Extension: object of reform, engine for innovation

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Abstract: *Extension activities are being pulled in many directions, and are being called on to respond more effectively to the needs of farmers to produce and to forge links with markets. In the USA, for example, State Cooperative Extension Services have a variety of purposes in urban areas and operate in cooperation with other government agencies. Thus extension services, while concentrating on production agriculture, especially via privatized and private extension-type service companies, are simultaneously broadening out to include new purposes and a new clientele. While extension's role is straightforward in contract farming and other commercial ventures, such is not necessarily the case with public sector extension. Its structure, organization and operating system may differ from country to country, even from region to region. Nonetheless, whether in the private or public sector, a major concern for extension is to operate in the context of agricultural innovation systems (AIS) so that new knowledge is applied and used. A key objective in reforming extension, as argued in this paper, is to make it a better instrument, or engine, for the promotion of innovation, the dissemination of knowledge and the facilitation of development.*

Keywords: *agricultural extension; innovation systems; agricultural reform; agricultural policy*

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Extension is currently associated with different sectors and diverse providers employing a variety of terminologies – everything from extension to advisory services to knowledge and information business services (KIBS). As a result, the term 'extension' has become a generic term employed to refer to the variety of systems and providers that have emerged for communicating and transmitting information and technology to farmers and other rural populations. Extension is often viewed as comprising public, private and semi-public 'systems' that make up a multi-institutional, multisectoral 'pluralistic' system. Also, views on extension have changed in emphasis from agricultural production to helping farmers organize themselves, and most recently to the linking of farmers to markets (Swanson, 2006; Shepherd, 2007). At the same time, other service orientations, such as environmental and health information services, are being considered as complementary parts of agricultural extension (World Bank, 2008). Originally thought of as part of a 'knowledge triangle' composed of research, education and extension, extension is currently viewed more broadly as part of 'agricultural innovation systems' (AIS).

The above changes, involving how extension is perceived, how its aims have changed, and how it is seen to fit into a newly conceived larger system of agricultural innovation, further underscore the importance of extension as both an object of reform and an engine of innovation. As an object of reform, it is called upon to adopt, for example, innovative structural, funding and managerial arrangements, and as an engine for advancing innovation (the process by which new knowledge, information or technology is developed, adapted, diffused and used, leading to social and economic change), it is called to take on new roles beyond traditional technology dissemination. These include organizing rural producers, forging links with markets and playing a brokering role with other actors in the agricultural innovation system. Hence we differentiate the extension-related *reform* 'innovations' currently on the agenda in countries

worldwide from the *programme service* 'innovations' that extension systems can (and many say should) promote. In our view, extension thus becomes an 'input–input' organization – with reform inputs shaping the system and programme service inputs directing the aims of the system. The effectiveness of extension in both regards will ultimately depend on the political resolve of a country to strengthen its agricultural innovation system, plus the nature and extent of policy and institutional changes that extension organizations are willing to make.

Given this perspective, the present paper reviews the ongoing extension reform initiatives in the context of AIS and argues for major institutional reforms to strengthen extension so that it facilitates innovation more effectively. The paper is organized as follows. The next section discusses the changing views on extension and innovation. Section three discusses the four major reforms in extension implemented during the last two decades. Questions of effectiveness in the broadening of extension provision and facilitating innovation are discussed in section four. The paper concludes with suggestions on ways of strengthening extension so that it can further facilitate innovation and meet the expanding knowledge and support needs of rural populations.

Changing views on extension and innovation

The major theoretical paradigm that contributed to the emergence of extension as a discipline and profession was the 'diffusion of innovation' suggested by Everett Rogers (1962). Innovation was defined as a new technology developed by scientists, transferred by extension personnel and adopted by farmers. Governments established extension organizations in different countries mainly to transmit new technologies developed by agricultural research centres. Extension also provided feedback to researchers on farmer problems. This diffusion of innovations approach (also known as the technology transfer approach) is widely referred to as the linear model, since it assumes a linear relationship between research, extension and farmer – with organized, publicly sponsored science as the source of innovation. Even though this transfer of technology, or linear model of innovation, has been widely discredited (Biggs, 1990; Röling, 1994), efforts to dislodge it have been unsuccessful (Ruttan, 1996). In fact, most policy makers, ministry officials, research administrators and managers, economists and agricultural researchers cannot imagine any theory of innovation other than the linear model, and continue to adhere to it, even after years of failure in situations where it does not apply (Röling, 2006). This linear approach also views agricultural research as the source of all agricultural innovation.

