

Antecedents to Relational and Nonrelational Source Use: An Exploratory Investigation

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Abstract

Drawing a distinction between relational and nonrelational sources, we explore the antecedents to selecting an information source. The antecedents to use have been categorized into job, individual, and source characteristics. Two theoretical models are developed and tested using working professionals. The differences between the models are highlighted and discussed. The results indicate that there are differences in the drivers of source selection which could have direct implications for the design of knowledge management systems.

1. Introduction

Knowledge has become one of an organization's most valuable resources, and knowledge management rests on the assumption that the intellectual capital within an organization is valuable and that proper utilization of this resource will lead to beneficial outcomes for the organization [1].

Knowledge can reside in any of a number of different locations within an organization including documents, employees, policies, and even embedded within the organizational culture [2, 3, 4]. With knowledge being widely distributed around the organization, a major challenge in knowledge management is getting knowledge resources to individuals when they are needed [5]. How individuals select the sources they use to acquire information and knowledge, has received relatively little attention, though recent work has investigated how individuals access others for knowledge [1, 6].

Numerous types of sources exist that an individual can access ranging from customers to online databases. In this context, a source is a repository that can provide knowledge or information [7]. Prior work has categorized sources in many ways, but we distinguish between relational and nonrelational sources [8]. Where prior work has often tangled the use of an information source together the use of the information itself, our conceptualization focuses solely upon factors

lead to source selection, regardless of what it is to be used for

A relational source can be viewed as a source that requires some sort of interaction with another individual while a nonrelational source requires no such interaction. This distinction has important implications for knowledge management. Polanyi's distinction between tacit and explicit knowledge suggests that when easily codified information is needed one would choose a nonrelational source whereas when one needed information that is difficult to codify, a relational source would be chosen [9, 10]. The goal of this research is to explore the differences between the factors that lead to the use of relational and nonrelational sources. By understanding what factors drive source selection, we hope to provide guidance for the development of KMSs.

This paper progresses as follows. First a brief background about KM is discussed. Next the constructs that would impact source selection are presented. These constructs are applied to the selection of relational and nonrelational sources in two models. These the models are tested, and the results discussed. Lastly implications for KM and future research are discussed.

2. Background

Since the goal of KM is to manage knowledge as a resource, it must be realized that seeking knowledge is a response to a need. At its most basic level the individual needs to learn something, and in the instance of going to an external source to access knowledge, the individual has chosen to learn from the experiences of others [11].

While a knowledge management system (KMS) generally refers to a type of information system designed to manage organizational knowledge [2], others warn about over emphasis on the IT aspects of a KMS [12, 13]. IT can be an important enabler of a KMS, but differences in the disparate sources linked together through KMS also need to be addressed.

KMSs have become commonplace for technical support personnel [14] but KMS usage in this context remains low [15]. Even the best IT enabled KMS is of little value if it is unused. By understanding the antecedents to source selection, KMSs can be designed to encourage use. In terms of KMSs, IT has blurred the line between relational and nonrelational sources, so to some extent if one of the goals of KM is to make relational sources available through nonrelational means, we are moving in the right direction [2, 16].

Several antecedents of source selection have been identified in previous. These antecedents typically fall into three categories—job, individual and source characteristics [17]. In this research we identify two constructs that fall into each category. Within job characteristics are task complexity and knowledge type. The individual characteristics under investigation are transactive memory and boundary spanning. Lastly, the source characteristics are source accessibility and quality. Quality and accessibility have both been shown to be direct antecedents to source use [17, 18] but it is unclear whether the other factors have a direct relationship with use or if their effects are mediated by quality and accessibility.

2.1 Job characteristics

Job characteristics have been shown to influence work behaviors and thus are expected to influence source selection. Prior work has focused on task complexity and its relationship with number of sources used [17]. In this study the effects of task complexity and information type on accessibility, quality and use are investigated.

