

Motivating knowledge sharing through a knowledge management system[☆]

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Abstract

Based on both economic and sociological theory, the effects of supervisory control and organizational support on the frequency and effort of individuals in contributing their personally held valuable knowledge to a “best practices-lessons learned, repository-based” knowledge management system (KMS) were compared. Supervisory control, as expected, had significant impact on frequency, but it also had unexpectedly significant influence on effort. When system variables—usefulness and ease of use—were controlled for, the organizational support measure had little effect on either outcome. These results provide greater support for economic-agency-theory motivators of knowledge sharing and lesser support for organizational support motivators than has been previously believed. They also emphasize the important impact of systems variables in motivating KMS use. Since the study was conducted in a government (joint civilian–military) organization, the organizational type may significantly influence the results. However, since the result is contrary to the conventional wisdom that suggests that a “knowledge-sharing culture” is all-important, at the very least, this study shows that the nature of the organization may moderate the relationship between the motivational approach and the outcomes.

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1. Introduction

Modern processes and systems enable the sharing of organizational knowledge in new ways [1,2]. Scholars and practitioners in various fields have turned their attention to knowledge management systems (KMS) as

a means of sharing knowledge in organizations [3,4]. Many KMSs are designed to capture individuals’ knowledge so that the broader organization can benefit from its dissemination.

The strategy of utilizing a KMS to capture and distribute knowledge often requires that individuals contribute their knowledge to a system instead of keeping it to themselves or sharing it directly with known others only through conversations or written personal exchanges. Presumably, some individuals in some organizational cultures follow the “knowledge is power” dictum by hoarding knowledge and sharing it only

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when externally motivated to do so [5–7]. Even willing contributors may sometimes be reluctant to share when they do not know who may benefit from the shared knowledge [8].

This study addresses two primary factors that may influence the behavior of individuals who contribute knowledge to a KMS. The question, “How to best motivate individuals to contribute their knowledge to a KMS?”, has been ranked as the fourth most important issue in KM by high-level KM practitioners [9]. As well, Alavi and Leidner [10] identify “incentives for knowledge contribution and sharing” as an important research issue in KM.

This study focuses on the individual who is a potential knowledge sharer and the potential effects of two motivational approaches—supervisory control and perceived organizational support—on knowledge sharing behavior. Outcomes are assessed in terms of the frequency of contributions of knowledge made to a system and the effort the individual intends to exert to share knowledge that he/she believes will benefit the organization.

2. Background and theory

The knowledge possessed by a firm represents a strategic resource that can create competitive advantage [11–14]. A firm’s knowledge is the result of years of organizational activity in which the knowledge of individuals is combined into a collective whole [15].

The emphasis on collective knowledge created through a combinative process focuses attention on the issue of how organizations should motivate and support employees who may have useful knowledge that might be shared through a KMS [16].

One approach to motivation is illustrated by Perlow [17], who studied knowledge workers in a software development group where the management of the organization instituted a stringent means of controlling the employees. The company imposed strict demands by monitoring employees, by observing them closely, and by routinely checking up on them. Management instituted mandatory meetings, deadlines, and extra work to ensure that the employees were working in the best interest of the firm.

Other organizations utilize a very different means of motivating their knowledge workers. Nair [18] posits that managers of knowledge workers should institute team-based management styles if they wish to get the most out of their employees. Alvesson [19] illustrated this approach in a case study of a computer consulting

company. The study found that the management felt that the company operated efficiently because management strove to have a strong interpersonal culture in the organization. This culture was based on focusing on the organization as a community instead of viewing it as merely a collection of individuals.

These quite different methods of motivating knowledge workers’ performance—which can roughly be termed “supervisory control” versus “social exchange”—provide a foundation for assessing the factors that influence individuals to share knowledge through a KMS.

2.1. Supervisory control

Supervisory control is a factor that should have an important impact on an individual’s willingness to share his/her knowledge through a KMS [20]. Supervisory control is defined as efforts by management to increase the likelihood that individuals will act in ways that will result in the achievement of organizational objectives [21,22]. Supervisory control is important because an assumption in agency theory, which has been quite successful in demonstrating a positive effect on the behaviors exhibited in a principal–agent relationship, and in some other management literature, is that the goals of the employer and the employee are, to some degree, divergent. This necessitates control in order to align the goals of the two actors [23]. The exact nature of the supervisory control mechanisms needed to produce goal congruence is unresolved because of the widely-varied types of control mechanisms that have been utilized and studied [24–27].

Agency theory presents a rational view of individuals as seeking to maximize their individual utility [28]. This rational view, however, may not account for the variation in contributions to a KMS. For instance, an individual may contribute to a KMS specifically because of instituted controls without regard to the efficacy of their contribution. If this occurs on a large scale, the system may suffer from an overabundance of contributions that provide little real value to the organization [29].