Challenges to the 'transfer of technology' approach began in the 1980s, as professionals began to realize the inappropriateness of promoting high-input technologies in diverse, risk-prone and variable conditions (Chambers and Jiggins, 1987). At that time, participatory research methods were promoted to strengthen the types of research needed for understanding and strengthening farmers' own capacity to develop new knowledge to solve problems. The assumption was that farmers had considerable indigenous knowledge and their ability to use and improve this knowledge could be strengthened through research (and extension) carried out in participation with extension workers. Although they provided a critique to the dominant technology transfer model (Chambers *et al*, 1989) and highlighted the importance of farming systems and farmer participation in technology development, both participatory technology development and farming systems research have so far had only a very limited impact on the way technologies are developed and promoted. These debates, however, broadened the use of the term 'innovation' to include farmer inventions or technologies developed by farmers. It was recognized that innovation could come from multiple sources (including farmers) and that the way the agendas of different stakeholders were represented in the innovation process also affected the 'appropriateness' of the new technologies developed (Biggs, 1990). While the importance of institutional innovations in technology development and promotion also began to be increasingly appreciated, the role of extension was still identified with promoting technical innovations.

In the 1990s, discussion on agricultural knowledge and information systems – AKIS (Röling, 1994) brought into focus the importance of a wider set of information sources and the value of creating systems that assisted in the generation and dissemination of knowledge. AKIS highlighted the need for strengthening the capacity of the different systems (mainly research, extension and education) and the linkage mechanisms among these systems. With second-generation problems of promoting technologies (pest resurgence, unsustainable land management) becoming more evident, the importance of group action and therefore the need for platforms for interaction to promote innovation began to be increasingly recognized. Innovation started to be described as the emergent product of interaction among stakeholders regarding a natural resource or in ecosystem services (Röling and Wagemakers, 1998). The concept of innovation was broadened further to include the outcomes of interaction among the diverse actors required to address a particular problem. In this scenario, the role of extension was identified as facilitating the processes of reflective action, learning and decision making by stakeholders.

More recently, the innovation systems concept has been applied to agriculture (Hall *et al*, 2001, 2004; World Bank, 2006). Its attraction is that it recognizes that innovation is not a research-driven process simply relying on technology transfer. Rather, innovation is seen as a process of generating and accessing knowledge and putting it into use. Central to the process are the *interactions* of different people and their ideas; the *institutions* (the attitudes, habits, practices and ways of working) that shape how individuals and organizations interact; and *learning* as a means of evolving new arrangements specific to local contexts. The main focus of the emerging agricultural innovation system (AIS) is on strengthening the capacity of the different actors in agricultural development to create, diffuse and use knowledge – or in other words, on strengthening attitudes and skills to enable innovation. According to the World Bank (2006), a national AIS can be defined as 'a network of organisations, enterprises, and individuals focused on

bringing new products, new processes, and new forms of organisation into economic use, together with the institutions and policies that affect the way different agents interact, share, access, exchange and use knowledge'.

Indeed, most of the innovations needed in present-day agriculture have 'collective dimensions', that is, they require new forms of interaction, organization and agreement between multiple actors (Leeuwis and Van den Ban, 2004). In the AIS, the main focus is on the policy and the institutional environment, which are conductive to the flow of knowledge, and include the manner in which different actors interact, as well as policies and practices that determine how well these interactions work. In this new view of agricultural innovation, some of the potential roles for extension include: setting the innovation agenda; organizing producers and the rural poor and building their capacities; building coalitions of different stakeholders; promoting platforms for information sharing; experimenting with and learning from new approaches; and acting as a 'bridging organization' that provides access to knowledge, skills and services from a wide range of organizations, including research institutes (Sulaiman and Hall, 2002, 2004). Performing these wider roles is important if extension is to 'reinvent' its future and to be relevant to the evolving rural context (Rivera, 1996; Sulaiman and Hall, 2002).

Reform initiatives

Disparate pieces of innovative reform are being advanced to change public sector agricultural extension systems in developing countries. These include *structural changes* aimed at the privatization and decentralization of extension services; *changes in the mode of funding* involving cost recovery; and *organizational and management changes*, including better linkages with research and use of information technology. *Changes to extension programmes* have also been suggested and are being implemented: these include linking farmers to markets; extension playing a brokering role with different actors in the AIS; and addressing health, environmental and population issues.

Initiatives for structural change

Two radical initiatives on structural change have been put forward: namely, privatization involving the withdrawal of government funding and delivery of extension, and the decentralization of authority to lower levels of government, including delegation to non-governmental, farmer organizations and other grass-roots control.

