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Using actor-oriented tools to analyse innovation systems in Bangladesh

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Introduction

These guidelines are based on our experiences of using an actor-oriented approach to identify pro-poor interventions in chilli and livestock innovation systems in the char lands (river islands) of Bangladesh. For more information see our research project report and companion paper (Matsaert *et al.*, 2004 a and b).

In the first section we discuss what we mean by an actor-oriented approach. The second section describes the tools we have been developing and in the final section we discuss our experiences in Bangladesh and some of the issues this has raised.

What do we mean by an actor-oriented approach?

Innovation systems are made up of a range of actors involved in generating and using new knowledge, technologies, management practices, marketing processes and institutional relationships.

The actor-oriented approach is based on the premise that a healthy and effective 'innovation system' is one where there are strong flows of information and useful partnership coalitions between key actors over time. This view has been strongly supported by studies of innovation processes (see for example Douthwaite, 2002, on Enabling Innovations).

"The importance of partnership in development interventions is widely accepted by those working in development. However, it is our experience that, in practice, the issue of how to build strong links and partnerships is often neglected"

The importance of partnership in development interventions is widely accepted by those working in development. However, it is our experience that, in practice, the issue of **how** to build strong links and partnerships is often neglected. One reason is the lack of tools to allow development actors to analyse actor links and to plan, monitor and evaluate interventions which relate specifically to this aspect of their work.

Here, the actor-oriented approach focuses on identifying the key actors in a system, mapping the links and information flows between them, and looking at how these inhibit or support pro-poor innovations. The actor-oriented tools described below have been designed specifically to assist development actors to integrate linkage and partnership

issues more fully into their work.

These tools are drawn from a wide range of sources. These include social anthropological and social network research techniques (see Long and Long, 1992; Lewis, 1998), stakeholder analysis (see Grimble and Wellard, 1997), agricultural information knowledge systems (see Roling and Jiggins, 1997) and process monitoring and documentation (see Mosse *et al.*, 1998). However, the tools are not commonly found in the analysis and planning of interventions in natural resource-based innovation systems.¹

Actor-oriented tools complement other planning, monitoring and evaluation tools. They focus on the structure of social relationships between the key actors involved in a development scenario. We have found them useful for:

- **analysis** of a given institution (e.g. an organisation or enterprise, project or sector) in terms of strong and weak linkages between its 'actors';
- **planning**: visual presentation of critical links which should be supported or developed to meet the overall development goals e.g. poverty reduction, inclusion of marginal groups.
- **monitoring and evaluation**: visualising how interventions have impacted on critical linkages over time.

The tools that we have used and that are described in detail in this paper are outlined in Table 1.

Tool	Brief description	Objective
Actor timeline	Similar to a PRA timeline, but focuses on key actors and innovations.	To understand the dynamics of an innovation system and identify key actors.
Actor linkage maps	Arrows used to plot links between key actors.	To identify key actors.
Actor linkage matrices	Links between key actors plotted onto an Excel matrix.	To visualise the links between key actors.
Determinants diagram	Group exercise focusing on understanding particular links.	To summarise and analyse findings. For planning, monitoring and evaluating change.
		Used for in-depth analysis of an actor linkage e.g. issues of control and trust between actors.

¹ For examples of use by others in NR innovation systems see Ramirez, 1997 *Understanding Farmers Communication Networks* (IIED, Gatekeeper series) www.iied.org/sarl/gatekeepers/gk_abs/abs61_70.html#66 and other related work which can be found on www.isglink.org.

Box 1: How to create an actor timeline

Timelines can be generated through a review of literature, individual interviews (particularly with people with a long association with the innovation system) and group discussions. Usually a combination of all these will get you the fullest information.

Group discussions with knowledgeable people in the sector are useful to analyse and discuss the implications of the timeline e.g. trends and new directions.

For the group discussion, use a flip chart or blackboard.

- Start with the earliest recorded memory in this innovation system (e.g. in Figure 1, the introduction of chilli to the Indian subcontinent).
- Now mark key innovations since that time.
- On the timeline these can be linked to key events in local or national history e.g. independence, the year of the big flood, etc.
- For each innovation marked on the line, note actors who created or helped the spread of this innovation. These are the key actors.
- Discuss implications: how has this innovation system changed? Where is it heading now? Who have been the key actors in the past and present?
- The timeline can be plotted vertically as shown in Figure 1, or horizontally (see example in Biggs and Matsaert, 2004.)

