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Knowledge Seeking and Knowledge Sharing in a nonprofit organizational partner network: a social network analysis

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ABSTRACT
This research empirically examines the online social network of a national, non-profit organization which we refer to as the national alliance to reduce violence (NARV), an organization designed to bridge the gap between non-profit organizations across the US which address the issue of interpersonal violence. As a network of practice, knowledge shared by the nonprofit organizations originates across a breadth of experts in the disciplines of advocacy, science, practice and policy. Two problems served as the motivation for this research. First, how does the online network structure support current knowledge contribution and knowledge retrieval within the network? Second, how could the online network structure enhance knowledge contribution and knowledge retrieval to meet the needs of the organization? We acquired network structure and knowledge sharing data through the collection of survey responses from NARV’s membership list. The data were analyzed as a two-mode affiliation network using UCINET, a popular application for social network analysis. For the first research question, we found that the action groups of research and public awareness are positioned to be strong sources of knowledge contribution and knowledge retrieval within the network? Second, how could the online network structure enhance knowledge contribution and knowledge retrieval to meet the needs of the organization? We acquired network structure and knowledge sharing data through the collection of survey responses from NARV’s membership list. The data were analyzed as a two-mode affiliation network using UCINET, a popular application for social network analysis. For the first research question, we found that the action groups of research and public awareness are positioned to be strong sources of knowledge contribution and knowledge retrieval within the network due to the number of nodes with whom they are connected. For the second research question, we identified training and mentoring as the action group from which other nodes desire knowledge.

Keywords  
Knowledge Seeking, Knowledge Sharing, Social Network Analysis, Interpersonal Violence, Sociographs

INTRODUCTION
Interpersonal violence is a societal issue addressed by a large number of organizations within the United States. According to the World Health Organization, interpersonal violence is defined as acts of violence between individuals. The FBI found that in 2009, there were 894,940 reported acts of interpersonal violence within the United States. The number of non-adjudicated and unreported cases is substantially higher. Organizations which address this issue typically have two foci: provide services to the victims and educate society. The common goal amongst those organizations is to decrease the number of instances of interpersonal violence. It could benefit the community of non-profit organizations addressing this issue to share their knowledge, essentially building a collection of knowledge which will aid the community in achieving the goal of decreased
interpersonal violence. Enhancement of knowledge sharing may be achieved through the effective use of communication technologies.

This research empirically examines the online social network of a national, non-profit organization which we refer to as the national alliance to reduce violence (NARV), an organization designed to bridge the gap between non-profit organizations across the US which address the issue of interpersonal violence. NARV is essentially the hub of a “network of practice” (Wasko and Faraj, 2005, pg. 37) which promotes knowledge sharing and collaboration in a partnership of 150 non-profit organizations across the nation. As a network of practice, knowledge shared by the non-profit organizations originates across a breadth of experts in the disciplines of advocacy, science, practice and policy. As a collective they aim to bring awareness of interpersonal violence to the forefront of national issues and, in highlighting it as a serious problem, empower people and organizations to affect change and aid in decreasing the acts of interpersonal violence between individuals.

We acquired network structure and knowledge sharing data through the collection of survey responses from NARV’s membership list. Addressing the issue of interpersonal violence requires the collaboration of experts and organizations across diverse disciplines (Lewis, 2005). NARV provides examples of this diversity through its membership which includes organizations from disciplines such as health care, law enforcement, education and mental health. Adding another layer of diversity, each organization within the discipline may deal with a different aspect of interpersonal violence, i.e. child abuse, spousal abuse, date rape, etc. This diversity increases the breadth of knowledge held by the non-profit members and supports the need for a communal storehouse of knowledge accessible by the member organizations. This work presents the first set of findings of this study, and is based upon the social network analysis of NARV.

Our interest in this research is twofold. First, we are interested in examining how knowledge contribution and knowledge retrieval occurs within the current network structure. Extant IS literature has derived that social structure facilitates the contribution of knowledge within networks of practice (Wasko and Faraj, 2005). Additionally, management literature has demonstrated aspects of knowledge retrieval within and between organizations (Borgatti and Cross, 2003). Secondly, we are interested in examining how knowledge contribution and knowledge retrieval can be enhanced by the network structure to meet the needs of the organization. Given these contexts, two problems serve as the motivation for this research. First, how does the online network structure support current knowledge contribution and knowledge retrieval within the network? Second, how could the online network structure enhance knowledge contribution and knowledge retrieval to meet the needs of the organization?