2.2. Social exchange among individuals

Social exchange theory posits that people contribute to others commensurate with the contributions that they perceive are being made by others to them [30]. This theory views the contributions that individuals make to an organization as elements of reciprocal arrangements [31]. Reciprocal arrangements occur when an individual performs some type of action for another individual,

group, or organization. The action is performed without a specific economic contract that ensures that the action will be repaid [88]. Rather, the individual who performs the action does so because he/she generally believes that the action will be reciprocated at some future time, though the exact time and nature of the reciprocal act is unknown and unimportant [89].

Unlike an economic exchange relationship, in the social exchange relationship the potential result of any behavior is based on a trust that the relationship will proceed as in past exchanges [32,33]. This relationship of mutual exchange may exist between individuals or between an individual and an organization [34,35].

Numerous studies have demonstrated the relationship between social exchange and positive outcomes in organizations [36–39,90].

2.2.1. Perceived organizational support

The idea of social exchange from an individual to an organization and vice versa was used by Eisenberger et al. [10], in developing the concept of perceived organizational support (POS) to explain how individuals in organizations can become committed to their organizations. They proposed that “employees develop global beliefs concerning the extent to which the organization values their contributions and cares about their well-being” [40, p. 501]. They adopted the reciprocal view of this relationship in which high levels of POS will create a feeling of obligation in the employee, whereby the employee will feel obligated to support organizational goals.

Other research supports this conclusion e.g. [41–44]. POS has become a much used construct in social science and business (e.g. [45,46]). It should be equally appropriate to analyzing KM knowledge sharing behavior from the social exchange, or knowledge sharing cultural, perspective.

2.3. The effects of supervisory control and organizational support

Numerous studies have identified the differences between theories of economics (e.g., supervisory control) and theories of sociology (e.g., organizational support) and their impacts on the achievement of organizational goals ([47–50,27,51,52,91]). Sometimes, these studies propose that the theories of economics and sociology rely on differing assumptions and therefore cannot be considered to be similar (e.g. [53]). Some even contend that the cross-pollination of the disparate theories is inappropriate and should be avoided ([54,92]).

Davis et al. [47] contributed to this economics versus sociology discussion by suggesting that viewing individuals as utility maximizers may not account for the complex set of factors that can motivate individuals to accomplish things that do not always seem to directly maximize their utility. They stressed that other motivational elements that are not based on economic assumptions of utility maximization are necessary to account for the motivational elements in individuals and organizations [55].

With a “repository” type of KM, the sharer’s personally held valued knowledge becomes a “public good” [56,57] which may result in an undersupply of the good, i.e., too little knowledge being shared [58–62].

Thorn and Connolly [60] conducted research that conceptualized information in a database as a public good. They concluded that it is likely that individuals will not share their personally held most-valuable information through such systems. They identified cost as a factor for individuals considering sharing their valuable, personally held information in terms of “sharing cost”—the time and/or effort that is required by the individual to share knowledge through a computer system. They concluded that this cost is something that is considered by the potential sharer when making the decision of whether to contribute.

Constant et al. [63] identified positive motivators for individuals to contribute even when the personal costs may be high. These include the enhancement of positive self esteem, the reinforcement of an individual’s understanding of their own knowledge, and the shared values of organizational citizenship [64,65]. Goodman and Darr [8] identified the contextual conditions in the organization affecting an individual’s decision to share his/her knowledge. They determined that a sharing culture is necessary prior to implementation of such a system. They also identified “shared rewards” as an important element in producing such a culture. Such intangible and “cultural” variables may well constitute the currently “accepted wisdom” among KM practitioners (e.g. [66]). However, overall, these results are not consistent.

This distinction is related to the fundamental notions of intrinsic versus extrinsic motivation. Employees are intrinsically motivated when their needs are directly satisfied (e.g., self-defined goals), or when their satisfaction lies in the content of the activity itself. Intrinsic motivation occurs when an activity “is valued for its own sake and appears to be self sustained” [67, p. 599]. Conversely, extrinsic motivation emanates from external sources, such as those that are involved in supervisory control.

Osherloh and Frey [16] conclude that intrinsic motivation should best facilitate the sharing of tacit knowledge. They argue that because managers cannot easily observe knowledge and whether it has been shared, they need to rely on intrinsically motivated employees to accomplish sharing goals. O'Dell and Grayson [68] found intrinsic motivation important to sharing best practices as did Ko et al. [69] in the context of ERP implementation. So, while there is a widespread belief that creating a “sharing culture” may be the best thing that management can do to stimulate the intrinsic motivation of potential knowledge sharers, this conclusion has not been shown to be valid in comparative studies.

