contributions of public tags are in fact intentionally added for other users and are not the by-product of tagging for personal use. These findings suggest that there are two distinct sets of motives driving contributors of tagged resources: self-oriented motives (for tagged resources contributed for personal

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use) and other-oriented motives (for tagged resources contributed for other users).

In this paper, we further investigate the dynamics of tagging for self and for others and the relationship between the quantity and quality of the tags contributed by the users based on a survey of actual users of two popular social bookmarking sites. This paper is organized as follows. In the next section, we review the literature and develop the hypotheses and the research model with the variables of interest. We follow that with the description of the research methodology. Then, we present the data analysis and a discussion of our results. We conclude with the implications, contributions and future research directions.

SOCIAL BOOKMARKING SYSTEMS

Most tagging systems offer users the option to store, tag and classify their resources as private or public. Private tagged bookmarks are only available to the user who contributed them, while public tagged resources are available to all the other users in the system. Users may access the public repository of tags and resources without contributing tags of their own. The act of contributing tagged resources for others is similar to the voluntary contributions of movie reviews at MovieLens (Ling *et al.* 2005) and product reviews at Amazon.com (Peddibohtla and Subramani 2007). Those contributions are independently initiated by an individual contributor who interacts with the website but not with other specific users. Similarly, users of social bookmarking systems may derive a personal benefit from storing their own bookmarks but when they decide to share their contributions, they help other users with whom they have no direct ties. In addition, though their tagged resources are identified by their user names, they usually get no feedback if and when their contributions are in fact viewed or used by other users.

One important difference, however, between individual contributions to movie or product review sites and to social bookmarking systems is in the nature of the contributions and the level of effort required to produce them. While writing a product or movie review involves the more demanding task of writing a document that expresses subjective and personal opinions, storing and tagging a bookmark is a much simpler task. This is partly due to the fact that humans naturally categorize objects and information based on an assessment of similarity, and tagging bookmarks is an expression of that ability (Jacob 2004).

From a rational standpoint online public repositories, like social bookmarking systems, that are sustained by voluntary contributions of information present an interesting paradox. Voluntary contributions intended to help others are a typical manifestation of pro-social behaviour, i.e., positive acts aimed at benefiting others, such as volunteering or donating (Brief and Motowidlo 1986; McNeely and Meglino 1994). However, individual contributions to online public repositories, such as social bookmarking systems, take place in a context that lacks social cues (Peddibhotla and Subramani 2007). Each contribution is intended to help the general collective of others and not a specific user. Also, the interpersonal interaction inherent in other contexts, such as open source communities and helping forums (Koch 2004), is absent in these impersonal repositories. Instead, the contribution involves the interaction of the user only with the system, rather than the interaction of one user with other users through the system.

MOTIVATIONS FOR CONTRIBUTION TO ONLINE PUBLIC REPOSITORIES

Helpfulness can either be motivated by a selfish desire to benefit oneself or by a selfless concern for others (Clary and Snyder 1999). Empirical research findings on the motivations for volunteering indicate that individuals are motivated by a combination of self-interested and other-interested considerations (Clary *et al.* 1998). Experimental evidence indicates that the interaction between altruists and selfish individuals is in fact essential for achieving human cooperation (Fehr and Fishbacher 2003). Voluntarism is one of the mechanisms explaining the provision of information goods in discretionary systems. In voluntary repositories, contributors and non-contributors coexist and voluntary participation offers an alternative to overcome some of the social dilemmas traditionally associated with the provision of public goods (Hauert *et al.* 2002). Therefore, voluntary contributions to a public repository are the result of two distinct types of motives: self-oriented motives and other-oriented motives.

In their study of electronic networks of practice through Usenet groups, Wasko and Faraj (2000) found that users contribute due to an interest in the community and expectations of generalized reciprocity, and also because helping others is enjoyable and satisfying. In the context of an electronic network for a professional legal association, the same authors found that people's contributions are motivated by a desire to enhance their own reputation and share their experiences without an expectation of reciprocity from others or commitment to the community embedded in the network (Wasko and Faraj 2005).

