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Transforming the Roles of a Public Extension Agency to Strengthen Innovation: Lessons from the National Agricultural Extension Project in Bangladesh

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ABSTRACT Purpose: *The rapidly evolving nature of agricultural innovation processes in low-income countries requires agricultural extension agencies to transform the classical roles that previously supported linear information dissemination and adoption of innovation. In Bangladesh, strengthening agricultural innovation calls for facilitation of interactive communication and a wide range of mediation tasks within (and between) stakeholders operating in different social spheres. This paper examines how a public-sector agricultural extension agency has attempted to change its roles in implementing a major agricultural extension project in order to strengthen agricultural innovation. This role adjustment is a key outcome of an effectively functioning innovation system because it enables collective actions and enhances performance that meets the needs of clients.*

Methodology: *The study uses a case study design that includes mixed methods data collection and analysis. Using interviews, group discussions, observations, and a semi-structured survey, data were collected from stakeholders of a major regional agricultural extension project in Bangladesh. Findings: The findings suggest that the agricultural extension agency missed the opportunity to deliver the agricultural extension project in such a way that it strengthens collective actions and functions that would respond to the needs of all clients within the system. This is due to institutions that create obstacles within the agricultural innovation system. These obstacles relate to the tendency to remain in a linear paradigm of technology transfer and dependency on public service, the under-estimation and depreciation of intermediary roles of extension personnel (e.g. brokering, negotiating, convening), and finally, an inability to foresee extension methods (e.g. training, demonstration) as the facilitation of interactive learning and knowledge embedding processes.*

Originality/ Practical Implications: *This is the first case study from Bangladesh that provides insights into extant initiatives taken by a public-sector agricultural extension agency to put innovation system thinking into use. The paper discusses a number of lessons, which will be useful for evolving new forms of extension work and applying agricultural innovation systems thinking in low-income countries.*

KEY WORDS: Innovation system, Institution, Learning, Poverty, Partnership, Agricultural extension

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Introduction

Agricultural extension services are often credited with enhancing food security, alleviating poverty and improving livelihoods (Cunguara and Moder 2011; Van den Ban and Samanta 2006). Currently, the rapidly changing agricultural development context is confronting numerous challenges related to social, economic and environmental performance that implicate the need for collaborative learning and knowledge management processes. A new concept of agricultural innovation rejects the classical concept of innovation, which was largely based on creating access to new ideas and tangible products, primarily from national research institutions (World Bank 2012). It is now recognized that the drivers, conditions and processes of development are dependent on heterogeneous actors learning and adapting to constant changes across different scales, rules, perceptions, identities and social relationships that govern their interdependencies, including unintended and unforeseen interactions (Leeuwis and Aarts 2011).

New insights from agricultural innovation studies have urged policy-makers and rural development professionals to adopt different ways of performing agricultural extension services (World Bank 2012). In effect, Agricultural Innovation System (AIS), is promulgated to undertake reforms in the knowledge and innovation support structures. However, AIS still tends to be an academic window into agricultural development and requires operational concepts and tools if we want to make a real change (Spielman et al. 2009; World Bank 2012). Many countries have taken initiatives to transform roles of the agricultural extension to support innovation as a collective process of putting knowledge into practice, and achieving multi-stakeholder social, economic and environmental goals. For instance, the South Asian countries, such as India and Bangladesh, have been trying various extension reforms since the beginning of the 21st century. Public-sector extension agencies and extension workers are finding it difficult to translate their roles from the classical model of agricultural extension to the AIS perspective (Rivera and Sulaiman 2009).

Bangladesh has a strong public-service extension system that was built on its legacy of the Training & Visit (T&V) approach (Hassanullah 2002). The decentralization of the Bangladeshi extension system was introduced as part of the wider initiative to decentralize public administration for more cost-effective governance, as recommended by international donor agencies in 1990s. Against the backdrop of conventional transfer of technology extension services, two time-bound projects namely the Agricultural Support Services Project (ASSP) and the Agricultural Services Innovation and Reform Project (ASIRP) were implemented, during from 1992 to 2003, in order to transform extension strategies of the largest public-service extension agency which is the Department of Agricultural Extension (DAE) (ASIRP 2003). The reforms led to a revised extension approach and known as the New Agricultural Extension Policy (NAEP) in 1998. The reforms also prompted a shift in agricultural extension services provided by DAE towards a project-based strategy. The aim of this strategy is to solve specific problems by offering group-based extension services, creating multi-organizational partnerships, and decentralizing service mechanisms to ensure the needs of vulnerable social groups are met.

The extant knowledge of whether or not, and therefore, how the public-sector extension agency in Bangladesh is changing its roles in such a way that it is consistent

with strengthening agricultural innovation, is scant and anecdotal. This implies that more empirical research is needed to understand the capacity challenges of a public-sector extension agency to act as an effective partner and facilitator of innovation. Using a case study from Bangladesh, this paper examines how changes to extension services have been difficult, especially for public sector organizations, which are often struggling to retain any existing competencies while navigating the bigger structural shifts occurring within the innovation system that are bringing new players and rules to the field of extension (Sulaiman and Hall 2005).

