What Leads Us to Share Valuable Knowledge? An Experimental Study of the Effects of Managerial Control, Group Identification, and Social Value Orientation on Knowledge-Sharing Behavior

Dennis F. Galletta  
University of Pittsburgh  
galletta@katz.pitt.edu

Peter V. Marks  
U.S. Army Medical Department Center & School  
pete-marks@us.army.mil

Scott McCoy  
Worcester Polytechnic Institute  
smccoy@wpi.edu

Peter Polak  
University of Miami  
ppolak@miami.edu

Abstract

Knowledge management (KM) has become an important focus in today’s information systems research and practice. An experiment investigated three factors that influence the behavior of individuals contributing their personally-held knowledge to a knowledge management system (KMS): managerial control, group identification, social value orientation, specifically when the individual sharer believes that the knowledge they are considering sharing has some potential value to them and others in their organization. Hypotheses suggested main and interaction effects of the three antecedents to sharing of valuable knowledge. Supported main effects included managerial control and social value orientation, and the 2-way interaction between social value orientation and managerial control was also supported. The hypothesized three-way interaction was supported. This research can expand understanding of the antecedents of knowledge sharing for both researchers and practitioners alike.

1. Introduction

Knowledge management (KM) has become an important focus in today’s information systems research and practice. There are more options than ever before for building systems to make sure that knowledge, previously housed only in the minds of certain organizational members, is captured, stored, and shared with others [8]. Recent research has examined issues [1] and strategies [14] relevant to Knowledge Management Systems (KMS).

Sharing knowledge has great intuitive appeal in the executive suite. Without sharing, different employees repeatedly facing the same problem would need to “reinvent the wheel” as they become familiar with the details of the problem and fabricate a possible solution. On the contrary, with sharing, consulting a database would reveal that the problem has already been encountered, and steps have been defined toward an efficient solution.

Such systems are appropriate in a wide range of organizations, but they are most evident in the area of computer software. For example, Microsoft created its “Knowledge Base” (KB) over a decade ago, which is the first place employees will check when a software problem surfaces. A large number of people have contributed to the KB since it was created, and a wide range of problems and solutions are available. The choice to use the system is obvious to an employee trying to solve a problem; either spend hours and perhaps days trying to identify the source of a problem or find the solution within minutes on the KB. Microsoft’s decision to move the KB to an extranet is ample testimonial to its usefulness; now customers can solve their own problems without calling support personnel.

While the benefits of a KMS are quite obvious and can provide some strategic advantage [6][11][13][25], it would be naïve to assume that there are not difficulties inherent in knowledge sharing. One important difficulty is that the cultures of many organizations provide significant power to individuals holding unique knowledge [12]. Much of this individual knowledge power is determined by the perceived value of the knowledge that an individual possesses. Therefore, an important element that must be considered in any discussion of knowledge sharing is how to motivate an individual to share knowledge that they believe to be valuable to themselves within their organization. This paper reports an experimental study of some variables that have been associated with sharing valuable
knowledge. In particular, managerial control, group identification, and social value orientation are manipulated to discover their effects on sharing knowledge perceived to be valuable to the sharer.

2. Prior Research

Employee behavior has been studied in many contexts over the last hundred years. In particular, sharing behavior has been studied in the context of managerial control, group identification, and social value orientation [10][27]. All three variables were applied to KMS by Marks et al. [18].

The next several sections will describe the research model, the dependent variable of sharing valuable knowledge, the three independent variables and their interactions, and the results of an experiment to support the hypotheses implied by the model and the literature.

Relationships among the four variables are hypothesized to follow the model illustrated in Figure 1. In brief, managerial control, group identification, and social value orientation are hypothesized to contribute to knowledge sharing. Also, interactions are hypothesized.

2.1. Knowledge Sharing

With the move from an industrial-based to a knowledge-based economy and the need for combining multiple items of knowledge to form combinative capabilities, there is a need to determine why individuals share the knowledge they possess, especially using a KMS.

A method of studying the sharing of knowledge is to study knowledge in a system as a public good. A public good is something that is available to all members of a community or organization regardless of whether they contributed to the constitution of the good [3][19]. Often used examples of public goods are public television, public parks, and clean air [24]. The fundamental problem with public goods is that they are subject to the "free rider" problem, whereby an individual will enjoy the benefits of a public good without contributing to its institution or maintenance resulting in an undersupply of the good [9][20][26]. This problem, if left unchecked, will eventually result in the destruction of the good because individuals will attempt to utilize the good while no one works to replenish it.

