Knowledge and Information Sharing in Transnational Knowledge Networks: A Contextual Perspective

Sharon S. Dawes, Mohammed Gharawi, Brian Burke
Center for Technology in Government
University at Albany
187 Wolf Rd., Suite 301, Albany, NY 12205
+1 518 442 3892
sdawes{mgharawi}{bburke}@ctg.albany.edu

Abstract

As government agencies increasingly collaborate with international counterparts on critical global issues, transnational knowledge and information sharing grow in importance. This paper explores the nature of Transnational Knowledge Networks (TKNs) and identifies critical contextual factors that hinder or enhance their performance. We explore a set of contextual distances that separate the participating organizations and discuss their potential influence on the success of TKNs. The paper concludes with a conceptual framework and a set of testable hypotheses to guide the next phase of our research in understanding knowledge and information sharing across national and cultural boundaries.

1. Introduction

Governments of the world are evolving toward a complex global network of political, societal, and economic dependencies, enabled in part by the expanding capabilities of information and communication technologies. These international engagements demand new kinds of knowledge sharing networks and information systems that combine both social and technical dimensions. Slaughter [55] describes these networks as a key feature of 21st century governance, arguing that the international system is not only one of formal relationships among sovereign states, but of less formal links among public, private, and nonprofit entities that interact with each other on the basis of expertise and interest rather than formal power. These networks rely heavily on informal interaction, persuasion, and information to deal with critical areas such as security, the global economy, and environmental protection.

This paper reflects a current research effort to analyze the actual experiences of government and partner organizations in the United States, Mexico, and China as the basis for both conceptual models and practical tools for effective transnational knowledge sharing. With a focus on transnational knowledge networks in air quality monitoring and improvement, an area with significant domestic and international impact, the research addresses these questions:

- What are the main characteristics of TKNs?
- What are the factors that may promote or hinder their success?
- Which strategies, tools, and behaviors are more likely to lead to successful transnational knowledge networks that benefit individuals, organizations, and communities?

This research effort is exploring these questions through two case studies, one in North America and one in Asia, as vehicles for exploring the factors that shape transnational knowledge networks and for building, testing, and refining a methodology for conducting such work in more depth in the future. The North American case involves the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua, El Paso, Texas, and Doña Ana County, New Mexico Air Basin (JAC) [32]. The JAC was formed in the mid to late 1990s in response to concerns about poor air quality in this US-Mexico border region. This transnational knowledge network comprises members representing all levels of US and Mexican governments as well as academic researchers, industry, and environmental advocacy groups. Since the network's inception, the partners have worked collaboratively to share knowledge and information in an attempt to collectively address air pollution problems that span the border region. The JAC has influenced national, federal, state, and local air quality policies as well as facilitated joint US and Mexican projects that have reduced air pollution in the region. This initiative constitutes an operational transnational knowledge network [10].

In the second case, a transnational knowledge network is emerging in relationships involving the United States and China. This initiative, known as AIRNow-International (AIRNow-I), involves the US EPA, the Shanghai Environmental Monitoring Center

1530-1605/11 $26.00 © 2011 IEEE

(SEMC), and several other US and Chinese partners. The Shanghai initiative is based on the US AIRNow program which provides the US public with easy access to air quality information for over 300 cities via a publicly available Web site. It also disseminates information to the media and other outlets including *USA Today* and the Weather Channel [1]. The AIRNow-I represents US EPA's efforts to update and enhance AIRNow in collaboration with international partners. Shanghai is the first international partner in this initiative. Over the past four years, US EPA, SEMC, and other partners have worked closely on adapting the US AIRNow technology in Shanghai. The launch of the new Shanghai air quality reporting system occurred in early May 2010 as part of the Shanghai World Expo. Because the AIRNow-I Shanghai effort is at an earlier stage of collaboration than the US-Mexican JAC initiative, it offers an opportunity to observe and analyze it as it develops.

Data from both cases will be analyzed with a focus on transnational knowledge and information sharing from the point of view of each country and culture. A cross-case analysis will then be used to build a preliminary model of information flow and use across national boundaries, taking into account the cultural contexts involved.

In this paper we present the conceptual basis for an integrated framework to assess the contextual dimensions in the two cases. The framework embodies the complexity surrounding knowledge and information sharing in trans-governmental networks. In the next section we identify the main characteristics and processes embedded within these networks and propose a definition of success. The paper then discusses the contextual factors that affect success as they relate to three layers of complexity: information and knowledge content, organizational context, and the national contexts where the interaction takes place. We then introduce several factors that can be conceptualized as contextual "distances" that exist when organizations in different countries interact. These are grounded in the literatures of Knowledge Transfer (KT), Cross-Boundary Information Sharing (CBIS) and Public Sector Knowledge Networks (PSKN). We conclude with an integrated conceptual framework as well as propositions that will be tested in the cases studies that comprise the next phase of our research.

