

**106a. AGRICULTURAL RESEARCH-EXTENSION LINKAGE
SYSTEMS: AN INTERNATIONAL PERSPECTIVE**

Joseph U. Agbamu

**106b. DIFFERENT WAYS OF FINANCING
AGRICULTURAL EXTENSION**

Anne W. van den Ban

ABSTRACT

Both of these papers offer conceptual frameworks for the analysis of agricultural research and extension systems. The first paper focuses on the linkages between research and extension and how these linkages can be enhanced. Based on a study of seven countries – Indonesia, Japan, Republic of Korea (South Korea), Mexico, Nigeria, Tanzania and Thailand – five forms of research-extension linkage are presented. The paper discusses the institutional arrangements governing agricultural research-extension linkages in each country, the procedures through which farmers' problems are identified and research themes decided, and the administrative levels at which linkages operate. The paper examines how the procedures for linking research systems and extension services are managed and highlights the key weaknesses of each linkage type. It concludes that policy changes, institutional reorganisation, and the strengthening of institutions are required to enhance agricultural research-extension linkages in developing countries.

The second paper is concerned with alternative means of financing agricultural extension and the ways in which different financial mechanisms may influence the type of extension support offered to farmers. The paper examines the motives of different organisations for investing in agricultural extension and analyses the implications of alternative funding mechanisms. It offers some hypotheses regarding alternative funding mechanisms in relation to the flow of knowledge to, in and from extension organisations; the management of these knowledge flows; the goals of the extension organisation; the choice of extension messages; extension methods and approaches; the target groups; and the management of the extension organisation. In many countries a pluriform extension system is developing in which different organisations are financed in different ways. Whether or not the privatisation of extension is desirable depends on factors such as labour productivity, the extent to which there are surpluses or shortages in the production of food, and the impact of extension on consumer food prices.

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Acronyms	
AARD Agency for Agricultural Research and Development	
ADP Agricultural Development Programme	
AEC Agricultural Extension Centre	
AEIC Agricultural Extension and Information Centre	
AIAT Assessment Institute for Agricultural Technology	
BAE Bureau of Agricultural Extension	
BAIF Bharatiya Agro-Industries Foundation	
DDR Directorate of Rural Development	
DOAE Department of Agricultural Extension	
INIFAP National Agriculture, Livestock and Forestry Research Institute	
IPM Integrated pest management	
NAERLS National Agricultural Extension and Research Liaison Service	
NGO Non-governmental organisation	
OECD Organisation for Economic Cooperation and Development	
PRDA Provincial Rural Development Administration	
RDA Rural Development Administration	
SEDAGRO State Secretariat of the Agriculture Department	

106a. AGRICULTURAL RESEARCH–EXTENSION LINKAGE SYSTEMS: AN INTERNATIONAL PERSPECTIVE

Joseph U. Agbamu

1 INTRODUCTION

The concept of linkage implies the communication and working relationship established between two or more organisations pursuing commonly shared objectives in order to have regular contact and improved productivity. Havelock (1986) contends that linkage is a term used to indicate that two systems are connected by messages so as to form a greater system. He argues that if the barriers between two systems are permeable enough for messages and responses to flow out of each to the other, then a link has been created between the two. From this viewpoint, agricultural research and extension services are two systems which are linked by information flow and feedback.

For agrotechnologies to be relevant to local needs, researchers, extension workers and farmers must play important roles in identifying research problems, adapting the recommendations to local conditions and providing feedback to researchers about the innovations that have been developed. Effective communication links between researchers and extensionists are vital in the modification of technological recommendations and in initiating further research; such links enable new technologies and management practices to be suited to local ecological conditions. The participation of extension workers in adaptive research trials allows them to become familiar with the technologies they are expected to promote and also helps to ensure that the sociological dimensions of farming are not neglected.

The relationship between key actors in the research–extension linkage system is illustrated by Figure 1. A conceptual schema for the functioning of the linkages, as shown in Figure 2, can be conceived as having relational parts which have been grouped into: (a) the formal agricultural knowledge system embracing researchers, extensionists, subject-matter specialists, linkage activities and methods; (b) the client system, i.e. farmers (the end users of technologies); and (c) problems affecting the linkage activities.