In their investigation of product reviews at Amazon.com, Peddibohtla and Subramani (2007) report that frequent contributors are driven by multiple self-oriented motives (the need for self expression, utilitarian motives, enjoyment) and other-oriented motives (social affiliation, altruism, generalized reciprocity). Similarly, in open source communities, individual contributors are likely to have various motives for

participating (Koch 2004, Roberts *et al.* 2006). Those motives range from socially-related reasons (altruism and fighting for software freedom) to more hedonistic explanations like fun in programming (Bonaccorsi and Rossi 2006).

In another study, Wang and Fesenmaier (2003) found several motivations that made users of an online travel community more likely to contribute content to the site. Those motivations included efficacy (the ability to help/be helped by others), expected reciprocity, and relationship- and community-building. In addition, ease of communication on the site and the users' personalities increased their level of contribution.

In the context of tagging systems, Marlow *et al.* (2006) categorize the motivations to tag resources in a tagging system into two high-level objectives: organizational and social. While the first objective conceives tagging as a mechanism to file and organize resources for their future retrieval, the second objective allows users to share their resources with others through the tags they choose. Thus, in social bookmarking sites, as in other types of tagging systems, users are motivated by personal needs and sociable interests.

RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

In an earlier study on social bookmarking systems (Arakji *et al.* 2006), we found that users separate the contributions intended for themselves from those made for others, suggesting that there are two distinct sets of motives driving tag contributors: self-oriented motives and other-oriented motives.

Self-oriented motives are the reasons that drive individuals to tag resources for themselves. In social bookmarking systems, individuals may tag resources for convenience and future reference, i.e. ease of finding websites at all times and from any computer (Riddle 2005). Due to the nature of social bookmarking systems, it is likely that individuals tag for themselves only resources that they consider valuable or worth finding in the future (Golder and Huberman 2006). Thus:

Hypothesis 1a: Self-oriented motives are positively related to the quality of contributions for self.

When users are driven by self-oriented motives, they expect a personal benefit from the resources they tag. Since new resources are continually being added to the web and users' interests are also evolving, as users discover new online resources, they are likely to add them to their personal bookmark collection along with descriptive tags (Golder and Huberman 2006). Therefore:

Hypothesis 1b: Self-oriented motives are positively related to the quantity of contributions for self.

Other-oriented motives are the reasons driving individuals to tag resources for others. Empirical studies indicate that users provide advice to others (Constant *et al.* 1994), offer help with software (Lakhani and von Hippel 2003), and make available code in open source software development communities (Roberts *et al.* 2006) even when it is not compulsory for them to do so (Kollock 1999). These contributions increase the pool of available resources that will bring benefits to the members and lead to the sustainability of systems based on voluntary contributions (Butler 2001). Thus:

Hypothesis 2a: Other-oriented motives are positively related to the quantity of contributions for others.

However, having many resources is not sufficient to sustain a social structure if these resources do not benefit their members (Butler 2001). In their analysis of a product review repository, Peddibohtla and Subramani (2007) suggest that other-oriented motives are positively related to the quality of contribution. The notion that individuals contribute for others when they have something useful and unique to contribute has also been documented in other information sharing contexts (Ling *et al.* 2005, Raban and Rafaeli 2007). In social bookmarking systems, the more users believe they have something useful or valuable that should be brought to the attention of others or that should simply be catalogued in the system, the more likely they are to share those resources with others (Mejias 2005). Thus,

Hypothesis 2b: Other-oriented motives are positively related to the quality of contributions for others.

Prior studies report that the quality of contributions by users can be negatively related to the quantity of their contributions (Jones *et al.* 2004, Peddibohtla and Subramani 2007). When individuals choose to contribute to online repositories, they are investing their time, energy, attention and knowledge (Butler 2001). Therefore, when contributors focus on the quality of their postings, the quantity of postings tends to be lower, due to time constraints associated with producing their contributions. Similarly, in a social bookmarking system, users who are evaluating the relevance of the resources they tag are expected to produce fewer contributions than those who are not carefully evaluating the quality of such resources. Thus:

Hypothesis 1c: Quality of contributions for self is negatively related to their quantity.
Hypothesis 2c: Quality of contributions for others is negatively related to their quantity.

Contribution of tagged resources for personal use is likely to produce a spill-over effect. In other words, the more users contribute tagged resources for personal use,

the more likely they are to contribute some of those resources to the public pool (Golder and Huberman 2006). We also expect that the better the quality of the tagged resources users contribute for personal use, the better the quality of the tagged resources they contribute for others. Thus:

Hypothesis 3a: Quantity of contributions for self is positively related to quantity of contributions for others.
Hypothesis 3b: Quality of contributions for self is positively related to quality of contributions for others.