Review of Relevant Concepts and Theories

The key theoretical construct addressed in this paper is the notion of an emerging AIS and its implication for changing roles of a public-sector agricultural extension agency. The innovation systems framework has been developed through decades of intellectual debates, and featured relatively recently within agricultural sciences and rural development studies (Pant and Hambly Odame 2009). In this development context, agricultural innovation does not turn out in a one-dimensional, linear knowledge dissemination and adoption process of research-extension-farmer configurations, but rather, it depends on learning and meaning creation among multiple stakeholders (farmers, inputs and processing industry actors, agricultural traders, retailers, policy-makers, consumers and NGOs), networks and reconfiguration of socio-cognitive elements such as perception, rules, agreements, identities and relationships (Leeuwis and Van den Ban 2004). These stakeholders and institutional elements comprise an innovation system (IS) that can be defined at various levels: the national, local/regional, sector/technological (Asheim et al. 2011). At the national level, AIS may be defined as ‘a network comprising the organizations, enterprises, and individuals that together demand and supply knowledge and technology, and the rules, and mechanism by which these different agents interact, share, access, exchange and use knowledge’ (World Bank 2006, 5). At the local level, the network includes farmer-to-farmer flows, sharing and exchange of ideas, information, motivation, resources, knowledge and skills between farmers and other agricultural development agencies, scientists, and diverse off-farm actors. Learning is a contextually embedded process, hence it is called ‘situated mutual learning’ by the innovation scholars (Horton et al. 2011). The notion of learning has to go beyond a one-way process of knowledge transfer in order to support multiple, emerging interactions of different groups and organizations with various interests and social positions that are negotiated and mediated with a purpose to generate commonly shared knowledge. Stakeholders may be trapped in situations that hinder their motivations to adapt to and learn new ways of performing tasks while following stringent rules and policies (Sulaiman and Hall 2005). For institutional change and partnership development, this implies more emphasis on tacit knowledge circulation or non-proprietary relationship building, which is embedded in everyday networking practices, testing beliefs, and be clear about different value systems (Pant and Hambly Odame 2010).

Unlike the 1980s and 1990s models of agricultural extension for rural development (e.g. training & visit; farming systems research and extension approaches) the AIS framework regards ‘institutional innovations’ as a cornerstone of development in low-income countries (World Bank 2006; Hounkonnou et al. 2012). Formal

institutions (legislation, procedure, and policy) and informal institutions (norms, values and practices) not only enable or constrain interaction and learning of innovation actors, but are also influenced by the prevailing social systems (Klerkx et al. 2011). Culturally defined norms, historically determined institutional development, national and international priorities and policies mold the abilities of stakeholders to share knowledge, validate specific knowledge, develop accountability and achieve performance in research and extension services. Therefore, in order to ensure AIS work, there is a need for ways to make necessary adaptations to accommodate the existing shortcomings of the prevailing institutional environment and redevelop a shared theory of change, which will adjust roles within the AIS. This implies challenging top-down and hierarchical approaches as well as changing routines and practices to ensure learning between one-to-one, one-to-many, and many-to-many innovation actors (Hall et al. 2004; Hambly Odame et al. 2012).

From the history and evidence of agricultural extension in low-income countries it is recognized that organizational routines and institutional practices are not easily changed (Rivera and Sulaiman 2009; Hounkonnou et al. 2012). Institutional change needs to ensure on-going adaptations that take into account social and experiential learning by individuals, organizations and networks as a core development strategy. This is quite distinct from being achieved through one-off events, for instance, training workshops and policy dialogues. The ‘event approach’ typifies a conventional and dominant practice to effect change in attitudes and behaviors of extension staff, but there is often very little follow up to ensure change in performance and response to clients’ needs (Kibwika et al. 2009). Public-sector extension agencies face challenges in fostering innovation capacity – the ability to be part of advisory approaches and methods that build and sustain relationships among producers; between producers, and users of knowledge; between scientists from multiple disciplines and policy-makers in the specific socio-political context and many other such arrangements implicating a range of stakeholders, informal networks and formal institutions (Bimer et al. 2006; Hall 2005).

Using the theoretical constructs of an AIS such as, facilitation of learning, multi-actor network and partnership, and institutional change, this paper examines the experience of a public-sector extension agency in Bangladesh which has attempted to transform its roles in order to strengthen innovation. More specifically, the theoretical constructs direct the study to look into the extant practices and challenges of the public-service extension agency in fostering innovation capacity, which include among others new ways of designing effective, efficient and accountable projects, managing innovation supports, developing or assessing pluralistic partnerships and institutions, and facilitating learning.

Case and Research Methods

The North-west Crop Diversification Project (NCDP) was purposively selected for this study. This is one of the largest regional projects that DAE, attempted just after the organization had gone through several years of reform. The project was built on a systems approach and had similar elements of an AIS, such as facilitation of learning, formal and informal institutions and multi-actor organizational partnerships. With the financial assistance of the Asian Bank Development (ADB), the project was

implemented between 2002 and 2008 to enhance the capacity of smallholders for the production of High Value Crops (HVCs) in 16 northwest districts of Bangladesh. This is a region where the majority of farmers live on the edge of poverty. Producers are encouraged to grow HVCs because these crops have a high market price in the local market.