Privatization. Extension systems, originally designed to transfer non-proprietary information to farmers, have already been totally privatized in the UK, New Zealand and the Netherlands. Efforts to privatize extension in developing countries, however, have not been very successful. Peru opted for a privatized system, with agricultural extension being carried out by international NGOs and private companies (Rivera, 1998), but this system proved to be inadequate for the country's needs. In contrast, Bolivia has devolved extension to municipalities, which depend almost entirely on non-governmental organizations to carry out extension-type services. Several years ago, Bojanic (2001) argued that the critical factor was the lack of state initiatives to regulate and promote pro-poor extension activities (as still appears to be the case in Bolivia).

Chile, one of the most advanced countries in its thinking about agricultural extension systems – having gone through various reform stages (Cox and Ortega, 2004) – has only recently discontinued its involvement in extension, leaving its function primarily to private extension services (although it still operates in particularly disadvantaged areas). In Uganda, however, the jury is still out. In 1997, the Government of Uganda requested the World Bank's help to design a different kind of extension programme – one more explicitly driven by the ideas and needs of farmers (Nahdy, 2004; see also: www.org.ug). The expectation is that the Uganda National Agricultural Advisory Services (NAADS) will transform extension into an institution that empowers farmers to identify and pursue answers to their own questions about opportunities and problems on their own farms (Nahdy, 2004). However, progress is slow and major challenges appear to be impeding the development of NAADS.

Decentralization. Nation states are encouraged to decentralize authority. Three types of decentralization tend to be highlighted: political, administrative and fiscal decentralization (Parker, 1995). Apart from these, economic or market decentralization also appears in different forms and combinations across countries, within countries and even within sectors. Rondinelli (1987) identifies four subcategories within administrative decentralization: deconcentration, delegation, devolution, and transfer to non-governmental institutions. In short, there are various forms of decentralization, which may overlap, so that definitions of these terms are not precise. Indeed, the World Bank's *World Development Report 2008* refers to an increasing 'devolution' – which is, according to Rondinelli, the transfer of authority to lower levels of government – 'of extension functions to farmers' associations, rather than to local government' (for example, Carney, 1996; see also World Bank, 2006 on client groups).

Another, more radical form of 'decentralization' involves the withdrawal of government from the funding and delivery of extension services: namely, total privatization. The trend towards privatization has not proved viable in developing countries, but this trend has led to another one, which involves reconstituting public sector agricultural extension as a fee-based institution.

Reforms in financing extension

Cost recovery. Aside from radical reform measures, such as those just reviewed, there has been a push by governments for extension systems to institute cost recovery for services rendered. Knowledge and information have become 'commodified' (Buttel, 1991) and farmers have been increasingly called on to pay for services. Of the various schemes for public sector extension cost recovery, Hanson and Just (2001) cite the following:

(a) *fee-for-service extension* provided by a public extension system;
(b) *partial user fees for services*, with partially publicly funded private extension where extension services are provided by private firms under contracts, or fees are paid by public extension budgets (as in the northern region of Mozambique); and
(c) *policy-supported private extension*, in which fee-for-service extension provided by private firms is made viable by government requirements, subsidies or tax reductions on specific production practices.

In their review of private extension schemes involving fee-for-service extension with no public support, Hanson and Just (2001) argue that 'a universal movement toward paid extension is not in the public interest'. They conclude that 'optimality calls for a mix of public, private, and paid extension including policy support of private extension', or in other words, they advocate 'pluralistic' systems.

Recovery of the cost of advisory services through user charges is sometimes seen as having several objectives – easing the burden on public funds, stimulating private sector participation in service provision and making services accountable to farmers as paying clients (Kidd *et al*, 2000). In Kidd *et al*'s estimation, cost recovery would depend to an extent on the viability of agricultural markets and the ability of farmers or farmers' organizations to pay for services.

Van Crowder (2000) notes, with reference to the Uganda National Farmers Union, 'While farmers may say that they are willing to pay for advisory services, the determination of fee structures needs to take into account not only the stated willingness of farmers to pay but their actual ability to do so'. In the case of Ugandan farmers, their ability to pay even partially for advisory services is limited by their lack of surplus financial resources (Van Crowder, 2000).