The entire research model for this study can be seen in Figure 1. In order to confirm that self-oriented motives are not related to the quantity and quality of contributions for others, and vice-versa for other-oriented motives, we include those relationships in the model we test. They are denoted with dotted lines in Figure 1.

METHODS

In order to test the research model and the hypotheses, we collected data via an online survey of actual users of two popular social bookmarking sites with similar functionality. The sites will remain anonymous for this article due to the fact that they did not provide us with permission to use their names. Since the context of a social bookmarking site can determine user behaviour, we used the taxonomy of tagging systems by Marlow *et al.* (2006) to ensure that our sites were similar in that regard. According to their classification of tagging sites, both of the sites we used in our study are primarily for the purpose of organizing and future retrieval of personal resources, i.e., websites, as well as sharing those resources with others. Both sites allow individuals to bookmark and tag webpages, as well as designate them public or private. Individual contributions of tags are not anonymous but identified with a user id. The owners of the site advertised the link to our online survey through emailed newsletters, in blogs or in the homepage of the site. The survey was tailored to each site so that the questions mentioned the name of the site.

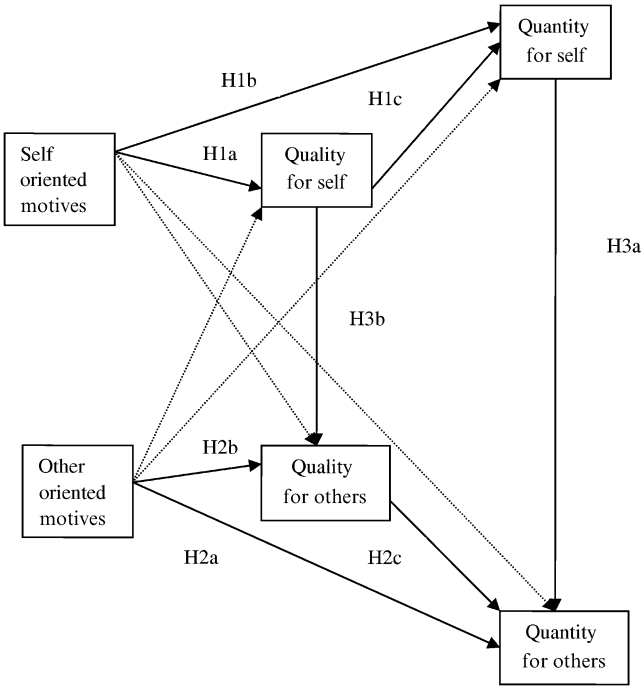

Figure 1. Research model

Measures

Quality of tagged resources, both for self and for others, was operationalized as perceived relevance. Quantity of tagged resources, both for self and for others, was operationalized as perceived volume of contributions relative to the total amount needed. Both were measured using scales adapted from Lee *et al.* (2002). We created two new scales to measure self-oriented motives and other-oriented motives. We validated the new scales with a sorting exercise and a pilot study (Moore and Benbasat 1991). All scales were 7-point Likert scales ranging from 'Strongly Disagree' to 'Strongly Agree.' The items for each of these scales are shown in Table 1. Finally, we measured demographics such as gender, age, education, income, frequency of use and user tenure at the social bookmarking site.

Respondents

From the 381 users who accepted the invitation to participate in the study, we obtained a sample of 94 complete and usable responses (66 users from site A and 28 users from site B). An ANOVA showed no differences between the respondents of the two sites on any demographic variables. Therefore, we were able to use the entire sample of 94 in testing our model. The respondents are 77% male and 23% female. Over 69% are in the age range of 26–45 and 88% have at least some college education. These characteristics are consistent with the demographics of taggers reported by the Pew Internet and American Life Project (Pew 2007). Approximately 76% have been users of the social bookmarking sites for more than a month and over 62% use the site at least once a day. Table 2 shows the demographic characteristics of our sample.

