Using Net-Map to Assess and Improve Agricultural Innovation Systems

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SYNOPSIS

Practitioners require methods that capture the complexity of an AIS and structure it in a way that allows actors to use the detailed information rapidly. Net-Map is a participatory influence network mapping method based on social network analysis and power mapping. This pen-and-paper method helps those involved in or observing agricultural innovation to determine and discuss who the actors are, how they are linked, how influential they are, what their goals are, and what the crucial bottlenecks and opportunities are. Net-Map is useful for understanding complex, dynamic situations in which multiple actors influence each other and the outcome. It can be used for an initial assessment of an innovation system and can also help to monitor the innovation system's development over time.

BACKGROUND AND CONTEXT: REQUIREMENTS FOR AN AIS ASSESSMENT TOOL

The AIS approach, instead of focusing on specific actors, appreciates that an innovation involves multiple partners who have formal and informal ties, have different goals, and use their influence in various ways to further or block the innovation. Practitioners increasingly require methods that capture this complexity and structure it in a way that allows actors to use the detailed information rapidly.

AIS assessment tools ideally need to capture a specific range of complex data and to do so under particular logistic conditions. The following data are needed to understand an AIS:

- Who are all the actors involved (impacting on and being impacted by the innovation, formally and informally involved, supportive and unsupportive of the innovation)?
- How do these actors interact (including formal and informal links, material flows such as funding or seed, nonmaterial flows such as ideas, policy pressure)?
- What are their goals with regard to a specific innovation or the general innovativeness of the system (are they supportive, unsupportive, or neutral)?
- How strongly do they influence the innovation system's ability to innovate?
- What are the crucial strength and weaknesses of the innovation network? Where are bottlenecks and coalitions? What links are missing? What strategies are successful?
- How does the innovation system change over time?

With regard to the logistics of the method needed, it is crucial for it to be straightforward and easy for people to apply in the field; provide results quickly; allow for exploring and understanding systems with many unknowns; structure the complexity but leave room for in-depth explanations; support users in developing strategies for improving the AIS; and collect data that are comparable between sectors, countries, and over time.

INNOVATIVE ELEMENT

Net-Map, a participatory social network mapping approach (Schiffer and Hauck 2010), is based on social network analysis (Hanneman and Riddle 2005), power mapping (Schiffer 2007), stakeholder analysis (Grimble and Wellard 1997), and participatory action-research (Kindon, Pain, and Kesby 2007). This method helps those involved in or observing agricultural innovation to determine and discuss who the actors are, how they are linked, how influential they are, what their goals are, and what the crucial bottlenecks and opportunities are (Schiffer and Hauck 2010; http://netmap.wordpress.com).

HOW NET-MAP WORKS

Net-Map can be used in planning, implementing, monitoring, and evaluating interventions. The following step-by-step description briefly explains how it works.

1: Getting started

Net-Map is a pen-and-paper method that involves drawing networks together with participants (individuals or groups) to capture their complex knowledge of a system and make implicit or tacit knowledge explicit. Net-Map can be used as a tool by external actors, such as donors or researchers, to acquire a better understanding of the situation and monitor its development. It may also be used internally (for example, by an implementing NGO or ministry) to help decision makers and implementers improve stakeholders' involvement, strategic planning, monitoring, and evaluation. Net-Map sessions are typically facilitated by a trained Net-Map practitioner.

Before starting the activity, it is important to determine its framework and goal: Net-Map can be used as a one-off activity for planning or as a startup tool to get an activity on track. For monitoring and evaluation, a baseline Net-Map at the beginning of the intervention and one or more follow-up Net-Maps are recommended (for example, after one, three, or five years). It is possible to do a string of individual interviews or one (or more) group meetings.

The first step is to develop the overall question. It normally has the format: "Who influences XY?" XY can be specific ("Who influences farmers' adoption of this new rice variety in this area within the next five years?") or more general ("Who influences the innovativeness of the agricultural sector in this country?").

Often the more specific questions provide more specific and therefore useful answers. For example, one might learn that network structures that encourage the adoption of a new rice variety might be similar to those for other crops.

2: Who is involved?

The people attending the session normally consist of the host (the person/organization who is looking for answers), the facilitator (expert in the Net-Map method, neutral in the content question), participants from different areas of the innovation system, and a note-taker. Choosing the right participants is crucial, because the knowledge of the people interviewed is the core source of information. For example, a broad set of perspectives could be gained by including people from: the private sector, NGOs, donor agencies, government, and civil society (farmers, consumers); the national, regional, district, and local level; different ethnic groups, nationals and foreigners, different ages and genders; and agriculture, trade, finance, and industry. The ideal group is between 6 and 12 people. Larger groups should be split into (equally diverse) subgroups.