3. Research model, measures and hypotheses

The basic research question addressed in this study is: “What relative impact do supervisory control and social exchange have on individuals’ decisions to share knowledge through a KMS?” Various hypotheses deal with the relative influence of these two factors on the frequency of contributions and the effort expended in contributing to a KMS. As well, several hypotheses deal with joint effects, mediation effects and the influence of system moderating variables.

The KMS that is studied is in the nature of a “best practice” database [70], or “discretionary database” [60]. This system specification is important because it changes the structure of traditional sharing from a reciprocal view, whereby the individual doing the sharing knows with whom he/she is sharing [71,72], to an organizational view, where the potential recipient of the shared knowledge is unknown [60]. This is a key distinction between “knowledge sharing” and “knowledge transfer”; in the latter, the person who is to be the recipient is usually known to the source [73,74].

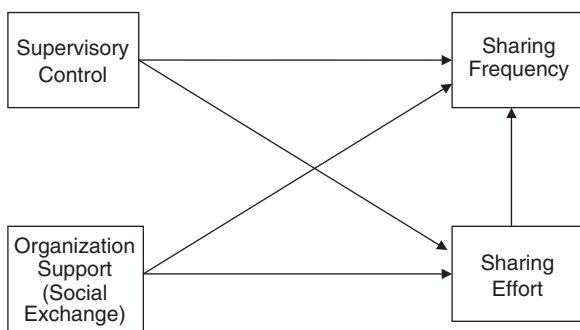


Fig. 1. Basic research model.

This research model of Fig. 1 is useful for comparing the effects of the two approaches: supervisory control and social exchange as identified by Blau [30].

The pertinent managerial questions related to this research revolve around the exact nature of the impacts of the two elements. If formal supervisory control has the greatest effect on sharing in a KMS, then managers should emphasize the development and implementation of formal supervisory control mechanisms. On the other hand, if social exchange accounts for more of the variance in sharing through a KMS, then management should place greater emphasis on positive relationships among employees and managers and on the creation of a “knowledge-sharing” culture.

There are two dependent variables in the research model of Fig. 1: frequency of contributions and the intended effort to contribute knowledge that the sharer believes has a positive value for the organization.

These two dependent variables should be important to the successful implementation of a KMS because management desires that their employees contribute to the system frequently, but also wants employees to contribute knowledge to the system that is potentially valuable to the organization. If, for instance, an individual contributes frequently to the system but exerts little effort to ensure that his or her contributions are organizationally efficacious, the system may get filled with low-value knowledge that does not have a positive impact on achieving organizational goals. Conversely, if an employee is willing to exert effort to contribute what he/she believes to be valuable knowledge to the system, but he/she does so infrequently because management does not encourage frequent contributions, then the system may be unhelpful.

3.1. Measures

The survey instrument is shown as Appendix A.

Frequency of sharing is a self-reported measure of individual contributions to the system that is derived from research by Igarria et al. [75]. It is used because of the validity demonstrated in the context of systems that are similar to that being studied here.

Effort is measured with an instrument that assess the amount of effort that an individual is willing to exert to contribute organizationally efficacious knowledge. It is a combination of items used by Kalman [76] and Torkzadeh and Doll [77], who studied the impacts of

technology use on a series of specific work processes. This combination of previously used and validated items addresses both self-reported intended effort and the individuals positive evaluation of the knowledge being contributed—e.g., the composite measure includes specific types of contributions (those intended to “save time,” “improve quality,” etc.).

An independent construct of the research model, supervisory control, reflects the amount of influence that an individual perceives that management is exerting in order to get compliance for its notion of appropriate contributory behavior [48,27].

The other independent construct, organization support, assesses the social exchange between and individual and an organization and is measured through the well-known POS instrument [40].

3.2. Control variables

Control variables reflecting system usefulness and system ease of use were addressed in the study. System variables were tested for their impact on an individual's frequency and effort in sharing knowledge through a KMS. System variables have been an important part in a wide range of IS research, and have consistently demonstrated a major effect on the use of IS systems [78–80]. Specifically, the variables of “perceived usefulness” and “perceived ease of use” of an information system have demonstrated a relationship to the usage of systems [81].

3.3. Hypotheses

In an environment that has a focus on supervisory control, employees have been found to, and should, focus on the tasks that are being controlled by management [82–84]. This relationship has not been adequately tested in the context of a KMS, as indicated by King et al. [9] and Alavi and Leidner [3], but it reflects the belief that extrinsic motivations (e.g., supervisory controls) have the greatest impact on easily measurable outcomes (e.g., frequency).

Hypothesis 1. The level of supervisory control is positively associated with the frequency of contributions to a KMS.

This, however, may not have an impact on the willingness of employees to contribute knowledge that is truly efficacious for the organization. According to social exchange theory and the results of numerous studies, the effort that an individual is willing to exert to contributing efficacious knowledge should have a direct relationship with the amount of organizational

support that an employee perceives. This reflects the belief that organizational support will draw on the intrinsic motivations that will impact on less-easily measurable behavior (e.g., effort).

