

## **A Framework for Inter-organizational Knowledge Sharing: Managerial Influences**

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### **Abstract**

*The purpose of this paper is to determine whether an existing organizational knowledge management framework could be utilized in an inter-organizational domain. We selected the threefold KM framework developed by Holsapple and Joshi (2000; 2002). This framework has been well tested and provides clearly defined elements to examine the influences on knowledge management and knowledge sharing in an organizational context. We report the results of testing the framework in three inter-organizational case studies and propose some adaptations to the managerial influences for inter-organizational analysis.*

### **Keywords**

Inter-organizational, knowledge sharing, framework, managerial influences

### **INTRODUCTION**

In knowledge management (KM) research, most attention has been in an organizational context. While we recognize that organizational issues are important, increased collaboration between organizations and with government agencies have identified additional KM and knowledge sharing (KS) issues in the inter-organizational domain. Our paper is concerned with these inter-organizational KM and KS problems.

We propose that the threefold knowledge management framework developed by Holsapple and Joshi (2000; 2002), while primarily an organizational framework can be applied for inter-organizational analysis. The framework identifies three key areas that influence KM and KS (managerial, resource and environmental). Within these three influences have been identified a number of factors that characterize KS.

To test the applicability of the framework by Holsapple and Joshi (2000; 2002) in an inter-organizational context we have used case studies involving regional sustainable development groups. Such groups bring together a mix of government and industry members to examine sustainable development issues that affect the region. The groups collaborate to develop policies and practical applications on sustainable development that meet regional needs. They can cross boundaries between business and government offering opportunities for collaboration on projects, foster the sharing of knowledge and broaden the understanding and views of those organizations involved (von Malmborg 2003).

These inter-organizational groups include a mixed membership between multiple government, business, non-profit and educational organizations with potentially differing agendas that can be more complicated than found in single industry inter-organizational ventures. This means that members can have a greater difficulty developing a mutual understanding, a key requirement in successful knowledge sharing (Cohen & Levinthal 1990; Lawson et al. 2009).

This paper is part of a wider study to develop a framework for KS in inter-organizational groups. In this paper we focus specifically on testing the managerial influences. The paper provides an overview of the threefold KM framework in general and discusses in more detail the managerial influences included in the framework. We then

describe the methodology used in the research. We outline the results of testing the framework in three inter-organizational case studies and propose some adaptations to the managerial influences for inter-organizational analysis. The paper concludes with a discussion on the implications and limitations of this framework for inter-organizational research.

## **KNOWLEDGE MANAGEMENT FRAMEWORKS**

Based on a literature search, a number of information systems and KM frameworks were considered. In our search, we found little evidence of KM frameworks developed for an inter-organizational context but there were some available for an organizational context that potentially could be adapted for inter-organizational usage.

In the broader information systems research we considered usage of social exchange theory (SET). SET provides opportunity to examine why members of a group would exchange a resource that could be of value to them and what value they receive in return (Blau 1964; Emerson 1976). In the context of our research, the resource would be knowledge. While not specifically an inter-organizational theory, SET would provide opportunity to understand the motives for the different organisations and their individual representatives involved in these sustainable development groups to share knowledge with other organisations. However, we chose not to utilize SET as it is focused only on the value of exchanging knowledge between the individual members or organizations without consideration of any other factors that may influence or inhibit KS in these sustainable development groups.

KM frameworks that were considered included Szulanski's model on knowledge transfer (1996), Wiig's KM pillar framework (1993) and Holsapple and Joshi's threefold knowledge management framework (2000; 2002).

Szulanski's model on knowledge transfer focuses on intrafirm transfer of best practices and the 'stickiness' of the knowledge transferred (1996). The framework provides factors to examine the stages of knowledge transfer and the barriers that can create difficulties in the knowledge transfer process.

Wiig's KM framework outlines three pillars for managing organizational knowledge: a) the adequacy of knowledge; b) evaluating knowledge and knowledge activities; and c) governing KM activities (1996). The focus of this framework is on managerial influences that affect KS in an organization.

These two frameworks were not selected as they were considered too narrow in the elements they examined for inter-organizational usage. In the case of Szulanski's model, the focus on knowledge retention within the organization did not provide any factors for examining motivation for sharing or knowledge control. The KM framework by Wiig provides a number of factors that could be utilized for examining the managerial influences in an inter-organizational context but doesn't consider external factors or resources that also contribute to KS inherent in inter-organizational collaboration.

The threefold knowledge management framework outlined by Holsapple and Joshi provides a useful description of the characteristics that affect and influence KM and KS (2000). The purpose of the framework is to provide a foundation for the evaluation of KM processes in an organization and to stimulate investigation into KM issues by researchers.