Depending on the country, linkage activities are usually managed at varying administrative levels – national, regional, state and local levels. The agricultural research and extension system identifies farm families as their target and the hub around which researchers and extensionists focus their actions. The constraints which hinder research–extension linkage potentially affect the agricultural output of farmers, whereas effective links will allow farmers to enhance their output through the availability of farming innovations.

This study is based on the premise that agricultural research and extension organisations are established as instruments for promoting agricultural development, and that effective linkages between these organisations help them to achieve their goal. Since the methods of forging links between research and extension organisations differ from one situation to another and from country to country, this paper presents five types of agricultural research–extension linkages, as found in seven countries: Indonesia, Japan, Republic of Korea, Mexico, Nigeria, Tanzania, and Thailand.

The study on which this paper is based sought to answer the following questions: What form of research–extension linkage exists in each of the seven countries? How are the procedures for linking research stations with extension centres managed in each country? What are the key weaknesses in the research–extension linkage in a given country? How can weak links be strengthened to improve agricultural communication between research and extension organisations in the countries under study?

2 RESEARCH METHODOLOGY

This study formulated a theoretical framework of agricultural research–extension linkages from a global perspective and identified the positions of various countries within the framework. A survey was then undertaken in seven countries to collect information to elaborate and substantiate the linkage types in the

Figure 1 The connection between the main actors in the agricultural research–extension linkage system

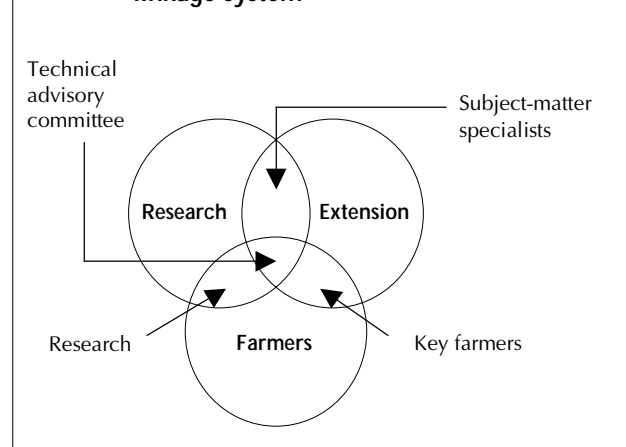
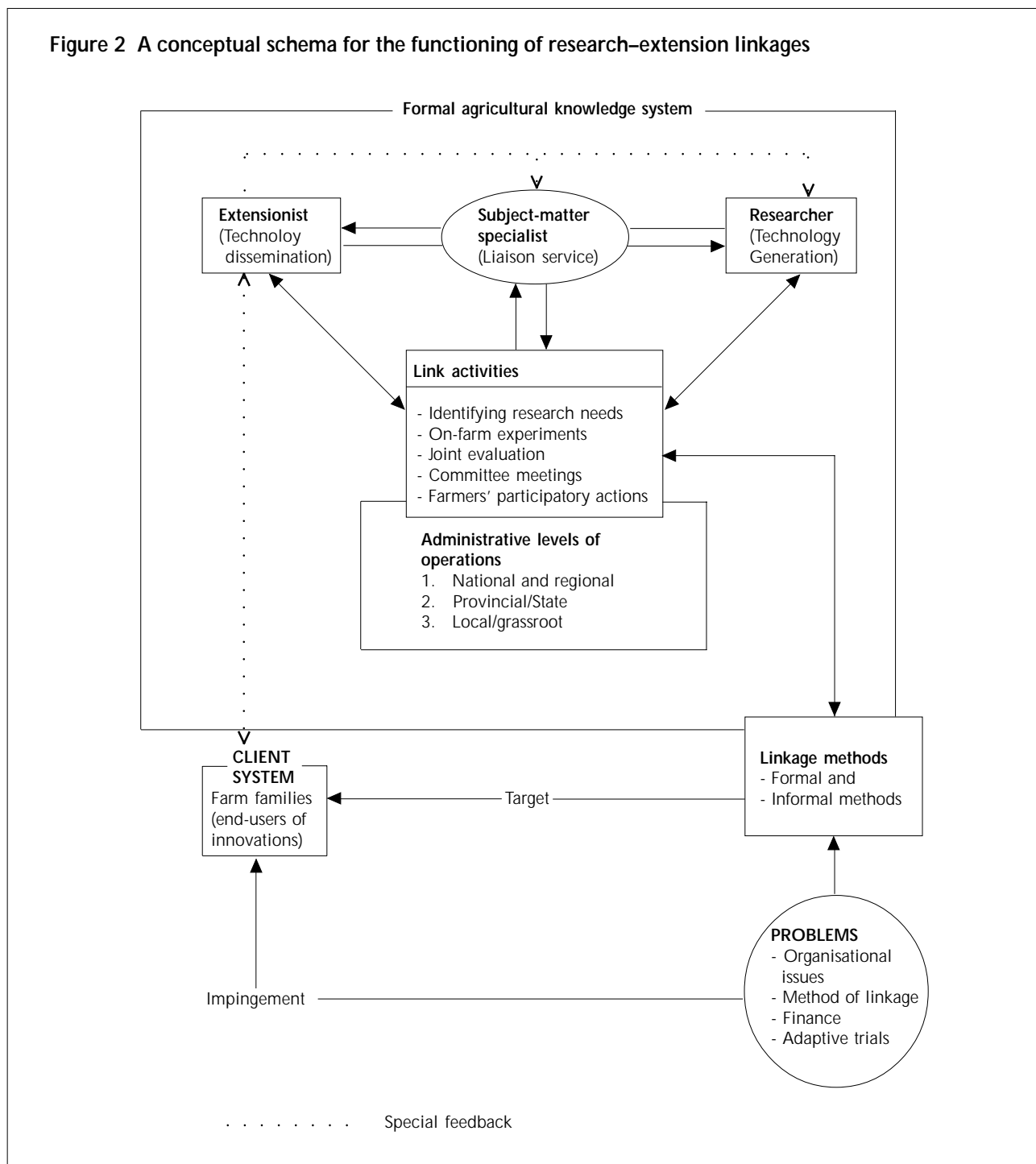