Task complexity is comprised of three dimensions—component, coordinative and dynamic complexity [19]. The most common view of complexity is component complexity. This is simply the number of non-redundant tasks. Coordinative complexity refers to the relationships between task inputs and outputs. Dynamic complexity reflects changes in the environment that influence the relationships between task inputs and outputs [19]. The first two types relate to the task and the last one deals with the a priori determinability of the task [20].

These three types of complexity influence information seeking tasks. More complex tasks require more, and often different, information. Information can serve to reduce complexity as the more an individual knows about a task, the easier it is to accomplish that task [21]. In situations where dynamic complexity is an issue the information requirements will be more tacit as a general rule. Because the environment cannot be completely explained people will need access to

contextualized information in order to adequately deal with their situation. When faced with dynamic complex tasks, we expect to see a difference between relational and nonrelational use.

While we expect to see differences in the effects of complexity between relational and nonrelational use, we also surmise that it will impact source quality and accessibility. In the case of more complex tasks an individual will be willing to work harder to access a necessary source and as such will not perceive it as less accessible. We also expect a relationship between complexity and quality since the literature suggests that quality information is useful with little or no refinement, any sort of information that addresses the complexity is likely to be seen as higher in quality.

The type of information typically required can also influence source selection. Many different categorizations of information exist, but the bulk of them tie back to Polanyi's observation that some knowledge is hard to explain or transfer while other knowledge is more easily transferred [9, 10]. One such classification that integrates well into Polanyi's conceptualization was developed by Byström and Järvelin [20]. This conceptualization classifies information into three broad categories [20]. Domain information refers to theories, scientific laws, and other facts. Problem information is characteristics about the problem that can be garnered from viewing the problem space. Problem solving information is the expertise in the treatment of a problem. These three types of information correspond well with Polanyi's tacit and explicit dimensions of knowledge [9, 10]. Domain information is much like explicit knowledge whereas problem information can be either tacit or explicit and problem solving information is generally tacit [20].

Domain information is the "lowest" level of information. It can easily be codified and transferred. As subjective interpretation is needed, the information is harder to transfer via non-relational sources, which would lead an individual to refer to relational sources. Knowledge management systems (KMS) are systems that are designed to be a non-relational source, but are often treated as a relational source [22]. Lower levels of information will be associated with non-relational sources while higher levels will be associated with relational sources; hence we expect to see a difference in effect of information type between relational and nonrelational sources.

The type of information that is needed may also impact perceptions of accessibility and quality. When more explicit knowledge is needed, relational sources will be seen as higher quality and more accessible,

while the converse will be true when tacit knowledge is what the individual requires.

2.2 Individual characteristics

Characteristic unique to the individual could also reasonably be expected to influence source selection. We explore two individual traits that are expected to directly impact knowledge and information-seeking behavior: transactive memory and boundary spanning. Although transactive memory was initially investigated with regards to intimate dyadic relationships [23, 24, 25] it can also be applied to groups of individuals [26, 27]. The effect of transactive memory on source accessibility, quality and use is investigated. Boundary spanning would also be expected to influence source selection although for this construct only the relationship to use is investigated.

Transactive memory (TM) has been defined as a shared memory system for encoding, storing and retrieving information [28]. Where initially used to explain behavior and memory systems within intimate couples [23, 24, 25] TM has recently been applied to groups as well [29, 30]. Individuals in continuing relationships come to rely on others to supplement their own limited cognitive resources [29].

Transactive memory develops over time with repeated interactions. The formation progresses through three distinct stages. The first is stereotyping, whereby knowledge is assigned internally to a person based on certain external attributes. For example, one would expect women to be knowledgeable about different things than men. The key to building a reliable TM system is to move beyond this default level.

There are several ways to advance the creation of the system. For instance, one person could accept responsibility for a certain domain of knowledge. To the group from that time forward, that person is the repository for that type of information. A second method results from the disclosure process whereby group members learn who has experience in various domains because other members display expertise or share information regarding their expertise. A third means is by knowing other member's access to information. For example, being the first to access something new, or having a longer history with a certain type of information. Others will assume that person knows more than themselves [28].