Hypothesis 2. The level of perceived organizational support is positively associated with the effort exerted to provide efficacious knowledge to a KMS.

The combination of organizational support and supervisory control should be expected to be more influential toward both frequency and effort than either variable alone.

Hypothesis 3a. Supervisory control and organizational support will jointly influence frequency more than supervisory control alone.

Hypothesis 3b. Supervisory control and organizational support will jointly influence frequency more than organizational support alone.

Hypothesis 4a. Supervisory control and organizational support will jointly influence effort more than supervisory control alone.

Hypothesis 4b. Supervisory control and organizational support will jointly influence effort more than organizational support alone.

The dependent variables in Fig. 1 are also expected to be related. The Theory of Reasoned Action (TRA) [85] focuses on why individuals perform certain behaviors. It attributes behaviors to one's strength of intention to perform said behaviors. This is called “behavioral intention” which, according to TRA, is reflective of “attitude” and “subjective norm.” Attitude is defined as one's positive or negative feelings about performing a behavior, and subjective norm is one's perception that people who are important to them think that a behavior is appropriate.

The effort to contribute organizationally efficacious knowledge reflects behavioral intention, which is, in turn, based on the positive attitude of the contributor as defined by TRA. Therefore, frequency should reflect both contributions that were made in order to promote a positive effect and contributions that were made to meet a “requirement.” In order to resolve the issue of effort's effect on frequency, it is tested as a mediator in the relationships between organizational support-frequency and supervisory control-frequency.

Hypothesis 5a. The relationship between organizational support and frequency will be mediated by effort.

Hypothesis 5b. The relationship between supervisory control and frequency will be mediated by effort.

4. Research method

The organization in which data were collected is a large US federal agency with the responsibility of procuring and maintaining communications systems in an element of the US Department of Defense. The organization is headquartered in the US; however, its members are geographically dispersed throughout the world. The members of the organization are a diverse mix of military personnel, civilians working for the government, and civilian contractors.

This organization developed a KMS in order to better disseminate knowledge among members. It is a secure internet/extranet system inaccessible to the general public that has a number of tools for sharing including e-mail, public message posting, virtual meeting rooms, electronic libraries, directories of people and information, and a “best practice-lessons learned” database. The system is well utilized by the organization members.

The survey focused on a specific tool—the “best practices-lessons learned” repository. This repository is a classic public good [57].

The survey instrument was validated through a pre-test using nine doctoral students and pilot test with a sample of 30 organizational participants who were not included in the sample frame for the subsequent data collection. These provided insight into the formatting of items and indicated that acceptable levels of validity and reliability would be forthcoming. The main study involved the testing of hypotheses as well as the confirmation of the validity and reliability of the measures, even though all measures had been assessed in prior studies.

4.1. Response rates

The system administrator randomly sent out 600 requests for participation through the organization’s email server. There were 208 “hits” to the survey web site resulting in 169 usable responses—a usable response rate of 28 percent.

4.2. Sample characteristics

The characteristics of the respondents are described in Table 1 in terms of gender, age, education, time in the organization, and time with an account on the system.

The respondents were generally well educated, with 84% having earned at least a bachelor’s degree. Those who responded also have spent a considerable amount of time with the organization, with over 50% of the

Table 1
Sample characteristics

	(%)
Gender	
Male	68
Female	32
Age	
23–30	2
31–40	16
41–50	40
51–60	32
Over 60	10
Education	
High school/GED	2
Some college	14
College degree	23
Some graduate school	15
Master’s degree	45
PhD/JD/MD, etc.	1
Years in organization	
1	15
2–4	25
5–8	15
9–10	10
Over 10	35
Access to the system	
Less than 6 months	7
Six months to a year	9
Between 1 and 2 years	30
Between 2 and 5 years	44
Over 5 years	10

$N = 169$.

employees working for over 5 years and 35% working there for over 10 years. They are also experienced in utilizing the system, with 84% utilizing the system for over a year.

4.3. Reliability and validity of scales

Because multiple items were utilized to measure each construct, these items were combined under their respective constructs in order to analyze all constructs in a single model. Each of these constructs was tested for reliability and validity using Cronbachs’ α (minimum 0.7) and factor analysis (minimum loading 0.40). All items had reliabilities of 0.94 or greater except frequency (0.86). Table 2 shows the results of the factor analysis. All variables were retained for further analysis. Table 3 shows the correlations among the variables.

