Disseminating Research Results on Trypanocide Resistance in West Africa: A Method for Identifying Effective Pathways

Affognon H D (1), Matsaert H (1), Puskur R (2), Randolph T F (1)
(1) International Livestock Research Institute, Nairobi, Kenya: h.affognon@cgiar.org
(2) International Livestock Research Institute, Addis Ababa, Ethiopia

Abstract

This study introduces a method for identifying effective and relevant pathways for disseminating research results within a multisector system of organizations. The application of the method is illustrated in the context of tsetse and animal trypanosomosis control in Ghana. Two network analysis approaches (participatory and ego mapping) were used to identify the links between different organizations. The participatory mapping shows that the actors with the most links are Veterinary Services Directorate (VSD), Directorate of Agricultural Extension Services (DAES) and livestock owners. The analysis identifies major actors (VSD, DAES, and livestock owners) that can play a role in linking diverse unrelated actors for knowledge and information dissemination. The ego mapping shows similar results where DAES and VSD together with livestock owners exhibit a high degree centrality and a high betweenness index. Computing the shortest paths to reach pastoralist (Fulani) herders who are the most important end-users of this type of knowledge and information using the participatory network mapping, three main pathways were identified. Each pathway starts from VSD and passes through an intermediary before reaching the Fulani herders. In the first pathway, the intermediary is DAES; in the second, livestock owners[1] and other livestock keepers serve as the intermediary link; in the third, informal drug sellers. Working with the third pathway via informal drug sellers may be problematic as their sale of drugs, and treatment of animals, is not legal.

Keywords: Social network analysis, knowledge and information dissemination, animal trypanosomosis

Introduction

Farmers' capacity to control their production environment depends on their available assets, and among these, knowledge and skills are key components. However, discovering ways to increase access to and delivery of knowledge remains a major challenge. To deliver new knowledge from recent research in West Africa on veterinary drug resistance, we drew from theoretical concepts and approaches to knowledge management in an innovation system perspective to guide the dissemination of strategies to control the risk of resistance. Knowledge management is concerned with ways of exchanging knowledge among those who develop it and those who are expected to gain from applying this knowledge in their production practices (Hartwich et al., 2007). The objective of the study is to ensure that trypanocide resistance research results become accessible and are utilised by stakeholders at different levels. This study introduces a method for identifying effective and relevant pathways for disseminating research results within a multisector system of organizations.

Methodology

The study combines social network analysis (SNA) and graph theory to identify key sources of knowledge and intermediaries for transmitting knowledge to end-users. Social network analysis is a diagnostic method for collecting and analyzing data on patterns of relationships among people or organizations (Wasserman and Faust, 1994; Scott, 1992). Applied to knowledge management, social networks analysis can identify patterns of interactions, including their properties such as the average number of links between organizations and those playing the role of knowledge brokers. In this study, a workshop served as a means to gather the information necessary for the analysis. A two-day workshop was organized in Accra, Ghana on 5 – 6 November 2008, on tsetse and animal trypanosomosis control in Ghana. The workshop gathered participants from Tsetse and Trypanosomosis Control Unit (TTCU), Universities, Directorate of Agric-extension Services (DAES), Information and Audio Visual Unit (IAVU/MOFA), Veterinary Service Directorate (VSD), Central Veterinary Laboratory (CVL), Project Planning Monitoring and Evaluation Unit (PPM&E), Farmers Association, Ghana Atomic Energy Commission (GAEC), Environmental Protection Agency (EPA), Food and Drugs Board (FDB), Ghana Broadcasting Corporation and the Private Sector (AGROVET). Two network analysis approaches, participatory

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[1] Livestock owners are people in cities who own cattle kept in the villages. A livestock keeper can also be a livestock owner

mapping and ego mapping, were used to identify links between the various organizations. For the participatory mapping, workshop participants were asked to identify actors who they felt played a role in information exchange on animal trypanosomosis and its control and to map links and rate the importance of the actors in the network. The same exercise was performed for the ego mapping where matrices were filled by individuals representing each organization. The networks were analyzed using the software Visualizer.

We estimate an actor's centrality in the network in order to identify bridges. Centrality in graph theory and network analysis is a quantification of the relative importance of an actor within the graph. A central actor typically has a stronger capability of connecting other network members. There are several ways to measure centrality. The two most widely used centrality measures are degree centrality, and the betweenness index (Freeman, 1977; Freeman, 1979). Degree centrality is measured as the number of direct ties that involve a given actor (Freeman, 1979); an actor with high degree centrality maintains contacts with numerous other network actors. The betweenness index is an indicator of an actor's brokerage role, with a high value signifying an actor that has links with diverse unrelated actors. As such, a central actor occupies a structural position that may act as a conduit for information exchange.