2. Defining and understanding TKNs

If successful international collaboration demands knowledge and information sharing networks, we need to understand them better and understand what makes them succeed or fail. In this section we draw on research on cross-boundary information sharing and integration, public sector knowledge networks, and knowledge management to develop a definition of TKNs and to identify ways to define and measure success.

2.1 Defining TKNs

In its simplest form a transnational knowledge network can be understood as two governmental sub-units located in different countries involved in the exchange of knowledge, information, or both in order to address a mutual concern [24]. However, research in related areas indicates that this simple conceptualization of TKNs masks their multi-dimensional and interdependent character and a high degree of complexity.

Many policy domains have engaged in the development of organizational networks to improve knowledge and information sharing capabilities across traditional organizational boundaries. Public sector knowledge networks or PSKNs [19] for example, comprise a multidimensional combination of interorganizational relationships, policies, information content, professional knowledge, work processes, and technologies brought together to achieve a collective public purpose. Similarly, recent research on cross-boundary information sharing and integration (CBIS) in public health and criminal justice in the United States has produced a useful definition that can be applied to TKNs. This work defines CBIS as a complex multidimensional phenomenon with four interrelated components: trusted social networks, shared information, integrated data, and interoperable technical infrastructure [25].

In line with this previous work, we conceptualize TKNs as multidimensional organizational phenomena of interdependent components that include political, social, organizational, and technical dimensions which influence performance. The knowledge and information sharing exchange that occurs in these networks is an unfolding process involving collaboration and learning as two facilitating processes.

These intertwined processes and their international setting give TKNs their main characteristics: They cross national borders and may include both government and non-governmental actors; the exchange and learning processes are bi-directional for all participants; they involve diverse types of knowledge and information content; and they operate at the sub-national level and therefore are influenced but not closely controlled by the participating organizations' respective legislators or executives (24).

2.2 Defining and measuring TKN success

In order to understand how TKNs perform we need to consider what constitutes successful performance and what internal and external influences or conditions make success more or less likely. A review of the knowledge management literature reveals several approaches. For instance, studies that consider technology and innovation transfer relate success to the degree to which transferred knowledge is re-created in the recipient organization [43]; others relate knowledge transfer success to the degree to which "a recipient obtains ownership of, commitment to, and satisfaction with the transferred knowledge" [14, p. 42].

However, knowledge transfer is only one aspect of TKNs. When viewing TKNs as multi-dimensional interdependent collaborations, a multi-dimensional performance framework is more appropriate. Drawing on Dawes [19], performance can be assessed though structural measures such as the size of the network and its resilience and survival over time, by performance measures such as achievement stated goals, as well as learning, quality and efficiency metrics; and by interaction measures such as fairness, conflict resolution, and satisfaction. Structural, performance, and interaction measures can all be assessed for their impact on the network as a whole, on each participating organization, and on the individuals involved. We adopt this multi-dimensional view in our subsequent discussions of contextual factors and their effect on TKN success. The following sections identify these contextual factors, discuss their influence, and incorporate them into an integrated model to aid better understanding of the full range of contextual complexity.

3. TKNs: A contextual perspective

Many researchers argue the importance of contextual elements when studying knowledge utilization and sharing [2, 31]. Based on extensive review of pertinent literature in e-government and international knowledge management, among others, we identified contextual elements that characterize the external and internal environments of the individual organizations that participate in TKNs. These contextual factors can be understood as three layers of complexity: information and knowledge content; organizational context; and national context (Table 1). The content layer represents the main characteristics of the knowledge and information being exchanged. The organizational context embodies the structures, capabilities, and constraints of the governmental units involved in the exchange. The national context corresponds to the cultures and political systems that surround the interaction [24].

Table 1: Contextual factors influencing organizations participating in TKNs

Layer	Factors
Knowledge and Information Content	o Type o Value o Sensitivity o Confidentiality o Degree of standardization o Embeddedness o Codifiability
Organizational Context	o Goals and interest o Trust and past relationships o Executive support o Perception of risk o Perceived costs and benefits o Organizational culture o Leadership o Authority and hierarchical structures o Rules and procedures o Resources o Absorptive capacity.
National Context	o Culture o Political support o Laws and policies o Language

3.1 Knowledge and information content

The knowledge and information content to be exchanged in TKNs can vary in several respects. Researchers have distinguished between two main types of knowledge: tacit and explicit [44, 47]. Tacit knowledge is hard to communicate and deeply rooted or embedded in action, involvement, and commitment within a specific context [7, 44]. Knowledge that is explicit and codifiable is more readily transferable [61]. Similarly, articulability, the degree to which knowledge can be expressed in language, numbers, formal procedures and explicit techniques, can affect the effectiveness of knowledge sharing [5].