This framework was selected because it provides a comprehensive set of elements connected to KS. Holsapple and Joshi describe the framework as providing a language for discussion of KM and KS influences and to "*help researchers systematically identify constructs that may impact knowledge sharing*" (2000, p.254-255). The framework recognises earlier KM frameworks, providing a solid connection with theoretical developments. The framework was initially developed through an analysis of the literature on KM frameworks and then finalized through use of a Delphi methodology involving KM experts that provides a level of confidence in its application.

Since its conception, the framework has been utilized by many researchers in various KM areas such as the development of critical success factors for implementing KM (Wong 2005) or the development of a model for KM success (Jennex & Olfman 2009). The framework has also been used to examine the organizational KM strategy at Nortel Networks (Massey et al. 2002) and the KS barriers in the United States Air Force (Myers 2006).

Our research looks at the application of the threefold framework to an inter-organizational context. We test how the framework, as it is, applies in an inter-organizational context and propose adaptations for inter-organizational application. The focus of this paper is on the managerial influences but our future work extends beyond this to resource and environmental influences on inter-organizational KS not found in other frameworks considered.

## **THE THREEFOLD FRAMEWORK**

The key influences identified in the framework are managerial, resources and environmental. Holsapple and Joshi identify managerial influences as those that involve the administration of the knowledge processes in the

organization (2000; 2002). There are four main factors identified: leadership, coordination of the knowledge, controlling the knowledge and measurement of the effectiveness of knowledge management and sharing. Resource influences include both knowledge resources and other resources that can affect the way knowledge is managed and shared in an organization. The key resource factors include artifacts such as office space, the human participants, the infrastructure, organizational culture and funding. While managerial and resource influences on KM are predominantly internal, Holsapple and Joshi also identify a third, external influence on knowledge management and sharing as environmental (2000; 2002). These external environmental influences include the competition, governmental climate and technology changes that an organization has little control over.

As a part of the development of their framework, they proposed several variations for use in exploration of different organizational KM issues. These variations maintain the same three key influences and factors, only adjusting the perspective of those factors for a different investigation such as ethical considerations of knowledge management, outsourcing and knowledge sharing. Our research utilizes the knowledge sharing perspective.

As the focus of this paper is the application of the managerial influences in an inter-organizational context, this next section discusses managerial influences specifically.

### Managerial Influences

As mentioned above, managerial influences are about administering the management and sharing of knowledge. Holsapple and Joshi identify four key factors that have managerial influence on KS; coordination, control, leadership and measurement (2000; 2002). Within each of these factors they identify a number of elements that are summarised in Table 1.

*Coordination* is about managing dependencies in a knowledge-based organization such as the development of reward structures to encourage knowledge sharing. The elements to consider in coordinating organizational sharing include the development of reward and incentive systems and the scheduling of knowledge flows to maximize the opportunities for sharing. The focus of coordination is to ensure that those involved can see the benefits of participating and sharing knowledge.

*Control* is focused on ensuring that the needed resources and processes are available in a quality and quantity to promote knowledge sharing. Elements within control include defining the knowledge content and the quality of knowledge that is shared, establishing channels for sharing knowledge that allow all participants ample opportunity and the protection of knowledge sources including retention of those sources.

Table 1 Managerial Influences

Factors	Coordination	Control	Leadership	Measurement
Elements	Reward systems	Knowledge content	Building a trusting environment	Assessing/evaluating knowledge sharing processes
	Incentive systems	Channels of sharing		Reward evaluation
	Scheduling knowledge flows	Quality of knowledge		Measurement of what and how much is shared
		Protection of sources		Impact on organizational performance

Sourced from Holsapple & Joshi 2000, Table 6, p256

In the development of their framework, Holsapple and Joshi (2000, 2002) recognised that the core competencies of *leadership* are to coordinate, control and evaluate the conditions for knowledge sharing. Thus leadership has an impact on all areas of the managerial influences of the framework. However, the specific focus in the model for leadership is on the characteristics of the leaders and their role in the group's knowledge sharing. The key element for leadership is developing conditions for knowledge sharing is the development of a trusting environment where participants feel that their contributions are valued.

*Measurement* involves the evaluation of the knowledge sharing processes and the knowledge obtained. It can provide ways of evaluating the contribution of these processes for management (Wong 2005). While measurements can be linked to financial results, it can also relate to non-financial and intrinsic items (Holsapple & Joshi 2000; Malone 1997; Webber 1997).

## METHODOLOGY

This research is a multi-case study based on three sustainable development inter-organizational groups. The purpose of this paper is an examination of the threefold knowledge management framework by Holsapple and Joshi (2000) applied in an inter-organizational context. In this paper, the focus is on the application of the managerial influences of the model.