Figure 2 A conceptual schema for the functioning of research–extension linkages



theoretical framework. This study focused exclusively on formal public-sector linkage mechanisms. It did not examine informal linkages, commercial or profit-oriented research and extension systems.

The seven countries surveyed were selected on the basis of world regional groupings and development levels using the World Bank economic classification system in which countries are grouped into six categories (World Bank, 1992). Japan was chosen from high-income and Organisation for Economic Cooperation and Development (OECD) countries; South Korea from high-debt and medium-income countries; Thailand from low-debt and medium-income countries; Mexico from heavy-

debt and lower medium-income countries; Indonesia from high-debt and low-income countries; Nigeria and Tanzania from heavy-debt, lower low-income countries. Apart from Japan which was purposely selected, the other six countries were randomly selected from regional groupings.

Personal interviews, field visits and questionnaires were used to collect information. In each country 30 agricultural research and extension personnel and 10 key farmers contributed information to the survey. Official publications of research institutes, extension organisations, and ministries of agriculture constituted secondary sources of data.

3 A THEORETICAL FRAMEWORK FOR RESEARCH-EXTENSION LINKAGES

A theoretical classification framework was fashioned to provide a general basis through which the linkage forms of non-privatised public research-extension within the seven countries could be discerned.

Forms of research-extension linkage

The type of research-extension linkage in a given country can be determined by using the theoretical framework embodied in the five forms of linkage listed below. The overall criteria used in the theoretical classification of linkage forms are: (1) the status of agricultural research and extension organisations relative to one another, and (2) the transfer methods of sourcing research problems, deciding on research themes, and research results – these methods are classified as either top-down or bottom-up approaches.

Form A: Research and extension organisations operate at the same status in a country, using a bottom-up approach in decision-making on linkage activities.

Form B: Both organisations have the same operative status, using a top-down approach to manage the links.

Form C: Research and extension organisations have unequal status, and the linkage system operates according to a bottom-up management approach.

Form D: Both organisations are unequal in status, and the linkages operate according to a top-down management approach.

Form E: There is no organised linkage system between agricultural research and extension organisations.

The bottom-up method of sourcing research problems and decision-making in linkage forms A and C presume that these forms of linkage work more efficiently if prefectural, provincial or state governments possess their own independent agricultural research stations and extension agencies.