The value of the content being exchanged may also influence the effectiveness of the exchange process especially when participating organizations perceive knowledge they have as a key organizational asset [61]. Sensitivity, confidentiality and lack standards or common definitions may also hinder sharing [16].

3.2 Organizational context

Lane and Lubatkin [36] argue that the ability of an organization to learn from another is jointly determined by the relative characteristics of the two organizations. Accordingly, research shows that many organizational

level factors may influence the effectiveness of TKNs. Generally, organizational interests are rooted in goals, missions, and priorities. Participants' perceptions of risks, costs, and benefits are additional critical factors that affect the success of knowledge networks [16, 62]. Organizational structures and cultures [34, 60] and a variety of capabilities [11] also play a significant role in the success of information sharing activities.

In addition, trust is essential for establishing, developing, and maintaining inter-organizational relationships [51, 38, 12]. Trust is influenced by the history of past relations and has direct consequences for establishing and sustaining collaboration [37].

Authority is another major influence on the performance of networks [49, 60], although formal authority alone is insufficient to ensure successful and willing participation in many settings [23, 53]. Previous research has also demonstrated the importance of leadership, executive support and organizational commitment in promoting the success of information sharing [3, 4, 17, 23].

Finally, availability and compatibility of resources influence the ability of participants to evaluate, assimilate, and use external knowledge. Researchers refer to this as absorptive capacity and identify it as a main factor that may hinder or promote success of sharing across boundaries [8, 35].

3.3 National context

Previous research demonstrates that difficulties associated with transforming and sharing knowledge through international collaboration result from differences in national, organizational, and professional cultures [6]. Sharing activities in TKNs are likely to be influenced by the characteristics of the external environment such as national culture, language, political interests, and existing laws and policies [18]. Lucas [39] argues that the location of subsidiaries in multi-national corporations along cultural dimensions such as power distance or individualism-collectivism, [29], significantly impact knowledge sharing. Generational and gender-oriented differences as well as different time orientations can have similar impacts.

Language differences represent an obvious challenge in international collaborations as the need for both literal and conceptual translation adds complexity, difficulty, and opportunity for error [21, 22]. Finally, as TKNs involve at least two organizations located in different countries, the institutional environment, and more specifically, the existing laws and policies of the participating agencies' respective countries will influence operation and success of TKNs. Similarly, the type and level of political support for the initiative also influences prospects for success [23].

4. Contextual distances

The contextual factors discussed above all create distance between the participating organizations that affect their ability to understand and engage with each other. The idea of contextual distance is a useful way to organize and examine these factors. We organize them into six categories of distance: cultural, political, organizational, relational, knowledge, physical, and technical. For each category we offer a testable proposition that addresses the essential conceptual argument.

4.1 Cultural distance

The term "culture" refers to shared beliefs, values, and practices [42, 57]. Social scientists use the concept to differentiate among social collectives such as groups, organizations, and nations. The distance between beliefs, values, and practices strongly influences cross-cultural interaction, including knowledge and information exchange [42].

Generally, knowledge sharing becomes more difficult when cultural distances become greater. For instance, as cultural distance increases, more time has to be allocated for communication, development of common managerial approaches and designing compatible work routines [46]. These factors may extend the time required to achieve the desired goals and consequently affect the success of the TKN.

Additionally, cultural distance has negative consequences for collaboration and learning processes which are integral to sharing activities in TKNs. In knowledge management research, Tiemessen et al. [58] point to the potential problems that may result from differences in partners' national and organizational cultures. With regard to the influence of cultural distance on learning, Lyles and Salk [40] argue that cultural distance may lead to misunderstandings that may minimize flows of information and learning. Similarly, Ting-Tommy [59] argues that intercultural interactions are often filled with second guesses and misunderstandings due to differences in language and communication styles as well as different value orientations.

Moreover, Schlegelmilch and Chini [52] assert "human capability to capture and understand complex facts is rooted in a cultural setting and, thus, tends to differ across cultural areas" (p. 220). Consequently, some researchers argue the importance of considering learning styles and techniques in various cultures [50].

On the positive side, however, as the duration of a cross-cultural relationship increases, trust is expected to improve [28] and cultural distances tend to shrink [41], as the partners become more familiar with each

other's expertise and idiosyncrasies [54]. This kind of learning increases the effectiveness of sharing activities among participating agencies and consequently increases the chances of success.

> **Proposition 1:** Differences in beliefs, values and norms, and language will create misunderstandings, cause delay, and generate conflicts that impede collaboration and negatively influence learning in TKNs.