We should stress here that we are not advocating a 'blue-print approach' to actor-oriented analysis. Rather we would like to share some tools that we have found useful. We have used them in combination with a range of other research methods: PRA, quantitative surveys, focus group discussions. The type of tool to use and way to use it should be adjusted depending on the context of the analysis and aims of the users.

These tools can be used to analyse large amounts of data collected through a research activity. But equally, they can be useful to guide group discussions based on group members' existing knowledge of an innovation system (see discussion of long-term versus short-term approaches in the final section which looks at our experience of using these tools in Bangladesh).

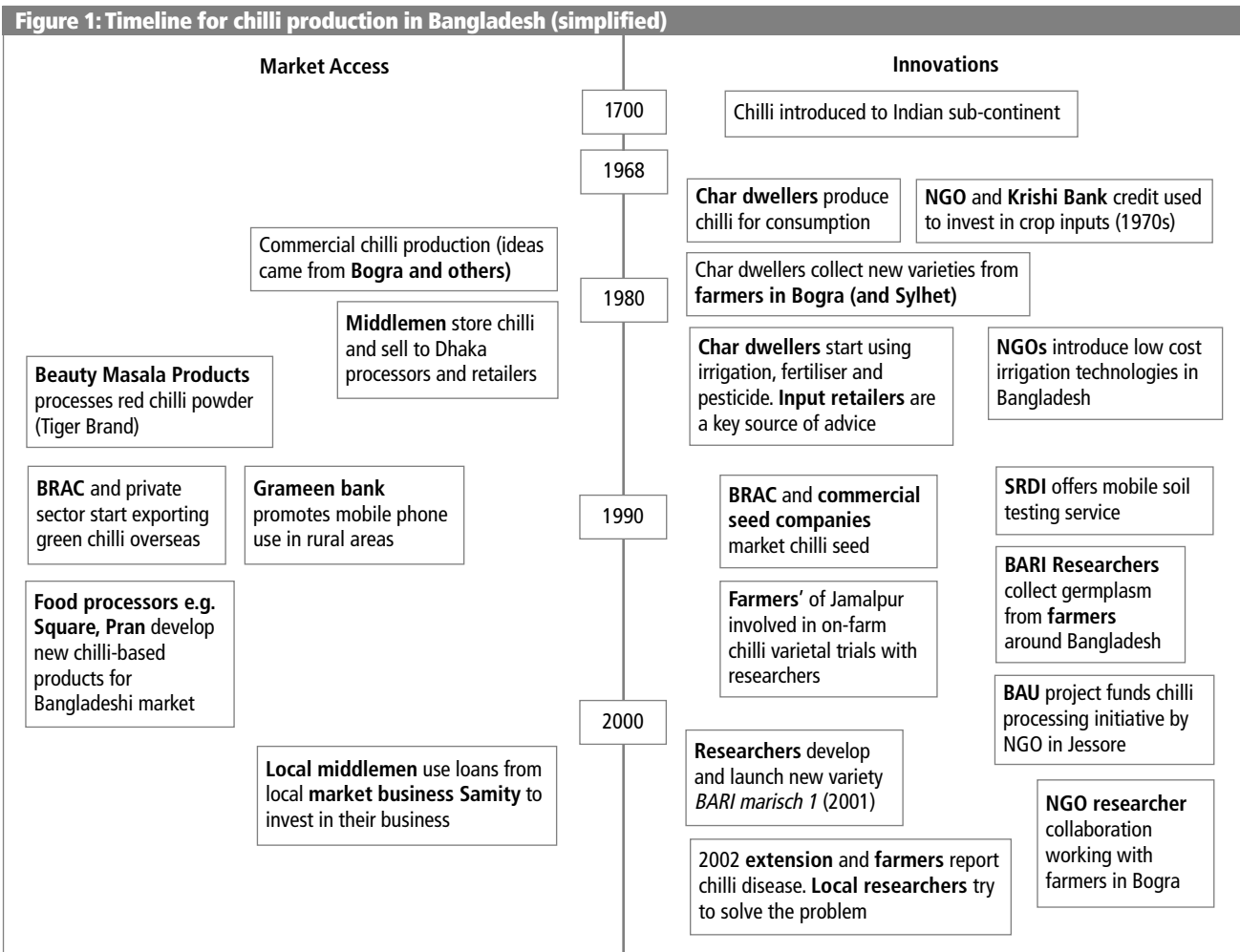
Tools

Actor timeline (Figure 1)

This maps the history of an innovation system. It looks specifically at significant changes and at the roles of key actors over time. Developing a timeline is a useful starting point for an

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actor-oriented analysis. The timeline helps to identify who the key actors are, and what their role is and has been. It also gives a feeling for the dynamics of an innovation system and where it is currently heading (see Box 1).