Factors and indicators of linkage forms

The study considered five factors in identifying the forms of linkage: the size of the national research system; size of the extension service; level of adult literacy; the organisation of agricultural administration; and agricultural policy in terms of the importance attached to research and extension. The five indicators used to measure the five factors were: (i) number of research institutes/experiment stations at national and state levels; (ii) ratio of extension workers to farm families; (iii) percentage of adults with basic education; (iv) the organisational nature of agricultural administration; (v) research and extension budgets as a percentage of the national agriculture budget, together with the existence of laws and regulations for agricultural policy. The indicators of research-extension linkage factors as they apply to Indonesia, Japan, Mexico, Nigeria, South Korea, Tanzania, and Thailand are shown in Table 1.

4 FORMS OF RESEARCH-EXTENSION LINKAGE IN SEVEN COUNTRIES

Indonesia

The Agency for Agricultural Research and Development (AARD) administers the 16 national research centres/institutes in Indonesia on behalf of the national Ministry of Agriculture. There are no independent research centres operating at provincial level. The agricultural extension service is controlled by the Bureau for Agricultural Extension (BAE), under the Ministry of Agriculture. The BAE supervises extension services at all levels through regional offices and works in collaboration with the heads of districts and villages. As part of the BAE, the Agricultural Extension and Information Centre (AEIC) operates at district level. At the sub-district level is the Agricultural Extension Centre (AEC); 10–20 field extension workers are attached to each AEC.

The Rural Socioeconomic Research Centre of AARD is responsible for monitoring all on-farm experiments in the regions and provinces. These on-farm experiments are conducted by the Assessment Institute for Agricultural Technology (AIAT) at provincial level, and by the Agricultural Technology Assessment Place (a substation of AIAT) at village level. Adaptive research staff of AIAT work with subject-matter specialists to develop technology packages which are then passed on to the extension centres. AIAT thus exists as a linkage interface between research and extension organisations in Indonesia.

The AECs, subject-matter specialists and researchers all serve as sources of research needs, but only national researchers make final decisions in selecting research problems and themes. The AECs receive innovation packages from research centres through the subject-matter specialists deployed to AIAT. Although there has recently been more interaction between national research staff, extensionists and farmers at the provincial level, this heightened interaction has not led to final decisions on linkage activities being controlled at the provincial and district levels: the management of agricultural research-extension linkages in Indonesia depends mainly on AARD-supervised institutes and is still largely a top-down approach.

With a nationally controlled research-extension linkage system in which decision-making is concentrated in the hands of national officers, and AEICs and national research centres are unequal in status, research-extension links in Indonesia can be classified as form D of the theoretical framework.

Japan

Japan's 13 national research institutes have networks with 255 prefectural research institutes and experiment stations through six national agricultural experiment stations. Since the national government does not directly offer extension services, agricultural research-extension linkage in Japan operates at the prefecture (state) level. It is a bottom-up management system in which decisions

Table 1 Indicators of research–extension linkage forms: the outlook of seven countries

Indicators	Indonesia	Japan	Mexico	Nigeria	South Korea	Tanzania	Thailand
1 (a) Number of national research institutes	16	19	15	19	13	3	7
(b) Number of research institutes/experimental station operating at state level	-	255	32	-	-	-	-
2 Ratio of extension workers to farm families	1:1200	1:252	1:800	1:1615	1:500	1:1000	1:1000
3 Adult literacy (percentage of total population with basic education)	83.2%	99.0%	89.2%	55.6%	98.0%	66.8%	93.5%
4 (a) Nature of agricultural administration	Webbed with local leadership in a centralised system	Decentralised and many roles given to prefectures	Complex and decentralised with more roles to states	Under two tiers of government structure with a measure of federal control	A central system with huge command structure	Simple organisational arrangement with regional and provincial structure	Semi autonomous departments in Ministry of Agriculture and Cooperatives.
(b) Number of bureaux/department/agencies in agricultural ministry	7	8	5	6	5	5	9
5 Importance attached to research and extension							
(a) Research budget as percentage of national agricultural budget	8.0%	1.8%	7.7*%	3.0%	2.2%	1.4%	4.5%
(b) Extension budget as percentage of national agricultural budget	6.0%	1.0%	10.0*%	2.1%	1.5%	1.2%	8.5%
(c) Existence of policy laws and regulations	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Figure given is for the State of Morelos, since the Federal Government has no budget for extension services.
Note: Budget figures are for 1997/98, but in Indonesia and Tanzania they are for 1996/97.