By relying on others to act as information stores, the other group members are free to develop deeper levels of understanding within their own area of expertise, but still have access to others' task relevant information [27]. Individuals are dependent on one another for

acquiring, remembering, and generating knowledge [31]. Traditionally perfect knowledge awareness was assumed so everyone within a system knew who knew what.

In today's workplace, teams are often distributed or otherwise separated. Geographical distance, lack of trust, organizational structure, or even culture can impede the development of a transactive memory system within a team [31]. In cases where a TM system has formed, the expectation is that individuals who have well developed TM systems will view relational sources as more accessible, of higher quality, and will use them more than nonrelational sources. Because of this, we expect TM will impact relational and nonrelational sources differently.

Boundary spanners are individuals that cross organizational boundaries. Most commonly boundary spanners are thought of as operating where the organization meets its external environment, but as organizations have grown more complex, boundary spanners also bridge boundaries within an organization [32]. As organizations become more specialized internally idiosyncratic language and jargon naturally develop within a group. Boundary spanners have the ability to understand and recode that specialized language for use by other functional groups outside the original group [33]. Seen from this perspective, boundary spanning is a role an individual takes on or develops over time through interacting with knowledge sources.

Individuals who demonstrate high levels of communication across organizational boundaries are called task coordinators [34]. In acting as a boundary spanner, the individual often has access to the information that is to be transferred [35]. Being a role boundary spanner would not be expected to impact views of accessibility or quality since by the nature of their role as a boundary spanner they already have access to the information and have most likely already judged its quality. Though being a boundary spanner would directly impact use.

2.3 Source characteristics

Two source characteristics have consistently been shown to influence source selection: accessibility and quality [17, 18, 36].

While the accessibility of a source can be viewed from several perspectives, this research takes a cognitive view of accessibility. In the past, accessibility has focused on physical access to a source [18, 37]. Accessibility has been investigated as a broader construct including the social and cognitive availability of others [38]. In today's workplace the expanded view

of accessibility as social and cognitive accessibility is more appropriate given that physical accessibility is much less of a concern than it was in the past. Whether the individual uses a relational or nonrelational source the more accessible a source is, the more likely it is to be used.

The quality of a source has also been shown to impact use. While individuals do not always use the highest quality information available, the amount of faith placed in the information is related to how the user perceives its quality [39]. Information quality has been shown to be an important determinant in information systems use [40, 41]. While there is some degree of trade-off on quality based upon how accessible a source is, given equal levels of accessibility, individuals prefer higher quality sources [37, 39]. Since these factors apply to all sources, we do not expect to see differences in their effects between relational and nonrelational sources.

3. Methods

We use the constructs discussed above to explore the antecedents to information quality, accessibility and use. The effects of these constructs are used to test two models, one for relational sources and one for non-relational sources. We expect transactive memory, task complexity and information type to impact accessibility, quality and use of both types of sources, although we expect to see differences between the effects on the two categories of sources. Further we expect accessibility, quality and boundary spanning to influence use of both types of sources.

3.1 Item measures

Source types have been conceptualized into both relational and nonrelational sources [8]. We use eight sources: printed media, static internet pages, dynamic webpages, knowledgebases, supervisors, coworkers within a functional department, coworkers outside the functional department, and others outside the organization. A priori these were expected to fall into four non-relational and four relational sources. Factor analysis on accessibility, quality, and use was used to group the sources. As expected the sources grouped into relational and non-relational sources. Knowledgebases, which were expected to be a non-relational source, behaved as relational sources. This may suggest that people treat knowledgebase the same as other individuals [22]. Based on this analysis, three sources were treated as nonrelational and five were treated as relational.