This research was undertaken utilizing mixed methods which allowed for the collection of different data during the phases of the research leading to a richer understanding of the knowledge sharing issues faced by the inter-organizational sustainable development groups. In addition, the multiple methods for data collection and analysis allowed for validation of the results by being able to confirm or test results against other sources (Mingers 2001).

### Case Study Background

The three regional sustainable development groups studied were established between 2002 and 2007. These groups involve a mix of personnel from local and state government, industry, education and non-profit organizations. Details of membership can be seen in Table 2.

A case study approach was used because our overarching research project is to understand how these inter-organizational groups share knowledge. Where in-depth understanding and a focus on how or why a phenomenon works in a contemporary situation, a case study research method is appropriate (Yin 2009).

Table 2 Case Study Demographics

Group	Established	Members	Member Type	Interaction Frequency	Leadership	Governance
A	2002	34	Local/State Govt, Industry, Education, Non-profit	Bi-monthly	Chair	Board
B	2006	180	Local/State Govt, Industry, Education, Non-profit	Bi-monthly when funded	Facilitator	Committee
C	2007	21	Local/State Govt, Industry, Education	Monthly	Facilitator	Board

### Data Collection

Data was collected through three primary methods:

1. Questionnaires to obtain demographic and network data.

The purpose of the preliminary questionnaire was to collect network data on personal networks, who the members of the groups feel are the experts and who they talk to outside of group meetings. The questions utilized were adapted from research by Giuliani (2005) who used social network analysis to examine cluster knowledge networks in the Italian and Chilean wine industries. Similar to Giuliani's research, we wanted to examine the knowledge expertise and knowledge channels. The only changes to Giuliani's questions were to suit our sustainable development context and knowledge areas. To improve the accuracy of responses in the questionnaire, we utilized a free choice approach to the questions, allowing participants to name as many or as few as they wished (Wasserman & Faust 1994). We also chose a rostered recall approach rather than free recall in the listing of names in the groups (Wasserman & Faust 1994). Participants were provided with a list of the group member's names to aid as a prompt to who was part of the group. As the three case studies have evolving memberships and not all members can attend every meeting, provision of a roster of names aided participants in naming the members they felt best suited each question.

In order to obtain a very detailed network analysis on knowledge experts and personal network ties as a channel of knowledge sharing we collected additional responses from one of the groups (Group A).

2. In-depth interviews from a random sample of members across the three groups to obtain deeper insights of why members participate in these sustainable development groups, what incentives they receive through participation, group leadership and control of knowledge sharing processes

The in-depth interview utilized semi-structured, focused, questions to allow us to talk to individual members about the group and the group's knowledge sharing processes. Some of the questions were adapted from Tang (2008) on knowledge sharing in inter-organizational collaborations in the biotech industry. Tang's questions looked at why members of the inter-organizational group would participate in knowledge sharing and what

they received from that participation. These questions resonated with our research to understand the intrinsic benefits in participation with an inter-organizational sustainable development knowledge sharing, particularly industry member's that risk the loss of competitive advantage through participation. We adapted Tang's questions on why members would collaborate and what they would discuss, adjusting them for our sustainable development context. These questions allow us to see why an organization agreed to be a part of these knowledge sharing groups as well as what the group actually discuss.

Additional interview questions covered such aspects as external knowledge sources, perceptions of the group's processes and operations, membership in competing sustainability groups and attitudes towards technology as a communication method. The knowledge from these questions allowed us to develop an understanding of the group's infrastructure and contributed to developing an understanding of the environmental influences of the framework.

3. Direct observation of group meetings to gain an understanding of the internal workings of the groups and each member's roles.

Direct observation of group meetings allowed us to acquire knowledge on the patterns of social interaction in their natural environment (Henn et al. 2009). Specifically, we were able to observe how the group communicates as a whole, the group structure, the leadership methods, what was being shared as well as how the members interact. Direct observation can give a different perspective to what the participants themselves think may be happening. Observation allows us to develop a connection with the members of the group and to build familiarity and trust that aided in carrying out the interviews.

A summation of the data collection methods can be seen in Table 3 showing their relation to the analysis method and purpose of enquiry.