4.2 Political distance

Political distance reflects the gaps and conflicts among the existing laws and policies, political interests and agendas of the home countries of participating organizations. The influence of political distance may range from affecting the ability of participants to create a stable collaborative environment to influencing their ability to carry out specific kinds of activities. Laws governing intellectual property, trans-border data flow, privacy protection, contracting and other topics may or may not match. In addition to the gap between existing laws and policies, the distance between political philosophies can present competing or conflicting views and agendas. For example, one view may favor open access to information, and the other may favor restrictions or censorship.

In TKNs where interaction involves both developed and developing countries, aspects of the legal systems and infrastructures may be well-established on one side and missing or under developed on the other. In such cases, the political distance would be larger and participants may face legal barriers that may impede sharing activities. From the developing country side, barriers such as lacking for enacted laws, ineffective enforcement of existing laws, and frequent changes in the legal infrastructure are all possible challenges. On the other hand, the well established legal infrastructure on the side of a developed country may impose restrictions that limit the ability of participants to establish or sustain their engagement [63].

> **Proposition 2:** The greater the gap and conflicts among existing legal frameworks and political interests, the less likely participants will be able to initiate and sustain a TKN.

4.3 Organizational distance

Many organizational level factors strongly influence the effectiveness of TKNs. Inkpen and Dinur argue that "the differences between organizational units stand at the core of understanding their ability to utilize and share knowledge" ([31], p. 6).

Organizational distance begins with differences in mission and goals [16]. It also refers to the "degree of dissimilarity between the partners' business practices, institutional heritage, and organizational culture" ([54], p. 473). Similarly, Schlegelmilch and Chini [52] define organizational distance as differences in structures, processes, and values. Narteh [42] argues that organizational differences in many respects (such as decision-making processes, norms, objectives, and organizational structures that define authority and responsibility relationships) are likely to affect the ways employees interact and consequently the effectiveness of the knowledge sharing process.

Differences in absorptive capacity, or the ability to evaluate, assimilate, and use external knowledge introduces different learning rhythms that influence the facilitative effective of learning on knowledge sharing processes [35]. Additionally, Khamseh and Jolly [33] argue that stable, unstable, unilateral or disputed relations are explained by variations in the absorptive capacity of participants.

Differences in organizational resources are also important. When participating organizations are at different levels of development, have different stature in their countries, or enjoy different amounts of discretion over spending, their ability to contribute to the goals of the TKN will reflect those differences.

> **Proposition 3:** The greater the distances among participants regarding organizational goals and interests; formal structures, rules and procedures; organizational culture; absorptive capacity; and resources the less likely they are to successfully initiate and sustain a TKN.

4.4 Relational distance

The extent to which participating organizations know and relate to each other also influences TKN success. Relational distance is shaped by the duration and type of historical interactions among the participating organizations. The distance is greatest when participating organizations collaborate for the first time. As time passes, the distance tends to decrease. Inpken [30] argues that organizations that have worked together in the past are more likely to have a basic understanding of each other's skills and capabilities, which provides impetus for learning. Positive previous ties can establish an adequate level of trust that allows participants to forgo the relationship-building processes which are necessary for participants working together for the first time.

Simonin [54], studying knowledge transfer in strategic alliances, states the importance of contrasting more established alliances with more recent ones. He notes the duration of the relationship has a counterintuitive moderating effect on organizational distance which was found to be nonsignificant for more recent alliances, and significant for longer-established ones, perhaps reflecting an unrealistic honeymoon period at the beginning and a more complete understanding of differences as the relationship develops over time.

Thus, relational distance implies challenges that may impede the collaboration and learning that facilitate sharing in TKNs. Generally, a prior positive relationship can facilitate trust, which is a main promoter of collaboration in any network. Such prior relationships also enhance the ability to resolve conflicts. Norman [45] argues that over long relationships participants develop behavioral expectations and understanding of each other, and become subject to norms of reciprocity. These effects enhance collaboration in a variety of ways that contribute to the overall success of TKNs.

> **Proposition 4:** The likelihood and extent of success in TKNs is lowest in newly-formed relationships and rises as relationships mature and develop over time.

4.5 Knowledge distance

Knowledge distance refers to differences in the existing knowledge bases of the participating organizations. Cummings and Teng [14] find that an appropriate overlap of knowledge is conducive to the success of knowledge transfer. Conversely, there is a negative relationship between the extent of knowledge distance and transfer success.

Generally, knowledge distance influences the learning process which facilitates the sharing activities in TKNs. Grant [27] contends that learning performance is negatively influenced when the object of learning is not related to what is already known and when a common language for interpreting experience does not exist. Similarly, Powell et al. [48] state that what can be learned is significantly influenced by what is already known. Also, Szulanski [56] finds participants that engaged in related business prior to knowledge transfer are likely to possess similar knowledge bases that reduce the difficulty of transferring knowledge from one organization to another.