To measure the use of each type of source two different measures were used. The first was a Likert

scaled item that asks how frequently an individual used a particular source. The second item ask the participant to rate their percentage use of a particular source. These items were standardized then combined to create the measure used for each source. To get a measure of overall relational or nonrelational use, the usage of the source types were then combined into an overall use measure for relational and nonrelational use. Both of these scales were created by the authors and the items are show in appendix A.

Items for accessibility were taken from Zmud et al. which used a semantic differential scale on five adjective pairs [38, 42]. Accessibility was measured for each source type. Again individual source measures were combined to produce a single accessibility score for relational and nonrelational accessibility. These adjective pairs are shown in appendix A.

Quality has been conceptualized at both the informational and system level. For this study, system quality was not measured and the focus was only on information quality. System quality was not assessed because the focus is solely on the information the individual access not perceptions of the system providing the information. Information quality is still a multidimensional construct [43, 44]. Two items to measure quality were taken from all three subscales of McKinney, Yoon and Zahedi's quality measure [43]. The items are shown in appendix A. The items from this scale not included were general overview questions and given that the items were being used on eight sources, we tried to minimize the redundancy in items. Quality was measured on each source type, and combined to form a single relational and nonrelational quality score.

Transactive memory is a mental shared knowledge system. Individuals carry a mental model of who knows what within their organization. This construct was measured with all four items taken from Peltokorpi [31]. These items are shown in appendix A.

Individuals who perform as boundary spanners help transfer technology and information across organizational boundaries [45]. Two items, shown in appendix A, to measure boundary spanning were taken from Keller and Holland [45].

Task complexity was measured using items taken from Goodhue's task-technology fit instrument [46]. The four items correspond closely to the conceptualization of component and coordinative complexity [19]. These items are in appendix A.

Type of information was conceptualized along the tacit--explicit dimensions as posed by Polanyi [9, 10]. To measure the type of information an individual needed, a semantic differential scale was used that was

Table 1. Means, standard deviations, reliabilities and correlation of constructs (nonrelational)

	mean	s.d.	ICR	1	2	3	4	5	6	7
(1) use	0	0.57	1	1						
(2) access	4.91	0.97	1	0.34	1					
(3) quality	4.88	0.70	1	0.35	0.26	1				
(4) transmem	5.66	1.13	0.87	0.13	0.20	0.21	0.78			
(5) complex	5.49	1.32	0.86	0.29	0.29	0.15	0.13	0.78		
(6) info type	3.19	1.51	0.78	0.19	0.00	-0.08	0.00	0.26	0.73	
(7) boundary	5.36	1.28	0.77	0.14	0.23	0.16	0.18	0.48	0.24	0.8

Diagonal elements in the correlation table are the square root of the average variance extracted. For adequate reliability the root of the AVE should be greater than the off diagonal elements.

Table 2. Means, standard deviations, reliabilities and correlation of constructs (relational)

	mean	s.d.	ICR	1	2	3	4	5	6	7
(1) use	0	0.39	1	1						
(2) access	5.21	0.85	1	0.30	1					
(3) quality	5.21	0.66	1	0.37	0.56	1				
(4) transmem	5.66	1.13	0.87	0.13	0.27	0.41	0.79			
(5) complex	5.49	1.32	0.86	0.13	0.11	0.16	0.10	0.77		
(6) infotype	3.19	1.51	0.77	-0.06	-0.14	-0.11	0.01	0.26	0.73	
(7) boundary	5.36	1.28	0.85	0.27	0.24	0.27	0.17	0.48	0.19	0.86

Diagonal elements in the correlation table are the square root of the average variance extracted. For adequate reliability the root of the AVE should be greater than the off diagonal elements.

comprised of three adjective pairs. These items were developed by the authors, and are shown in appendix A.

