Identifying Knowledge Management Capacity Needs of Rural Advisory Service Networks

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Abstract

Knowledge management is the creation, coordination, transfer, and integration of knowledge so it is accessible and usable by specific stakeholders. Knowledge management has been shown to facilitate the development of networks, as well as to sustain established networks, based on the appropriate collection and subsequent application of embedded social capital. For rural advisory service (RAS) networks, knowledge management can be an important tool to ensure that both explicit and tacit knowledge is shared amongst network members with the anticipated benefit of increased capacity of the network. Although the importance of knowledge management is well documented within the literature, there are limited guidelines for what specific knowledge management capacities a RAS network should develop. Using the Delphi process, a panel of 31 experts from 24 countries arrived at consensus on 34 specific knowledge management capacities associated with effective RAS networks. The results of the research provide a practical framework for RAS providers and networks to focus knowledge management capacity assessment and capacity-building activities.

Keywords: knowledge management, Delphi, evaluation, capacity assessment

Introduction

Farmers must dedicate time and pay attention to management decisions, along with the development of management skills to be successful and engaged in sustainable production (Kay, Edwards, & Duffy, 2015). The World Bank (2007) has emphasized that "using agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in smallholder farming" (p. 1). Extension professionals, also known as rural advisory service (RAS) providers, offer the management skill training necessary for farmers to revolutionize and have been recognized as indispensable for agricultural development (Anderson, 2007). Unfortunately, Bezemer and Headey (2008) found "over the last three decades, there has been an inefficient and systemic bias against agriculture and the rural economy in the allocation of developmental resources" (p. 1342).

Despite limited resources, RAS providers are empowering farmers around the world through educational programming (Davis & Sulaiman, 2014), often referred to as extension education. RAS providers (extension educators in some parts of the world) are most often supported by government agencies, non-profit organizations, farmers' unions, and for profit organizations. They have diverse educational backgrounds and perspectives on agricultural production practices, but they all have the same intent: to help farmers become more productive and sustainable (Davis & Sulaiman, 2014).

To provide support, guidance, and harmonization amongst disparate RAS providers, different organizations have emerged; one such organizing entity is the Global Forum for Rural Advisory Services (GFRAS; Davis & Sulaiman, 2014). Organizations such as GFRAS serve to facilitate interconnections amongst RAS providers, thus establishing RAS networks (Christoplos, 2010; Davis & Sulaiman, 2014). For example, country-level national RAS networks are supported by thirteen regional networks across the world, which are in turn supported by the GFRAS organization (Davis & Sulaiman, 2014). GFRAS strives to support small farmers' development of management skills through the regional and national RAS networks that provide training and resources, including knowledge products and platforms to share global knowledge about RAS and agricultural production (Davis & Sulaiman, 2014). Therefore, RAS networks at all levels require the tools and methods necessary to manage and share knowledge, often referred to as knowledge management (Davis & Sulaiman, 2014).

Knowledge management is the creation, coordination, transfer, and integration of knowledge so it is accessible and usable by specific stakeholders (Paulin & Suneson, 2015). It is an organizational asset which must be recognized for its utilization to reach its full potential (Groff & Jones, 2012). There are many social aspects to knowledge management with multiple scientific fields contributing to its advancement including philosophy, cognitive science, social science, management science, information science, economics, and artificial intelligence (Kakabadse, Kakabadse, & Kouzmin, 2003).

Dalkir and Liebowitz (2011) identified that knowledge has two dimensions; tacit and explicit, with tacit difficult to articulate and explicit more tangible. Given that many agricultural practices are modified to local conditions, agricultural knowledge tends to be tacit (Schreiber et al., 2000). One of the main tenants of knowledge management is to transform tacit knowledge assets to provide value within specific contexts (Metcalfe, 2005), therefore knowledge management

could be extremely useful within the agricultural domain if applied correctly.

As an additional benefit, knowledge management has been shown to facilitate the development of new networks, as well as to sustain established networks, based on the appropriate collection and subsequent application of embedded social capital (Woodhouse, 2006). The benefits of knowledge management systems should therefore accrue to the primary clientele of RAS services as farmers and smallholders continue to take an active role in knowledge acquisition and application resulting from the shift from production-oriented to market-oriented agriculture (Phillipson, Gorton, Raley, & Moxey, 2004).