Organizing smallholder groups was the entry point in the organizational arrangement and institutional building process of the NCDP. After being organized in groups, smallholders' capacity for innovation had to be enhanced through various social mobilization activities (e.g. developing plans, networking, and entrepreneurship), and social and technical trainings (e.g. farmers training, extension events, discussion in group meetings). In regular group meetings (weekly/fortnightly), Non-Government Organization (NGO) partners were responsible for facilitation of discussions about group values, norms, project supports, credit facilities, technological options etc. Four NGOs including the Bangladesh Rural Advancement Committee (BRAC), PROSHIKA Manobik Unnayan Kendro, were partnered in this project to organize and coach group members for social mobilization and micro-credit support. DAE was responsible for implementing farmers' training and extension events. In addition, workshops and training for staff worked at different levels in the partner organizations were major means of developing organizational capacity of the project. Several public-sector organizations such as the Department of Agricultural Marketing (DAM) and Local Government Engineering Development (LGED), Bangladesh Agricultural Research Institute (BARI), and Rajshahi Krishi Unnayan Bank (RAKUB) were supposed to implement market development, adaptive research, and agribusiness credit line components of the project respectively.

NCDP is a complex system that comprises institutional arrangements, components, stakeholders, partners and emergent actors. The public-sector extension organization (i.e. DAE) has dual roles in this project—overall facilitation of the project activities at different levels on one hand, and implementation of the training and extension component as well as some activities of adaptive research on the other. Since NCDP is a large integrated project in terms of its diverse objectives, activities, area of coverage, number of components and organizations, it is not within the scope of this paper to investigate all of the different components of the project. The paper concentrates instead on the process of stakeholder collaboration for mobilizing smallholders' groups and conducting agricultural extension methods. Analysis presented in this paper also looks at the challenges that key stakeholders encountered in order to perform collective actions.

The study employed a case study method that is a flexible approach for empirical inquiry involving in-depth investigation of a contemporary phenomenon within its real-life context. This method is appropriate when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence or techniques of data generation are used (Yin 1984, 23). In this study, the case is the NCDP's multi-stakeholder partnership arrangements (group mobilization and extension training) for strengthening agricultural innovation in Bangladesh during the period of from 2001 to 2006. The study adopted embedded design, i.e. analysis of the sub-units of the case such, as formal and informal organizations (e.g. farmer groups, partners), farmer households, and project events (Yin 2003).

The process of data collection and analysis explores themes and groups evidence relevant to the roles and challenges of the agricultural extension agency, followed by verifying the preliminary observations with the research participants (Punch 2005; Creswell and Tashakkori 2007). In Bangladesh, field research was conducted between August and December, 2006 in Bogra—a north-western district located about 220km from the capital Dhaka. Data collection processes started with a review of secondary sources (reports, manuals, brochures and magazines) in order to get initial insights about the project and its context. As well, information relevant to the theoretical constructs of AIS was identified (e.g. stakeholders, activities implemented, etc.). In the exploratory and qualitative phase, the study involved semi-structured key informant interviews with 36 respondents and informal (unstructured) interviews with 30 participants who were project partners, farmer group members, and relevant institutional actors (e.g. nursery owners, input dealers, commission agents). General and participant observations were undertaken within several specific events, such as two monitoring and evaluation workshops at national and sub-district level, three farmer trainings and four farmer group meetings. A focus group discussion was conducted where group members, DAE and NGO field officers participated. At the final stage of the study, two surveys were conducted—one with 30 randomly selected farmer group members (two members randomly selected from a sample of 15 farmer groups representing 212 farmer groups) in Sherpur, Bogra. A second sample purposively selected all staff members (50 respondents) from partner organizations working in the project across the five sub-districts.

Data were collected by the first author with the help of two trained data enumerators. Except for the survey, all interviews and discussions were recorded in vernacular on a digital voice recorder, and later, transcribed into English. The transcribed data were analyzed manually by the first author from the perspectives of qualitative research techniques (Miles and Huberman 1994; Strauss and Corbin 1998). A combination of inductive and deductive data analyses was used. For qualitative data, a preliminary coding scheme was developed before the field study that contained a list of concepts and themes related to institutional and organizational challenges to strengthen innovation. The codes include concepts such as, 'interaction', 'sharing', 'relationship', 'rules', 'norms', 'motivations' etc. As the field study progressed, other relevant concepts emerged and additions were made to the coding scheme. Examples of these concepts are, 'resources', 'incentives', 'organizational routines' and 'extension methods'. Similar codes were grouped under predefined themes, such as 'learning', 'network', 'facilitation', 'innovation capacity', 'institution', 'partnership'. Data transcription and analysis continued as the field study progressed. Based on the preliminary observations and results of analysis, a structured questionnaire generating quantitative and qualitative data was developed including variables related to participation, innovation supports, challenges for collaboration in implementing the group-based approach and extension methods. Survey data were analyzed using descriptive statistics. This methodology enabled cross-checking of the survey findings with the initial exploratory and qualitative phase of the study.

The validity and reliability of the study were ensured through triangulation and sequencing of methods and data sources, inductive and deductive analysis informed by predefined concepts, prior field and research experience of the first author as well

as a grasp of language and cultural context by first author, and feedback on preliminary findings from both participants and analytical discussions and critique provided by the second author (Bernard 2006; Golafshani 2003; Punch 2005). There were two meetings with local extension and rural development experts and practitioners, one during the exploratory stage (August 2006) to discuss the research project and another at the end of the study (December 2006) to discuss the preliminary findings. This provided an opportunity to get feedback on preliminary findings from four staff members working with DAE and partner NGOs of the project during the second presentation.