Table 2
Factor analysis

	1	2	3	4	5	7
CTRL2	0.905					
CTRL4	0.876					
CTRL7	0.872					
CTRL6	0.868					
CTRL5	0.860					
CTRL3	0.841					
CTRL1	0.779					
USE4		−0.919				
USE2		−0.908				
USE3		−0.898				
USE5		−0.898				
USE6		−0.878				
USE1		−0.868				
EFFORT1			0.948			
EFFORT3			0.948			
EFFORT2			0.906			
EFFORT4			0.904			
EOU2				0.913		
EOU6				0.897		
EOU1				0.849		
EOU4				0.792		
EOU3				0.775		
EOU5				0.765		
POS3					0.878	
POS5					0.827	
POS8					0.820	
POS4					0.786	
POS7					0.783	
POS2					0.740	
POS9					0.737	
POS1					0.725	
POS6					0.715	
FREQ2						0.914
FREQ1						0.820
Eigenvalue						
Variance						
α	0.96	0.97	0.97	0.94	0.94	0.86

Extraction method: Principal component analysis.

Rotation method: Oblimin with Kaiser normalization.

Table 3
Means, standard deviations and correlations

	Mean	SD	EFFORT	FREQ	CTRL	POS	USE	EOU
EFFORT			1.00					
FREQ			0.487	1.00				
CTRL			0.492	0.433	1.00			
POS			0.275	0.307	0.532	1.00		
USE			0.362	0.381	0.377	0.435	1.00	
EOU			0.365	0.272	0.348	0.455	0.599	1.00

All correlations significant at ($p < 0.000$).

5. Hypotheses test results

The various hypotheses were tested using appropriate statistical techniques as discussed below.

5.1. The effect of supervisory control on contribution frequency

The first hypothesis involves the relationship between supervisory control and the frequency of system contributions. This hypothesis was tested by using a regression with the contribution frequency as the dependent variable and supervisory control as the independent variable.

The result shows a significant and positive relationship between supervisory control and frequency of contributions with an F statistic of 38.5 ($p < 0.000$) and an adjusted R^2 of 0.183. Therefore, Hypothesis 1 is supported.

5.2. The effect of organizational support on effort to contribute efficacious knowledge

The second hypothesis involves the relationship between organizational support and effort to contribute efficacious knowledge. This hypothesis was tested by regressing organizational support on the amount of effort that an individual would expend to contribute organizationally efficacious knowledge.

The result shows a significant and positive relationship between organizational support and effort with an F statistic of 20.18 ($p < 0.000$) and an adjusted R^2 of 0.07. Therefore, Hypothesis 2 is supported.

5.3. The effect of supervisory control and organizational support on effort and frequency

Hypotheses 3a, b, 4a and b propose that the two independent variables of supervisory control and organizational support will explain more variance in both effort and frequency than either variable alone.

The set of hypotheses, 3a–4b, was tested through regressions that analyzed the impact of supervisory control and organizational support in a hierarchical regression that entered one of the independent variables followed by the other independent variable. This method of testing removes the statistical effect from the first step of the regression so the second step can be interpreted for its unique impact or effect in the analysis [93].

In Hypothesis 3a, supervisory control was regressed on frequency in the first step of the hierarchical regres-

Table 4
Hypotheses 5a and b

	$p <$	β	Supported?
<i>Regression model—Hypotheses5a</i>			
1. Effort on OS	0.000	0.275	Yes
2. Freq on OS	0.000	0.307	Yes
3. Freq on OS	0.007	0.187	Yes
4. Effort	0.000	0.435	Yes
Mediation effect	Partial		
<i>Regression model—Hypotheses5b</i>			
1. Effort on CTRL	0.000	0.492	Yes
2. Freq on CTRL	0.000	0.433	Yes
3. Freq on CTRL	0.007	0.255	Yes
4. Effort	0.000	0.361	Yes
Mediation effect	Partial		

sion resulting in an F statistic of 38.5 ($p < 0.000$) and an adjusted R^2 of 0.183. The second step of the regression included organizational support after the impact of supervisory control was effectively removed. This produced an F change of 1.7 ($p < 0.195$) and an R^2 squared change of 0.008.

In this test, supervisory control and organizational support are not shown to significantly account for more variance in frequency than does supervisory control alone. Therefore Hypothesis 3a is not supported.

In Hypothesis 3b, organizational support was regressed on frequency resulting in an F statistic of 17.4 ($p < 0.000$) and an adjusted R^2 of 0.089 as shown in Table 4. Then, supervisory control was included in the second step of the regression to produce an F change of 20.9 ($p < 0.000$) and an R^2 change of 0.1.

These results indicate that supervisory control adds significantly to the explained variance for organizational support alone. Therefore, Hypothesis 3b is supported.

In Hypothesis 4a, supervisory control was regressed on effort in the first step of the hierarchical regression resulting in an F statistic of 53.2 ($p < 0.000$) and an adjusted R^2 of 0.237. The second step of the regression included organizational support. This produced an F change of 0.056 ($p < 0.814$) and an R^2 change of 0.000.

This result does not lend support to the argument that supervisory control and organizational support jointly account for more variance in effort than supervisory control alone. Therefore, Hypothesis 4a is not supported.