The problem of free riders is also considered in the literature that deals with information as a public good. Thorn and Connolly [26] conducted research that attempted to specifically conceptualize information in a database as a public good, using a number of experiments that attempted to mirror many of the processes the organizations were attempting to implement. After their experiments, they concluded that information in a shared database, like other public goods, will generally be undersupplied. Stated more directly, it is likely that individuals will not share their personally-held information through knowledge management systems.

Constant, et al. [7] identified positive motivators that entice individuals to contribute even when personal costs of doing so are high. These include positive self esteem, reinforcement of an individual's understanding of their own knowledge, and shared values of organizational citizenship [22]. Goodman and Darr [12] identified the existing contextual conditions in the organization as
having an impact in affecting an individual's decision to share his/her knowledge. This means that the organization must have a sharing culture before the implementation of a system that has the purpose of redistributing knowledge in the organization. They identified shared rewards as an important element in producing this culture.

The willingness to contribute knowledge may also be affected by the perceived value of the knowledge that can be contributed to the system. Individuals will assess the value of their personally-held knowledge positively or negatively before they consider contributing it to a KMS [5][16]. Therefore, an individual’s decision to share knowledge is not only based on organizational and individual contextual factors, it is also based on the value that an individual assigns the knowledge that they may contribute. Given that sharing valuable knowledge is a central goal for KM, it is important to identify its antecedents. There are potentially hundreds of antecedents for sharing valuable knowledge, and a single study can only examine a small number at a time. In this study, we consider three that seem especially likely to be important: managerial control, group identification, and social value orientation. This set was proposed by Marks et al. [18], and each is described below.

2.2 Managerial Control

Organizations sometimes exert control to influence employees’ attitudes, behaviors, and activities [4]. The behavioral literature (for example, [15]) takes the particular view that management attempts to have individuals work together on projects that make use of agreed-upon strategies to achieve identified organizational goals.

Control ranges from the stringent to the benign. In a case study of a software development organization, Perlow [23] found stringent controls that made use of constant monitoring, mandatory meetings, strict deadlines, and heavy work loads to encourage hard work. On the other hand, Alvesson [2] found a software development firm that operated very efficiently without harsh controls. The organizational culture encouraged strong interpersonal communication, teamwork, and partnership.

Managerial control is neither positive nor negative. That is, rather than focus on the type of mechanism, in this study we are interested in the existence rather than the particular nature of that influence. As Marks et al. [18] argue, “It is simply an attempt by management to influence the behavior of individuals within the organization by paying attention to the elements in the workplace that are important” (p. 1).

Therefore, we expect that:

H1: The number of contributions will be higher for those subjected to managerial control than for those without managerial control.

2.3 Group Identification

Group identification, also known as social identification, is a variable that addresses the amount of identification an individual has to a particular group. Positive group identification has been a very important element in public goods research for determining why individuals share more willingly or exercise restraint in resource dilemmas [17].

Group identification has been shown to affect how people contribute to the common good [10][27]. Although it is usually considered an individual difference variable, De Cremer and Van Vugt [10] found that, when reminded of their group membership, “selfish” individuals would increase their cooperation.

Our expectation is:

H2: The number of contributions will be higher for individuals with higher group identification than those with lower group identification.

2.4 Social Value Orientation

Social value orientation [21] is another individual difference variable that refers to individual personality preferences for outcomes in social dilemmas. There are often two views of this variable. Following preferences expressed on an instrument, respondents fall into three different profiles: cooperative, competitive, and individualistic. An individualist is a person who tries to maximize his/her own return in all situations but cares little if others are also maximizing their own returns. A competitor will attempt to maximize his/her return by producing the maximum amount of separation between themselves and others. An individualist cares little about how others around him/her are doing, while a competitor is concerned with the success of others. Both of these individuals are different from a collectivist. A collectivist tries to ensure that he/she is sharing any returns in an equal manner with others.

These categories (individualist, competitor, and collectivist) are often combined into two groups for analysis. The groups are labeled proself and prosocial. The prosel group is a combination of individualist and competitor individuals. This prosel group is most concerned that the outcome in any social dilemma is based on their ability to make a gain. The prosocial
group is composed of collectivist individuals, who are satisfied when the group collective is met in social dilemmas. It is proposed here that prosocial and proself orientations have an impact on the decision to share in a public goods dilemma, regardless of the organizational variables present. In fact, some studies have demonstrated that an individual with a prosocial personality will normally contribute to any public good even when the organizational measures are neutral or negative [27].