Actor linkage maps (see Box 2)

This exercise builds on the timeline in helping to identify key actors, and goes further in analysing the links between them. 'Ego-based' maps can be developed with individual actors to look at who they link with. 'Innovation system' maps are used to combine and synthesise 'ego-based' linkage maps, allowing the overall network of links between key actors to be visualised.

Maps can be developed by a group to summarise their knowledge of a key actor or innovation system. In other circumstances maps might be used to summarise the find-

ings of more quantitative data based on interviews or to monitor key actors in case studies.

Maps can be used on a wide range of scales. For example, you could use a map to look at information flows within an organisation, or to look at links in a regional or national innovation system. One user noted that using a (ego-based) map is a good tool to carry out a 'health check' of your organisation's linkages.

A different map would be used for a past situation, a current situation and a future scenario situation. Remember the maps of the past and present should reflect actual situations and therefore might look very different from official organisational charts. If you are planning to bring a new actor into the situation, then you add this actor to the map, with planned linkage arrows.

Box 2: How to create a linkage map

As with the timeline, maps can be drawn up by one actor or in a group.

1. Ego-based map

- Put the name of the actor in the centre of the page
- Ask the actor who they link with for different aspects of their enterprise
- Use arrows to show direction of flow of information or services
- Use thick or thin arrows to indicate the importance of the link

Figure 2: Ego-based linkage map: Char dweller links for access to information on chilli production

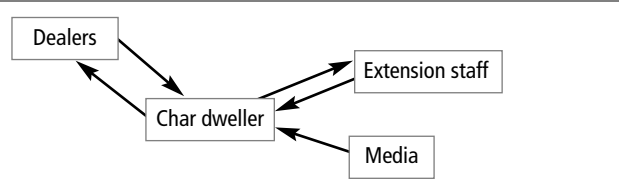
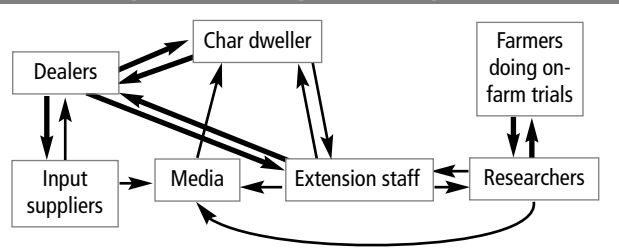


Figure 3: Actor linkage map: information flows in char-based chilli production (simplified example)



Actor linkage matrix (see Figures 4 and 5)

The matrix complements the map. It basically plots the same information as an 'innovation system' map but has the advantage of:

- allowing analysis of more complex systems with many actors (maps get very messy);
- ensuring all possible links between actors are considered, but then allowing you to focus on critical linkages; and,
- allowing links to be given a value (strong ones and weak ones).

How to create a linkage matrix

- Use a spreadsheet programme e.g. Excel.
- Plot key actors on vertical and horizontal axis.
- Each cell in the matrix represents the flow of information from the actor on the vertical axis to the actor on the horizontal. For example, cell 1D represents the flow of information from char dwellers to extension staff (in the map this is shown as an arrow). Row 1 represents all the information flowing from char dwellers to others. Column A

Figure 4: Actor linkage matrix information flows in char-based chilli production (simplified example)

Actors	A Char dwellers	B Farmers doing on-farm trials	C Researchers	D Extension staff	E Media	F Input suppliers	G Dealers
1 Char dwellers				✓			✓✓ ✓✓
2 Farmers doing on-farm trials			✓✓				
3 Researchers		✓✓		✓✓	✓		
4 Extension staff	✓				✓✓		✓✓
5 Media	✓				✓		
6 Input suppliers					✓✓		
7 Dealers	✓✓✓			✓✓		✓	

shows all the information coming from other actors to char dwellers.