### Data Analysis

Table 3 Data Collection and Analysis Methods

Data Collection & Analysis Method	How the Method was Used	Purpose of the Method	Contributes to Managerial Factors
20 questionnaires (from group A). Social Network Analysis	Develop network maps of personal networks, expertise networks and map reciprocal communication	Develop understanding of channels of KS, expertise networks, protection of knowledge sources.	Control Measurement Coordination
34 questionnaires. Descriptive statistical analysis	Mapping group demographics, participation roles, and development of external knowledge sources	Develop an understanding of how the group members share knowledge through different channels, why members participate and external knowledge sources utilised.	Coordination Control
23 in-depth interviews. Microanalysis of interview data	Performed top-down coding of interview transcripts in Nvivo using characteristics developed from theoretical framework.	Develop an understanding of why participation, channels of KS, control, leadership, filtering of knowledge, infrastructure and operations, participants and organizational beliefs	Coordination Control Leadership Measurement
14 months of observation. Microanalysis of observation data	Performed top-down coding of observation notes in Nvivo using characteristics developed from theoretical framework.	Develop understanding of organizational processes, infrastructure, knowledge shared, competition, technology usage, external KS.	Coordination Control Leadership Measurement

Data analysis involved social network analysis based on the questionnaire complimented by microanalysis of interview data and observational field notes. The main purpose of social network analysis is to examine the relationships between actors (Wasserman & Faust 1994). One aspect is its use in determining the relational ties

between actors as channels for transfer or 'flow' of resources, in our case the resource is knowledge. The questions specifically address the issue of who each member considers to be the most knowledgeable (quality) with regards to specific knowledge types. Data collected was directional, indicating who members talk to rather than the assumption of reciprocal communication. Network maps were developed to analyse the interaction between members in group A at the personal channel of communication. These network maps provided insight into who the prominent members of the group are in terms of communication or perceived expertise and also contributed to understanding some of the methods of protecting knowledge sources in the groups.

A top-down microanalysis was applied to interview data based on the factors and elements within the three-fold knowledge sharing framework that address how these influence knowledge sharing activities and relationships within the groups (Strauss & Corbin 1998). The microanalysis also allowed us to identify new, emerging elements on knowledge sharing in inter-organizational groups that were not part of the original organizational framework. Data from individual interviews was cross-checked to verify the roles of key experts in the knowledge network. The top-down microanalysis was performed by the lead researcher and verified by two independent researchers. A comparison of the coding results between the three researchers was carried out and clarifications made after review (Miles & Huberman 1994).

As interview data can be individualistic and focused on the individual participant. The responses from the participants can be limited somewhat to their recall and their priorities (Kvale & Brinkmann 2009). To understand how the group shares knowledge, to counter the possibility of not getting a full understanding of the issues discussed, we used observational data collected from group meetings. Field notes from observations were analysed to develop an understanding of synergies within the groups and the member's interactions. We also utilized observational data to validate our findings from the interviews and social network analysis (Mingers 2001).

## RESULTS

We applied the framework as a lens to examine KS activities in three inter-organizational sustainable development groups. The application of the framework had two purposes, to test its suitability for use in examining an inter-organizational context and to identify any possible adaptations required because of the inter-organizational use.

### Coordination

Coordination is about ensuring that participants can see the benefits of contributing knowledge and includes organization of reward systems, incentive systems to promote involvement and the scheduling of knowledge flows.

In all three of our case study groups, no traditional reward systems were apparent either during or prior to the observational period. The nature of these groups is predominantly voluntary. Members participate to represent their organizations in the group to share knowledge and develop an understanding of the wider regional issues in sustainable development. None of the groups is well funded. In most cases, some fee is provided by the participating organizations towards basic administrative costs of the groups, including in one case, the funding of the group's leader. However, there is little supportive funding available. When interviewing participants, there was little indication that the members were rewarded by their organizations for their participation in any of the traditionally recognized methods such as bonuses or promotion. Where members were promoted, it usually resulted in them leaving the group because of the changing nature of their job role which would not be an incentive to continued participation for the group.

However, we did find evidence of incentives for participation in the group both for the members personally and for their organizations. These incentives to participate were intrinsic benefits of participating. Questionnaire data showed that 65% of the organizations participated because of the opportunity to share knowledge and develop networks. Members indicated that personally, they were provided with opportunities for networking with key personnel within the region. As one member indicated, participation fast-tracked his knowledge of the key players, "*Without the (group)...it would've taken five years for me to get around all those agencies probably and make those contacts.*" Members also indicated that a key incentive was the ability to promote their own issues that have a regional affect – to get their story heard and to 'drum up' support. As an example, one education institute was able to involve members of the group in a pilot running of a carbon accounting course as members could "*participate and become advocates for the course...or encourage others, industry reps to participate.*" This incentive also applied to the member's organizations where concerns could be promoted. We observed that this allowed for opportunities to collaborate with other organizations such as in applications for funding for specific projects that were increased because of the additional support that could be provided through collaboration.

Members also indicated that the opportunity to learn other perspectives of issues, to share knowledge and develop a big picture of the issues in the region were key incentives for their participation (Van Der Meer et al.

2012) Members indicated that the group provided opportunity “...to bring everyone in under that same roof to hear in a consistent, coordinated fashion”. Industry members indicated that through participation they could “...gauge what other organizations are thinking and what’s important to them...and that makes us a better business in the sense of us being able to offer services”.