Charging for extension, however, need not be based on financial resources, but could be based on receipt of materials in kind, such as (1) through donating a proportion of the crop produced, (2) through providing services to the extension service, or (3) through selling farm-related materials. For this to work, the extension agent's advice must be appropriate to the circumstances. An example of this kind of fee charging for extension exists in China (Fei and Hiroyuki, 2000), where contractual arrangements are developed between farmer and extension technician, and payment for extension services depends on the production and sale of farm-related products. China's experiment is particularly interesting in that the function of the fee-charging scheme is not so much to recover costs, but to provide incentives. Farmers and extension technicians are closely associated in this scheme – with rights, responsibilities and economic interests linked by a contract directly between the farmer and the technician. As mentioned earlier, such an arrangement necessarily assumes high-quality technical expertise and training on the part of the extension technician. Although not feasible in all instances, this system of direct contracting between extension technician and farmer stands out as distinct from the schemes generally cited and, as Fei and Hiroyuki (2000) suggest, it provides a valuable alternative for cost recovery in developing countries.

Initiatives in organization and management

The organization and management of extension services are subject to a variety of forces, which are determined by the extent to which services may require the reorganization of the larger institution, for example, a ministry of agriculture. In general, the organization and management of extension will depend on a number of basic considerations: for example, the organization or reorganization of the ministry of agriculture; the ministry's legal framework and objectives; the implications for extension of the ministry's objectives; the mission of the extension services; the regions to be serviced by extension; the governing principles underlying the management of extension; the detailed features of the organizational structure of extension; and the mechanisms and management of linkages with other organizations. Thus the extension service/organization will be governed by the reforms undertaken at the policy level and the strategies intended to implement the policy and evaluate its results.

Additionally, for extension organization and management to function properly, linkages are important, especially with research (Pray and Echeverría, 1990; Kaimowitz, 1990; Van Crowder and Anderson, 1997), but also with post-secondary agricultural education and training systems. The advantages of good linkages are often extolled, for example: Engel (1990) and Ortiz (1990) both claim that integrating research, education and extension could improve the overall performance of agricultural technology systems. If this is the case, asked Van Crowder and Anderson (1997), then why is the problem of 'weak linkages' so persistent and so pervasive? Their answer is that major actions are required to improve agricultural technology systems: namely, shifts in research, extension and education priorities; stronger policies to mandate linkages; improved functions and funding; changes in the organization, staffing and management of these institutions; and the development of strong multilevel links among these organizations and with farmers. For instance, in India, agricultural technology management agencies (ATMAs) are constituted at the district level to bring convergence among programmes of various departments, with their activities being guided by a committee comprising farmers and other stakeholders. In this age of change, a promising idea appears to be to promote linkages through funding grants requiring cross-institutional activity among actors in the AIS. Organization and management of extension is also being affected by other emerging developments such as information and communication technologies (ICTs) and new techniques and procedures being increasingly employed in leadership training and programme development.

Initiatives for new programme directions

Once known as the application of scientific research and new knowledge to agricultural practices through farmer education, the field of extension now tends to encompass a wider range of activities. While some still associate extension with production, others, as we have noted,

promote the idea of extension's role in linking farmers to markets (Neuchatel Group, 2002), reducing vulnerability and enhancing the voice of the rural poor (Farrington *et al*, 2002), developing micro-enterprises (Rivera *et al*, 2001), poverty reduction and environmental conservation (Alex *et al*, 2002) and strengthening and supporting farmer organizations (Sulaiman and Hall, 2002). Increasingly, extension is related to communication and learning activities involving other professional disciplines, such as health and the environment.

There is a significant call for a shift in the priorities of extension to direct its efforts towards organizing and 'linking farmers to markets' (USAID, 2004; Singh and Swanson, 2005; Swanson, 2006). This orientation supports the principles underlying the AIS concept, which aims to promote the dissemination and use of new knowledge relevant to agriculture for commercial use and income generation (World Bank, 2006).

Extension is also being pressured to embrace a broadened mandate to provide a range of organizational, managerial, marketing and technical support. Extension can address these demands, but only if it can reinvent its role as a facilitating organization that connects farmers with different sets of service providers. This means that extension needs to partner with a number of different agencies and must develop specific arrangements in line with local circumstances and objectives (Sulaiman and Hall, 2004). Ideally, this is the role extension should be playing in the emerging AIS.

Extension services are also being called on and expected to respond to issues (as noted in the *World Bank Development Report 2008* chapter on 'Agricultural advisory services') such as those relating to health (and especially AIDS), population, sustainable agriculture and the environment, and not only to the productivity and profitability concerns of linking farmers to markets.