However, there is very limited research available to provide knowledge management guidance within the RAS context. Identifying the characteristics of effective knowledge management systems and practices within RAS would ensure RAS providers have access to the information necessary to best serve RAS clientele (Hartwich, Perez, Ramos & Soto, 2007). A study focused on identifying the characteristics, and specifically the capacities, associated with effective knowledge management within the RAS context would provide a robust platform for RAS practitioners as well as a novel framework for theoretical consideration (OECD, 2006).

Theoretical Framework

This study used social capital theory as the theoretical framework. Woolcock and Narayan (2000) identified four views of social capital: communitarian, network, institutional and synergy. Specifically, a network view of social capital theory was utilized for this study. In a network, social capital represents resources embedded within the network which can be accessed or mobilized through network ties (Lin, 2003).

The network provides the conditions necessary to access and use embedded resources (Lin, 2008). Previous literature has recommended organizational networks, like RAS networks, should be leveraged to harness their insights and social capital potential (Nahapiet & Ghosal, 1998). Additionally, Bodin and Crona (2009) found that when networks connect diverse stakeholders from multiple perspectives and institutions, the embedded social capital resulted in more effective problem solving than from groups composed of homogenous institutions.

Nevertheless, integrating knowledge, in the form of social capital, from multiple specializations into a single harmonized system requires specialized knowledge integration. Previous research has shown that knowledge integration can be more of a challenge than original knowledge creation (Grant, 1996). Furthermore, for the integrated knowledge to be valuable, there must be some way for the accumulated knowledge to be transferred back out; therefore, there must be sufficient transmission channels available (Paulin & Suneson, 2015).

Knowledge management, and the focus on knowledge transfer among various levels of a system, or network, uses multiple instruments and skills to accomplish the integration and transmission process (Engel, 1990). The complexity of linking social capital acquired through networks to knowledge management systems capable of effectively integrating and transmitting knowledge has been vexing; a fundamental challenge has been the lack of a common understanding of effective knowledge management (Paulin & Suneson, 2015).

For well-known, but not well-understood concepts such as knowledge management, previous literature has suggested the identification of specific capacities as an operative way to improve

clarity and structure (OECD, 2006). For this purpose, the Organisation for Economic Co-operation and Development (2006) has defined 'capacity' as the "ability of people, organisations, and society as a whole to manage their affairs successfully" (p. 18), and 'capacity development' as "the process whereby people, organisations, and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time" (p. 18). The use of capacity identification may therefore serve as an effective tool to clarify somewhat ambiguous topics such as effective knowledge management (OECD, 2006). Consequently, a set of capacities associated with effective knowledge management within a RAS context may be best extracted from the social capital of a network of individuals familiar with the context (Paulin & Suneson, 2015; Woolcock & Narayan, 2000).

Purpose and Research Objectives

The purpose of this study was to identify the capacities needed for a RAS network to be effective in knowledge management. The study was driven by the following research objectives:

1. Create a comprehensive list of potential knowledge management capacities.
2. Arrive at a consensus on the specific capacities necessary for a RAS network to be effective in knowledge management.

Methods

The research objectives were addressed using a modified Delphi method research design. Specifically, the researchers conducted the Delphi method to gain experts' opinions regarding the development of a consensus listing of the capacities needed for a RAS network to be effective in knowledge management. "Delphi has often

been used for the purpose of content validation of constructs to be used in quantitative research" (Garson, 2014, Chapter 8, para. 1).

The RAND Corporation developed the Delphi method to collect knowledge and create consensus on a specific topic from a group of experts (Dalkey & Helmer, 1963; Ziglio, 1996). Previously, the Delphi method has been used to gain insight into topics that are otherwise difficult to analyze (e.g. Okoli & Pawlowski, 2004). The Delphi method has been used extensively since the 1960s (Garson, 2014) to analyze numerous topics, for example, trends in social science (Gliddon, 2006; LeClerc, LeFrancois, Dube, Hebert, & Gaulin, 1998) and technology (Okoli & Pawlowski, 2004).