However, the dynamic relation between knowledge distance and sharing success is also important. As knowledge distance shrinks, the chances for participating organizations to locate and access new knowledge outside their own knowledge bases decreases and that may influence their willingness to collaborate [30] and their ability to solve novel problems. Conversely, as the differences in their knowledge bases increase, it will be more difficult to create a learning relationship [30].

> **Proposition 5:** When participants possess a moderate level of similarity in their existing knowledge bases, learning and willingness to collaborate will be enhanced and will contribute to TKN success.

4.6 Physical distance

Physical distance generally refers to the relative geographical locations of participating organizations. Some researchers discuss the difficulties that physical distance presents for conducting face-to-face meetings which are necessary for establishing relationships and for transferring tacit knowledge [14, 15]. Others point to the influence of physical distance on the development of social capital among the individuals of participating organizations which is crucial for the development of good communication and the sustainability of the network [9]. When participants are widely dispersed across geographic areas, effective communication among people in different locations and smooth transmission of data may be hindered. In addition, in multi-participant efforts, those in closest physical proximity tend to engage more often and more fully, while those farther away are less involved. [63].

The problem of physical distance is a frequent focus for applications of information and communication technology, but there is strong evidence that face-to-face engagement remains essential for group formation and for complex communication and group-level creativity [13].

> **Proposition 6:** The ability of participants to communicate effectively and maintain a high quality of interaction is likely to decrease as the physical distance between participant locations increases.

4.7 Technical distance

TKNs, may involve information sharing, data integration or interoperability of systems across national boundaries. Technical factors thus present challenges that may impede the success of TKNs. Technical distance is shaped by the differences in the IT infrastructures and capabilities of the participating organizations. Previous research in information

systems points to different levels of complexity of IT infrastructure and telecommunications as a pressing concern for development of systems that cross national boundaries [65].

Similarly, transnational digital government studies emphasize the roles that technical distances and capabilities may play in the success of transnational networks. For instance, Tsugawa et al. [66] identify issues that result from differences in hardware, software and data schemes as critical to the success of transnational data sharing networks. Additionally, they contend these differences may exacerbate sociopolitical and sustainability issues by preventing the deployment of IT services that are essential for interoperability [66].

Some authors observe that technical distance in TKNs tends to shrink over time. In his study of transnational information systems, Cavaye argues that technical diversity is not a long-term challenge but instead tends to lessen over time as standardization of IT infrastructure and systems takes place among participants [64].

> **Proposition 7:** The more dissimilar the IT infrastructures and technical capabilities of the participating organizations in a TKN, the less they will be able to accomplish in terms of information sharing and integration, especially in the early stages of engagement.

5. Discussion

Based on previous discussion, we propose an integrated model that depicts the contextual complexity of TKNs (Figure. 1). The model emphasizes two kinds of context. First, it depicts the influence of cultural, political, organizational, and technical environments as three layers of complexity surrounding each participating organization. (These layers are discussed above as national context, organizational context, and knowledge and information content). These separate multi-dimensional environments strongly influence the perceptions, behaviors, and options for action for each participating organization. While the model depicts only two organizations for simplicity, these elements could be multiplied to represent networks with many members. Second, our discussion of contextual distances demonstrates the ways in which these crucial differences influence the processes and consequently the success of a TKN. These distances comprise the major elements of context for the network as a whole.

One strength of this model is that it incorporates collaboration and learning as two facilitating processes that are intertwined with the knowledge and information sharing process. Treating collaboration and learning in this way provides a basis for considering the development, operation, and performance of TKNs in a more holistic way for both researchers and practitioners. In practical terms, efforts to identify and assess cultural, political, organizational, relational, knowledge, physical, and technical distances represent a systematic approach to understanding the strengths, weaknesses, and substantive differences that participants bring to the network. These notions of distance also provide a useful way to observe changes over time. Moreover, they help us consider how distances among participants contribute to different degrees of success for the stability of network structure, for its substantive performance, and for the effectiveness of the interactions that take place.