3.2 Sample characteristics

To investigate the above exploratory model a purposive sample of 204 working professionals was recruited from part time MBA classes at two different universities. Only individuals currently working in industry were allowed to participate. Average work experience in the sample was 4.41 years (S.D.= 4.48 years, N=201). Most participants were either technically or managerial career orientation, but a few reported themselves as clerical or other. Eighty participants (40.6%) identified themselves as technically oriented and 99 (50.3%) had a managerial orientation. Lastly, 123 participants (60.3%) were male, and 79 (39.1%) were female.

3.3 Data analysis

Both models were tested using partial least squares (PLS) regression. PLS is a structural equation modeling technique that allows both the structural and measurement models to be tested simultaneously [47].

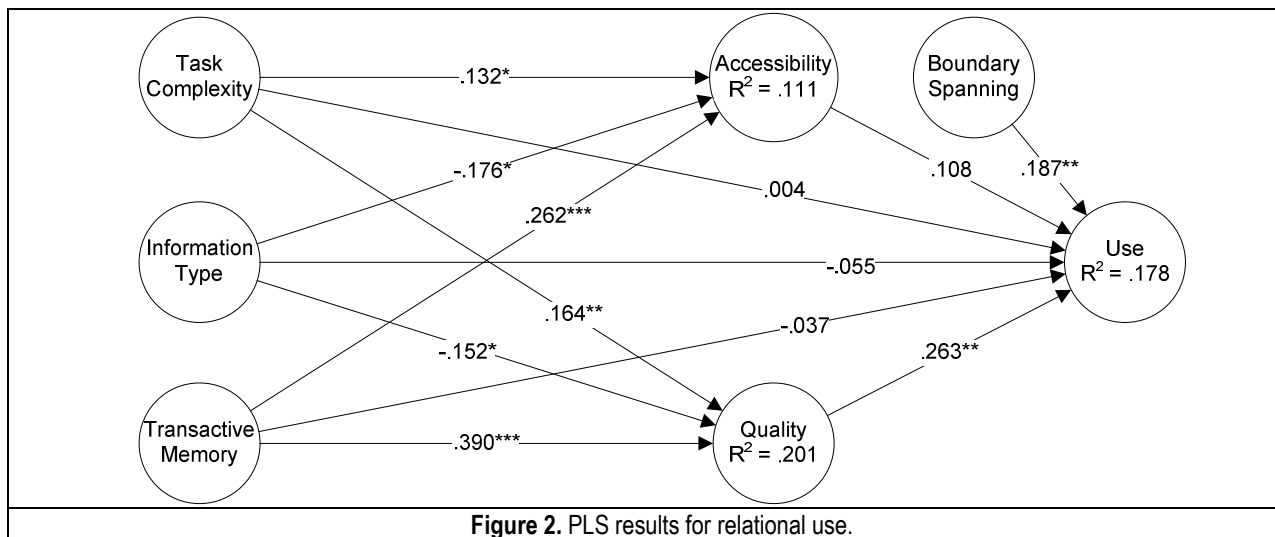
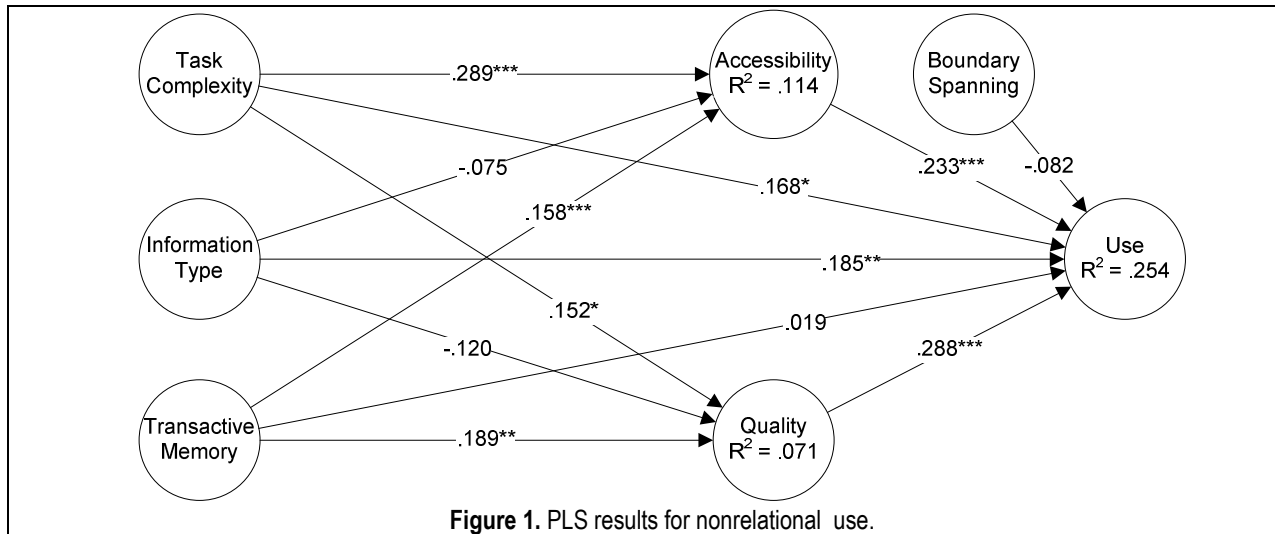
PLS is appropriate when the focus is on theory development and is preferred over SEM techniques such as LISREL for that reason [48]. The measurement model examines the psychometric properties of the items used to measure the constructs, while the structural model tests the relationships between the exogenous and endogenous variables [49]. Analysis was performed with Visual PLS (ver 1.04b1) which is a graphical interface to LVPLS (ver 1.08).