In the test of Hypothesis 4b, organizational support was regressed on effort resulting in an F statistic of 20.18 ($p < 0.000$) and an adjusted R^2 of 0.07. Then, supervisory control was introduced into the second step of the regression to produce an F change of 36.4 ($p < 0.000$) and an R^2 change of 0.166.

This test lends support to the argument that supervisory control and organizational support explain significant additional variance in effort than does organizational support alone. Therefore, Hypothesis 4b is supported.

5.4. Effort as a mediator between the independent variables and frequency

Hypothesis 5a tests the relationship between organizational support and frequency as it is mediated through effort.

The mediated regression approach utilized to test this relationship is a three-step process as described by Baron and Kenny [86]. In the first step, the mediating variable (effort) is regressed on the independent variable (organizational support); second, the dependent variable (frequency) is regressed on the independent variable; then the dependent variable is simultaneously regressed on both the independent and mediator variables. A variable is considered a significant mediator when the following conditions are met [86]:

1. the independent variable is significantly related to the mediating variable in the first test;
2. the independent variable is significantly related to the dependent variable in the second test;
3. the mediating variable is significantly related to the dependent variable; and,
4. the β -value of the independent variable on the dependent variable is less in the third test than in the second test.

There is a mediation effect when the independent variable is significant in the first test and in the second test, while simultaneously the mediator is significant in the third test. The third test indicates a full mediation effect if the independent variable is not significant. A partial mediation effect is present when the independent variable remains significant but with a lesser β in the final test.

The results of this test, as reported in Table 4, demonstrate a partial mediation effect. All three tests are significant and the β -value of organizational support was less in the third test ($\beta = 0.187$) than in the second test ($\beta = 0.307$), thus producing the conditions necessary to demonstrate partial mediation.

Hypothesis 5b tests the level of relationship between supervisory control and frequency that is mediated through effort. The results of this test also demonstrate a partial mediation effect where part of the relationship between frequency and control depends on effort. All

three tests are significant and the β -value of supervisor control was less in the third test ($\beta = 0.255$) than in the second test ($\beta = 0.433$), thus producing the conditions necessary to demonstrate a partial mediation.

5.5. Effects of control variables

System variables were tested as control variables in the research model of Fig. 1. The purpose of the system variables—system usefulness and ease of use [82]—in this study is to control for their impact as they pertain to the effect of supervisory control and organizational support on frequency and effort. By controlling for system factors, it is possible to ascertain whether the relationships established in the hypotheses remain valid despite individuals' perception of the qualities of the system.

Hierarchical regressions were run with system factors as the first elements to be regressed on effort and frequency. This effectively removes their impact on the variables that follow. Following this, the tested relationships in the other hypotheses were entered into the same regression.

Both of the system factors had significant and positive relationships with the dependent variables. This demonstrates that usefulness and ease of use are individually related to both frequency and effort.

Therefore, it is important to control for these system variables to determine whether the main hypotheses remain unchanged with the addition of these variables.

5.6. Results of controlling for system usefulness and ease of use

Controlling for the effects of usefulness and ease of use changed the results only for Hypotheses 2 and 5.

Hypothesis 2 supports a relationship between organizational support and effort with an F statistic of 20.18 ($p < 0.000$) and an adjusted R^2 of 0.07. When the system variables of usefulness and ease of use are entered into a hierarchical regression before the organizational support variable, the relationship between organizational support and effort is no longer significant with an F change of 1.4 ($p < 0.237$) and an R^2 change of 0.007.

Hypothesis 5 tests the effect of effort as a mediating variable in the relationship between organizational support and frequency. However, when the system variables of usefulness and ease of use are entered into the test as the first elements in order to control for their effects, the relationship between organizational support becomes non-significant, therefore removing the mediating effect.

Table 5
Analysis of full model

	Control β s		Direct effects β s		Full model β s
	Effort	Frequency	Effort	Frequency	Frequency
Usefulness	0.183	0.347**	0.120	0.271**	0.229*
Ease of use	0.219*	0.046	0.194*	-0.002	-0.069
Control	—	—	0.399**	0.338**	0.199*
Org. support	—	—	-0.116	-0.003	0.038
Effort	—	—	—	—	0.348**
Adj. R^2	0.182**	0.143**	0.276**	0.217**	0.300**

* $p < .05$, ** $p < .01$.

These results suggest that the system variables of usefulness and ease of use may have a stronger impact on the dependent variables than does organizational support.

6. Conclusions

Table 5 shows the details of the analysis of the full model. The first column, shows the β and R^2 of the control variables on the dependent variables. The second column shows all the β and R^2 of the independent and control variables on the dependent variables. The last column shows the β and R^2 of all variables on frequency.