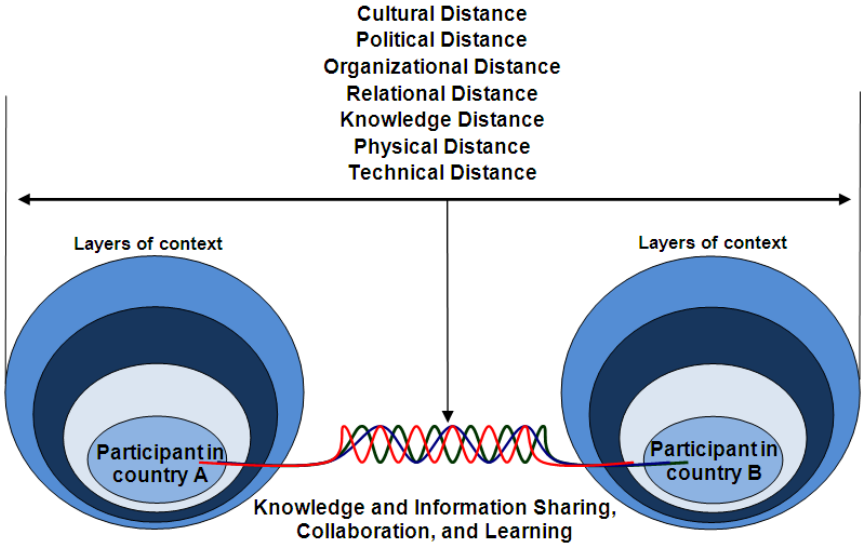

Figure 1: Model of Contextual Complexity in Transnational Knowledge Networks

The proposed model also has theoretical value as it bridges a gap between the literature of cross-boundary information sharing and knowledge transfer. Researchers in the first area have studied public sector knowledge and information sharing at three organizational levels, intra-organizational, inter-organizational, and intergovernmental within the same country [20, 26]. Strategic management research, including knowledge transfer, has addressed international engagement but within the private sector, and mainly within the boundaries of a single multi-national company. Due to the emergence of transnational knowledge networks, we argue the necessity of conducting studies to address knowledge and information sharing at the trans-governmental level where almost no empirical work has been conducted. This proposed model and the associated propositions provide a testable framework to guide the empirical work we will conduct in the subsequent phases of our research.

6. Conclusion and future research

In this paper we emphasize the importance of context in knowledge and information sharing at the trans-national level and discuss the influence of both country-specific environments and broader contextual differences among participants on the overall prospects for TKN success. The proposed model lays the foundation for future work that goes beyond description to build a more robust theory of transnational knowledge and information sharing for addressing global problems. In the next phase, we will elaborate on the basic ideas presented here to create a case analysis framework that will test the model in the JAC and AIRNow-I Shanghai cases with the goal of a refined theoretical model and a set of practical observations and recommendations for enhancing the performance of transnational knowledge networks.

References

[1] AIRNow. (2010). *AIRNow website*. Retrieved June 11, 2010, from www.airnow.gov

[2] Albino, V., Garavelli, A., & Schiuma, G. (1999). Knowledge transfer and inter-firm relationships in industrial districts: The role of the leader firm. *Technovation*, 19, 53–63.

[3] Anderson, R. H., Bikson, T. K., Lewis, R., Moini, J. S., & Straus, S. G. (2003). *Effective use of information technology: Lessons about state governance structures and processes*. Rand Science and Technology, Santa Monica, CA.

[4] Basu, V., Hartono, E., Lederer, A. L., & Sethi, V. (2002). The impact of organizational commitment, senior management involvement, and team involvement on strategic information systems planning. *Information and Management,* 39(6), 513-524.

[5] Bresman, H., Birkinshaw, J., & Nobel, R. (1999). Knowledge transfer in international acquisitions. *Journal of International Business Studies,* 30 (3), 439–462.

[6] Choi, C. J. & Lee, S. H. (1997). A knowledge-based view of cooperative interorganizational relationships. In P. Beamish and J. Killings (eds.), *Cooperative Strategies, European Perspectives*, San Francisco, CA: New Lexington Press, 33–58.

[7] Cohen, D., & Bacdayan, P. (1994). Organizational routines are stored as procedural memory: Evidence from a laboratory study. *Organization Science,* 5 (4), 554-568.

[8] Cohen, W.M. & Levinthal, D.A. (1990), Absorptive capacity, a new perspective on learning and innovation, *Administrative Science Quarterly*, 35, 128-52.

[9] Cohendet, P., Kern, F., Mehmanpazir, B., & Munier, F. (1999). Knowledge coordination, competence creation an integrated networks in globalised firms. *Cambridge Journal of Economics,* 23, 225–241.

[10] Cresswell, A., Burke, B., & Navarrete, C. (2009). *Mitigating cross-border air pollution: The power of a network*. Albany, NY: Center for Technology in Government, Retrieved May 15, 2010, from www.ctg.albany.edu/publications/reports/jac_mitigating

[11] Cresswell, A. Pardo, T., Canestraro, D., & Dawes, S. (2005). *Why assess information sharing capability?* Albany, NY: Center for Technology in Government, Retrieved June 10, 2010, from www.ctg.albany.edu/publications/guides/why_assess.

[12] Cresswell, A., Pardo, T., Thompson, F., & Zhang, J. (2006). Trust and collaboration: knowledge sharing in public sector IT innovations. In Roland Traumuller (Ed.) *Knowledge Transfer for eGovernment,* Linz, Austria: Trauner Verlag.