We found that the managerial scheduling of knowledge flows as a coordination issue was limited to the organization of group meetings for members on a regular basis by the leaders. Both groups A and C had regularly scheduled meetings for members and group B also had regular meetings when funding permitted. The scheduling of knowledge flows for the smaller project groups and for individual interaction is not directed from the management at group level, but instead a bottom-up approach initiated by the members. The opportunity for members to develop these bottom-up knowledge flows is due to the infrastructure of the group (a resource influence not covered in this paper) and the control of the group and infrastructure to promote knowledge exchange (a managerial influence discussed below).

### **Control**

Control includes management of accessibility and quality of the group’s knowledge content, the channels provided for members to share knowledge, the quality of the knowledge shared amongst members and the protection of knowledge sources in the group.

Knowledge content was a key focus of all three case studies, though the focus of the content did differ between the groups. Groups A and C were focused on policy and strategy knowledge in the areas of sustainable development while group B was more focused on the practical applications of sustainable development and only concentrated on policy and strategy knowledge where it affected organizational standards and regulations. This difference is most likely because of the higher concentration of industry organization in group B. All three groups were also interested in learning about the opportunities to attract funding for projects in sustainable development as funding was a factor in all three groups.

Knowledge quality also played a key role in the control of knowledge sharing content within all three groups. All three groups expressed concerns about the high volume and uncertain quality of knowledge in the area of sustainable development, that there is “so much knowledge out there”. Members also expressed concern with the conflicting opinions in sustainable development knowledge domain. The group management in each case study have recognised that this is a growing concern. In all three groups, the leaders had developed regular email bulletins that included articles and links from media sources for their members.

Additionally, member’s perception of the quality of knowledge differed depending on the source of knowledge. However, participants did indicate that the differing sources of knowledge were necessary, despite conflicting opinions because of the far reaching implications of sustainable development. As the leader of one group summed it up “*Research bodies tend to have a fairly disdainful approach to local government ... and a lot of local government tends to think of academics as woolly headed and impractical but we need all these different sets of knowledge to work together...but we also need practical industry, we need so much more knowledge from different areas.*”

In all three groups we found that knowledge sharing occurs through three key channels that were developed and maintained through the group. Knowledge is shared at the group level through meetings of all members at a high level. They also share more detailed knowledge based on specific projects at the working group level and through participation in the groups, the individual members were able to develop their own personal knowledge networks for specific knowledge sharing and ad hoc opportunities, explored further in Van Der Meer et al. (2011).

As part of the development of these different channels of knowledge sharing, the groups were able to provide some protection of their knowledge sources – the personnel within the group. We found that members of the groups that moved on due to promotion or job role changes were still able to share knowledge with the group through the individual networks that were developed as part of the three group’s knowledge sharing channels. This is an adaptation of Holsapple and Joshi’s (2000) views on the protection of knowledge sources which due to the organizational context are more focused on management’s need to protect knowledge sources from loss or unauthorised exposure and change. In the organizational context, protection of knowledge sources involves legal protection of knowledge through copyright or patents, social protection through staff selection and technological protection such as secure access (Holsapple & Joshi 2000). However, for these inter-organizational groups, the knowledge repository is the maintenance of a group memory developed amongst the members over time (Lehner & Maier 2000). There are no legal elements such as protection of competitive advantage. The main focus in the protection of knowledge sources is thus the ability to maintain a connection with group members if they move on thus retaining the group memory.

While confirming that these control elements developed by Holsapple and Joshi (2000) in the managerial influences of their framework did exist at the inter-organizational level, we also found indications of two other

control elements that need to be considered: *boundary spanning* of the knowledge shared and the development of a *strategic direction* and focus.

Boundary spanning involves two aspects: 1) sharing knowledge across organizational boundaries such as from the group to external organizations (Alavi & Leidner 1999; Davenport & Prusak 1998); and 2) communication boundaries for knowledge understanding and acceptance such as development of a mutual, shared understanding of concepts or perceptions (Carlile 2004). The members of all three groups are also part of their own parent organization and thus are required to report back on the developments within the group. We also found that each group has some form of oversight body that they report to. In both instances, the members were observed to apply pragmatic boundary spanning on the knowledge they communicated with these dependent, external bodies (Carlile 2004). This pragmatic boundary spanning involved filtering to improve the reception of knowledge and to prevent adverse reactions to knowledge and actions of the groups that were not yet fully developed (Van Der Meer et al. 2012). As one member explained this process “*the politics of the Board are quite different to the politics of the (group) and so the manner in what I tell the Board and when I tell them needs to be sensitively handled.*”

Each of the groups has also developed ‘terms of reference’ that outlines the purpose and operations of the group. The terms of reference document provides members with a mutual understanding of the group’s purpose and language (syntactic boundary spanning as described by Carlile, 2004). The broad membership of each group and the issues of the member’s organizations have also meant that the groups have had to deal with the different perceptions and agendas of these organizations. This has meant that the groups have had to develop semantic boundary spanning (Carlile 2004). The groups must ensure that there is flexibility in their approach in order to meet the needs of the different organizations agendas.