4. Results

PLS analysis was conducted in two steps. First the measurement model was analyzed to assess the model reliability and validity, then the structural model was analyzed which assesses the theoretical model. The relational and nonrelational models were analyzed separately. The differences between the two models are highlighted and discussed.

4.1 Measurement model

To assess the psychometric properties of the instrument, the composite reliabilities (ICR) and average variance extracted (AVE) were calculated.



Both are interpreted much like a Cronbach's alpha and an ICR greater than .70 is considered acceptable for research [50] while the AVE, which measures the variance captured by the indicators relative to the measurement error should be in excess of .50 [50]. The data demonstrates acceptable reliabilities and AVEs for both the relational and nonrelational models (see Tables 1 and 2). To evaluate convergent and discriminant validity for both models, the correlations and factor loadings of the constructs were examined. When the square root of the AVE of a construct is greater than its correlation with other constructs, this is evidence of discriminant validity. Another way to demonstrate discriminant validity is to examine the factor loadings, and when the loadings within a construct are higher than its loadings on other constructs [51]. All items meet both methods of

determining convergent and discriminant validity (see tables 1 and 2). The results of the factor loadings are not included due to space limitations, but are available from the first author.

4.2 Structural model

A bootstrapping procedure (100 resamples) was used to generate t-statistics and standard errors for the two models [51]. The beta weights and R squared values for the nonrelational model is shown in figure 1, and figure 2 has this same information for the relational model.

When the job characteristics were analyzed for relational sources, task complexity has a significant relationship with both accessibility ($\beta=.132, p < 0.05$) and quality ($\beta=.164, p < 0.01$). Task complexity had no relationship to use ($\beta=.004, p > 0.05$). Type of

information is also related to accessibility ($\beta = -.176$, $p < 0.05$) and quality ($\beta = -.152$, $p < 0.05$). Lastly, information type exhibited no direct relationship to use ($\beta = -.055$, $p > 0.05$).

For the individual characteristics, transactive memory had a significant relationship with both accessibility ($\beta = .262$, $p < 0.001$) and quality ($\beta = .390$, $p < 0.001$) though this construct did not directly influence use ($\beta = -.037$, $p > 0.05$). Boundary spanning, on the other hand, did exhibit a significant relationship with use ($\beta = .187$, $p < 0.01$).