According to Czinkota and Ronkainen (1997), "the selection of the experts is critical to the success of a Delphic study" (p. 152). Consequently, "the individuals comprising the expert panel should represent the research purpose in a way that legitimates the outcome of the Delphi process" (Garson, 2014, Chapter 6, para. 2). To ensure the appropriate experts were included in this study, the selection criteria identified by Okoli and Pawlowski (2004) were followed. First, the expertise domain was defined as an individual actively engaged in RAS from differing geographies, organizational maturity and experience. Next, nominations of individual experts were solicited from the GFRAS organization (Okoli & Pawlowski, 2004). The GFRAS organization was identified as the appropriate source for the expert panel based on the global coverage of the network and the diversity of experiences within the population of interest (Garson, 2014). In total a purposive sample of 31 RAS professionals constituted the expert panel.

The 31 experts that participated in the panel represented RAS practitioners, funding organizations, farmer and advocacy

groups, academic institutions, research institutes, policy makers, and other affiliated RAS support organizations (for example consultants and agricultural supply companies). Panelists had a range of experience with RAS exposure ranging from four to 45 years, with an average tenure of 18 years. Panelists represented the following countries: Bangladesh, Belgium, Bulgaria, Ecuador, Fiji, Georgia, Ghana, Guyana, India, Ireland, Italy, Lao People's Democratic Republic, Malawi, Nicaragua, Nigeria, Pakistan, Philippines, Samoa, Solomon Islands, South Africa, Switzerland, Uganda, United States of America, and Uzbekistan. Heterogeneity in amount of experience helped to ensure the panel had a diversity of perspectives represented (Garson, 2014).

Three iterations of the Delphi method were used to complete the study. The researchers followed recommendations in the literature to develop the processes and instrumentation (e.g. Delbecq, Van de Ven, & Gustafson, 1975; Nistler, Lamm, & Stedman, 2011). During the first round of the process, experts were asked to list five (5) of the most important capacities a RAS network should possess to be effective in knowledge management using a short phrase or word (Gliddon, 2006). The expert responses were analyzed and aggregated, or expanded, where appropriate (Garson, 2014; Gliddon, 2006) using the Dedoose qualitative analysis software (Dedoose, 2016). Responses from the first round were then used to develop the second-round questionnaire.

The second round of the Delphi was used to capture the expert panel members' level of agreement with the capacities identified in the initial round. The questionnaire listed the capacities identified and members of the expert panel were asked to indicate their level of agreement or disagreement that each item was an

important capacity for RAS networks to have on a five point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*). The scores for each item were then averaged. An item had to receive a mean score greater than 3.25 for the item to continue to the third round (Garson, 2014).

The third round of the Delphi was used to establish the expert panel members' level of consensus with the capacities that made it through the second round. Specifically, the expert panel was asked to "Please indicate whether or not the following knowledge management items should be kept or removed as it relates to the following statement. *A country fora or regional RAS network should…*". Each item that had 75% of the expert members agree it should be kept was retained (Garson, 2014).

Prior to research engagement Internal Review Board approval was obtained from the University of Florida. All three rounds of the Delphi were administered online. Using online or "E-Delphi addresses some of the shortcomings of traditional Delphi, notably greatly speeding up the time required for multiple iterations of the estimation-feedback-reestimation process" (Garson, 2014, Chapter 44, para. 1). All three rounds of the Delphi were administered using the Tailored Design Method (Dillman, Smyth, & Christian, 2008).

Throughout the process the results were downloaded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. For round one, data analysis included updating spelling and grammatical errors as well as thematic analysis and consolidated the results prior to round two to improve clarity and reduce redundancy (Garson, 2014). Thematic analysis was conducted using the Dedoose qualitative analysis software (Dedoose,

2016). This process was also undertaken to reduce the cognitive load required for panelists to respond in the second round (Ary, Jacobs, Sorensen, & Razavieh, 2010). There were 29 respondents to the first round for a response rate of 94%. Descriptive statistics were calculated based on data collected during round two of the Delphi to determine the level of agreement with behaviors (Ary et al., 2010). There were 27 responses to the second round for a response rate of 87%. Lastly, descriptive statistics were calculated at the end of round three to determine consensus amongst panelists across capacities (Ary et al., 2010). There were 29 respondents in the third and final round for a response rate of 94%. Response rates of greater than 70% per round within Delphi research have been found to be acceptable (Keeney, Hasson, & McKenna, 2011).