An additional element of control of the knowledge sharing in these inter-organizational groups has been the strategic direction and focus of the groups. This issue was not addressed by Holsapple and Joshi (2000) in their framework but is not a new issue in knowledge management (Ardichvili et al. 2003; Kawalek & Hart 2007; Riege 2005) and has impacted on the groups and their ability to share knowledge. It is possible that Holsapple and Joshi did not address the control of strategic direction and focus because in an organizational context strategic direction is considered and established outside of the knowledge sharing groups. However, in an inter-organizational context, the group itself must manage their own strategic direction and focus thus making it an appropriate addition to the framework.

In each case study, the groups at some time have had to redevelop the strategic direction and focus of the group. In groups B and C, the redevelopment of their strategic direction occurred during the observation period of this research. We found that during this period, there were minimal opportunities for knowledge sharing in the groups though ad hoc knowledge sharing still occurred through the personal network channels members had developed. For group A, the redevelopment of their strategic direction had occurred approximately 18 months prior to the observation period. Through our interviews, we learned from members of this group that during the redevelopment time the group also exhibited minimal knowledge sharing opportunities. As indicated by one member “... *there was one or two meetings when there was only maybe six people there and I seriously considered whether I was getting value out of the meetings and considered not coming.*” However, since the redevelopment, the knowledge sharing had increased as had the group’s membership and achievements.

## **Leadership**

While leadership is an element in the coordination, control and measurement of a group’s knowledge sharing (as discussed earlier) it has been isolated in the framework to focus on the role and characteristics of the group’s leaders. Holsapple and Joshi (2000) outline building a trusting environment as the key element of leadership in the managerial influences of their framework. We found that the leaders of all three case study groups did work to develop a trusting environment to encourage knowledge sharing. As part of this all three leaders described their roles as more of a facilitator than a leader. They see their purpose as to ‘*drive*’ the group and to “...*put structures in place so they can operate effectively and....get (the members) talking and working with each other.*”

However, while the leadership of these inter-organizational groups works to establish a trusting environment to encourage knowledge sharing, there are several leadership elements we saw demonstrated that also influence the knowledge sharing in these groups. These elements are 1) governance support; 2) gatekeeper and filter of knowledge and 3) effects of change.

All three of these inter-organizational groups reports to a form of governance body. These governance bodies, whether executive group or steering committee act in a position of oversight, monitoring the groups developments and also act as a champion and supporter of the groups projects to external organizations. However, the governance body also needs to show support for the leadership of the group as this can influence the development of a trusting environment and the knowledge sharing in these groups. We observed that in groups A and B, both group leaders had strong support from their governance bodies, particularly so in group A

where the CEO of the governance body attended all meetings of the group, not to lead the group but instead to show that “...*the (governance body) supports them and is interested in them and to take their matters seriously*”. She also indicated that her role was to attend and support the leader “...*to be able to support him as the chair. It’s important that I’m there as CEO to do that.*” This support allowed the leader to develop and drive the group more so than in group C where the leader lacked support for their work from the governance body with the group, contributing to a lack of knowledge sharing and group cohesion. As we observed in group C, there was a lot of tension between the group and the leader and also with the governance body. Part of this was a result of the redefining of the group’s purpose and roles. However there were situations where the governance body did not provide the support the group leader required and instead ‘blamed’ the leader. These issues were observed in at least three of the group meetings and also raised in several of the interviews undertaken.

The leadership of the inter-organizational groups we observed were the public face of these groups to external bodies. This is not to say that other members of the groups did not act as a representative. However, the leaders were the key conduit of knowledge to government, to the governance bodies, to the media and other external, independent organizations. As such, the leaders in their public role were observed as gatekeepers and filters of the knowledge disseminated from the group to the wider world (Van Der Meer et al. 2012). As mentioned in the control aspects of managerial influences, knowledge disseminated to external bodies involved pragmatic boundary spanning involving the filtering of the knowledge to improve acceptance and also the timing of when knowledge is disseminated. As the representative of the group to many external bodies, the leader of the each group made decisions on when knowledge would be disseminated to best advantage and the tone and content of group knowledge shared externally.

The leaders also filtered external knowledge coming into the group in two ways: 1) selection and distribution of quality knowledge sources (as discussed in Control above); and 2) modifying the tone and content of feedback from the overseeing governance groups. This second point was prevalent in group C during their transitional phase. The group’s leader mentioned reducing the severity of comments made by the governance body about the actions of group C. The leader believed that reporting these comments verbatim would only upset the already troubled group. By not reporting negative feedback, it was hoped to give the group time to settle into its new direction.