Surprisingly, the accessibility of relational sources did not impact the use of relational sources ($\beta = .108$, $p > 0.05$). The quality of relational sources did exhibit a positive and significant relationship with use ($\beta = .263$, $p < 0.01$). In all 11.1% of the variance in relational accessibility and 20.1% of the variance in relational quality is accounted for by transactive memory, task complexity and information type, and those constructs as well as relational accessibility, quality and boundary spanning explain 17.8% of the variance in relational source use.

For the job characteristics when nonrelational sources are investigated, task complexity is significantly related to nonrelational quality ($\beta = .289$, $p < 0.05$) and accessibility ($\beta = .152$, $p < 0.001$), and it is also has a significant relationship to use ($\beta = .168$, $p < 0.05$). Type of information is not significantly related to either quality or accessibility ($\beta = -.075$ and $-.120$, $p > 0.05$), but it does have a significant relationship directly to use ($\beta = .185$, $p < 0.01$).

The individual characteristic of transactive memory has a significant relationship with both nonrelational quality ($\beta = .189$, $p < 0.01$) and accessibility ($\beta = .158$, $p < 0.001$) but not nonrelational use ($\beta = .019$, $p > 0.05$). Boundary spanning was not related to nonrelational source use ($\beta = -.082$, $p > 0.05$).

For nonrelational sources, both accessibility and quality were significantly related to nonrelational source use ($\beta = .233$ and $.288$, $p < 0.001$). In the nonrelational model, transactive memory, task complexity and information type explained 11.4% of the variance in accessibility, 7.1% of the variance in quality, those factors as well as quality, accessibility and boundary spanning explain 25.4% of the variance in nonrelational source use.

This analysis highlights several interesting differences between these models. Information type differed between the two models in its relationship to quality, accessibility and use. In the nonrelational model it directly affected use whereas in the relational model its effects were fully mediated through quality and accessibility. Task complexity directly effected use

in the nonrelational model while its effects were fully mediated through quality and accessibility in the relational model. Boundary spanning directly impacted use in the relational model where it had no effect in the nonrelational model. Lastly accessibility did not affect use in the relational model.

5. Model comparisons and discussion

The results show that differences in antecedents of relational and nonrelational source use exist. These differences have implications for the design and implementation of organization knowledge management systems. One interesting result is that knowledgebases appear to behave as a relational source. This result suggests that an important focus in developing these systems needs be on the quality since this factor has a direct impact on use relational sources, and fully mediates the effects of task complexity, information type and transactive memory.

The results for other factors also have interesting implications, in particular the negative relationship between information type and quality merits further investigation. This is particularly important since information type was positively related to nonrelational use and negatively related to relational accessibility and quality. This result is counter to most of the prevailing thought. Tacit knowledge that is seen as sticky and as residing in people's heads would naturally suggest the use of relational sources. Instead it appears that people go to nonrelational sources when they need tacit knowledge. Further they rate the accessibility and quality of relational sources *lower* when they need tacit knowledge.

More complex tasks lead to nonrelational source use instead of relational sources. While relational sources can selectively present knowledge, individuals still appear to prefer nonrelational sources when task complexity is high. The need for more tacit information has long been associated with the use of relational sources [37, 52, 53]. Further individuals use the highest quality source available so this negative relationship to quality is surprising [39]. Since relational sources can selectively present and tailor the information to the seeker maybe it is the selective presentation that impacts quality. This is an area future research should investigate.

That accessibility did not have a relationship with relational source use seems surprising given that accessibility has been seen as a primary driver of use across all categories of sources [18]. Other work has shown that accessibility has a lesser impact on use for relational sources than for nonrelational sources [22]. Perhaps this is due to the multitude of technological

advancements in communication. Relational sources are more accessible than ever before due to cell phones, e-mail, instant messengers and other technological solutions designed to keep people connected to each other.

As would be expected, boundary spanners tended to use relational sources. Acting as a knowledge broker is associated with using relational sources.