Results

　　At the end of the first round of the Delphi, including the consolidation process, there were 42 capacities identified by the expert panel (Table 1). Panelists were then asked to indicate the level of importance they associated with each capacity in Round Two of the Delphi. Of the 42 capacities from the first round, there were three items that did not achieve the *post hoc* threshold with a mean score greater than or equal to 3.25 to be retained in Round Two; therefore 39 capacities were included in the third and final round. The mean values for the capacities ranged from 4.38 to 2.59 (Table 1). Experts associated the highest level of importance with the statement "A country fora or regional RAS network should…share information openly and honestly."

Table 1
Delphi Round One and Two Results: Level of Importance for Knowledge Management Capacities (n = 42)

Capacity	M	SD
Share information openly and honestly	4.38	0.75
Make activities, products, best practices, and success stories accessible to stakeholders in a format they can use	4.26	0.81
Have members that are actively engaged in sharing knowledge	4.22	0.75
Have individuals working collaboratively and sharing information freely	4.19	0.74
Have stakeholders that are expected and encouraged to input their ideas and suggestions to strengthen the network	4.19	0.68
Have a culture that supports sharing among all levels of staff within the organization	4.15	0.66
Provide opportunities for networking through shared information/resources	4.04	0.71
Support stakeholders using the knowledge available to them to inform RAS practice	4.00	0.78
Have financial resources available to organize meetings, exchanges and peer learning events.	4.00	1.00
Have feedback mechanisms in place to provide useable formative data	3.96	0.90
Provide an effective platform for enhanced learning and information exchange through face to face opportunities (e.g. meetings)	3.96	0.59

Use data to provide insight into challenges and opportunities	3.92	0.98
Articulate an established knowledge management strategy including the knowledge being managed, the purpose of the knowledge, and who the information is for	3.89	0.89
Have network personnel that are available to organize meetings, exchanges and peer learning events.	3.89	0.97
Have information available in annual report format	3.85	1.13
Provide documentation of knowledge (activities, products, best practices, success stories) to RAS professionals through a centralized platform	3.85	0.77
Correctly identify the knowledge needs of RAS professionals	3.85	0.99
Offer an understanding of knowledge management	3.81	0.88
Provide an effective platform for peer-to-peer learning	3.78	0.89
Provide network level needs assessments	3.78	1.01
Offer training on how to use information and data	3.78	1.15
Communicate in local language(s)	3.70	1.10
Readily recognize knowledge creators	3.69	0.74
Provide the ability to develop content from a variety of information sources	3.67	1.04
Provide an effective platform for enhanced learning through asynchronous online platforms (e.g. website)	3.67	1.11
Have RAS professionals that use the available knowledge	3.63	0.79
Provide network level monitoring and evaluating	3.63	0.93
Have network personnel that are technically skilled in their use of knowledge management resources	3.59	1.05
Provide network level reporting skills	3.59	0.69
Provide training based on network level needs assessments	3.59	1.12
Establish a stable internet platform for knowledge management	3.59	1.05
Establish connections with research institutes	3.56	0.89
Have network personnel that are capable of sifting, selecting, prioritizing, refining, organizing, packaging and disseminating knowledge	3.56	1.01
Provide innovation thinking experts	3.52	1.25
Provide an effective platform for enhanced learning through synchronous online platforms (e.g. Skype)	3.48	0.98
Use software and monitoring tools specifically for knowledge management	3.41	1.12
Have information available in quarterly report format	3.41	0.75
Resolve conflicts that result from knowledge management	3.41	1.05
Provide database archiving	3.37	1.28
Communicate in English	3.11	1.05
Provide network level research	3.00	1.24
Have information available in monthly report format	2.59	1.05

For the third and final round of the Delphi, panelists were asked to indicate whether each of the capacities should be kept or removed to establish consensus.

Amongst the 39 capacities from Round Two there were 34 capacities that achieved a level of consensus greater than the *post hoc* threshold of 75% (Table 2).