Findings

Facilitation of agricultural and rural development innovation process is a new task for public-sector extension services in Bangladesh. The institutional arrangements and necessary partnership mechanisms are closely related to the expectations of an AIS with respect to adapting and learning new ways of performing tasks while following stringent rules and policies. This process can be tremendously challenging and this paper discusses several dimensions of the situation encountered in Bangladesh.

Challenges to Forging Agreement and Preliminary Stakeholder Engagement

Preparation of agricultural and rural development innovation involves activities, such as preliminary stakeholder analysis, solicitation of stakeholders' ideas, exploring the capacity for innovation, forging agreements and identifying broad areas and boundaries of interaction and intervention. In the Bangladeshi case, the preparation process leaped over ground situations, farmers' expectations, and concerns of relevant institutional actors. Analysis identified five indications of this disregard of stakeholder demand. First, there was an early delay in the preparatory stage of the project. The donor agency, (i.e. ADB) set the requirement for strong monitoring and supervision of development programs in Bangladesh (ADB 2001). In getting financial assistance for agricultural development projects, a pre-condition was to form a technical assistance team in consultation with the ADB. The donor did not disburse funds until 2002 due to delays in fulfilling the requirement of forming a Technical Advisory (TA) team for NCDP. As stated in a project document, 'Due to unavoidable circumstances, the project could not be started on schedule. After fielding of the TA team, the project activities have been intensified (...)' (NCDP 2003). Nine international and 16 domestic consultants comprised the large TA team. Second, crops and technologies targeted by the project were selected based mainly on expert consultation rather than on rigorous need assessment steps. Several ex-ante factors such as profitability, market demand, agro-ecological suitability, were considered in selecting crops. The project was started without a comprehensive need analysis study, as mentioned by a project consultant, '(...) the intervention of the project has to be selected by assessing the demands of the clients (...) so far I know the need assessment has not been conducted yet (...)'. Third, the geographical coverage of the project was determined based on ease of physical access, administrative monitoring and organizational familiarity rather than the potential cultivation of HVCs. A district extension administrator stated, 'we do

not know much about the steps followed for selection of the sub-districts (. . .)', while an NGO officer clarified, '(...) the project administrators selected the most of upazilas (sub-district) to the peripheral network that could be easily accessed from the main highway in the North-west region'.

Fourth, partner organizations were selected considering their mandate in public services and relevance to different components of this project. For instance, DAM, BARI, LGED are relatively large public sector agencies who had been criticized for their bureaucratic attitudes and performance in interactive agricultural development policy implementation and service delivery (Majumder and Shivakoti 2001). On the other hand, NGO partners were selected mainly on the basis of their experience with micro-credit sector, scale of operations and budgetary capabilities. Typically the AIS approach, and application of its experience in other cases, suggests that project partners should be selected considering their innovative spirit, commitment, and ability to deal with uncertainties, and emergent ideas in agricultural innovation process (Ekboir 2012; Swanson and Rajalathi 2010). A small number of big NGOs may be a desirable choice, if the project intends to ensure ease of central monitoring and feedback system. But, it may also implicate a closed process of stakeholder selection.

Fifth, and finally, there was lack of a comprehensive process of consultation and agreement with stakeholders about institutional arrangements, project rules and norms at the preparatory stage of the project. Belated appointment of the TA team created pressure to speed up the project and meet pre-determined deadlines. As there was no baseline study for this project, the TA team designed the project based on available literature/ documents and resources of HVCs production, marketing, processing, credit and agri-business, and then solicited feedback through several regional meetings and the inception workshop. Field officers of DAE and partner NGOs missed the opportunity to develop a clear understanding of the existing context which could influence the synergistic functions of the project components and subsequently, systemic performance. As illustrated by a comment from a DAE field officer, '(...) we do not know the function of adaptive research, and agri-business credit line (. . .)'. Overall, the study found little evidence that most field level staff were aware of the functions of the different components and institutional arrangements within NCDP.

Challenges to Planning, Monitoring and Evaluating Innovation Support

Two seasonal (winter and summer) and annual planning and review workshops were organized by DAE in every sub-district to operationalize the principles of bottom-up planning processes. These were expected to provided opportunities for relevant stakeholders to interact and discuss progress as well as develop proposals for the next year. The workshops were supposed to serve as an interactive space for field officers of DAE, NGO partners, farmers and other partners to engage in dialogue and mutual learning from the field experience. The workshops focused mainly on training, extension and group development activities. The field extension agent of DAE was responsible for contacting farmers, conducting need assessment and relaying farmers' concerns back to the workshops. When asked about this process,

two-thirds of the farmers mentioned that they knew neither about the planning and review workshops nor the needs assessment study. When asked about farmers' limited participation, extension agents mentioned several reasons related to lack of logistical support for bringing farmers together, poorly qualified human resources for facilitating innovation processes, and the absence of incentives for farmers and partners to maintain their involvement in training, extension and group development tasks.