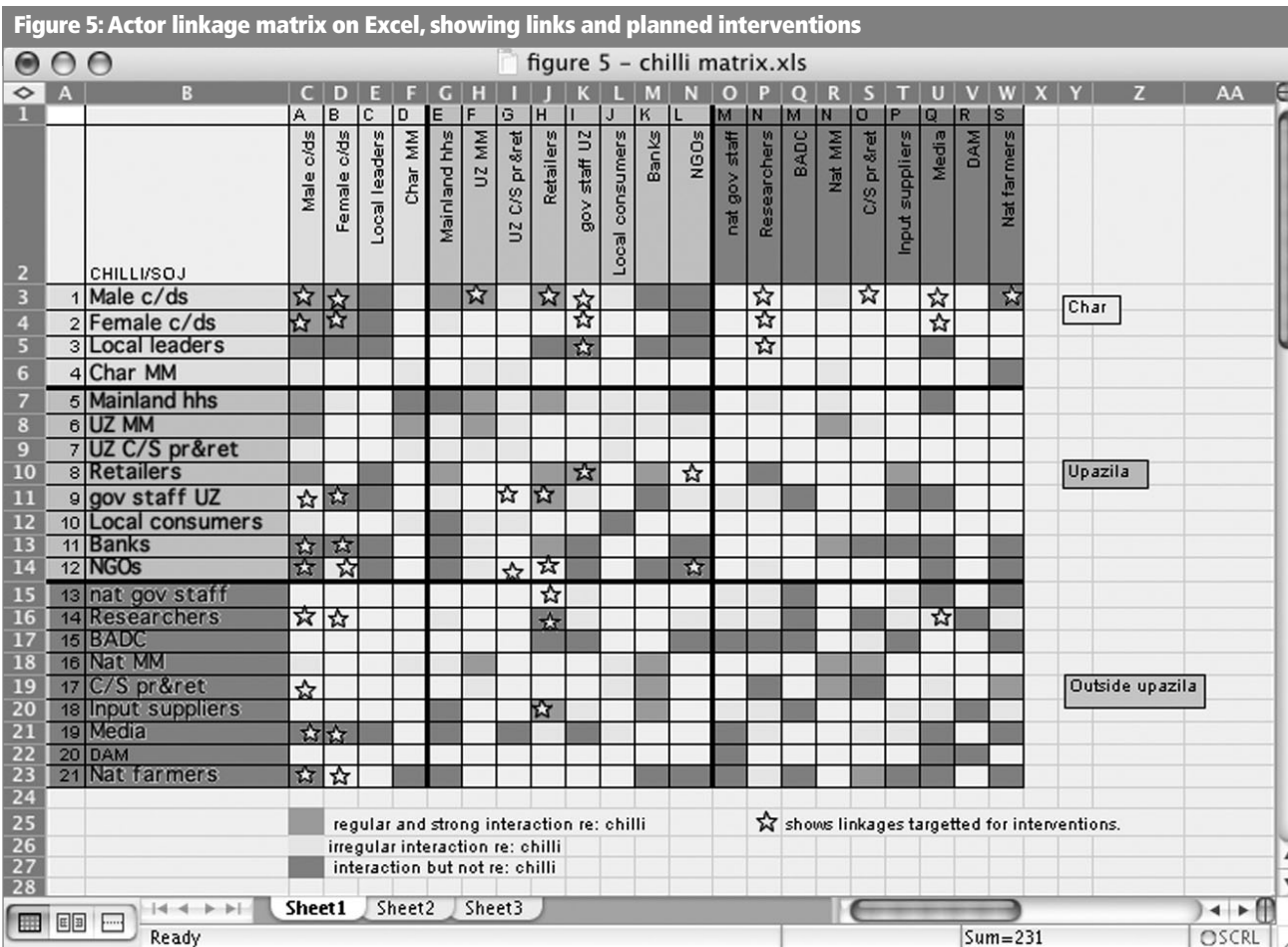
- Use symbols or shading to show information flowing from one actor to another. Once you have agreed on the code, fill in for each actor linkage.
- Each cell in the matrix can be linked to a piece of text describing the linkage and explaining the ranking given.
- As with the actor linkage maps, a separate matrix can be used to represent past, present and possible future situations.
- For planning and monitoring purposes, symbols can be used to indicate linkages which are targeted for interventions or which have been impacted by a particular activity. See Figure 4, for a matrix showing an analysis of current links and targeted intervention areas. In this case the interventions were divided into those which have built on existing links, those which created new links, and those which aimed to change the nature of existing links (e.g. changing power relations).

Variations on the basic matrix

Complex matrix data can be visually represented on maps using the UCINET network analysis software, available free

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on the Internet.²

For day-to-day office use, a **matrix board** can be used to show existing linkages and areas for interventions. This is a matrix drawn onto a board, with hooks in each square on which counters can be hung to represent the strength of a linkage. Coloured counters can be used to indicate targeted areas for intervention.