Source: Agbamu (1998)

on linkage activities are taken at prefecture level without the direct involvement of national officers.

Research–extension linkage involves the use of subject-matter specialists, technical committees, joint study meetings, and staff exchanges between prefectural research and extension organisations. Farmers' problems and needs are compulsorily sourced by district extension centres from farmers, agro-cooperative societies, schools, and town/village administrative offices. Local needs identified by extensionists are supplemented with those identified by researchers and subject-matter specialists. In general, decisions on the selection of farmers' problems/needs as annual research themes are finalised at prefectural level by a committee comprised of researchers, administrators, subject-matter specialists, extension workers, farmers' representatives and knowledgeable persons. Although national officers are not directly involved in this process, they make input by putting forward unresolved research themes that have been referred to them and by highlighting policy directives on research themes from the National Ministry of Agriculture, Forestry and Fisheries.

The Japanese research–extension system is characterised as form A; a bottom-up approach with prefectural research and extension organisations of equal status.

Mexico

The seven main agricultural research institutes and eight regional experimental stations in Mexico fall under the authority of the Federal Secretariat of Ranch, Agriculture & Rural Development. The university-based National Agriculture, Livestock and Forestry Research Institute (INIFAP) is the key organisation in the promotion of research–extension linkages at national level. INIFAP forms one of the seven main institutes and has offices in each state for networking with local extension workers. Under the National Alliance Programme, INIFAP distributes publications on on-farm technology testing, including validation and demonstration trials.

At state level, each of the 32 states has an agricultural experimental station under the State Secretariat of the Agriculture Department (SEDAGRO). SEDAGRO's Directorate of Rural Development (DDR) has extension offices and farmers' support centres in state zones, municipalities and villages. It is the DDR that employs subject-matter specialists and extension workers. The state-level research–extension linkage is promoted through meetings between researchers from state experimental stations and DDR and through joint activities between DDR, state researchers, INIFAP and networks of farmers' foundations.

The Mexican research–extension linkage system allows the devolution of decision-making power to states and farmers' cooperatives. Farmers' foundations and non-governmental organisations take final decisions on research needs/problems for the projects they finance or undertake jointly with government research stations.

With research–extension linkages operating at state level, the lower status of extension service, and the strong participation of farmers' cooperatives in decision-making, the Mexican system is classed as form C of the theoretical framework.

Nigeria

All the agricultural, forestry and fisheries research institutes in Nigeria are owned by the federal government; the states have no research institutes. Each of the 36 states is divided into extension zones, blocks and cells. The extension workers and subject-matter specialists of the state Agricultural Development Programmes (ADPs) depend on the national research system for most technologies. Nigeria is divided into five ecological regions. Five regional coordinating research institutes (operating under the National Agricultural Research Project) oversee the research needs and coordinate farming systems research activities in each ecological region.

Research–extension linkages are promoted at regional level through regional research–extension committees and quarterly technology review meetings involving subject-matter specialists. In addition, the National Agricultural Extension and Research Liaison Service (NAERLS) operates through the programmes of each national research institute and through NAERLS regional offices. The Federal Agricultural Coordinating Unit works with collaborating institutions (research institutes, universities, and ADPs) in coordinating linkage activities. Although provision is made for farm input traders to participate in Nigeria's research–extension–farmer–input supply linkage system, their level of participation has been very weak.

The identification of annual research needs is done through a joint problem diagnostic survey in each state by staff of national research institutes, universities and state ADPs. There is lesser involvement of village extension agents and block extension supervisors in collating farmers' needs for the formulation of research themes and plans. Although state ADP officers and national researchers participate in discussing the research problems at regional level, national officers assume power in finalising decisions on research themes (without farmers' representation). Most decisions on the direction of linkage activities are taken from above (at national level), and research and extension organisations in Nigeria are unequal in status. For these reasons, Nigeria is best categorised as form D of the theoretical framework

South Korea (Republic of Korea)

Agricultural research and extension in South Korea are integrated under a huge national institution called the Rural Development Administration (RDA) with headquarters in Seoul. The RDA, which is an organ of the Ministry of Agriculture and Forestry, has jurisdiction over nine Provincial RDA (PRDA), nine research

institutes, four regional experiment stations, 32 location-specific commodity experimental sites, 154 city/county extension offices, and 1,380 farmers' consulting offices. To ensure the harmonisation of agricultural extension programmes between national and local levels, the funding of extension services comes from national, provincial, and city/county governments.