Extension changes in retrospect

Public sector extension in both developed and developing countries is undergoing major reforms. The variety of extension reform initiatives also reflects the value governments and businesses attribute to extension. The presence of more actors in extension provision, mainly the private sector and NGOs, has ensured the availability of different kinds of extension support. However, much of the extension provision still revolves around dissemination of technical messages and problem-solving advice at the farm level. While pluralism in extension provision is considered desirable (Zijp, undated), privatization of public sector extension as a reform measure tends to lead to a one-sector system, not the optimality suggested by Hanson and Just (2001). Privatization and cost-recovery measures have tilted extension provision to more of a paid service focusing on situation-specific problem-solving technical advice. Farmers who are small and poor can benefit from these arrangements only when they are organized into groups and supported by the state to access quality advice. Privatization and cost recovery seem to have further reduced extension's role in educating farmers to build their capacity so as to make sense of information from multiple sources. Extension, especially in the public sector, needs to strengthen the capacity of small farmers to access, adapt and use knowledge, and this will necessitate the provision of technical, managerial and organizational support.

While there is a case for strengthening linkages among the different organizations in the AIS, the emphasis continues to be on strengthening research–extension–farmer linkages. Although strengthening these links is necessary, this is not sufficient to promote innovation. While the innovation systems framework emphasizes the importance of better interaction and knowledge flows for innovation, extension planning and implementation continue to be based on the research–extension–farmer paradigm. Linking farmers to markets is important, and extension services need to sharpen their ability and expertise to do this. Quite often, linking farmers to markets has to go beyond providing price information, and involves developing new market arrangements. Ideally, extension within the AIS should act as a bridging organization, linking together the different aspects of knowledge, expertise and skills available in different organizations (including research) so that the capacity to access, adapt and apply knowledge is enhanced.

Recent reform initiatives have not yet fully addressed the issue of either broadening the mandate or building the capacity of extension to perform these wider roles. A related issue is the need to strengthen the ability (administrative, financial and technical) of decentralized units at the district, block or county level to develop, implement and evaluate programmes suitable for the local context. For too long, development analyses and programmes have given in to bureaucratic tendencies to promote 'one-size-fits-all' solutions. In short, there is no formula for reforming public sector agricultural extension systems (Rivera, Van Crowder and Qamar, 2001). Happily, this conceptual bias is being replaced by the more pragmatic concept of 'best fit' (Birner, 2005), which insists on an individual country analysis before extension changes or development.

At the same time, whether public or private (or whether called advisory, front-line or knowledge and information business services), extension has an important role to play in strengthening the AIS. Extension can play this role, but only if it embraces approaches such as innovation systems to reinvent itself. Extension's reform and development are critical to strengthening the capacity of the AIS to deal with the rapidly evolving environment. Meanwhile, contemporary extension institutions are being called on to confront societal issues that are not strictly speaking agricultural issues. Extension services are being called on and expected to respond to issues (as noted in the *World Bank Development Report 2008* chapter on 'Agricultural advisory services') such as those relating to health (and especially AIDS), population, sustainable agriculture and the environment, not just the productivity and profitability concerns of linking farmers to markets. If this shifting of responsibility is to continue, then rather than diminish extension, as has been the case with pressures to downsize and contract out services, extension will have to be expanded to include professionals in these various areas and to train them for work in the field. Indeed, if the role of public sector extension is expanded, then

leaders and policy makers will probably find themselves called upon to consider, in addition to extension's commitment to agricultural advancements, its role in the development of rural economies, social equity and the protection of the environment. This would mean a serious review of public sector extension.

Playing this wider role requires large-scale restructuring and institutional change, which, by and large, the extension bureaucracies have been reluctant to undertake. Reinforcing this reluctance is an extension policy dialogue that continues to be couched in terms of a narrow conceptualization of extension as an agency transferring technology and improved practices from research stations to farmers (Sulaiman and Hall, 2005).

Conclusion

In summary, public sector extension provides an important service component in the knowledge system, as well as in the agricultural development process. While currently being pulled in many directions, called on to respond more effectively to farmers' needs to produce and make links with markets, it is also branching out in countries such as the USA, where state cooperative extension services may operate in urban areas in cooperation with other government agencies for a variety of reasons. What we see, then, is that public sector extension is at one and the same time concentrating on production agriculture in privatized and private extension-type service companies and, in contrast, widening its vision as to its aims and the clientele to be served. While extension's role is straightforward in contract-farming arrangements and other commercial areas, such is not necessarily the case with public sector extension. Its structure, organization and operational system may differ from country to country, even from region to region within countries. Overall – whether in private or public sector extension arrangements, the main concern for extension in the context of AIS is to promote innovation, so that new knowledge is applied and used. Indeed, one of the objectives in reforming extension, therefore, should be to ensure that extension plays this role as a better instrument, or engine, for innovation. In short, extension is presently an object of reform, while continuing to be an increasingly important engine for knowledge, innovation and development.

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