Table 2
Delphi Round Three Results: Level of Consensus with Knowledge Management Capacities (n = 39)

Capacity	Consensus %
Provide an effective platform for enhanced learning and information exchange through face to face opportunities (e.g. meetings)	96.6
Provide opportunities for networking through shared information/resources	96.6
Make activities, products, best practices, and success stories accessible to stakeholders in a format they can use	96.6
Have a culture that supports sharing among all levels of staff within the organization	96.6
Provide documentation of knowledge (activities, products, best practices, success stories) to RAS professionals through a centralized platform	96.6
Have feedback mechanisms in place to provide useable formative data	93.1
Have members that are actively engaged in sharing knowledge	93.1
Have network personnel that are available to organize meetings, exchanges and peer learning events.	93.1
Provide network level monitoring and evaluating	89.7
Provide network level reporting skills	89.7
Correctly identify the knowledge needs of RAS professionals	89.7
Have stakeholders that are expected and encouraged to input their ideas and suggestions to strengthen the network	89.7
Provide an effective platform for peer-to-peer learning	89.7
Share information openly and honestly	86.2
Provide an effective platform for enhanced learning through asynchronous online platforms (e.g. website)	86.2
Provide an effective platform for enhanced learning through synchronous online platforms (e.g. Skype)	86.2
Have information available in annual report format	86.2
Have network personnel that are technically skilled in their use of knowledge management resources	86.2
Offer an understanding of knowledge management	86.2
Use data to provide insight into challenges and opportunities	86.2
Have financial resources available to organize meetings, exchanges and peer learning events.	86.2
Have individuals working collaboratively and sharing information freely	82.8
Have RAS professionals that use the available knowledge	82.8
Establish a stable internet platform for knowledge management	82.8
Have network personnel that are capable of sifting, selecting, prioritizing, refining, organizing, packaging and disseminating knowledge	82.8
Articulate an established knowledge management strategy including the	82.8

knowledge being managed, the purpose of the knowledge, and who the information is for	
Support stakeholders using the knowledge available to them to inform RAS practice	82.8
Provide network level needs assessments	82.1
Establish connections with research institutes	82.1
Provide database archiving	79.3
Provide the ability to develop content from a variety of information sources	79.3
Readily recognize knowledge creators	78.6
Communicate in local language(s)	75.9
Use software and monitoring tools specifically for knowledge management	75.9
Offer training on how to use information and data	72.4
Resolve conflicts that result from knowledge management	71.4
Provide innovation thinking experts	69.0
Provide training based on network level needs assessments	65.5
Have information available in quarterly report format	62.1

Conclusions, Implications, and Recommendations

Although there has been extensive research into knowledge management theory and practice within the literature (Metcalfe, 2005), there has been a notable lack of knowledge management research within the RAS context. The results of this study indicated that it is possible to develop a list of capacities associated with effective knowledge management within RAS networks using a social capital theoretical foundation (Woolcock & Narayan, 2000).

This study employed a network view of social capital where experts within a RAS network were identified and asked to participate in a Delphi process. The results of the study were consistent with the existing literature indicating that social capital accessed through RAS network resources was an effective way to identify the capacities needed for a RAS network to be effective in knowledge management since the experts were able to build consensus despite their global differences (Lin, 2008). An implication from these results is that capacities derived from a panel composed of RAS network experts from across the globe are appropriate and applicable to RAS networks generally (Bodin & Crona, 2009).

Previously, one of the main challenges with defining effective knowledge management has been a lack of a common understanding (Paulin & Suneson, 2015). This study sought to resolve this issue by focusing on the competencies associated with effective knowledge management in RAS networks (OECD, 2006). By identifying the necessary competencies, RAS networks should have a framework to better evaluate their knowledge management (Paulin & Suneson, 2015). Based on the results for the study, knowledge management capacity might be defined as the ability to successfully collect, categorize, use, and distribute knowledge within a defined context. Additionally, effective knowledge management may be defined as the successful application of knowledge to achieve a desired result. From this perspective, knowledge management should be considered as a range of processes, not limited to specific tool. For example, a knowledge management technical platform might include software, hardware, and infrastructure used to support knowledge management activities; however,

the technical platform is subsumed within the larger context of knowledge management.