Knowledge sharing behavior is expected to follow these general traits as we expect to find:

**H3:** The number of contributions will be higher for individuals categorized as prosocial than for individuals categorized as proself.

### 2.4. Interactions

Perhaps more interesting than the main effects shown above, which already have found support in other contexts, would be interactions that might exist among the three antecedents in the knowledge sharing context. Two two-way interactions are proposed, and a three-way interaction is also suggested.

It is expected that prosocial individuals will make fewer contributions for the good of the group. However, when managerial control is imposed, some individual rewards are therefore created. Whether the control is a punishment for lack of sharing or additional rewards for sharing, there are suddenly individual implications of sharing. In contrast, prosocial individuals already find rewards for sharing and such control is not expected to affect behavior. Therefore:

**H4a:** The number of contributions by prosocial individuals will be higher in groups with managerial control than in groups without management control.

**H4b:** The number of contributions by prosocial individuals will not be affected by the imposition of managerial control.

In a manner similar to the above interaction, prosocial individuals who encounter group identification cues are likely to already be thinking a great deal about the others while prosocial individuals might begin thinking more about the group than they would if left to their own devices. This line of reasoning is consistent with results by De Cremer and Van Vugt [10]. Therefore:

**H5a:** The number of contributions by prosocial individuals will be higher in groups with group identification cues than in groups without such cues.

**H5b:** The number of contributions by prosocial individuals will not be affected by group identification cues.

Finally, it is expected that the three antecedent variables will be synergistic, and prosocial, management control, and group identification cues will react in a three-way interaction:

**H6:** The number of contributions will be subject to a three-way interaction among the antecedents managerial control, group identification cues, and social value orientation.

### 3. Method

The participants in this study were 76 students from two separate universities, one in the Northeast U.S. and one in the Southwest U.S. The experiment was conducted in class as a voluntary extra credit project for the associated courses. Data collection took place using a web browser and automatic entry into an Access database using Cold Fusion.

Students were told that they would be participating in an investment experiment whereby they would make decisions about sharing investment information with other students in their classroom through the network. Subjects were told that their reward, given in class points, would be dependent on two components: (1) the subject’s personal reward level, and (2) the reward level of the overall group. These two items represented individual performance and group performance, respectively.
Sixteen rounds were set up with situations that set up knowledge sharing dilemmas whereby a piece of knowledge had a certain payoff probability for the potential sharer and a different payoff probability for another member of the group (see Figure 2).

Each question outlined a reward probability for the subject if knowledge is not shared and a reward probability for another member if knowledge is shared. After each dilemma was presented, subjects were asked if they would share the information or not (see Figure 3). If they shared information, the reward probability would go to another group member and help build the group’s performance. If they did not share, the reward probability stayed with the subject. The translation mechanism of dollar rewards into extra credit class points was described, however probabilities in fact were not used in determining points (as in a simulation) because the intent was only to determine individual sharing patterns, not how many points each group would obtain. Expected (X) was calculated for all students who participated and they were awarded this number for their extra credit.

The sixteen dilemmas progressed from clear to difficult. For example, one of the clear questions stated that not sharing would result in a large reward probability to the individual while sharing would result in a very small reward probability to another individual within the group. Another clear question presented a very small individual reward probability and large reward probability for another member of the group. The items became more difficult as the difference between the two reward probabilities decreased. A group reward was instituted for any group that shared over 40% of their knowledge as a group during the experiment. This meant that an individual would maximize their payoff if they were able to keep all of their information, while the other members of their group shared all of their information.

Managerial Control was operationalized by providing cues to half of the subjects determined by random assignment using a pre-assigned coded subject number containing the treatment conditions, and carried out by a Javascript program. The cues were interjected after item 6 and again after item 12, and stated that not enough sharing was taking place (Figure 4).

Group Identity was operationalized simply by stating to half of the subjects (again, determined by random assignment using pre-assigned subject numbers and Javascript code) that the purpose of the experiment was to compete with a group in a rival institution. The other half received no such cue. This kind of manipulation was used successfully in the study by Van Vugt and De Cremer [27].
Social Value Orientation: After the end of round 16, subjects completed a short survey including the Decomposed Games instrument to measure the social value orientation of the respondents [21], which was collapsed as described above into proself and prosocial traits. This measure used has excellent psychometric properties, having been found to be internally consistent and reliable over long periods of time [10].