Additionally, the effects of changing leadership in the inter-organizational group should also be considered. All groups go through change whether organizational or inter-organizational. We have observed that in each of the groups, they had a leadership change that affected the opportunities for knowledge sharing and the group’s operations. In group A, the change of leadership brought about an improvement in the groups cohesiveness and interest in participation. In group B, the change of leadership brought about a period of inactivity while the new leader coped with a new position and other priorities that resulted in a drop in group participation. In group C, the change of leadership was in addition to the change in the group’s strategic direction. These two changes coinciding led to destabilisation in group C and a loss of knowledge sharing activities for nearly 12 months of the group’s operations.

## Measurement

Measurement includes managerial evaluation of a group’s knowledge sharing processes, the evaluation of rewards implemented, measurement of what and how knowledge is shared and the impact of the knowledge sharing on organizational performance.

Measurement of the knowledge sharing in these mixed inter-organizational groups is a difficult concept because it can be hard to determine the measures used. It is more likely in inter-organizational groups that involve joint ventures between businesses for product development or expansion of core competencies, a set of measures could be established. Additionally, in this context there is a management body that would carry out the measurement. However there is little opportunity to link the knowledge sharing that occurs in sustainable development groups to financial results as proposed by Lev (1997), Malone (1997) or Stewart (1997) and suggested by Holsapple and Joshi (2000) in their threefold framework.

It is possible to assess the value of knowledge sharing processes in the groups through intrinsic measures (Webber 1997). The difficulty with utilising these intrinsic measures is that the knowledge sharing is often only one element in the outcome of the measures and thus may not be wholly or even partially the reason for a positive or negative assessment.

While interviews indicated a clear sense of accomplishment within the groups in terms of their knowledge sharing and collaboration, we found that none of the three groups carried out any particular measurement of their knowledge sharing processes or the impact their knowledge sharing has on the group or the organizations the members represent. However, we have identified proxies that could be used to assess the knowledge sharing, such as changing attendance and membership levels in the groups, the cohesiveness of the members and the outcomes of projects and collaboration opportunities. For example, in group A, the last 18 months has seen a

slowly increasing membership from approximately 20 members to 30 but more importantly attendance at the group meetings has increased from an average of six members to more than 20. For group B, while membership has increased, the lapse in the group's operations in 2010 has meant that attendance at group meetings has dropped from an average of 60 members as indicated through interviews to an observed average of only 20 members at events.

Knowledge sharing does not occur where members are unable to work together or communicate, thus group cohesiveness has been observed as a potential measure for these inter-organizational groups. We observed that group A has a very tight knit community that actively exchanges knowledge outside of the group meetings. Group C has been going through changes during the observation period that has meant problems in group meetings. Members of group C have developed cliques supporting different views on the restructuring that has resulted in some tension during group interactions and reduced knowledge sharing opportunities in group meetings. However, all members interviewed indicated that they contact members of the group regularly through the personal network level. Even when there are problems through one channel of knowledge sharing, a group can still have a cohesive structure through other channels. We found from analysis of the knowledge networks and meeting observations that some of the members that did not attend group meetings often, were considered to be an important source of knowledge and respected via the personal networks.

## DISCUSSION

The purpose of this paper is the testing of the framework by Holsapple and Joshi (2000; 2002) to determine its relevance for applicability in an inter-organizational context and through testing, identify any adaptations that might be required.

Holsapple and Joshi identified 12 elements within the managerial influences of their framework for use in KS (2000). We found that six of these elements can apply as is, in both the organizational context and in an inter-organizational context. The existing elements that work in both domains are: the coordination of incentives to encourage participation and knowledge sharing and the scheduling of knowledge flows; control of the knowledge content, the channels of sharing and quality of knowledge shared within the group; and the role of the leader in building a trusting environment.

Table 4 Inter-organizational Adaptation and Extension of Managerial Influences

Factors	Coordination	Control	Leadership	Measurement
<b>Existing Elements</b>	<u>Reward systems</u>	Knowledge content		<i>Assessing/evaluating knowledge sharing processes</i>
	Incentive systems	Channels of sharing	Building a trusting environment	<u>Reward evaluation</u>
	Scheduling knowledge flows	Quality of knowledge <i>Protection of sources</i>		<i>Measurement of what and how much is shared</i>
<b>New Elements</b>		Boundary spanning	Governance support	<u>Impact on organizational performance</u>
		Strategic direction and focus	Gatekeeper/filter	

Table key: underlined text – elements that have low application in an inter-organizational context; normal text – elements used in both organizational and inter-organizational context; italics text – elements modified for an inter-organizational context.