A potential limitation of the study was the selection of experts for the Delphi panel. Despite efforts to be as inclusive as possible, and provide a platform for individuals representing RAS networks from across the globe (Bodin & Crona, 2009), the quality of the result is still dependent on the knowledge and expertise of the panel. This risk was mitigated by including experts with a diversity of experience levels as well as a variety of RAS networks represented from both a maturity and resources perspective (Garson, 2014).

There were five capacity areas the expert panel almost unanimously agreed RAS networks should possess for effective knowledge management. First, providing an effective platform for enhanced learning and information exchange through face-to-face opportunities (e.g. meetings). Second, providing opportunities for networking through shared information and resources. Third, making activities, products, best practices, and success stories accessible to stakeholders in a format they can use. Fourth, having a culture that supports sharing among all levels of staff within the organization. Finally, providing documentation of knowledge (activities, products, best practices, success stories) to RAS professionals through a centralized platform. Although previous knowledge management research has tended to focus on tools and technology (e.g. Metcalfe, 2005), the results of this study were less technology centric and more interaction oriented. These results indicated RAS networks have a different set of needs and criteria than other contexts. Scholars and practitioners need to develop systems and processes that are more contextually appropriate for a RAS audience.

Specific to RAS networks, the results indicated knowledge management efforts should include both technical and facilitation platforms. Given the nature of RAS networks, this result may be logical. For example, when access to the internet or other technologies are limited, the most effective method for sharing knowledge amongst network members is through meetings or events attended in person. The facilitation, or non-technological, aspect of knowledge management is critical under these conditions. This result is also consistent with the theoretical foundation for the study identifying that the network aspect of social capital is a relevant consideration for knowledge management in RAS networks (Woolcock & Narayan, 2000).

A secondary theme that emerged across multiple capacities was the importance of networks ensuring members are participating in knowledge management activities. Specifically, individuals should share information freely, and stakeholders should be expected and encouraged to input their ideas and suggestions to strengthen the network. Knowledge management, by definition, is based on aggregated knowledge (Girard & Girard, 2015). If networks do not have a culture where members readily contribute to the aggregated knowledge base, the value of any subsequent knowledge management efforts would be limited (Girard & Girard, 2015). RAS networks should ensure there is a sufficient culture of knowledge sharing and contribution amongst members as a pre-condition for knowledge management activities. Any knowledge management activities should be preceded by an evaluation of the network culture to determine if the necessary support exists. The capacities identified in this study related to culture would be a suggested starting point.

Although the organizational and cultural aspects of effective knowledge management in RAS networks emerged, there were also more process centric themes. These results indicated that although particular technical platforms for knowledge management in RAS networks were not identified, there still must be some platform for knowledge to be sifted, selected, prioritized, refined, organized, packaged, and disseminated. To improve knowledge management effectiveness, RAS networks should establish a dedicated platform that is appropriate for their membership and context. The results of this research identified that the specifics of the platform are less germane than the utility of the platform and the ultimate accessibility of knowledge.

An additional methodological recommendation is to use the Delphi process to gather insights from RAS experts for future research. The results of this research indicated the Delphi process was effective at generating a sufficient number of potential knowledge management capacities, as well as ultimately coming to a consensus on the importance of the solicited capacities. Future research is recommended to use the Delphi process when analyzing research questions within a RAS context, especially for topic areas that do not have a strong theoretical foundation within RAS. For example, the use of information and communication technologies in RAS networks, the organizational and institutional functioning of RAS networks, the professionalization of RAS within RAS networks, and RAS network's capacity to advocate on behalf of RAS would be recommended areas of further inquiry.

Finally, results from Delphi studies have served as the basis for instrument development in the past (Cheng, Kuo, Lin, & Lee-Hsieh, 2001). It is recommended that the results from this study be used to develop an instrument for measuring knowledge management capacity within RAS networks to identify areas of strength and those worth investing time and finances to build upon. A standardized instrument validated under multiple RAS network conditions would be a tremendous asset for future RAS capacity assessment and subsequent extension efforts (Girard & Girard, 2015).

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