The study found that there was infrequent participation of DAM, LGED and BARI in planning workshops. Some organizations such as DAM and BARI do not have an organizational structure beyond the district level. Respondents from these organizations mentioned physical distance as a barrier for them to participate regularly in planning, monitoring and evaluation events. Representation of public and private seed sectors was insufficient. As indicated by a seed dealer, '(...) some farmers asked me about the project but I could not tell anything (...) extension agent never discussed this with us'. Key informants confirmed that actors from the seed sector were not aware or contacted about the project and workshop. Although the project questioned the credibility of the private sector for providing quality seeds (NCDP 2003), the seed dealerships are the main sources of seed and planting materials for vegetables, fruits, and spices. Public and private seed sectors (private traders and NGOs) were usually involved by the central project administration for importing seeds and planting materials to be used in conducting demonstration plots for the project.

Besides missing functional links and commitments of relevant innovation actors, the planning and review process was dominated by the staff of DAE, and constrained by conflicts of norms and conservative maintenance of status-quo roles. NGO partners expressed their dissatisfaction since their ideas, and suggestions were often not considered and appreciated by the staff of DAE. While mobilizing smallholder groups, the stakeholders were engaged in disputes over several issues of group selection and credit norms. These issues are discussed in the next section of the paper. Farmers expressed their dissatisfaction for not getting their views in place and getting effective feedback from the facilitators of DAE. The outcomes of the annual plan were a number of crop-wise demonstrations, budget spent for demonstration, number of other extension events, training, number of groups formed and future targets. Management was more in-line with updating previous plans with some modifications made on the basis of their perception of agronomic factors of the target crops. Reporting omitted evidence of learning, such as integration of other system components (e.g. market chain, seed sectors, post-harvest processing). In fact, there were farmer respondent and key informant references to DAE's own boundaries, institutional mandate and culture, and the dominating attitude of facilitators and lack of opportunities for partners and relevant institutional actors to assess their roles and contributions to planning and subsequent implementation of the project activities. This means that planning and review aimed at achieving tangible products (technologies or events) without imparting due consideration to learning, performance and ultimately, institutional innovation.

Challenges to the Facilitation of Group-based Extension Beyond Knowledge Transfer

As group mobilization, micro-credit support, farmer training and extension events are intertwined, DAE and NGO partners are supposed to work in close collaboration. But at the early stage of group formation, DAE and NGO partners did not reach an agreement on a set of joint operating principles, strategy (theory of change) or work schedule. Working in a public organization, field workers of DAE were reluctant to change their own work styles and agenda. NGO partners started forming producer-market groups without consulting DAE. When they submitted the group lists, DAE did not approve these for mainly two reasons – (i) delay in getting donor funds; and (ii) non-compliance of group criteria. NGO partners perceived credit management as an entry point for group mobilization, and therefore, they also included members of their own micro-credit groups who were mainly landless. According to the project, eligible group members should have land to cultivate HVCs. In some instances, DAE also formed groups as they had to start training, demonstrations and other extension events. However, prior consultation and consensus-building among members of both DAE and NGO formed groups, were neglected in most cases.

In what followed, group mobilization activities were trapped in a series of early nascent mistrust, conflicting interests, and undisclosed perceptions. NGO partners preferred farmers who would be able to start repaying loans quickly. According to their experience, marginal and landless farmers performed better in credit recovery compared to small farmers. Since these farmers are usually involved in multiple livelihood activities (both on-farm and off-farm) they can start returning loan installments promptly. On the other hand, DAE preferred resource-enabled farmers, and emphasized project rules that selected farmers based on ownership of a certain amount of cultivable land. In effect, DAE and NGO partners were involved in contradictory positions such as, non-approval of groups or group members, delays in organizing farmers training, denial of DAE staff to include some group members for training and blaming each other for not complying with project rules.

Several extension methods such as farmers' training and demonstration using Farmer Field School (FFS) were identified as ways to enhance smallholder knowledge and skills of different HVCs. Farmer training was referred to as 'village based training', after the idea that the events should be conducted at a local club, school or household of a group member. This would ease farmers' mobility difficulties, especially for women, and create an informal learning environment. However, DAE decided to conduct the training events in their sub-district training facilities, where some farmers had to travel long distances to attend. This decision was taken based on DAE's ease of organizing effective training events. However, the study revealed some key complications due to this decision. In particular, a one-day training program was structured into four training sessions, of which three sessions were allocated for production and processing of three different crops and one session for marketing and credit management. Training observations indicated that topics were selected randomly based on experience of the extension personnel and agro-ecological factors (e.g. the most common crops cultivated in a region or crops grown in a particular season). A comprehensive training needs assessment was rarely evident, if not absent. The district officers took the liberty of choosing topics for their

training session without following a training plan. There was also insufficient preparation for organizing training logistics and communicating between trainers and participants. Sub-district officers were very careful to allocate one or two sessions for trainers from the district office in the training schedule, even though they had not confirmed the availability of these resource persons. In some instances, when organizers were informed last minute about the unavailability of a trainer for a specific training session they had to allocate another trainer spontaneously. These situations were indicative of a strong bureaucratic approach with hierarchical relationships between district and sub-district extension officers as well as a lack of attention to the needs of the trainees.

Observations indicate that training sessions followed instructional and instrumental approaches of passing technical information to the participants. This is also supported by participant's opinions about training (Table 1). Trainers used conventional training aids such as, folders, booklets, leaflets, and posters. They were less interested in using available visual aids supplied by the project (e.g. printed transparent sheets), collecting and using real-life examples (e.g. samples of diseases, fruits, and experiments) and preparing new hand-outs or hands-on learning exercises. Although there were some limitations (e.g. power supply), trainers did not have the necessary motivation to develop and use innovative teaching materials and methods when there were no such limitations. This issue had also been discussed in a national meeting, where the project administrators and stakeholders reported their concerns about field trainers' motivation and quality of training for trainers.