THEORETICAL FOUNDATION

This section provides a review of knowledge sharing and social networking and examines how they relate to this study.

Knowledge Sharing

The concept of knowledge sharing implies action on the part of individuals engaged in the acts of contribution and inquisition. This knowledge reciprocity has been examined within multinational corporations (Gupta and Govindarajan, 2000), within long-term inter-organizational relationships (Im and Rai, 2008) and how social and expert status affects the knowledge sharing within groups (Thomas-Hunt, Ogden, and Neale, 2003). Their study provides a foundation for the idea of knowledge reciprocity in the current study and how that reciprocity is affected by one’s position in the network. Knowledge contribution has garnered attention in the information system (IS) literature. Wasko and Faraj (2005) examined why individuals contribute knowledge to networks of practice when there is no direct benefit of the contribution and found that individuals do not have an expectation of reciprocity. Their study is pertinent to ours in that we exam the network structure and knowledge sharing actions to determine if there are actionable expectations of receiving knowledge from others within the network. Additional studies have focused on explaining the use of electronic knowledge repositories by those who contribute to them (Kankanhalli, Tan and Wei, 2005) and how IT-based features which are used in online communities enhance an individual’s contribution of knowledge to the community (Ma and Agarwal, 2007). Our study incorporates an examination of the use of technology in the knowledge reciprocity actions. On the knowledge retrieval side, studies include the characteristics of the relationships and how those characteristics impact an individual’s decision to seek knowledge within a social network (Borgatti and Cross, 2003) and once users are connected electronically, how to empower them to seek the available knowledge (Brazealton and Gorry, 2003). The current study examines both knowledge contribution and retrieval in the context of a non-profit electronic network of practice and how the structure of the network impacts individuals’ decisions to contribute and retrieve knowledge.
Social Networking

Social network analysis (SNA) is the phrase used to describe the study of the structure of social networks. It is important to understand that the structure is comprised of at least two social entities and the links between them (Churchill and Halverson, 2005). Key studies within the social networking literature have included the 1960s small world study which conducted an experiment to determine the odds of any two people, randomly selected within the United States, knowing each other (Travers and Milgram, 1969), and a study of the strength of weak ties within a network (Granovetter, 1983). While these studies lay the foundation for SNA, the current study focuses on a structured network in which organizations opt in, thus removing a degree of the randomness of connections. The advent of online social networks added a new level to the research. Wellman, Salaff, Dimitrova, Garton, Gulia, and Haythornthwaite (1996) used the term computer-supported social networks (CSSN) to describe online social networks. Along with the importance of the structure of CSSNs, the authors noted that “[m]uch of the communication on CSSNs involves the exchange of information” (Wellman et al. 1996, pg. 219). This concept of information exchange is equivalent to the knowledge seeking and sharing addressed in the current study. An aspect of SNA to study the knowledge sharing within a social network is to examine the affiliation networks in which the members are engaged. “[T]he assumption is that co-membership in groups or events is an indicator of an underlying social tie” (Borgatti & Halgin, 2003). The current study utilizes the techniques of SNA, including affiliation network analysis, to study the NARV online community. This is a unique study in the fact that the organizations which hold membership to NARV are non-profit agencies whose membership is voluntary and for the purpose of the shared goal of addressing the social issue of interpersonal violence.

METHODS

Data for this study were collected from a survey of members of NARV’s partner organizations. The national partnership is a network of providers, practitioners, researchers, and other members that work together towards the collective goal of violence prevention across the human lifespan. The members of NARV come from a number of backgrounds and geographic regions. As an organization, NARV is tasked with encouraging its partners to share information in such a way that the network as a whole benefits.

The nature of the data collection for this study consisted of a survey that was distributed to NARV partners and their organizations. The survey was distributed in April of 2011 to a total of 165 members. The initial data collection resulted in a total of 36 usable surveys. A larger data collection is underway that is expected to result in an approximate sample size of 70 responses. The results of this complete data collection will be reported in a subsequent paper. In this survey, we asked NARV three questions related to their knowledge sharing practices. The first question asked respondents to identify which of the partnership action groups (nine groups in total, summarized in Table 1) with whom they currently shared knowledge.