It was found that 47 of the 76 subjects responded as proself individuals, while 10 responded as prosocial individuals. The other 19 were indeterminate. These numbers are rather unexpected, as in practice most subjects exhibit prosocial tendencies. It is possible that in most studies, subjects respond with answers higher in social desirability. These subjects did not seem to exhibit that bias.

The three independent variables provided a 2x2x2 experimental design.

Because the group identification variable might have been rather subtle, a manipulation check question was included that asked subjects how much they identified with their pre-assigned group. The 7-point Likert scale showed that there was indeed an effect; the group identification group exhibited a higher group identification score (see Table 1). The difference in means was significant (t=-1.92; one-tailed p=.0295; 74 d.f.; equal variance test).

4. Results

Hypothesis 1 asserted that managerial control cues would result in more information sharing. Because the cues were offered twice, three segments of sharing opportunities were offered and analyzed, as was the total sharing throughout the session. Table 2 illustrates that subjects performed as would be expected; overall there was a significant difference in sharing (t=-2.3; one-tailed p=.01; 74 d.f.; equal variance test). The scores on the segment before the first cue were not significantly different while the scores on the segments following the cues were each significantly different. Therefore, Hypothesis 1 is supported strongly.

### Table 1 – Group Identification Manipulation Check

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No Group</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>* Manipulation Check</td>
<td>1.94</td>
<td>.84</td>
</tr>
<tr>
<td>* p&lt;.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2 – Contributions by Managerial Control

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No Control</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Contrib.</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>* Total sharing</td>
<td>5.93</td>
<td>2.84</td>
</tr>
<tr>
<td>Sharing 1-6</td>
<td>2.34</td>
<td>1.06</td>
</tr>
<tr>
<td>* Sharing 7-12</td>
<td>1.98</td>
<td>1.39</td>
</tr>
<tr>
<td>* Sharing 13-16</td>
<td>1.61</td>
<td>.89</td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>* p&lt;.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis 2 predicted that group identification subjects, via school competition, would contribute more than subjects without the group identification context. Because Levine’s test revealed that variances were not equal in each group, the separate variance approach was used. Nevertheless, the difference was not significant and therefore Hypothesis 2 fails to receive support (see Table 3).

One cautionary note is that when the 19 eliminated individuals, who were indeterminate on social value orientation, are added back to the analysis, group identification is strongly supported.

Hypothesis 3 predicted that prosocial subjects would contribute more information than proself subjects. Table 4 illustrates the cell means, and the difference was significant (t=-1.81; one-tailed p=.039; 55 df; equal variance test). Hypothesis 3 is supported strongly (see Table 4).

Hypotheses 4a and 4b assert that there is a 2-way interaction between social value orientation and managerial control cues. Table 5 presents all cell means, separated into four groups of items (total, before the first cue, after the first cue, after the second cue).

H4a predicted that proself individuals would be affected by the managerial control cues. As expected, the same pattern emerged as in H1. The total sharing score was significant (t=-1.92; one-tailed p=.031; 45 df.; equal variance test) as were the scores after the first and second

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No Control</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean contrib.</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Pro-self</td>
<td>Mean contrib.</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Total sharing</td>
<td>7.80</td>
<td>4.92</td>
</tr>
<tr>
<td>Sharing 1-6</td>
<td>3.20</td>
<td>1.64</td>
</tr>
<tr>
<td>Sharing 7-12</td>
<td>2.40</td>
<td>2.30</td>
</tr>
<tr>
<td>Sharing 13-16</td>
<td>2.20</td>
<td>1.30</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

* p<.05
cues. However, the scores on the segment before the first cue were not significantly different. Therefore, H4a was strongly supported.

H4b predicted that prosocial individuals would not exhibit differences due to managerial control cues. Due to the small sample size (5 in each cell), cutoff p level of .200 was chosen. As predicted, no differences were significant (p=.401; p=.405; p=.362; and p=.277 for total; first uncued segment; first cued segment; and second cued segment, respectively, even using the cutoff rate of .200). H4b receives support, but should be taken with caution as the data did not exhibit a normal distribution.

Hypothesis H5a asserted that proself individuals would differ because of different group identity treatments. The means shown in Table 6 were not significantly different (p=.231), so H5a is not supported. Hypothesis H5b could not be tested because there were only two prosocial subjects in the no-group-identity cell.