RESULTS

We used Partial Least Squares with PLS-Graph v. 3.0 with the bootstrapping resampling procedure to test the research model and corresponding hypotheses. This

Table 1. Factor analysis for all constructs and their items as well as mean and standard deviation values for all items

	Self oriented motives	*Other oriented motives*	*Quantity for self*	*Quantity for others*	*Quality for self*	*Quality for others*	*Mean*	*St. Dev.*
I create tags for websites because I want to be able to find those websites later if I need to	**0.825**	0.040	0.434	0.228	0.428	0.121	6.19	1.19
I create tags for websites that I need to have in my list of bookmarks	**0.747**	0.199	0.510	0.313	0.604	0.319	5.73	1.67
I create tags for websites that I discover and I believe will be useful for me in the future	**0.823**	0.051	0.400	0.090	0.335	0.159	6.40	1.00
I create public tags for websites because I think other users will find those websites useful	0.076	**0.941**	0.198	0.498	0.174	0.629	4.74	1.83
I create public tags for websites because I think those websites should be discovered by other users	0.112	**0.935**	0.218	0.523	0.253	0.662	4.85	1.65
I create public tags for websites because I think those websites should be included in this site	0.122	**0.817**	0.032	0.319	0.093	0.417	4.55	1.90
I create public tags for websites so that other users will be able to find those websites	0.093	**0.909**	0.277	0.569	0.283	0.663	4.51	1.89
The number of my tags is sufficient for my needs	0.476	0.232	**0.877**	0.368	0.570	0.337	5.29	1.45
I have an appropriate number of tags for what I need	0.493	0.132	**0.884**	0.269	0.547	0.260	5.18	1.54
The number of my public tags is sufficient for other users' needs	0.253	0.480	0.328	**0.951**	0.422	0.733	4.17	1.49
I have an appropriate number of public tags for other users' needs	0.215	0.537	0.360	**0.955**	0.443	0.678	4.29	1.56
My tags are useful for my tasks	0.552	0.187	0.571	0.371	**0.838**	0.371	5.82	1.32
I have tags that are relevant to my tasks	0.524	0.174	0.670	0.371	**0.887**	0.292	6.03	1.15
My tags are appropriate for my tasks	0.473	0.153	0.589	0.387	**0.881**	0.298	6.00	0.97
I create tags that are applicable to my tasks	0.346	0.252	0.373	0.432	**0.846**	0.267	5.90	1.38
My public tags are useful for other users' tasks	0.110	0.604	0.250	0.671	0.261	**0.920**	4.73	1.44
I have public tags that are relevant to other users' tasks	0.275	0.640	0.362	0.678	0.334	**0.933**	4.86	1.40
My public tags are appropriate for other users' tasks	0.235	0.586	0.331	0.745	0.364	**0.931**	4.61	1.38
I create public tags that are applicable to other users' tasks	0.259	0.603	0.302	0.626	0.354	**0.893**	4.59	1.48

Table 2. Demographics

Variable	*Frequency (%)*	*Variable*	*Frequency (%)*
Age		Gender	
Under 18	2 (2.1%)	Male	72 (76.6%)
18–25	16 (17%)	Female	22 (23.4%)
26–35	36 (38.3%)		
36–45	29 (30.9%)	Household Income	
46–55	8 (8.5%)	Under $10,000	12 (12.8%)
Over 55	3 (3.2%)	$10,000–$19,999	3 (3.2%)
		$20,000–$29,999	6 (6.4%)
Education		$30,000–$39,999	12 (12.8%)
High School or Equivalent	5 (5.3%)	$40,000–$49,999	12 (12.8%)
Vocational/Technical School (2 yr)	1 (1.1%)	$50,000–$74,999	14 (14.9%)
Some College or University	19 (20.2%)	$75,000–$99,999	8 (8.5%)
Bachelor's Degree (4 year)	29 (30.9%)	Over $100,000	7 (7.4%)
Master's Degree	24 (25.5%)	Rather not say	20 (21.3%)
Professional Degree (MD, JD, etc.)	3 (3.2%)		
Doctoral Degree	8 (8.5%)	Frequency of use	
Other	1 (1.1%)	Rarely	6 (6.4%)
Rather not say	4 (4.3%)	About once a month	4 (4.3%)
		About once a week	9 (9.6%)
Membership		2–3 times a week	16 (17%)
A week or less	12 (12.8%)	About once a day	15 (16%)
A month or less	10 (10.6%)	Multiple times a day	44 (46.8%)
Three months or less	30 (31.9%)		
Six months or less	16 (17%)		
Nine months or less	10 (10.6%)		
A year or less	6 (6.4%)		
Over a year	10 (10.6%)		

modelling technique simultaneously assesses the validity and reliability of the measurement of the constructs and estimates the relationships among these constructs. PLS has been widely used in the IS literature in general, as well as in recent studies on the different types of voluntary contributions to online repositories (e.g, Wasko and Faraj 2005).