Determinants diagram

This is intended as a group discussion tool to analyse the nature of a particular linkage. The tool encourages the group to explore the strengths and weaknesses of a particular linkage or relationship and to identify ways to build on strengths or overcome problems.

² Borgatti, S.P., M.G. Everett and L.C. Freeman (1999). UCINET 5.0 Version 1.00 Natick. Analytic Technologies.

This tool is useful in analysing the quality of a linkage. Maps and matrices, as we have used them, only show the relative strength of relationships and don't give an indication of issues of control, transparency, relative satisfaction with links etc.

The determinants diagram leads from analysis of a particular situation to the development of action plans. For this reason it is most usefully used with key actors who would be involved in any future implementation of suggested actions.

Our experience of using actor-oriented tools in Bangladesh

This research was hosted by Development Wheel (DEW), a small NGO working in the chars (river islands) in the Jamuna River in Bangladesh. Though fertile, the chars are extremely unstable and the river can wash them away as quickly as it builds them up. People here are amongst the poorest and

Box 3: How to create a determinants diagram

- Identify linkages on your matrix that look particularly important or significant (perhaps because they are very strong or particularly strategic e.g. linking national and local actors). It is not necessary, and would be too time consuming to look at every link in a matrix. The group must decide which links to focus on, using agreed criteria, and based on their particular goals or interests. Occasionally we have combined a group of links (e.g. links between char dwellers and a range of national market actors) for discussion.
- Work with groups of actors to look more closely at this link (could be a mixed or single actor group, depending on how well you think the group dynamic will work).
- Write the linkage in the centre of a flip chart. Ask the group to start by discussing the strengths, examples of successful linking, good experiences etc. Mark these in the area above the link (see Figure 5).
- Now discuss any problems experienced with this link. Mark these in the area below the link. For each problem, try to get to the root cause, before going on to discuss the next.
- For each root cause, look for potential solutions. Try to encourage the group to make these active solutions (not things other people should do for them).
- For each strength, look at how this could be built on to further improve this linkage.
- The final result will be a list of ideas for action. Obviously some 'areas for intervention' (what to do) will be more possible to implement than others. The exercise helps open up a discussion about the feasibility of different actions within the current social and political context.

most vulnerable in Bangladesh. Due to their impermanent nature and separation from the mainland, infrastructure is limited and char people don't tend to have access to mainstream service providers and markets.

Our team worked together with DEW to look at ways to help char dwellers improve the benefits of their natural resource-based enterprises.³ We wanted to look at how we could support char dwellers in getting better access to information, services and market opportunities.

The actor-oriented approach seemed particularly suitable for this type of analysis. We wanted to know who, in the absence of mainstream services, were the key actors involved in supporting char-based innovation systems. How, if at all, did these actors link with the formal system? Were there ways in which we could support this process?

³ The partnership was made up of DEW staff, anthropologists from Jahangirnagar University, a business advisory NGO, and a freelance agro-anthropologist

Box 4: An example of an important non-formal actor in beef production

Our study found that char dwellers particularly need veterinary support in the post-flood winter months when there are many cattle diseases. While the government vets do not have the resources to visit the chars often, we found that at this critical time a group of traditional healers, known as *goyal* arrive at the chars. These healers have been coming here for many, many years (parents and grandparents carried out the same profession) and have very good relations with char dwellers. Their familiarity means they can communicate and help female household members who are often left alone in charge of animals. This is very important, as it is not culturally appropriate for women to meet with unknown men such as the government vets. After staying on the chars for a few months, the *goyals* return to their home area: one or two villages in Jessore. As they are gathered together here for much of the year it would be easy for service providers to meet with them and provide them with training or equipment to improve the quality of their work.

Using the actor-oriented tools described, over a 12-month period, helped us to:

- map indigenous service and marketing networks and identify some important actors and links which DEW were not previously aware of, and which they now plan to work with (see Box 4);
- through using the tools with key actors, we began to develop a shared vision and to build partnerships for action; and,
- set up a baseline understanding of key linkages, strengths and weaknesses which we can use to continue planning and monitoring changes in the char-based innovation systems.