<table>
<thead>
<tr>
<th>Table 1. NARV Action groups with labels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Public Policy</td>
</tr>
<tr>
<td>Organizational Co-Directors</td>
</tr>
<tr>
<td>Funding and Development</td>
</tr>
<tr>
<td>Public Awareness</td>
</tr>
<tr>
<td>Training and Mentoring</td>
</tr>
<tr>
<td>Research</td>
</tr>
<tr>
<td>Publicity</td>
</tr>
<tr>
<td>Networking</td>
</tr>
<tr>
<td>Practitioners</td>
</tr>
<tr>
<td>Public Policy</td>
</tr>
</tbody>
</table>
Participants were given a list of the action groups and responded with a Boolean value (1 for yes, 0 for no) to determine whether they were engaged in active knowledge sharing with that particular group. Thus, for each question the analysis was conducted based on 36 x 9 = 324 data points. In addition to the question of current knowledge contribution, participants were also asked to identify the action groups with whom they would like to share knowledge. Finally, users were also asked to identify those action groups whose knowledge they utilized most frequently. In this way our analysis is able to differentiate between contribution and knowledge utilization.

The data were analyzed as a two-mode affiliation network using UCINET a popular application for social network analysis (Borgatti, Everett and Freeman, 2002). In an affiliation network, the analysis occurs at two levels. In addition to looking at the relationship between individual actors in the network, in this case respondents within NARV, the actors themselves can be modeled in terms of their affiliations with a certain organization, or in this case a NARV action group. Two-mode affiliation network analysis is a type of Whole network analysis, one of the two major branches of network analysis in which actors and their affiliations represent nodes and their relational ties are edges. For years, this type of network analysis has been used to examine research questions involving the nature of communication (Java, Kolari, Finin, and Oates, 2006; Takama, Matsumura, and Kajinami, 2006) and interaction within large social structures.

The central concept behind whole network analysis is the examination of collective characteristics common to all nodes. Traditionally variables of interest in this type of network analysis are density, the number of possible ties between nodes in relation to the maximum number possible, and closeness, which refers to the likelihood that two neighbors to a node are neighbors themselves. The concept of centralization is also important in SNA. Centralization refers to “the locations of individuals in terms of how close they are to the center of the action in a network” (Hanneman and Riddle, 2005). It can be broken down into three measures: degree centrality, closeness centrality, and betweenness centrality. Degree centrality measures the number of ties an actor has within a network. Closeness centrality measure the distance of actors from each other. Betweenness centrality measure how often an actor acts as a connector for other actors (Jiang and Wang, 2009; Hanneman and Riddle, 2005; Otte and Rousseau, 2002).

### RESULTS AND ANALYSIS

In the affiliation network, nodes are both the NARV action groups identified in table 1 and the individual respondents. This type of analysis makes it possible to identify both key individuals and key groups important to the flow of knowledge and information among partner organizations. Edges in this analysis refer to the actual ties identified by the participants between themselves and a particular action group. It is important to note that this concept of relational strength only applies to the actual affiliations themselves, as it is not possible for an individual respondent to have more than a single connection to a particular action group. The sociograph of this network is presented in figure 1. Table 2 presents the descriptive affiliation network characteristics for the current NPEIV knowledge sharing network, broken down by action group.