In South Korea, linkages between research and extension are made easier by virtue of the fact that both are administered by the same institution. Linkages are also promoted through joint evaluation committees and on-farm adaptive experimental activities. Farmers' problems are identified through data collected by researchers, and final decisions regarding research themes are jointly taken by researchers, subject-matter specialists and other officers. The results of research are screened and subjected to economic analysis by research evaluation committees. Subject-matter specialists from the extension management bureau of RDA participate in research planning and evaluation activities. Similarly, researchers participate in extension programmes and have opportunities to review the applicability of their research findings.

Both the research management bureau and the extension management bureau have equal status inside the RDA/PRDA. Research-extension linkages are administered at national level, and decisions from the top are passed down to lower levels of the administration. The Korean system thus fits linkage form B of the theoretical framework.

Tanzania

In Tanzania, research and extension are in different divisions in the Ministry of Agriculture and linkage mechanisms are not clearly spelt out. The three national research institutes fall under the authority of the Division of Research and Training and have substations in the 47 provinces. The Farming Systems Research-Extension Programme – also under the Division of Research and Training – is managed by zonal directors and implemented at provincial level through Liaison Offices. Extension falls under the authority of the Division of Agriculture and Livestock Extension Services. Agriculture and Livestock development officers are stationed at regional level, with agricultural extension officers and subject-matter specialists based in the provincial headquarters. District-level extension officers and village-level farm advisers use the training and visit extension technique. Although the official link between researchers and extensionists is weak (e.g. researchers and subject-matter specialists meet once a year), extension officers and subject-matter specialists unofficially inform researchers about farmers' problems. Subject-matter specialists are also informally involved in on-farm trials. Farmers and outsiders are mobilised to participate in research-extension linkage programmes, particularly in rice production.

Currently, the Tanzanian research-extension system is classified as linkage form D due to the unequal status between research and extension organisations, and the concentration of power at national headquarters. For Tanzania to enhance the linkage between research and extension, it will have to improve the quality of its extension staff through training, undertake institutional reorganisation to empower the provinces, increase funding for linkage activities and provide better means of transportation for district/village-level officers.

Thailand

The agricultural research system in Thailand is not yet integrated under a single authority at the national level. Under Thailand's Ministry of Agriculture and Cooperatives, there are departments of agriculture, agricultural extension, livestock, irrigation, forestry, fisheries, land development and others. Each of these departments has research institutes which are administered separately. The provincial governments have no independent research stations.

The Department of Agricultural Extension (DOAE) is linked to regional extension offices, and these are connected to the provincial agricultural extension offices. There are also district and sub-district extension offices. The extension services aim to raise farmers' income/quality of life by focusing on the promotion of improved crop and livestock technology, crop protection and input/credit support. The subject-matter specialists are based in the provinces. Provincial extension offices formally receive research results by requesting research reports or when DOAE arranges a seminar, conference or group training; staff can also informally obtain results from the mass media on a personal interest basis.

It was found that only researchers identify farmers' needs and take decisions on research themes. Apart from meetings between researchers and subject-matter specialists twice a year, there is no other evidence of routine linkage mechanisms between research and extension. There is no joint evaluation of on-farm trials, no farmers' participation, no joint decision-making, and no staff exchanges. Since there is no systematised research-extension linkage, Thailand can be classified as form E of the theoretical framework.

5 CONCLUSION

This paper has presented evidence from seven countries of the diversity of agricultural research-extension linkage systems prevalent around the world. This diversity is the result of contrasting sociocultural situations and the different development models adopted by different countries.