This table shows that supervisory control has the most prominent impact on the sharing of knowledge when it is measured as both frequency and effort. Also notable are the differing impacts of usefulness and ease of use on frequency and effort. Usefulness has a distinct relationship with frequency while ease of use has a distinct relationship with effort.

Overall, supervisory control was found to be positively related to frequency of contributions (Hypothesis 1) and organizational support was positively related to effort to contribute efficacious knowledge (Hypothesis 2).

These results provide support for many results reported in the control literature which suggests that when management provides encouragement of certain actions, in this case, knowledge-sharing behavior in a KMS context, this encouragement is positively related to outcomes.

These results also provide some support for the organizational support literature by demonstrating that there is a positive relationship between how individuals believe that they are treated in their organization and their desire to engage in positive actions that are difficult for management to explicitly verify.

The results confirmed that effort does partially mediate the relationship between organizational support-frequency and supervisory control-frequency. Therefore, consideration of the effort to contribute organizationally efficacious knowledge is necessary when addressing these relationships.

Generally, the control variables of usefulness and ease of use did not change the results of the original hypotheses except for Hypothesis 2 and 5. There were indications from the tests involving the system control variable that suggest that organizational support was not as important as was originally hypothesized. This provides evidence that the system variables of usefulness and ease of use have the most impact on the dependent variables, after supervisory control.

When the system variables are controlled for in the analysis, organizational support no longer has a significant relationship with effort. Therefore, the effect of the mediating variable is lost when the system factors are introduced, furthering the case that organizational support is not a significant predictor of either frequency or effort.

These results are important because they provide evidence that the system variables of usefulness and ease of use are more important to both effort and frequency of sharing in a KMS than is organizational support and should be considered as the second-most-important elements in promoting knowledge sharing through a KMS, after supervisory control.

7. Summary

This study focuses on the effects of some important organizational activities that are believed to have an important impact on knowledge sharing with a KMS. The two primary factors considered were supervisory control and perceived organizational support.

These two factors were believed to have differing effects depending on how knowledge-sharing is measured. When knowledge-sharing behavior was measured as frequency of contributions to the system, it was believed that it would have a strong relationship with supervisory control and a significantly smaller relationship with organizational support. Conversely, when knowledge-sharing behavior was measured as the effort to contribute efficacious knowledge, it was believed that it would have a strong relationship with organizational support and a significantly smaller relationship with supervisory control.

The most interesting result from these analyses is the prominence of the influence of the supervisory control variable on both of the dependent variables of frequency and effort. This is most important because of the impact of supervisory control on outcomes that are difficult to verify—namely the effort that an individual is willing to exert to share knowledge through a KMS. Previously, the importance of supervisory controls in influencing measurable outcomes was understood; however, this result is somewhat new and surprising.

7.1. Implications for researchers

This study has the limitations that are common to the selected methodology—primarily self-report bias. Actions were taken to reduce these difficulties as much as possible—e.g., respondents were not asked to give their name or any other identifying data.

The nature of the organization and the potential role of organization type must be further investigated using other organizations. The governmental (joint civilian and military) nature of the organization studied here may have importantly influenced the results. However, even if this is shown to be true, this study has highlighted the potential moderating effect of organization type and demonstrated that the conventional wisdom—that a “knowledge-sharing” culture is all-important—may not always be true in various kinds of organizations.

The overall results of the study are interesting, and potentially important, for researchers who should be warned against accepting the conventional wisdom

of the importance of “culture” over the extensively demonstrated influence of supervisory control in other domains.

7.2. Implications for practitioners

These results support supervisory control as the variable that has the most impact on the two dependent variables. For practitioners who intend to implement knowledge sharing in their organizations using a KMS, these results point to supervisory control as the most important factor for encouraging knowledge sharing, regardless of whether the sharing is measured as a quantifiable variable such as frequency or a less-readily quantifiable variable such as effort to contribute efficacious knowledge.

The results suggest that practitioners, at least those in some kinds of organizations, should not slavishly adopt the conventional wisdom and neglect supervisory control mechanisms for motivating knowledge sharing. According to these results, organizational support is not nearly as important as supervisory control in having individuals share efficacious knowledge frequently. Rather, systems variables—usefulness and ease of use—are second in importance to supervisory control.

So, practitioners should ensure that their KMS is easy to use and is perceived to be useful. They should not attempt to change the culture of their organization to fit the conventional wisdom that a knowledge-sharing culture is all important. Rather, they should assess whether their organization has primarily operated on the basis of supervisory control, and if so, it is probably best to continue to do so as the organization pursues KM.

Appendix A. Survey instrument

The following statements describe *how much effort* you intend to put into *sharing specific types of information through SYSTEM X*. Please *circle the number* that indicates the effort that you intend to put into sharing the following *types of information*.