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Degree Centralization</th>
<th>Closeness Centralization</th>
<th>Betweenness Centralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Awareness</td>
<td>0.237</td>
<td>0.491</td>
<td>0.235</td>
</tr>
<tr>
<td>Training and Mentoring</td>
<td>0.132</td>
<td>0.459</td>
<td>0.136</td>
</tr>
<tr>
<td>Practitioners</td>
<td>0.184</td>
<td>0.475</td>
<td>0.137</td>
</tr>
<tr>
<td>Research</td>
<td>0.289</td>
<td>0.509</td>
<td>0.257</td>
</tr>
<tr>
<td>Funding and Development</td>
<td>0.132</td>
<td>0.459</td>
<td>0.089</td>
</tr>
<tr>
<td>Public Policy</td>
<td>0.211</td>
<td>0.483</td>
<td>0.166</td>
</tr>
<tr>
<td>Dissemination of Information</td>
<td>0.132</td>
<td>0.459</td>
<td>0.099</td>
</tr>
<tr>
<td>Networking</td>
<td>0.105</td>
<td>0.452</td>
<td>0.086</td>
</tr>
<tr>
<td>Publicity</td>
<td>0.105</td>
<td>0.452</td>
<td>0.023</td>
</tr>
<tr>
<td>Organizational Co-Directors</td>
<td>0.211</td>
<td>0.483</td>
<td>0.208</td>
</tr>
</tbody>
</table>
From this diagram and the output provided by UCINET we can see that several of the action groups have a much higher level of degree centralization than others. For example, the high degree centralization of the research node (0.289) tells us that there are many connections to the node. Additionally, the closeness centralization (0.509) and betweenness (0.257) scores for the research action team show that this node is not only closely connected to other nodes in the network, but that it serves as a bridge through which knowledge can pass to other areas of the community. The NARV’s current knowledge sharing network is a close network, with an average closeness centralization score of 0.4722.

The especially high centralization scores from the research node makes intuitive sense, as researchers make up a large portion of the overall NARV team. By way of comparison, we can see that the dissemination of information action group, despite being tasked with getting information about NARV actions and objectives out to other partner organizations, scores significantly lower on betweenness centralization (0.099), implying that the action group may be a cloistered community, sharing knowledge amongst themselves but with few members outside the action team.

In keeping with the goal of maximum knowledge sharing, participants were next asked to comment on which action groups they would like to share knowledge with. Participants were not instructed to exclude any action group, thus they could select those groups with whom they were already sharing knowledge (i.e. the current network diagram) here as well. Figure 2 presents the sociograph for a future, or desired NARV knowledge sharing network, as reported by the individual respondents and broken down by action group. Table 3 presents the descriptive affiliation network characteristics for the future, or desired NPEIV knowledge sharing network, as reported by the individual respondents and broken down by action group.
Table 3. SNA statistics for the NARV future (desired) knowledge sharing network.

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Degree Centralization</th>
<th>Closeness Centralization</th>
<th>Betweenness Centralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Awareness</td>
<td>0.316</td>
<td>0.519</td>
<td>0.173</td>
</tr>
<tr>
<td>Training and Mentoring</td>
<td>0.474</td>
<td>0.583</td>
<td>0.290</td>
</tr>
<tr>
<td>Practitioners</td>
<td>0.316</td>
<td>0.519</td>
<td>0.125</td>
</tr>
<tr>
<td>Research</td>
<td>0.447</td>
<td>0.571</td>
<td>0.289</td>
</tr>
<tr>
<td>Funding and Development</td>
<td>0.105</td>
<td>0.452</td>
<td>0.048</td>
</tr>
<tr>
<td>Public Policy</td>
<td>0.237</td>
<td>0.491</td>
<td>0.084</td>
</tr>
<tr>
<td>Dissemination of Information</td>
<td>0.211</td>
<td>0.483</td>
<td>0.039</td>
</tr>
<tr>
<td>Networking</td>
<td>0.211</td>
<td>0.483</td>
<td>0.066</td>
</tr>
<tr>
<td>Publicity</td>
<td>0.053</td>
<td>0.438</td>
<td>0.000</td>
</tr>
<tr>
<td>Organizational Co-Directors</td>
<td>0.132</td>
<td>0.459</td>
<td>0.126</td>
</tr>
</tbody>
</table>

Figure 2. Future (Desired) NARV Knowledge Sharing network - 2 mode analysis showing individual actors and action team affiliations.
We can see from both the sociograph and the UCINET output that the role and placement of several action group nodes changes significantly in this hypothetical network structure. The research action team still maintains a very prominent place within the network, with degree centralization of .0.447, closeness centralization of 0.571, and betweenness centralization of 0.289.

However, the Training and Mentoring group, which played a very minimal role in the current knowledge sharing network, has taken a much more central role in this arrangement. The high degree centralization (0.474) shows that many other action groups would like to have communications with the individuals in this group, making them an important node for knowledge dissemination, and creating the large scores for closeness (.583) and betweeness (0.290) centralization.