[13] Cummings, J., & Kiesler, F. (2005). Collaborative research across disciplinary and organizational boundaries. *Social Studies of Science*, 35(5), 703-722.

[14] Cummings, J, L., & Teng, B. S. (2003). Transferring R&D knowledge: the key factors affecting knowledge transfer success. *Journal of Engineer, Technological Management,* 20, 39-68.

[15] Davenport, T.H., Prusak, L. (1998). *Working Knowledge: How Organizations Manage What They Know*. Boston, MA: Harvard Business School Press.

[16] Dawes, S. S. (1996). Interagency Information Sharing: Expected Benefits, Manageable Risks. *Journal of Policy Analysis and Management*, 15(3), 377-394.

[17] Dawes, S. S., & Pardo, T. (2002). Building collaborative digital government systems. In W. J. McIver & A. K. Elmagarmid (Eds.*). Advances in Digital Government,* US: Springer, 26, 259-273.

[18] Dawes, S. S. & Prefontaine, L. (2003). Understanding New Models of Collaboration for Delivering Government Services. *Communications of the ACM*, 46(1), 40-42.

[19] Dawes, S. S. (2005). *Conditions and measures of success in public sector knowledge networks*. Proceedings of the Fourth International eGovernment Conference, Copenhagen. Linz: Trauner-Verlag

[20] Dawes, S. S., Creswell, A., Pardo, T. (2009). From "Need to know" to "Need to share": Tangled problems, information boundaries, and the building of public sector knowledge networks*. Public Administration Review*, 69(3), 392-402.

[21] Duan,Y., Xu, X., & Fu, Z. (2006), *Understanding transnational knowledge transfer,* Proceedings of the 7th European Conference on Knowledge Management, Budapest, Hungary, 126-135.

[22] Eglene, O. & Dawes, S. S. (2006). Challenges and strategies for conducting international public management research. *Administration & Society*, 38(5), 596-622.

[23] Eglene, O., Dawes, S. S., & Schneider, C. A. (2007). Authority and leadership patterns in public sector knowledge networks. *The American Review of Public Administration*, 37(1), 91-113.

[24] Gharawi, M., & Dawes, S. (2010). *Conceptualizing knowledge and information sharing in transnational knowledge networks*. Albany, NY: Center for Technology in Government, Retrieved June 15, 2010, from www.ctg.albany.edu/publications/working/conceptualizing_tkns

[25] Gil-Garcia, J. R., Pardo, T. A., & Burke, G. B. (2010). Conceptualizing Inter-Organizational Information Integration in Government. In Jochen Scholl (Eds.) *Electronic Government: Information, Technology, and Transformation* (pp. 179-202). Armonk, NY: ME Sharpe.

[26] Gil-García, J. R., Schneider, C. A., Pardo, T. A., & Cresswell, A. M. (2005). *Interorganizational Information Integration in the Criminal Justice Enterprise: Preliminary Lessons from State and County Initiatives.* Proceedings of the 38th Hawaii International Conference on System Sciences, Waikoloa, Hawaii.

[27] Grant, R. M. (1996), Prospering in dynamically-competitive environment: organizational capability as knowledge integration, *Organizational Science*, 7, 375-88.

[28] Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal*, 38(1), 85–112.

[29] Hofstede, G. (1994). *Cultures and Organizations. Software of the Mind*, London: McGraw-Hill.

[30] Inkpen, A., (1998). Learning and knowledge acquisition through international strategic alliances. *Academy of Management Executive*, 12 (4), 69-80.

[31] Inkpen, A., & Dinur, A. (1998). *The transfer and management of knowledge in the multinational corporation: Considering context.* Philadelphia, PA: Carnegie Bosch Institute. Retrieved May 10, 2010, from http://cosmic.rrz.uni-hamburg.de/webcat/hwwa/edok01/cbi/WP98-16.pdf

[32] JAC (2010). *Joint Advisory Committee for the Improvement of Air Quality Paso Del Norte*. Retrieved June 01, 2010, from www.jac-ccc.org

[33] Khamseh, H., & Jolly, D. (2008). Knowledge transfer in alliances: determinant factors. *Journal of Knowledge Management*, 12 (1), 37-50.

[34] Kim, S., & Lee, H. (2006). The impact of organizational context and information technology on employee knowledge-sharing capabilities. *Public Administration Review*, 66(3), 370-385.

[35] Kumar, R. & Nti K. (1998). Differential learning and interaction in Alliance dynamics: A process and outcome discrepancy model. *Organization Science*. 9(3), 356-367.

[36] Lane, C. & Lubatkin, M. (1998). Relative absorptive capacity and inter organisational learning. *Strategic Management Journal*, 19 (8), 461- 77.