Another difference between the models is that while task complexity, information type and transactive memory explained about 11% of the variance in accessibility in each model, their effect on quality was quite different. Whereas 20% of the variance in quality was explained in the relational model, only 7% was explained in the nonrelational model. This would indicate that there are different antecedents impacting quality for nonrelational sources. Nonrelational sources have the credibility of the publishing organization standing behind them in the case of sources such as printed materials. Even in the online arena there is still likely to be a carryover effect if the publishing organization has an established reputation. Since quality impacts nonrelational use, understanding what impacts quality can help in designing nonrelational KMSs.

In terms of use, only 17% of the variance in use was explained in the relational model while 25% was explained in the nonrelational model. Quality and boundary spanning were significant predictors in the relational model. The others were fully mediated through quality. Once again this suggests that steps taken to improve perceptions of quality can have dramatic impacts in organizational knowledge management and should be paramount in the design if KMS.

While not a difference between models, another interesting finding was that transactive memory impacted the quality and accessibility of *nonrelational* sources. The studies that have looked at TM specifically only did so among groups of individuals [29, 30]. A transactive memory system is a shared memory system and knowing what others have access to is part of TM. In instances where someone goes to another for some sort of knowledge and the other person provides the seeker with a book the argument can be made that the seeker used a nonrelational source. This may explain why TM has a relationship with nonrelational accessibility and quality. While this relationship is not as strong as for relational sources, it is still significant. Future research can investigate more fully the nature of the relationship between TM and nonrelational quality and accessibility.

6. Conclusion

This study explored the antecedents to source use, and our results contribute by expanding the nomological network around information seeking. Where prior works have focused on accessibility and quality alone [17, 18, 52, 53], this research found that job and individual characteristics play important roles as well.

Although prior work has demonstrated the impact of accessibility and quality on use, this study shows that accessibility and quality have different impacts on use depending on whether relational or nonrelational sources are accessed. While the effects of some antecedents were anticipated, other findings were surprising and offer avenues for future work.

In an information driven environment, KMSs need to be designed to maximize expedient use of the system. By designing systems to encourage use in accordance with the antecedents that enhance selection, KM efforts will be more successful. While this study is exploratory, it provides an interesting first view into what drives source selection and offers some interesting ideas for future work.

7. References

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Appendix A. Survey items.

Below are the items used in data collection. Since the accessibility and quality measures were measured on each of the eight source types, only one set of questions is shown. The other constructs are shown in their entirety.

Use was measured with the following items:

"How often do you use [each of the eight sources] in your daily work tasks" (very infrequently...very frequently), and "Indicate the approximate percentage of the time you use [each of the eight sources] this column must sum to 100."

Accessibility was measured on a semantic differential scales. The adjective pairs were available/ unavailable, dependable/ undependable, convenient/ inconvenient, accessible/ inaccessible and personal/ impersonal.

Quality used a Likert scale. The items were "The information I get from [each of the 8 sources] is [six different items]" The six different items were "clear in meaning, easy to comprehend, accurate, credible, informative and valuable" (strongly disagree—strongly agree).

The four **transactive memory** items are: I am able to identify a person with relevant knowledge in my company. I know who has what kind of specialized expertise in my company. I know who is assigned to what task in my company. People in my work unit

know the right people and sources of information to perform efficiently (strongly disagree—strongly agree).

The **boundary spanning** items were I frequently recommend work related sources to fellow employees. Fellow employees frequently seek job related information from me. (strongly disagree—strongly agree).

The **task complexity** items were: In my job, there is a great deal of variety in the problems, issues or questions for which I need data. The business problems I deal with frequently involve more than one business function. In my work I frequently have to think about business problems and the associated data in new ways. It is necessary to spend time thinking about how best to address a business problem before I begin an analysis. (strongly disagree—strongly agree).

The adjective pairs used to measure **information type** were explicit/ tacit, easy to express/ difficult to express and specific/ vague.