Finally, Hypothesis 6 asserts that there would be a 3-way interaction among the three factors. Due to the small number of prosocial subjects in the non-group identification cell, any results from this test should be interpreted with caution. However, even with the difficulties in the ANOVA, the 3-way interaction was indeed significant (p=.037; F=4.62; 1,49 d.f.). Adjusted R² was .210, indicating that the ANOVA explained a substantial amount of variance. The means are shown in Table 7, and H6 is supported.

Because of the difficulties with normality of the data, Mann-Whitney nonparametric tests were also performed and found to be largely consistent with the parametric T-tests (except for H3, where the Mann-Whitney results were non-significant: Z = -1.394, p[one-tailed] = .082).

5. Discussion and Conclusions

This experimental study explored the direct and interactive effects of managerial control cues, group identification, and social value orientation on knowledge sharing. A synopsis of the results is found in Table 8.

This study addresses the practical implementation of knowledge sharing in organizations in a unique manner because of the prominence of managerial control and social value orientation over group identification as the most important factors when trying to motivate individuals to share what they believe to be valuable knowledge through a knowledge management system. This is somewhat contrary to conventional wisdom and much literature that identifies organizational cultural variables as the most important elements in knowledge sharing [8].

Hypothesis 1 supports the argument that managerial control impacts the decision to share knowledge that is thought to be valuable to the sharer. This result lends credence to the argument that management should pay

| Table 6 – Contributions by Group Identification and Social Identification (interaction) |
|-----------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Treatment | No Social Ident | Social Ident | | |
| | Mean | Standard Deviation | Mean | Standard Deviation | |
| Pro-self | | | | |
| Total sharing | 6.47 | 3.13 | 5.88 | 2.23 | |
| N | 30 | 17 | | |

| Table 7 – Total Sharing |
|-------------------------|-----------------|-----------------|-----------------|-----------------|
| Treatment | No Control | Control | | |
| | Mean | Standard Deviation | Mean | Standard Deviation | |
| No Group | | | | |
| Pro-self | 5.61 | 3.15 | 7.75 | 2.73 | |
| Pro-social | 16.00 | . | 10.00 | . | |
| Group | | | | |
| Pro-self | 5.56 | 1.42 | 6.25 | 2.96 | |
| Pro-social | 5.75 | 2.06 | 8.00 | 1.41 | |
attention to sharing in their organizations.

Surprisingly, group identification (Hypothesis 2) was not related to sharing valuable knowledge in this study unless 19 excluded individuals (indeterminate on social orientation) are added to the analysis. Failing to support H2 with more clarity is surprising because of the wealth of research which identifies group identification as an important factor in sharing behaviors [10][27]. A future study with a larger sample would help ascertain whether or not H2 is truly supportable. Finally, as expected, prosocial individuals will share valuable knowledge more often than proself individuals (Hypothesis 3).

Generally the hypotheses that addressed the interactive effects were supported. Proself individuals only contributed valuable knowledge to their group when they received cues in the form of managerial control. Alternatively, prosocial individuals did not provide a higher amount of valuable knowledge to their group when they received managerial control cues because they were already sharing their valuable knowledge because of their personality. Interestingly, proself individuals did not contribute more valuable knowledge when they were associated with a group. However, this may be a result of Hypothesis 2 not being supported because group identification did not produce a difference in the main test.

Based on the results of this study, future research is needed to discover other important antecedents of knowledge sharing, both separately and in combination with those explored in this study. Only with better understanding of the factors that facilitate sharing of valuable knowledge will KMS be likely to provide the competitive advantage promised by vendors, practitioners and researchers alike.

### Table 8. Results of Hypothesis Testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Expected Result (all in terms of amount of sharing)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Managerial cues &gt; No managerial cues</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>Group identification &gt; no group identification</td>
<td>Not supported unless 19 deleted subjects are returned</td>
</tr>
<tr>
<td>H3</td>
<td>Prosocial &gt; proself</td>
<td>Supported</td>
</tr>
<tr>
<td>H4a</td>
<td>Proself: with managerial control cues &gt; without cues</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b</td>
<td>Prosocial: with managerial control cues = without cues</td>
<td>Supported</td>
</tr>
<tr>
<td>H5a</td>
<td>Proself: with group identification &gt; without group identification</td>
<td>Not supported</td>
</tr>
<tr>
<td>H5b</td>
<td>Prosocial with group identification = without group identification</td>
<td>Not testable</td>
</tr>
<tr>
<td>H6</td>
<td>3-way interaction</td>
<td>Supported</td>
</tr>
</tbody>
</table>

### 6. References