The specific formal linkage mechanisms in the various countries studied include:

1. apex management with research, extension and training in the same institution;
2. matrix management i.e. research and extension as

- semi-autonomous bodies under the same ministry;
3. coordinating committees/meetings;
 4. communication units or liaison departments;
 5. use of a task force;
 6. staff exchanges;
 7. cooperation between universities' research programmes and extension organisations.

In addition, informal linkage mechanisms based on friendship and mutual interest include the promotion of joint social activities and the use of existing personal ties.

Japan's research-extension linkage system offers a range of opportunities for farmers' participation in joint decision-making on research themes at the prefecture level. The strong research-extension linkage in Japan can partly be attributed to the exchange of staff between agricultural research and extension organisations, enabling personnel to work for a specified time in each other's establishment.

In Indonesia, Nigeria and Korea the research-extension system is such that decision-making power is concentrated at the top, in the hands of national research officers. In order to strengthen the Indonesian linkage system, each province should have its own experiment station; researchers and extension personnel should meet more often; and the AECs should be more actively involved in identifying farmers' problems. It is recommended that Nigeria should change its agricultural research policy to allow state governments to control agricultural research stations and conduct research appropriate to the distinctive characteristics of each state. In the Republic of Korea, the placement of research and extension in one institution is commendable but greater devolution of power to PRDA would be desirable.

In Tanzania and Thailand, bold institutional reforms will be required to improve the linkages between agricultural research and extension. In Mexico, the gap in status between extension and research needs to be narrowed for greater linkage between the two systems.

The findings of this study show that policy changes, institutional reorganisation, and the strengthening of organisations are required to enhance research-extension linkages in developing countries. This paper has provided a theoretical framework through which global agricultural research-extension systems can be analysed in order to highlight specific ways in which research-extension linkages can be improved.

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106b. DIFFERENT WAYS OF FINANCING AGRICULTURAL EXTENSION Anne W. van den Ban

1 INTRODUCTION

In most countries agricultural extension has long been provided by a government service paid for by taxpayers. More recently a variety of ways to finance extension has emerged mainly as a result of the tendency to privatise government services and the increasing role commercial companies play in agricultural research and extension. This raises the question: What are the implications of the ways in which agricultural extension organisations are financed regarding the service that is provided to farmers? This paper addresses this question by focusing on the principles underlying decisions relating to optimal funding sources for extension.

Since very little research has been published on this question to date, this paper presents a conceptual framework that can be used in analysing these implications. It also puts forward some hypotheses for further research, though there remains the question of who might be willing to fund such research. This paper will show that decisions regarding how extension is financed have important implications for farmers and for the development of national agriculture.

2 FACTORS INFLUENCED BY THE WAYS IN WHICH AN EXTENSION ORGANISATION IS FINANCED

Box 1 lists the major ways in which extension organisations can be financed. The mechanisms through which an extension organisation is financed can affect the decisions made by the extension organisation relating to:

- goals;
- target groups;
- extension methods used;
- extension messages;
- internal organisation;
- cooperation with other organisations promoting agricultural development.

Decisions that are made regarding these issues carry with them a number of implications for the ways in which extension supports farmers. For example, does one teach farmers to use technologies which incorporate information and skills in specific devices and products (seeds, agrochemicals, machinery, etc.), or the information and skills of management practices?¹ Economists make a distinction between public and private goods. Everybody can benefit from a public good, i.e. it is not exclusively or excludably available to those who have paid for it. A public good is not subtractable, i.e. it is still possible for others to use the good after it has been used by someone – this is usually the case

with information. In contrast, only one person or organisation benefits from a private good. Extension is usually somewhere in between a public and a private good, but how close it is to either depends on the situation (Beynon et al., 1998).

What kind of farmer decision-making is the extension organisation trying to influence? This might include:

- adoption of technologies;
- management of technologies;
- optimal use of resources by a farmer;
- change in farming systems;
- changes in the supply of inputs/credit and the marketing of products;
- transfer of the farm to the next generation;
- changing from farming to another occupation;
- collective decision-making on resource use and on the way farmers try to influence government policies (van den Ban, 1998).

In several developing countries, e.g. India, extension mainly places attention on the adoption of innovations, while in many former communist countries most attention is on investment and marketing decisions. Farmers all over the world may need support with the whole range of decisions.