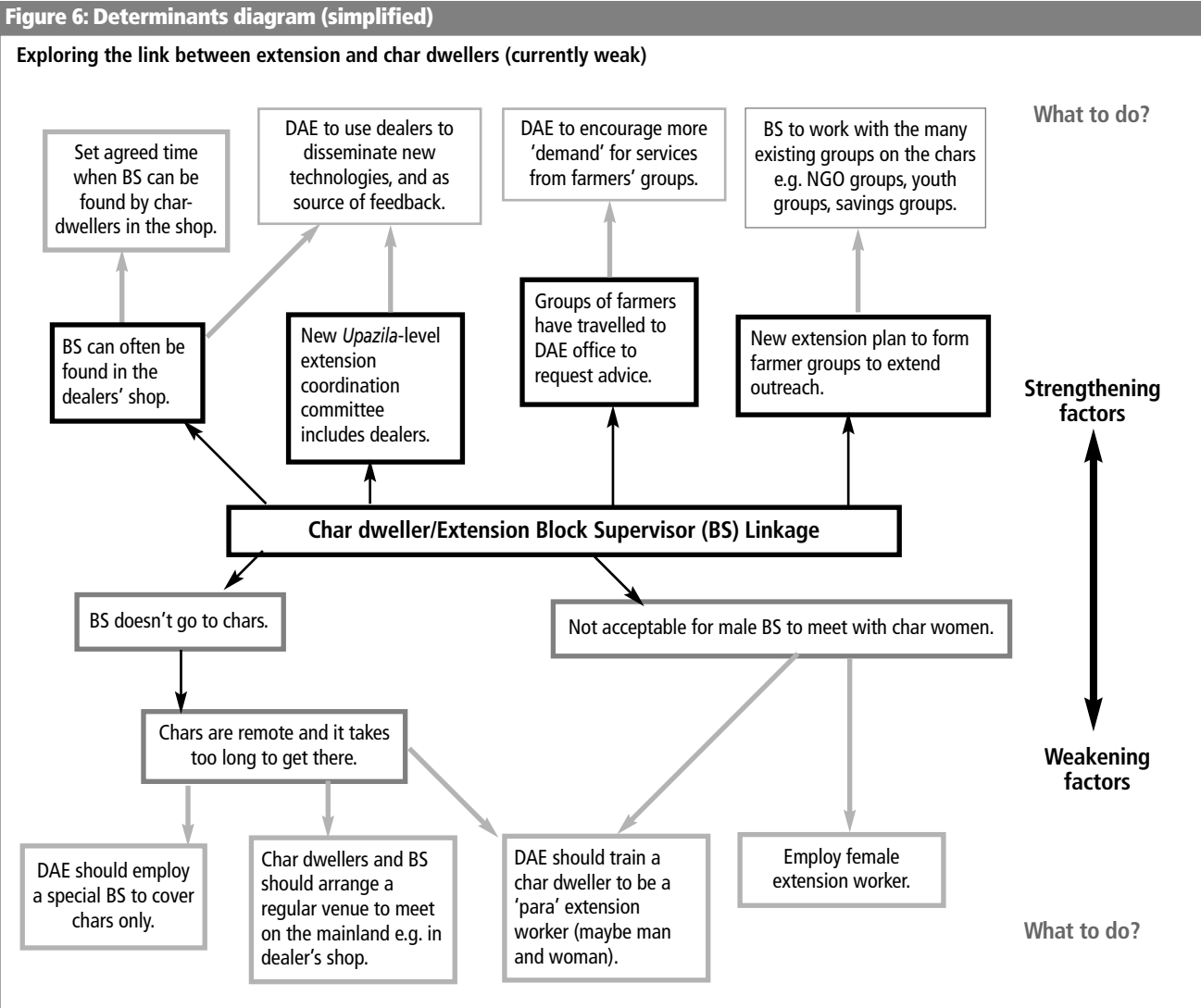
The research process we used consisted of a number of discrete phases: char-based and national surveys, case study monitoring, and focus group work. Through all of these we have tried to maintain an actor-oriented theme. The tools have been used in a PRA-type situation, in individual interviews and group discussions and the approach guided the design of our quantitative household survey.