Based on researcher observations of training events, only a few participants were active in terms of asking questions, and seeking further sources of information during training sessions. The quality issues of training sessions were cited as reasons for the majority of participants to be silent or inattentive. While probing these reasons, some participants mentioned two different goals for their participation in training: i) getting a training certificate, which is a requirement for application of a loan; and ii) getting an honorarium (US\$2). Without admitting many of their own limitations, DAE staff blamed farmers for their lack of learning motivation. One DAE officer stated, '(...) our objective is to provide knowledge and skill, farmers' objective is to get honorarium'. In effect, farmers adopted their own strategies (e.g. mimicking a public demand for training) in order to get a supply-driven service.

By the end of 2005, the project implemented 6,000 demonstrations on varieties and management practices of different HVCs. The project consultant developed the technical packages of the demonstration centrally. Since there was no well-defined guideline for implementation, extension agents of DAE selected farmers for conducting demonstrations based on their personal or past work relationships and DAE officers' perceptions of farmer innovativeness. These farmers were typically

Table 1. Farmers' opinion about training sessions

| Farmers' opinion | % farmers (n = 30) |
|--|--------------------|
| Training sessions were relatively abstract and theoretical | 83 |
| Training adopted one-way instructional sessions | 73 |
| The sessions followed interactive discussion | 27 |

Note: Farmers' survey, December 2006.

resource-enabled farmers who are likely to embrace technological packages earlier than others. A field extension officer explained his perception about possible demonstration farmers, '(...) traditional thinking and resistance to change exists (...) there are some farmers who always want to try new ideas. They are progressive ones whom some farmers follow while the rests always resist new ideas'. In a collective process of innovation, farmer selection might be accomplished through group consensus, willingness to learn and share, credibility in local social networks, and feedback from partner NGOs, who were supposed to facilitate and closely monitor group activities. Extension field officers show little motivation and interest in managing processes of conflict management and consensus development within or across farmer groups, 'if farmers were selected based on the group consensus there would be more conflicts and difficulty in selection of a recipient of demonstration', stated one field staff of DAE.

Persuasion is an important factor for achieving behavioral change objectives within a farming demonstration, but it can also be used to the detriment of collective action. In one observed demonstration, the DAE field officer highlighted tangible results such as, yield, input supports and technological soundness of the HVC and its marketing with farmers. Out of seven farmers, four indicated their preference for high yield, and three farmers indicated their objective for getting free inputs as reasons for setting-up demonstrations in their fields. Seventy percent of farmers surveyed also agreed that getting free inputs was an important motivation to conducting a demonstration. A project officer explained that extension agents had to implement the demonstration in a pre-defined timeframe. In order to avoid possible criticism for failure in negotiating the demonstration sites, staff used easy and rapid persuasion techniques to highlight tangible and immediate benefits of the HVCs for farmers. Extension agents did not know, however, the effective sources of inputs for these new technologies. The central project management supplied all inputs. Interested farmers missed opportunities to adopt the technologies due to non-availability of seeds or planting materials for some crops and varieties (e.g. summer onion, jujube budding, basmati rice, summer tomato etc.). Most extension agents were not interested in linking farmers with appropriate sources of inputs either because they did not know, or did not recognize this requirement as their responsibility. Rather than problem solve with farmers, they avoided the responsibility and deflected farmers attention to research stations or other public agencies. A typical smallholder farmer, however, was not capable of individually approaching a national research institute, which might not even offer such support. Only a specific communication approach would be help farmers to help themselves through collective action to secure the necessary inputs.

Extension agents emphasized adoption of HVCs as a technological package. They did not perceive the real meaning of participation and the importance of adaptation and co-production of knowledge and technology as integral to innovation processes. In this study, findings indicate that there were strong biases of the external professionals (e.g. project planners and scientists on the TA team) against participatory processes, as well as a fixation on technology adoption without efforts to identify local creativity and innovation. Moreover, there was lack of necessary follow-up visits and encouragement by farmers themselves to engage with other farmers by visiting demonstration sites. According to farmers ($n=30$) surveyed, only 17% of farmers visited demonstrations. This is similar to the results of the project monitoring study,

Table 2. Major criteria followed for evaluation of the demonstration

| Evaluation criteria | % DAE and NGO officers (n = 50) |
|--|---------------------------------|
| Agronomic success of crops (yield, pest, disease, cultural management etc.) | 72 |
| Indication of farmers' exchange of knowledge and learning | 44 |
| Social and organizational potentials of the technologies (seed availability, demands of traders and consumers, marketing facilities) | 30 |

Note: Organizational survey, December 2006.

which reported 15% of farmers visited demonstration sites in their area. It was also found that NGO partners were usually invited to attend the field day, but were not informed and invited to join in organizing demonstrations. The success of demonstrations was assessed on the basis of technological potentials (Table 2).

Overall, the findings indicate that the project paid insufficient attention to the wider self-help networking and exchange of knowledge and learning among farmers. For instance, one project study (NCDP 2006) indicates that out of 1,426 beneficiaries 43% of farmers surveyed reported application of knowledge and skills learned from the demonstration. No attempt was made to assess if farmer-to-farmer learning outside of the demonstration occurred and whether or not new autonomous networks of farmer knowledge were created.