PLS requires a sample size of at least 10 times the number of predictors, using the largest number of formative indicators of a construct or the largest number of antecedents leading to construct in the model (Chin 1998, Marcoulides and Saunders 2006). In our case, the highest number of structural paths directed at a construct is three (i.e. the number of paths pointing to quantity for others). Therefore, the minimum sample size required to test our model is 30 (3*10), well below our available sample of 94 respondents.

Table 3. Correlations between constructs. The values in the diagonal are the squared root of the Average Variance Extracted (AVE). The first column is the Composite Reliability (CR) for each construct

	CR	*1*	*2*	*3*	*4*	*5*	*6*
1 Self oriented motives	**0.840**	**0.799**					
2 Other oriented motives	**0.945**	0.110	**0.901**				
3 Quantity for self	**0.873**	0.550***	0.206*	**0.880**			
4 Quantity for others	**0.952**	0.245*	0.534***	0.361***	**0.953**		
5 Quality for self	**0.921**	0.549**	0.225*	0.634***	0.454***	**0.863**	
6 Quality for others	**0.956**	0.239*	0.662***	0.338**	0.740***	0.357***	**0.919**

* $-p<0.05$, ** $-p<0.01$, *** $-p<0.001$

Measurement model

We tested for convergent validity according to the procedure outlined in Chwelos *et al.* (2001) and Hampton-Sosa and Koufaris (2005). After running the model with PLS-Graph v. 3.0, we used the resulting item-construct loadings to compute single factor scores for all the constructs. We then ran a correlation analysis between the single factor score constructs and all the original items, the results of which can be seen in Table 3.

Since all constructs correlate highest with their reflective indicators, we confirmed convergent validity. An additional way to verify convergent validity was to examine the average variance extracted (AVE) for all constructs. As can be seen in Table 3, the AVE for all constructs is greater than 0.50, indicating that the majority of the variance is accounted for by the construct, thus further validating the convergent validity of our instrument. To verify internal consistency, or reliability, for all constructs, we examined the composite reliability scores, all of which exceeded the 0.70 cut off value (Fornell and Larcker 1981). For discriminant validity, the square root of the AVE of a construct must be lower than the correlations of that construct with the other constructs. As can be seen in Table 3, this was true in all cases, verifying the constructs' discriminant validity.

Hypothesis testing

The results of the PLS analysis for our model are presented in Figure 2[1]. The variances explained for all dependent variables in the model range from 39.2% to 57%, indicating that the model has good fit. Both path coefficients from self-oriented motives to quantity for self and quality for self are positive and significant, with values of 0.270 ($p<.01$) and 0.589 ($p<.001$) respectively. This indicates that both Hypotheses 1a and 1b are supported. Similarly, the path coefficient from other-oriented motives to quality of contributions for others is positive with a value of 0.624 ($p<0.001$), indicating that Hypothesis 2a is supported. However, the coefficient from other-oriented motives to quantity of contributions for others is not significant. Thus, Hypothesis 2b is not supported.

Contrary to our expectations, the hypothesized negative paths between quality and quantity of contributions for self and for others were not supported.