We have found the actor-oriented tools useful, enlightening and productive in the analysis of innovation systems. As we reviewed the methodology, particular strengths observed by the team were:

- The actor-oriented approach is holistic, linking the local, district and national level actors. Other anthropological tools often fail to do this.
- The actor-oriented approach is pro-poor as actor groups can be disaggregated to focus on different resource levels, gender etc.
- The approach encourages us to recognise and build on

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- indigenous systems.
- The tools make issues around actor links visible, for example highlighting gaps and showing innovative links.
 - As well as being used to map an existing innovation system, we found the tools useful for evaluating individual events (who was linked to whom) and for planning interventions.
 - The combination of individual case study monitoring and focus group discussions was useful. Individual discussions gave us rich detail and allowed us to discuss sensitive information and to get in depth information. Focus group discussions were useful for cross-checking, consensus building and for developing ideas for interventions.
 - Participation of actors was very good, particularly in group

settings. People enjoyed using the actor-oriented tools. They generated much animated discussion.

PRA, household interviews, case study monitoring, focus group discussions: which method is best for actor-oriented analysis?

We found that the combination of research styles was very effective. Our initial PRA exercise raised actors' awareness of our work and definitely helped build a good working relationship between the coalition team members. However, in the Bangladeshi rural context we found the PRA had some limitations. At the end of the exercise we did not feel we had adequately met our aims of understanding livelihoods and

Male char dwellers meet with other key actors (researchers, extension workers, private sector buyers) to help build new linkages



Photo: Shah Abdus Salam

building support for the study. This was due to the problem of getting large and representative group meetings. Men tended to be absent at work during the day, and women felt constrained from attending a meeting in a public space or in another household's compound. As a result there was a tendency for meetings to be dominated by one household. This made us unsure of the representativeness of our findings, and made it hard to understand and categorise different household and livelihood types.

In order to get a better understanding of household livelihoods we followed up the PRA with a quantitative household survey. We visited each household in the two study areas. The survey helped us to get a better feeling for the differences between households and to ensure that the case study monitoring stage included a range of household types.

For detailed information and to build an understanding of innovation processes, individual case studies were extremely valuable. Building on these, focus group discussions helped us to confirm the relevance of findings, to build consensus on key issues and to take analysis forward into action planning.

In a shorter exercise, actor identification, case studies and focus group work are probably the most critical exercises to get a good picture of actor links in an innovation system.

Subsector mapping and actor linkage maps: similarities and differences

In this study we used both subsector mapping and actor-oriented maps. Our research team members from BASC (Business Advisory Services Centre) frequently use subsector maps when carrying out business analysis. They found that the actor-oriented map gives a different perspective in analysing innovation systems for a number of reasons. See table below.

Our BASC team members felt that the actor linkage matrix was complementary to the subsector maps, with both having a role to play in project planning. Actor-

Subsector map	Actor linkage map
Looks at movement of goods in the market chain.	Looks at flows of information and goods. Not only what happens to the product, but how producers get access to information.
Focuses on economic interactions.	Looks at social and political as well as economic interactions.
Seeks to identify weak points in the existing market chain and ways to support these.	Seeks to identify alternatives to the traditional or mainstream linkages. Looks for potential to enhance systems through developing new links.

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Social mapping exercise with villagers in Nolshunda char



Photo: Shah Abdus Salam

An insignificant looking building houses a key actor in the innovation system: inputs retailer and source of advice on new technologies



Photo: Shah Abdus Salam

oriented analysis seems to be more suited to situations where there are a wide range of actors, with complementary skills or products, and where there is potential for new innovations to come from building links between these.

Long-term versus short-term analysis

In this research project we spent 12 months monitoring the links of our case study actors. This gave us the advantage of being able to identify key events and locations which bring actors together over the agricultural year. A second advantage of a long-term analysis phase was that it gave us time to develop relationships and build coalitions with our key actors to take us into the action planning stage.

On the negative side, we had some problems keeping some of our actors interested in what we were doing over a 12-month period. Some, particularly on the private sector side would have liked to have seen us move into action soon.

Most development actors do not have the luxury of a 12 or 18-month project preparation stage. We believe that the actor-oriented tools and approach followed here could be carried out over a shorter time period, using one-off interviews or case studies and group discussions rather than longitudinal case study monitoring. This would be particularly the case if good relationships with key actors are already established or by including representatives of key actor groups in the core research team.⁴

⁴ Following the completion of this research project, some members of the research team will be involved in implementing a shorter-term study of a business innovation system. This study is being carried out as a pilot for *Katalyst*, a Bangladesh business development programme

Political issues around presenting actor linkage information

One problem we encountered in our work concerned the political nature of the information revealed by our study. In some cases our findings on links contradicted the 'officially accepted' understanding of how things work. For example, our finding that DAE block supervisors are rarely seen on the char contradicted DAE's image as the ministry that reaches every corner of the country.