However, from our results we have identified three elements that still work in the framework if the characterization of them is modified and three elements that have limited application in an inter-organizational context. Additionally, we have developed four additional elements that play an important role in an inter-organizational context.

The elements in the framework that work with some adaptation are the control over protection of sources and measurement for assessing knowledge sharing processes and what and how much is shared. In our testing of the framework, these three elements were evident in our results, as described above. However, they did not fully match the descriptions provided in the original framework. For example, the protection of sources is described in the original framework as protection from loss, obsolescence and unauthorised changes or exposure such as through technological safeguards but with an emphasis on explicit organizational knowledge (Holsapple & Joshi 2000). We have broadened the concept of knowledge loss to include maintaining a connection to the tacit

knowledge of members who have moved on from the group. The main knowledge repository in the group is the group memory, the member's experiences and knowledge. Loss of a member can mean a loss from the group memory. However, through the establishment of multiple channels of sharing that includes a close-knit personal network between members, the group can maintain a connection or, as described by Wegner (1995), a directory to members that move on, keeping their knowledge accessible to the group. Through reinterpretation of the characterization of these elements as described in the framework, we have been able to utilise them in the new domain of inter-organizational knowledge sharing.

In our research there were cues of three elements of the framework, the coordination and measurement of rewards and the impact of knowledge sharing on organizational performance. However, their usage and influence on inter-organizational knowledge sharing was minimal. We had suspected that the coordination of rewards to promote knowledge sharing in the inter-organizational groups would have little application and thus little implication on the evaluation of rewards. In our observation of the three case study groups, prior to the testing of the framework, we had recognised that these inter-organizational sustainable development groups have little funding that could be used in the form of traditional rewards such as bonuses. The funding the groups do receive is predominantly through government grants that would prohibit the establishment of monetary rewards (Liebowitz 2004). Additionally, while these sustainable development groups are made up of members who represent a diverse number of organizations, the groups have no direct impact on the members organizations other than through the provision of knowledge and the incentives of participation discussed in the Results section.

These observations have led us to determine that these three elements have a low level of application in the inter-organizational context. However, we have chosen not to remove the elements from the framework as it is possible that they could have application in other inter-organizational groups. For example, in an inter-organizational joint venture between industries, an evaluation of the impact of knowledge sharing on organizational performance would be valid (Zack et al. 2009).

Through our testing of the framework for inter-organizational use, we found four reoccurring managerial issues that were not represented within the existing framework elements. We have added these elements to the framework. These four issues were the concerns over controlling boundary spanning of knowledge sharing and the strategic direction of the groups and the role of governance support with the group's leaders and the leaders role in knowledge sharing to external bodies. Each of these four issues has had significant impact on the knowledge sharing in these inter-organizational groups. Due to the inter-organizational nature of the groups, they must deal with and report to a diverse number of organizations with differing perspectives and agendas.

These issues add a level of complexity to the inter-organizational groups that may not be present in an organizational context and thus have not previously been considered in the development of the original framework. For example, in a knowledge sharing group developed within an organization, the strategic direction of the group is established by the management and would be in-line with the organizations business strategy. This provides the group with an established focus and direction that defines the group's purpose, for example as in the Honda case study examined by Nonaka and Takeuchi (1995). Additionally, where these knowledge sharing groups are established to allow for development of ideas for a project, there is a known management champion that supports the group and its designated leader. In the inter-organizational sustainable development groups we examined, the strategic direction is defined within the group and can be subject to change as discussed above. The groups also report to a governance body that has its own agendas and may not automatically support the leader of the group.

It is possible that these four issues that we have added as new elements to the framework may apply in an organizational context also.

## CONCLUSION

Our aim in this research was to determine whether an existing organizational KM framework could be utilized in an inter-organizational domain. We selected the KS version of the threefold KM framework developed by Holsapple and Joshi (2000; 2002). This framework has been well tested and provides clearly defined elements to examine the influences on KM and KS in an organizational context. The purpose of this paper was the testing of the framework to determine its relevance for application in an inter-organizational context and through testing, identify any adaptations that might be required.

Through our research we have shown that the threefold KM framework does have relevance in a differing domain than its original design. The implications of this research are that this framework, with suggested modifications, can provide a lens for examining the KM and KS influences on inter-organizational.

The results presented in this paper have been limited to an examination of the managerial influences. The context for testing the framework has also been limited to examination of inter-organizational sustainable development groups that involve a mix of government and industry members and that operate with little funding support.

Our research is continuing with an examination of the other two influences of the framework, resources and environment, in the same context to see how these can be applied in an inter-organizational context. The obtained insights indicate the potential for applying the framework in other inter-organizational settings such as joint ventures in industry and other government-industry collaborations.

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