The participants are asked to name all actors (individuals, groups, organizations) involved. Actors include not only those who are involved in formal decision making but everyone who can influence or is influenced by the issue.

3: How are they linked?

A link is something that flows from one actor to another (like money) or connects two actors (like friendship). Typical links in an innovation system are flows of money, ideas, innovative products, political pressure, and formal lines of command.

4: How strong is their influence?

This question focuses on how strongly the different actors can influence the specific issue at hand (not in the country at large)—for example, "How strongly can this actor influence whether farmers use this new rice variety?" Actors' influence is defined as their ability to achieve their goals in a social setting, despite resistance (Weber 1922).

The level of influence is represented by an "influence tower" (using some small, stackable objects). The greater the influence, the higher the tower. The influence tower is used to assess an actor's actual influence on a given issue; the actor's influence can be based on a number of attributes, such as money, formal position, persuasiveness, informal ties, and so on. The influence tower *does not* measure the actor's formal position or how influential the actor should be.

5: What are their goals?

The next step focuses on understanding the actors' goals. In some cases it makes sense to ask who actively supports the innovation or innovativeness, who is passive, and who actively hinders it. In other cases, actors might follow two competing philosophies or goals.

6: Discussion (what does this mean)?

In this step, the map is drawn, and any issues that came up with the mapping are discussed. The discussion can include

looking at bottlenecks, conflicts, coalitions, future strategies, missing actors, or links that should be developed in the future. It is not important to reach agreement on every point but to explore and understand different points of view, why people hold them, and how these different views can affect the innovation system. For example, if a representative from the agriculture ministry and one from the environmental protection agency disagree on a crucial issue, that information, in and of itself, can be important for shaping a future strategy of engagement with these two agencies.

7: Results

The Net-Map session yields the map and discussion notes. The network map can be entered into social network analysis software (such as Visualyzer™ or UCINET™), which produces a computerized network picture and also allows for some quantitative analysis, such as identifying bottlenecks or boundary spanners. While the network structure provides the bones, the discussion adds the meat, giving concrete information about how and why the network performs or fails.

Less tangible (but sometimes even more relevant) outcomes of a Net-Map session are the learning and energy shared by the people attending. Participants regularly report that they have gained enthusiasm for a common cause, have resolved misunderstandings, and have a clearer vision and shared strategy after attending Net-Map sessions. The intangible effects are especially powerful if participants discover blind spots together (see box 7.21 in the next section) or if a diverse group develops a common understanding. To make the most of these process results, it is crucial that the host is seriously committed to using them and continuing to collaborate with the participants.

BENEFITS, IMPACT, AND TWO CASE STUDIES

Since its development in 2007, Net-Map has been used in a variety of ways, within and beyond agriculture, in Africa, Asia, Europe, and the United States (for detailed case studies and methodological development, see http://netmap.wordpress.com). The uses have been as diverse as the following:

- Developing benchmarks and indicators for chicken and maize innovation systems in Ethiopia (box 7.20); see also Spielman and Birner (2008); Spielman and Kelemework (2009).
- Assessing communication channels concerning avian influenza in Ghana (box 7.21), Ethiopia, and Nigeria; see also Schiffer, Narrod, and von Grebmer (2008).
- Engaging stakeholders in Nigeria, Ethiopia, and Uganda in developing bisosafety legislation under the International Food Policy Research Institute's (IFPRI's) Program for Biosafety Systems; see http://programs.ifpri.org/pbs/).
- Understanding and improving regional water governance in northern Ghana; see Schiffer and Hauck (2010).
- Understanding fisheries management in small reservoirs in northern Ghana; see Hauck and Youkhana (2008). The Net-Map exercise revealed that overlapping governance systems (traditional and modern, top-down and bottom-up) were one reason for unsustainable management practices and poor enforcement of rules.
- Increasing the impact of agricultural research on policy making in Malawi and Nigeria; see Aberman et al. (2010). By looking at concrete case studies (such as studies of fertilizer policy), this project aims to understand when and how research can enter policy-making processes. Follow-up Net-Map sessions in Malawi will track changes over time.

Typically, the goals of a Net-Map intervention are twofold—to understand and to improve a situation. Two case studies provide more detail on how Net-Map was used in analyzing an innovation system in Ethiopia (box 7.20) and developing strategies to prevent the spread of avian influenza in Ghana (box 7.21). General lessons from the use of Net-Map are provided in the concluding section.

LESSONS LEARNED AND ISSUES FOR WIDER APPLICATION

Net-Map is a useful tool for understanding complex, dynamic situations in which multiple actors influence each other and the outcome. It can be used for an initial assessment of an innovation system in a country or sector and can also help to monitor the innovation system's development over time.