Discussion

This case study identified the existence of key institutional constraints on articulating stakeholder demands for innovation and redeveloping roles of public sector extension workers in a major project. The preparation stage of the project confronted the dilemma of articulating institutional choices through consultation and interaction with various stakeholders and mobilizing activities in a very short period. The facilitators omitted steps to develop sufficient awareness and perception about suitable ground rules, stakeholders' expectations, and possible options for institution building. It is not uncommon to find that extension administrators in South Asian countries do not have performance-based incentives to engage in complex and timely processes of demand articulation (Sulaiman et al. 2006). The institutional partnerships involving producers, markets, private sector actors, such as seed dealers, public sector employees and NGOs are building blocks of an AIS and their interaction should not start without proper discussion and analysis of 'who demands what'. The repercussions of not doing so might be that different needs emerge from multiple actors while clients' innovation needs might be excluded at the expense of the interests of influencing stakeholders e.g. project administrators (Klerkx & Leeuwis 2008). In the preparatory stage of the NCDP, the clients had limited opportunities to influence decisions about project norms, rules, and support. As well, the donor agency's expectation for a technically sound governance structure, and the lead agency's emphasis on catching up on the time-bound completion of project activities did not reflect farmers' innovation needs.

The case study findings show that public extension agency did not cater for the integration of actors' motivations for being part of the project. Missed opportunities to create mutual understanding and support the functional interdependence of components of an AIS (e.g. extension-research knowledge pulls, farmer-to-farmer learning, etc.) were evident. By referring to institutional boundaries, work beyond an actor's perceived role or organizational mandate or reinforced dependency within the farmer-extension relationship, partners made it difficult to conceive of different, more practical roles. Planning and review activities occurred in isolation from local knowledge networks (e.g. farmers, traders, and input dealers etc.), which prevented bringing their synergies to the innovation process. The findings from this study support the argument that 'system' thinking often reinforces, rather than subverts, in-built connotations of a clear boundary and a common goal, which is difficult to achieve in complex multi-actor processes (Leeuwis and Van den Ban 2004). A complementary thinking for DAE would have been to conceive the innovation process as facilitating or collectively forging networks of relationships, open and collegial interaction among multiple stakeholders and capacity for adaptive learning that cut across the individual, organizational and system levels (Pant 2012).

The public-sector extension agency concentrated on regulative and normative institutional issues such as 'what is to be done (group identification, mobilization, training and credit management)', 'by whom', 'when (timeframe of the project)', while leaving aside substantive cognitive institutional issues such as, 'why should these be done', and 'how'. The project administration intended 'blue print' and 'planned' implementation while local groups actively formulated and pursued their own interests. Therefore, institutional challenges to emerge during implementation were largely due to different individual cognition (e.g. perceptions, expectations, and ideas), as well as conflict within social interactions among different groups (farmer groups, project administration, service stakeholders, etc.). The innovation literature is clear that developing spaces for interaction within can be facilitated to share insights and make explicit tacit knowledge, negotiate expectations and build understanding (Pant and Hambly Odame 2010). This case study from Bangladesh indicates that farmers' groups and NGOs may devise their own rules through deliberative actions, rather than becoming reliant on 'rules' introduced by the project experts (Islam et al, 2011). This 'acting out' implicates 'non-proprietary' partnership mechanisms that could move towards meaningful change in public agricultural extension in low-income countries (Pant and Hambly Odame 2010). Historically, however, and as case study suggests, the reforms of public-sector extension bureaucracies are reluctant to undergo major revisions of their roles which limits opportunities for substantial institutional innovations (Sulaiman and Hall 2005).

The study provides two insights into role transformation for public-sector agricultural extension agencies within a theoretical framework of a well-functioning AIS. First, projects should be understood in terms of their practical outcomes, which arise because of the work of dedicated, performance-oriented organizations and individuals. Changes in individual cognitive domains (e.g. in our case the attitudes of DAE and NGO staff) are intrinsically linked to the project settings and can be facilitated better by installing necessary incentives and transparent feedback mechanisms between what staff actually do in the field or in the organization, but not by what they should do (De Leener 2003). Technically sound 'protocols' and

‘procedures’ (administrative rules and regulations) that stakeholders need to follow enhances job legitimacy but hinders creativity and spontaneity in human relationships. Knowledge building, networking and problem solving require interactive communication, which may or may not be part of institutional rules and norms. In contrast, a process approach such as spaces for role flexibility and iterative learning from review of mistakes and successes potentially improve actor legitimacy (Albaladejo et al. 2007). Second, this study illustrates that change is hampered by a lack of connection between individual and collective action. Farmers ‘opt out’ when their motivations for such things as free or cost-reduced inputs are not met. This means they are disengaged from various kinds of social learning that could positively influence their livelihoods as well as the performance of agricultural extension institutions. This study confirms an earlier point within the literature that social learning is the route to (or subject for) institutional learning (Woodhill 2002).