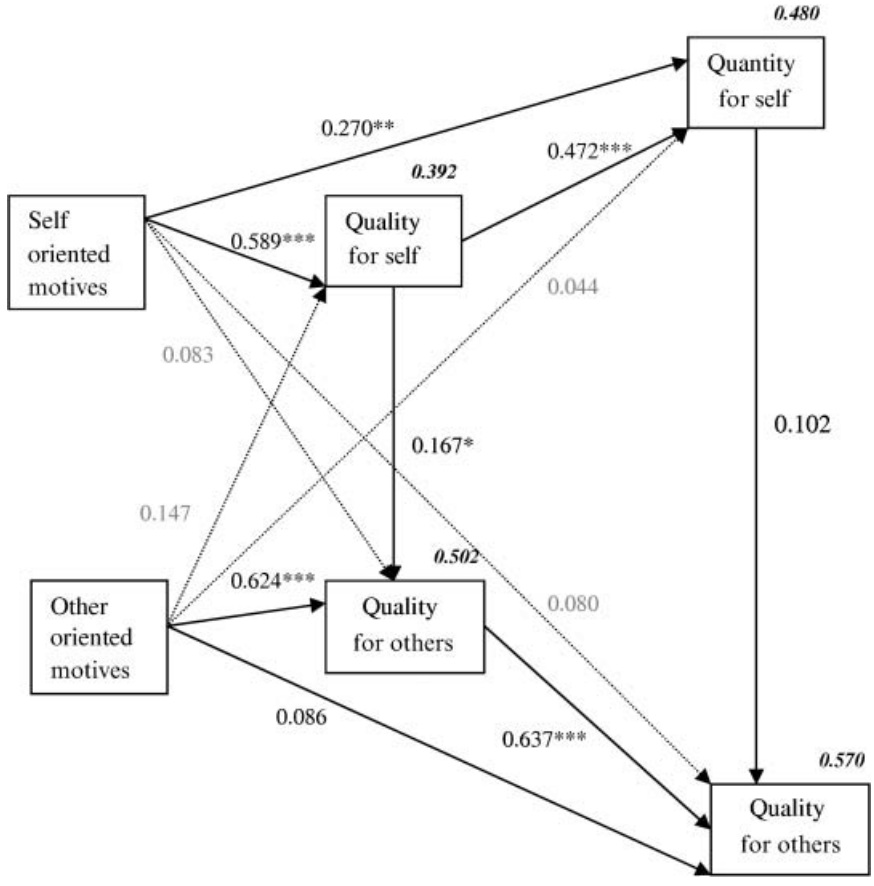

Figure 2. PLS results of research model

Note: Numbers in italics indicate variance explained by independent variables. * −$p<0.05$, ** −$p<0.01$, *** −$p<0.001$

Indeed, as Figure 2 shows, the path coefficients from quality to quantity for self and from quality and quantity for others are both significant but positive (0.472 and 0.637 respectively, with both at $p<.001$). Thus, Hypotheses 1c and 2c are not supported.

We found mixed results regarding the spill-over effects. The path coefficient from quantity for self to quantity for others is positive but not significant, while the coefficient from quality for self to quality for others is positive and significant (0.167, $p<.05$). Therefore, Hypothesis 3a is not supported but Hypothesis 3b is supported.

Consistent with our theoretical development, the path coefficients between self-oriented motives and quality and quantity of contributions for others, and between other-oriented motives and contributions for self – indicated by the dotted arrows and grey coefficients – are not significant.

DISCUSSION

The results of a survey among 94 users of two popular social bookmarking sites indicate that when tagging bookmarks, users are driven by self-oriented motives and other-oriented motives. We found that self-oriented motives are related to both quantity and quality of contributions for self. In other words, users who employ social bookmarking systems as a personal and portable repository of their own bookmark collections, i.e., with self-oriented motives, will contribute more tagged resources for themselves as well as resources that are more relevant to them. On the other hand, we found that other-oriented motives are only associated with quality of contributions for others and not with quantity. This indicates that users who contribute tagged resources for use by other users, i.e. with other-oriented motives, contribute only resources that they believe will be useful to the other users but do not contribute more resources for others overall.

We also found that the higher the quality of tagged resources contributed for self, the higher the quality of contributions for others. However, this spill-over effect does not manifest itself in terms of quantity, as large amounts of contributions for oneself are not significantly related to more volume of contribution for others. Thus, users who contribute a large amount of tagged resources for personal use do not necessarily contribute at the same level for others.

These results imply that users are much more discriminating when contributing tagged resources specifically for other users. When using the social bookmarking site as a personal bookmarking tool, users may add as many bookmarks as they can think of without limiting their contributions to ones that are more relevant to their needs. In this way they may create a less focused but more extensive collection of tagged bookmarks. However, when considering their contributions to the public pool of information, they prefer to add only what might be highly relevant to other users. This may be due to efforts to preserve the quality of public repositories or to conserve private resources (such as time and effort). More research is necessary to test these alternative explanations.

Our findings indicate that self-oriented motives are not related to the quality or quantity of contributions for others and that other-oriented motives are not related to the quality and quality of contributions for self. Each category of motives is solely related with their respective type of contributions (self-oriented motives with contributions for self and other-oriented motives with contributions for others). This reinforces the notion that contributions for self and for others are independent activities.