A Net-Map facilitator needs to be good at working with groups and individuals, giving them room to express themselves but also guiding them when the discussion goes off on a tangent. It helps if the facilitator is able to think in structures and discover patterns in complex maps. Prior knowledge of social network analysis is a plus but not necessary.

The Net-Map steps are normally taught in a learning-by-doing approach. After a brief (one-hour) session, new Net-Map facilitators are able to draw their first Net-Map on an issue of their choice. In five to eight days, with the help of an experienced Net-Map practitioner, a new Net-Map

Box 7.20 Net-Mapping a Poultry Innovation System in Ethiopia

The Debre Zeit-Mojo corridor in the Addis Ababa market shed is an exceptionally innovative area for poultry, where new breeds and methods are embraced much more rapidly and widely than in other areas of the country. Could Net-Map discover the network conditions that encouraged agricultural innovation? What lessons could be learned for other geographical areas and other agricultural products?

Net-Maps were drawn with researchers, extension agents, and poultry farmers. The links that were mapped included: production inputs and equipment (embodied knowledge); knowledge and information (disembodied knowledge); credit and financial services; regulatory oversight; and coordination and cooperation.

Through this process, participants discovered an innovation cluster of strongly interlinked private and public sector actors who had facilitated the development of a small commercial poultry farm sector. The analysis showed that this innovation cluster was inextricably bound to the specific location (the Addis market shed, with a market for white-fleshed chicken) and the collaboration between large-scale poultry producers and an agricultural research center. This context-specificity meant that the Debre Zeit-Mojo innovation cluster did not deliver a blueprint for poultry innovation systems in more remote areas of the country. Further research, for example through Net-Maps of poultry systems in less-privileged areas, would be needed to understand how innovation could be fostered under different conditions.

This experience shows how Net-Map can tease out which innovation conditions are specific to a given context and which can be transferred as general lessons for other areas. The method also helped colleagues who had worked in the country for a long time to see aspects of the innovation system of which they were unaware.

Source: Author; Spielman and Kelemework 2009.

Box 7.21 Net-Mapping to Reduce the Risk of Avian Influenza in Ghana

Net-Map was used in kick-off workshops for a project on pro-poor strategies to reduce the risk of avian influenza (http://www.hpai-research.net). Stakeholders from different areas of poultry production, marketing, and government oversight mapped all of the actors involved, focusing on two links: (1) flows of information about suspicious bird deaths and (2) flows of intervention if avian influenza was confirmed.

Group mapping allowed participants to exchange knowledge about this network and highlight specific bottlenecks. In Ghana, mapping revealed critical issues that had not been clear to the participants or researchers beforehand. The Net-Mapping session indicated that if there was an outbreak on a small farm, considerable information would be exchanged at the village level (including among teachers, opinion leaders, and other actors unrelated to the poultry subsector). Only one actor, however, bridged the gap between the community actors and district administrators: the animal health technician. The relatively low number of animal health technicians in the system increased the risk that reports of suspicious bird deaths would be delayed.

An even more crucial insight was related to the neglect of market actors in avian flu compensation schemes. Farmers were compensated for every bird culled by the government in an outbreak, but no such compensation was available to live bird traders. Participants diagnosed a potential corruption hot spot at the national border: Suspicious bird deaths in a trader's flock would give the trader strong incentives to bribe border veterinarians, cross to the neighboring country, sell the birds, and leave as soon as possible. This kind of activity sets the scene for a regional pandemic. The network figure shown here represents flows of information about suspicious bird deaths in Ghana, indicating the corruption hotspot at the border.

Source: Author.
Note: More information including illustrative Net-Map examples can be found at http://netmap.wordpress.com.

intervention can be developed with a team of facilitators with no prior training in the method. The basic process is taught; the proposed question and links are pretested with a number of interview partners; the questions are adjusted; and the new facilitators learn how to enter the data. A particular challenge in every Net-Map intervention is to ask the right general question.

Following this preparation, the group of facilitators will either invite participants to a group mapping session or conduct a series of individual interviews. Group mapping sessions are especially powerful for getting consensus and buy-in, developing strategic plans, and getting answers rapidly, without much additional analysis. If possible, plan one full day for a group session to allow for discussion and avoid rushing participants. It is possible to do a group Net-Map in half a day, however, and make it part of a bigger event, such as an inception workshop or annual planning meeting.

In some cases, however, individual interviews are more convenient. Actors may be geographically spread out or otherwise difficult to reach; interview partners may speak more truthfully about sensitive issues, especially if there is a great power difference between stakeholders or a history of conflict.

As noted, it is beneficial to have a time series; for example, Net-Mapping could be done at the beginning of a project, halfway through, and at the end. During each session, discuss what is useful, identify any underutilized opportunities, and identify bottlenecks. Develop strategies accordingly and use the next mapping session to see how the network changed, which strategies were successful, and what still needs to happen.