Taken in broader context, this study reaffirms the need to anticipate new and emergent partners for extension and advisory services and work on their complementary contributions to agricultural and rural development. Government-NGO partnership mechanisms have long been legitimized on the grounds that NGOs have more flexible work styles, and an agenda for empowerment of the resource-poor and social mobilization efforts. The findings highlight partner NGOs strategies that are less than altruistic—including members of their micro-credit groups, low interest in enhancing group-based capacities through engaged learning sessions, and supporting intermediary functions. Several studies have substantiated similar results that NGOs (especially large NGOs) have moved away from their original goal of social empowerment and governance (accountability) towards project-driven service-delivery (e.g. micro-credits, seeds etc.) (Moniruzzaman 2011). The findings from this study raise questions about organizational interests of partner NGOs that were supposed to be complimentary to the government extension agency in order to deliver group-based innovation support services.

There can be little doubt of the growing recognition that facilitation of organizational linkages and brokering of relationships underlie innovation products and processes as well as institutional innovation (Ekboir 2012). The situation in Bangladesh, where the collective processes of innovation are challenged by social distrust of both formal and informal institutional actors, now calls for ensuring extension work recognizes conflict between one-to-one, one-to-many, and many-to-many interactions (e.g. within and among farmers’ groups and service agencies). Innovation stakeholders’ hidden agenda become more important than their commitments to contribute to smallholder poverty alleviation. For instance, in this case, the NCDP was biased towards relatively rich farmers and paid less attention to creating networks of knowledge and skills exchange among resource-poor farmers and their communities. For a public extension organization, which has a long history of independent functioning, it is apparently impossible to negotiate the mandate and interests of public sector and private sector stakeholders while supporting a process of interactive learning and communication. Pant (2012) argues that a learning-based innovation process is influenced by the size, age and types of organizations involved. An extension organization with time may reach a stage of idea fatigue, and needs to revisit its capacities to embrace new ideas. In this respect, the study supports the findings of an earlier study (Islam et al. 2011), which reported that the public-sector

extension agency did not realize the importance and differences between extension as public and private goods, and that they need to embrace partnerships with other stakeholders (e.g. seed dealers, NGOs) in order to empower farmers' group in Bangladesh. It is quite possible that, at least in Bangladesh, extension scholars and practitioners may have to rethink the group approach to extension and advisory services evolving ways of building collective action that may not yet be understood.

Overall, the study points to key challenges such as the availability of necessary and competent human and social capital for innovation processes. Roles analysis, incentives and performance assessment tools should be used to engage clients and stakeholders in learning about one another and the socio-technical configurations of innovation processes. Traditional methods and ways of conducting extension services (instructional and instrumental approaches) may no longer suffice to stimulate changes among different actors and levels of the AIS. In this case study, extension agents identified their roles more as transferring information, and less as facilitating multi-directional (horizontal and vertical) knowledge exchanges among farmers and other innovation actors. The classical role of extension and communication in transferring top-down knowledge and resources creates dependency. Public extension staff require new skills that go beyond their existing technical skills to include 'soft skills', such as the ability to make use of contextual information and develop affective domains of learning that influence leadership and problem solving skills. There are opportunities available through the use of new media and extension methods for purposes of 'listening, not telling', and fostering conversations among stakeholders that might not otherwise happen (Leeuwis and Aarts 2011).

Finally, according to this experience, public extension will need reformed curricula within agricultural education and training institutes, to include new thinking about innovation and the reform of extension. The concern for curricula review has been growing for agricultural education institutes, since the graduates act as agent of change as researchers, service providers, observers, listener, communicators and contributors of innovative ideas and solutions to agricultural and rural development problems (Maguire 2012). There is a need for high-quality human resources at all levels with diverse kinds of expertise if new roles for innovation are to be defined. This realization has been growing in low-income countries like Bangladesh where present institutional training programs failed to induce organizational learning and change among workers and develop the quality leaders, who are not only technically competent but also fair, innovative and tenacious (Islam et al. 2011; Van den Ban and Samanta 2006). This also means that agricultural education and training should employ system thinking and integrate theory-based, competence-based and experiential learning for enhancing abilities of individuals to put knowledge into practice through reconciling necessary changes in their roles as individuals, organizations and systems (Pant 2012).

Conclusion

This study discusses the challenges facing the transformation of roles of a public sector extension agency in strengthening agricultural innovation. It should be recognized that public extension systems in countries such as Bangladesh will change slowly, and by themselves, be unable to achieve a well functioning agricultural

innovation system that meets diverse stakeholder needs. This case from Bangladesh indicates that no single project and organization can likely stimulate the institutional innovations required for poverty alleviation. Farmers are however becoming critical of their own dependency as well as the role and relationships they have as collective actors with government and NGOs as well as the private sector. This process of self-awareness will be tremendously relevant in future extension reforms. This paper identified key challenges of transforming extension roles, which are: i) a tendency among partners to retain existing institutional protocols and procedures and therefore be reluctant to make necessary changes; ii) devaluation or neglect of complimentary organizational mandates and incompetence in extension functions that enable broader intermediary functions (e.g. understanding and negotiating the innovation agenda, forging agreements, and developing relationships); and iii) an inability to anticipate 'extension methods' as the facilitation of learning and knowledge embedding processes. These areas should be explored further including comparative project analysis as well as regional case studies. It is possible to revisit the challenges of the first decade of the 21st century, with the expectation that Bangladesh can evolve an agricultural innovation system that meets the needs of all, and in particular, resource-poor smallholders.

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