Figure 3 further illustrates the gap between what currently exists in NARV and the desired level of knowledge sharing and cooperation across action teams. This figure shows the change in network centrality when comparing the current network (Figure 1) with the desired (future) network presented in Figure 2. From this comparison we can see clearly that relationships with action teams are not valued equally across the board. The training and mentoring action team represented the largest gap, with a change in centrality of (-0.955). Practice (change = 0.322) and research (0.253) also saw significant change, indicating a strong desire on the part of other teams to form relationships. Interestingly, several action groups also saw a shift in the other direction, as teams looked to move away from their existing relationships and form new bonds. The co-director group, for example, saw a 0.349 decrease in centrality. This may suggest that as the network matures, action teams look to move away from ties with traditional sources of network structure, in this case project co-directors, and form their own relationships with those partners that offer them the most value.

Finally, participants were asked to comment on the NARV action groups which contributed the knowledge that they used most often. The difference between this network and the original knowledge sharing network can be summed up this way. The current network presents an analysis of the groups to whom individual action groups contribute knowledge. Because this study considers not just the giving, but also the taking, of knowledge, we also consider the NARV action teams with the most to contribute in terms of useful, actionable knowledge.
Conclusions and Future Research

Non-profit networks of practice such as NARV hold a unique place with communities. Specifically, NARV serves as the hub for knowledge which could be used to improve services to individuals who have experienced interpersonal violence and/or aid in decreases the instances of interpersonal violence. Aimed at understanding how the organizations which hold membership in NARV contribute knowledge to and retrieve knowledge from the communal storehouse of knowledge, we conducted a survey of the membership organizations. Based on the results of the NARV survey, sociographs provide data which relate to our two research questions.

For the first research question, we found that the action groups of research and public awareness are positioned to be strong sources of knowledge contribution within the current network due to the number of nodes with whom they are connected. This means that a higher degree of knowledge contribution in the online network is achieved through these action groups. Conversely, action groups such as training and mentoring as well as funding and development have low degrees of centrality, meaning that fewer nodes share a connection with these action groups. In the context of NARV, increased knowledge regarding training, mentoring, funding and development could play a role in decreasing the instances of interpersonal violence within the community. Thus, the low degrees of centrality for these action groups could be a concern for NARV. Unfortunately, the current structure of the network does not support knowledge retrieval from these action groups.

For the second research question, we identified training and mentoring as the action group from which other nodes desire knowledge. This an interesting find as the majority of individuals who returned the survey responded with a demographic of more than 20 years of experience in their field. If individuals who have been in their field for an extended period of time still value the knowledge available through training and mentoring, it represents expert advice for NARV and the network structure. Increasing the connectedness of the training and mentoring action group could aid in meeting this strong need. Strong affiliations between training and mentoring and the two action groups with high degrees of centrality (research and public awareness) should be established. This could shift the position of the training and mentoring action group within the network, increasing its position to contribute knowledge and from which others can retrieve knowledge.

Online social networks are dynamic in nature, dependent upon the relationships among its entities (Boyd & Ellison, 2008). For NARV, this dynamism is enhanced due to the nature of the social issue being addressed. Ameliorating interpersonal violence means facing such issues as child abuse, spousal abuse and date rape. Organizations within the partnership have come together in an attempt to overcome knowledge barriers regarding that playing field for the purpose of decreasing instances of interpersonal violence. This study has revealed the knowledge contribution and knowledge retrieval structures within the online social network of NARV. Additionally, it has demonstrated the areas where more knowledge is desired by participants.

Further research in this area could extend this type of study to other non-profit organizations and examine their knowledge sharing networks with their stakeholders. Even if not connected nationally, such as being involved in NARV, non-profit organizations that address social issues often share knowledge with other entities within the community. Those entities might include law enforcement, health care providers or mental health professionals (Lewis, 2005). Employing this type of study could aid those non-profit organizations in improving their services through highly developed knowledge sharing among stakeholders. Additionally, employing this type of study on multiple non-profit organizations which address social issues could provide the foundation to develop a model of knowledge sharing within and among these types of organizations. Understanding knowledge sharing among organizations which address social issues could aid in increasing the quality of services provided and possibly impact the quality of life for citizens around the nation.

REFERENCES