Presenting information that contradicts an organisation's self image, particularly when, as in this case, it was presented by a small NGO to a large powerful organisation, is very problematic. Our findings were met with hostility and disbelief.

We soon realised that there was a contradiction within our own project aims of:

- critically analysing the current institutional environment; and,
- building partnerships to improve it.

As the research project progressed we moved away from 'critical, and judgemental' analysis that might alienate our research and coalition members, turning instead to a more 'appreciative enquiry' approach (see Magruder *et al.*, 2001). This does not mean we ignore weak links or pretend they don't exist. However, rather than focusing on them we look instead for positive links and ways forward. For example, looking at the char dweller/DAE relationship we found cases of farmers actively seeking out the block supervisor or even visiting the DAE *upazila* office and receiving the advice and services they required. Building

**Creating actor linkages through our work:
community facilitators, NGO members,
anthropologists and agricultural
researchers working together**



Photo: Shah Abdus Salam

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on this, and exploring how to develop this (still rare) linkage initiative is more constructive than dwelling on the fact that a low paid government employee, such as a block supervisor, is (and probably will always be) reluctant to make the long and tiresome journey to the chars.

Another change we have made is to move away from a 'quantitative valuation of links', which can also give an impression of judgement. Instead we use a colour-coded system showing the relative strengths of links.

We believe that changing the manner in which we approach our analysis does not lessen its effectiveness. In fact it is a more realistic and constructive way of ensuring that our analysis results in changes in the behaviour of key actors, and moves from the theoretical to the practical.

Maps and matrices: how useful are they in visualising and analysing actor links?

In our research work we found maps to be most useful for group discussions, plotting out links together with actors and for presenting findings back to them. However, maps can soon get very complex and web-like. It is easy to miss particular links. For systematic analysis, for ensuring all links are considered, and for planning, monitoring and evaluating the impact on particular links, we found the actor linkage matrix a more useful tool.

We have experimented with the use of an actor linkage

board, as an alternative to the Excel spreadsheet.⁵ This makes the matrix more accessible for group use. But we still find that a group prefers to revert to maps and finds these easier to work with. A matrix board might be useful as an office tool, to be used regularly with a small team to monitor progress in managing links.⁶

During the research period we were introduced to the UCINET software.⁷ This can be used to translate matrices into maps. The maps can then easily be manipulated to show, for example, only the strongest links, or links for one actor. We've found them an extremely useful complementary tool to the matrix.

One shortcoming we have found with the map and matrix is the difficulty in representing the 'quality' of a linkage. In our current use, maps and matrices show relative strength of links but cannot express issues such as the balance of power and control in a relationship (though separate arrows and cells do represent the direction of information flow). To actually analyse the quality of a link we found the determinants diagram group discussion exercise very effective. Currently, this analysis is summarised in a text

⁵ This is a matrix drawn onto a board, with hooks in each square on which counters can be hung to represent the strength of a linkage.

⁶ DEW plan to use matrix boards in their field office to monitor progress in developing proposed interventions.

⁷ Borgatti, SP, MG Everett and LC Freeman, (1999.) UCINET 5.0 Version 1.00 Natick. Analytic Technologies.

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description of key links. It would be interesting to explore ways of visually representing this.

Conclusion

We have written up our experiences of using this approach because we have found using these tools exciting and productive. Many of our development partners in Bangladesh and elsewhere have asked us to provide them with some guidelines to help them try out the tools themselves. We believe that these tools provide an important complement to other planning, monitoring and evaluation tools. They help us to focus on the 'who' and 'how' of our work, when there can be a tendency to get stuck in the 'what', 'where' and 'when' issues. Importantly the approach also encourages us to recognise and build on existing systems rather than imposing new structures.

We have used actor-oriented tools as part of an in depth, one-year study. However, we believe that they can be useful in shorter-term scenarios. Since completing this

study, team members have used the tools in a three-month analysis of a furniture innovation 'cluster' in Dhaka and on an even shorter, one-week review of personnel issues in a Bangladeshi port.

If you haven't used this approach before, we hope this paper will stimulate you try it out in your own situation. For those who are already using an actor-oriented approach, we hope this will make a useful contribution to the ongoing dialogue.

Please contact us

We hope you find this review of actor-oriented tools and shared experiences of using the approach useful. If you have any feedback please contact us. We would also be interested in hearing your experiences of using this approach.

For more information on the use of actor-oriented tools in our work, please visit our website www.development-wheel.org or email Development Wheel at dewhc@bdonline.org

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