To share information through SYSTEM X that could:
 –save time in the organization,
 I intend to put in
 –improve quality
 in the organization, I intend to put in

No effort at all	A great deal of effort
1 - 2 - 3 - 4 - 5	- 6 - 7 - 8 - 9 - 10
1 - 2 - 3 - 4 - 5	- 6 - 7 - 8 - 9 - 10

–solve job problems in the organization, I intend to put in 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
 –develop new ways to improve performance in the organization, I intend to put in 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

The following two statements describe how much *time you spend* utilizing *SYSTEM X*. Please *circle the number* that indicates the time you spend utilizing the system in the following question.

Never Rarely Some of the Time A Good Bit of the Time Usually Always

I contribute information to *SYSTEM X* 1 2 3 4 5 6

Please *check the box* that indicates the frequency that you contribute to *SYSTEM X*. Typically, how often do you contribute information to *SYSTEM X*? (Check the box)

- Not at all
- Once or twice a year
- Less than once a month
- About once a month
- 2 or 3 times a month
- Once a week
- More than once a week

The following statements describe how much *your supervisor* attempts to ensure that *you are utilizing SYSTEM X*. Please *circle the number* that indicates the extent to which you *agree or disagree* with each statement.

	Completely Disagree	Disagree	Slightly Disagree	Neither Disagree nor Agree	Slightly Agree	Agree	Completely Agree
My supervisor spends time with me explaining the tasks I have to do to appropriately utilize <i>SYSTEM X</i>	1	2	3	4	5	6	7
My supervisor frequently monitors whether I am following established procedures for <i>SYSTEM X</i> utilization	1	2	3	4	5	6	7
Specific performance goals are established for using <i>SYSTEM X</i>	1	2	3	4	5	6	7
I receive feedback from my supervisor concerning the extent to which I achieve goals concerning <i>SYSTEM X</i> usage	1	2	3	4	5	6	7
My supervisor reviews how I do my job when I do not attain <i>SYSTEM X</i> goals	1	2	3	4	5	6	7
If I do not meet performance goals associated with <i>SYSTEM X</i> , I am required to explain why	1	2	3	4	5	6	7
I frequently receive feedback on how I am accomplishing performance goals as they pertain to <i>SYSTEM X</i>	1	2	3	4	5	6	7

The following statements describe *your perception of characteristics of your organization*. For purposes of this survey, your organization should be thought of in terms of use of *SYSTEM X*. For example, if the information that you and your peers put into and retrieve from *SYSTEM X* is only available to other members in your department, then your department should be considered your organization. Please *circle the number* that indicates the extent to which you *agree or disagree* with each statement.

	Completely Disagree	Disagree	Slightly Disagree	Neither Disagree nor Agree	Slightly Agree	Agree	Completely Agree
This organization shows very little concern for me	1	2	3	4	5	6	7
This organization cares about my general satisfaction at work	1	2	3	4	5	6	7
This organization really cares about my well-being	1	2	3	4	5	6	7
This organization strongly considers my goals and values	1	2	3	4	5	6	7
This organization cares about my opinions	1	2	3	4	5	6	7
Even if I did the best job possible, this organization would fail to notice	1	2	3	4	5	6	7
This organization takes pride at my accomplishments at work	1	2	3	4	5	6	7
This organization is willing to extend itself in order to help me perform my job to the best of my ability	1	2	3	4	5	6	7
Help is available from this organization when I have a problem	1	2	3	4	5	6	7

The following statements describe *how YOU feel about SYSTEM X as it relates to YOU and YOUR work*. Please circle the number that indicates the extent to which you *agree or disagree* with each statement.

	Completely Disagree	Disagree	Slightly Disagree	Neither Disagree nor Agree	Slightly Agree	Agree	Completely Agree
Using <i>SYSTEM X</i> in my job enables me to accomplish tasks more quickly	1	2	3	4	5	6	7
Using <i>SYSTEM X</i> improves my job performance	1	2	3	4	5	6	7
Using <i>SYSTEM X</i> increases my productivity	1	2	3	4	5	6	7
Using <i>SYSTEM X</i> enhances my effectiveness on the job	1	2	3	4	5	6	7
Using <i>SYSTEM X</i> makes it easier to do my job	1	2	3	4	5	6	7

I find <i>SYSTEM X</i> useful in my job	1	2	3	4	5	6	7
Learning to operate <i>SYSTEM X</i> was easy for me	1	2	3	4	5	6	7
I found it easy to get <i>SYSTEM X</i> to do what I wanted it to do	1	2	3	4	5	6	7
My interaction with <i>SYSTEM X</i> is clear and understandable	1	2	3	4	5	6	7
I found <i>SYSTEM X</i> to be flexible to interact with	1	2	3	4	5	6	7
It was easy for me to become skillful at using <i>SYSTEM X</i>	1	2	3	4	5	6	7
I found <i>SYSTEM X</i> easy to use	1	2	3	4	5	6	7

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Further reading

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