[37] Levinthal, D. A., & Fichman, M. (1988). Dynamics of Inter-organizational attachments: auditor-client relationships. *Administrative Science Quarterly*, 33(3), 345-369.

[38] Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *Academy of Management Review,* 23, 438-458.

[39] Lucas, L. (2006). The role of culture on knowledge transfer: The case of Multinational Corporation. *The Learning Organizations*, 13 (3), 257-275.

[40] Lyles, M. A., & Salk, J, E., (1996). Knowledge acquisition from foreign parents in international joint ventures: An empirical examination in the Hungarian context. *Journal of International Business Studies,* 27(5), 877–903.

[41] Meschi, P. X. (1997). Longevity and cultural differences of international joint ventures: Toward timebased cultural management. *Human Relations*, 50(2), 211–227.

[42] Narteh, B. (2008). Knowledge transfer in developed-developing country interfirm collaborations: a conceptual framework. *Journal of Knowledge Management,* 12 (1). 78-91.

[43] Nelson, R. (1993). *National Innovation Systems: A Comparative Analysis.* New York: Oxford University Press.

[44] Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science,* 5 (1), 14–37.

[45] Norman, P.M. (2002). Protecting knowledge in strategic alliances – resource and relational characteristics. *Journal of High Technology Management Research*, 13(2), 177 - 202.

[46] Olk, P. (1997). The effect of partner differences on the performance of R&D consortia'. In P. Beamish and J. Killings (eds.), *Cooperative Strategies, American Perspectives* (pp. 133–159). San Francisco, CA: New Lexington Press.

[47] Polanyi M. (1996). *The Tacit Dimension*. Garden City, NY: Doubleday.

[48] Powell, W.W., Koput, K.W., & Smith-Doer, L. (1996). Inter-organizational collaboration and the locus of innovation: network of learning in biotechnology, *Administrative Science Quarterly*, 41, 116-45.

[49] Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative Science Quarterly*, 40(1), 1-33.

[50] Riesenberger, J. R. (1998). Knowledge—the source of sustainable competitive advantage. *Journal of International Marketing*, 6(3), 94–107.

[51] Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23, 393-404.

[52] Schlegelmilch, B., & Chini, T. (2003).Knowledge transfer between marketing functions in multinational companies: a conceptual model. *International Business Review*, 12, 215–232

[53] Schneider, M. (2002). A stakeholder model of organizational leadership. *Organization Science*, 13(2), 209-220.

[54] Simonin, B., (1999). Ambiguity and the process of knowledge transfer in strategic alliances. *Strategic Management Journal,* 20, 595-623.

[55] Slaughter, A. (2005). *A New World Order*. Princeton, New Jersey: Princeton University Press.

[56] Szulanski, G. (2000). The process of knowledge transfer: a diachronic analysis of stickiness, *Organizational Behavior and Human Decision Process*, 82(1), 9-27.

[57] Taylor, S. & Osland, J.S. (2003). The impact of intercultural communication on global organizational learning'', in Esterby-Smith, M. and Majorie, A.L. (Eds), *Handbook of Organisational Learning and Knowledge Management*, Blackwell, Oxford.

[58] Tiemessen, I., Lane, H, W., Crossan, M, M., & Inkpen A., C. (1997). Knowledge management in international joint ventures. In P. Beamish and J. Killings (eds.), *Cooperative Strategies, North American Perspectives* (pp. 370–399), San Francisco, CA: New Lexington Press.

[59] Ting-Toomey, S. (1999), *Communication Across Cultures.* New York, NY: The Guilford Press.

[60] Tsai, W. (2002). Social structure of "Coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization Science*, 13 (2), 179-190.

[61] Zander, U., Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test. *Organization Science*, 6(1), 76–92.

[62] Zhang, J., & Dawes, S. S. (2006). Expectations and perceptions of benefits, barriers, and success in public sector knowledge networks. *Public Performance & Management Review*, 29 (4), 433-466.

[63] Zheng, L. (2009). *Leadership Behaviors in Cross-Boundary Information Sharing and Integration: Comparing the US and China.* Ph.D. Thesis. State University of New York at Albany, Albany, NY.

[64] Cavaye, A. (1998). An Exploratory Study Investigating Transnational Information Systems. *Journal of Strategic Information Systems*. 7, 17-35.

[65] Ives, B.,& Jarvenpaa, S. (1991). Applications of global information technology: key issues for management. *MIS Quarterly*, 15 (1), 33-49.

[66] Tsugawa, M., Matsunaga, A., and Fortes J. (2008). Collaborative Cyberinfrastructure for Transnational Digital Government. *In Digital Government: Integrated Series in Information Systems*, Springer, (17), 330-337.