Results

The position of different actors in the networks related to tsetse and trypanosomosis control (Figures 1 and 2) were investigated using degree centrality and betweenness.

| Figure 1: Participatory mapping | Figure 2: Ego mapping |
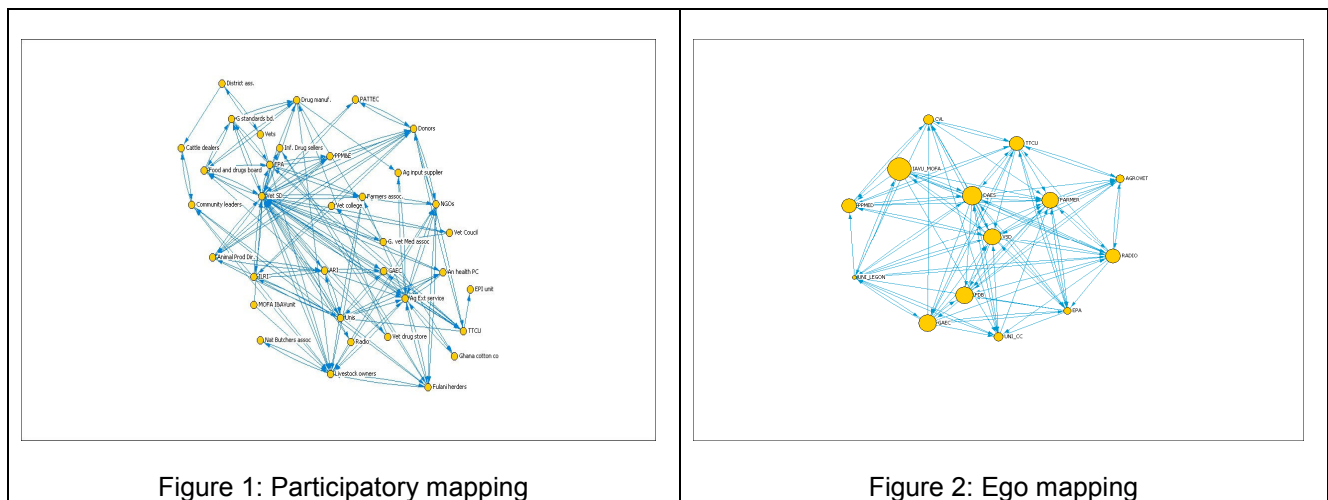
Tables 1 and 2 present the top three organizations presenting high values for degree centrality and the betweenness index for the participatory and the ego network maps, respectively.

Table 1: Top three organizations presenting a high degree centrality

Actors	Degree Centrality
Participatory map	
Veterinary Service Directorate (VSD)	45
Directorate of Agric-extension Services (DAES)	18
Livestock owners	17
Ego map	
Veterinary Service Directorate (VSD)	21
Directorate of Agric-extension Services (DAES)	21
Livestock owners	18

The participatory mapping shows that the actors with the most links are Veterinary Services Directorate (VSD), Directorate of Agricultural Extension Services (DAES) and livestock owners including livestock keepers. These actors can play a particular role in linking diverse unrelated actors for knowledge and information dissemination. The ego mapping shows similar results where DAES and VSD together with livestock owners exhibit a high degree centrality and a high betweenness index. Computing the shortest paths to reach pastoralist (Fulani)

herders, who are the most important end-users of this type of knowledge and information, using the participatory network mapping, three main pathways were identified. Each pathway starts from VSD and passes through an intermediary before reaching the Fulani herders. In the first pathway, the intermediary is DAES; in the second, livestock owners and other livestock keepers serve as the intermediary link; in the third, informal drug sellers. The first pathway represents the conventional public services hierarchy for extension; the hierarchical and highly bureaucratic way in which the services are organized often hampers a full realization of their potential. The second pathway corresponds to the farmer-to-farmer approach, which requires targeting dynamic farmers who would mostly likely to disseminate information to farmers with less access or ability to access new information. Working with the third pathway via informal drug sellers may be problematic as their sale of drugs and treatment of animals are not legal.

Table 2: Top three organizations presenting a high betweenness index

Actors	Betweenness Index
Participatory map	
Veterinary Service Directorate (VSD)	320.1
Directorate of Agric-extension Services (DAES)	153.0
Livestock owners	69.4
Ego map	
Veterinary Service Directorate (VSD)	4.8
Directorate of Agric-extension Services (DAES)	4.8
Livestock owners	4.8

Conclusions

Network analysis for knowledge and information dissemination can help identify relevant pathways and key actors based on their centrality characteristics and their capability to broker information exchange among otherwise disconnected actors. For the dissemination of new knowledge from research in West Africa on veterinary drug resistance, three main actors DAES, VSD and livestock owners and other livestock keepers were identified. However, according to participants in the workshop there are actors including private agricultural input supplier (AGROVET) with low degree centrality and a low betweenness index as they currently do not take part in sharing information on tsetse and animal trypanosomosis control but may contribute to knowledge dissemination given their information sharing function in the crop production sector. In a practical way, how can those actors that currently show potential for disseminating information, actually be provided incentives/capacity to perform this function? One important recommendation is to identify for the social network analysis actors involved in or having activities related to the topic of interest. It was stressed by participants for the process to be successful and sustainable requires reliable funding, including paying attention to mechanisms for actors' self-financing.

Acknowledgments

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