A notable finding of this study is that the hypothesized negative relationships from quality to quantity of contributions for self, and from quality to quantity of contributions for others, were not supported by the data. In fact, both path coefficients are positive and significant. This relationship between quality and quantity in both cases suggests that when tagging resources, users who focus on quality of contributions do not sacrifice the quantity of contributions they make. In fact, if they have higher quality resources, they may make more contributions. This is an unexpected result that may be explained by the nature of contributions to social bookmarking systems. Users who tag a large amount of bookmarks may be more frequent and more experienced web users. As such, they are more likely to be aware of higher quality websites. Therefore, it is likely that the quantity and quality of their tagged bookmarks is positively related.

Another potential explanation of the positive relation between quantity and quality bookmarks is from the perspective of transaction cost theory. Tagging online resources such as bookmarks is a low-cost and low-effort activity, similar to the automatic classification process that humans naturally perform when they categorize objects and information based on an assessment of similarity. In this case, tagging allows the free association of tags and resources without the restriction of formal structures or categorizations developed by others. This process can actually take much less time and effort than producing other types of contributions such as movie or product reviews, or encyclopaedia entries. Therefore, the typical time constraints that prevent users making high-quality contributions from producing more of those contributions do not seem to apply to social bookmarking systems. In addition, once a resource is entered and tagged in the system, it does not take any extra effort to make it public.

Implications

These findings have important implications for the sustainability and value of social bookmarking systems. The option of designating their tagged resources as public or private allows user to separate their contribution activities: tagging for self and tagging for others. Users of these systems contribute for others even when it is not mandatory for them to do so. They contribute for others only resources they deem potentially relevant. This result suggests that the collective action model underlying social bookmarking systems is sustained by voluntary contributions of high-quality resources (self-regulated voluntarism). Furthermore, because in social bookmarking systems high-quality contributions do not constraint their quantity, both the personal and the pro-social tagging function can benefit from a sizeable volume of high-quality contributions.

Due to the novelty of social bookmarking systems and others types of social-digital networks, little is known about the factors that sustain these systems. The current study suggests that contributing for self and for others are two distinct activities that coexist in such systems but we do not yet know the specific psychological and situational drivers of self-oriented and other-oriented motivations. Hence, future research should explore the antecedents of individual contributors' motivations.

By investigating motivations and contribution behaviour, this study analyzed the supply side of social bookmarking systems. Having enough high-quality tagged resources available is a necessary condition for the sustainability of social bookmarking systems. However, the ultimate success of these types of systems will be determined by the extent to which the resources they provide are actually used by others. Therefore, future research should also examine the demand side of these systems. In particular, the extent to which tagged resources are useful and used by others and how usage affects contribution levels of individual users.

Study limitations

Our findings must be interpreted in light of the limitations of this study. First, the source of the data is a cross-sectional survey, thus the causal relations posited in the model and substantiated with our statistical analyses can only be inferred based on our theoretical analysis. Second, our respondents were recruited from two popular social bookmarking websites and the results may not be generalizable to other contexts lacking the public/private option for tagging or to different types of social networks. Third, the size of our sample, though appropriate for PLS analysis, may have prevented us from finding other significant path coefficients. Fourth, it is possible that due to its voluntary nature, our survey attracted mostly users who contribute tags for others, while other self-interested users were not well represented in the pool of respondents. Despite these limitations, the main strength of our study is that it is based on data gathered from real users of actual social bookmarking sites.

CONCLUSION

Online social bookmarking systems are relatively new but are quickly growing in size and popularity. Understanding what drives their users to contribute to these public repositories of information is critical for those sites to maintain their growth. Our study sheds some light on the different types of motivations that such users can have. It also highlights some differences between using a social bookmarking site only for personal bookmark keeping or contributing to a public pool of tagged information for the public good. Future research needs to investigate users and their motivations in more depth in order for us to constantly improve this new information environment where information and meta-information is produced through collective efforts on a global scale.

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Notes

1. In order to test for any possible site effect of the site used on user responses, we ran a second PLS analysis of our research model with an additional binary variable to identify the site from which the respondent was recruited. We tested whether this variable had a significant relationship with any of the latent constructs in the model. The results showed that none of those relationships were significant, indicating that the site used did not significantly affect user responses.

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