Box 1 Extension organisations can be financed by:

1. a government service paid for by taxpayers;
2. a government service paid for by a levy on certain agricultural products;
3. a commercial company selling inputs to farmers and/or buying their products, which in its relationship with its customers also uses extension;
4. a farmers' association which pays for extension from its membership fees;
5. a farmers' association which is subsidised by the government;
6. a non-governmental organisation (NGO) which is financed by donations from inside or outside the country and/or by commercial companies for public relations purposes;
7. an NGO which is financed by subsidies from or contracts with the government (either the national or a donor government);
8. a consulting firm which charges a fee from the farmers, who are its customers;
9. a publishing firm which sells agricultural journals or other publications to farmers;
10. different combinations of the above. For example, it is possible for a government to pay the salaries of extension agents, whilst most of the operational expenses are covered by a farmers' association, or for a commercially-oriented cooperative or input-supply company to send a farm journal to its members/customers.

Is decision-making within the extension programme centralised or decentralised? To whom are extension agents accountable? (Edwards and Hulme, 1996) These factors are interrelated; for instance information on a decision to adopt a technology is less excludable than information on the transfer of the farm to the next generation.

3 WHY DO DIFFERENT ACTORS FINANCE AGRICULTURAL EXTENSION?

Actors who finance an agricultural extension organisation do so because they see it as a method to reach their own goals. Since the goals of different actors in an agricultural knowledge and information system (AKIS) are different, so are their reasons for investing in extension.

Government

In an important article, Bennett (1996) analysed the situations in which a government should invest in agricultural extension. He concluded that government should finance agricultural extension in the four cases described in Box 2. Each of these situations is described in more detail in the paragraphs that follow.

i. Government should invest in agricultural extension when the public benefits more from extension than the participants. Extension work on the use of fertilisers illustrates this point. A soil test can show the optimal quantity of potash fertilisers specific for a crop in a particular field. Nearly all the profit from this knowledge is for the individual farmer cultivating the field, which makes it hard to defend that the government should pay for this advice. The situation is different when the extension organisation tries to teach farmers in a community to use fertilisers at the optimal time. Extension agents will not have time to teach this to all farmers individually. Therefore they may discuss this at a farmers' meeting and contact the opinion leaders personally in the expectation that other farmers will follow their example. Whereas the soil test was a private good, through teaching opinion leaders extension becomes more of a public good. There is less reason to charge farmers for this information, which enables them to demonstrate to their neighbours that they can get higher yields by spreading fertilisers at the right time. Teaching farmers how to interpret the soil test themselves is another approach the extension organisation can use. To defend that this should be (partly) paid for by taxpayers one can argue that the government also subsidises other kinds of education and that the farmer who has learned how to interpret a soil test may teach this to his colleagues.

There is a lot of research which shows that investments in agricultural research and extension often have a high rate of return. A major return is that these investments reduce the costs of producing food that, on a large scale, results in a reduction of food prices for the consumers and makes it more

Box 2 Situations in which a government should invest in agricultural extension

- i. when the general public benefits more from extension than the individual participants;
- ii. for a type of extension which can be done better or cheaper by the government than by others;
- iii. when government agricultural development programmes can be made more effective if they are combined with extension;
- iv. when necessary public benefits are not sufficiently provided by private enterprise.

possible for farmers to compete on the world market (Beynon, 1998). This also decreases the need for the government to support prices of agricultural products.

It depends on the market situation whether the benefits are mainly for the consumers or for the producers. If a country produces coffee for export and contributes 0.1 per cent to world production, increased productivity of its coffee farmers will not change market prices but it can increase the income of these farmers considerably. If a country produces and consumes nearly all its rice, an increase in rice yields will be a major benefit for consumers through lower prices but farm families are also consumers. In this case it can be very profitable for consumers to finance extension on rice production with the taxes they pay. An example is the change in milk production in India. Between 1978 and 1993 milk production in this country increased by 114 per cent. However, the real consumer price of the milk decreased by 32 per cent, mainly because farmers learned to produce, process and market milk in a more efficient way thus benefiting consumers considerably (Candler and Kumar, 1998).

In many countries governments have supported the income of their farmers by restricting the import of agricultural products. The regulations of the World Trade Organization make it increasingly difficult to achieve this goal in this way. Improving the competitiveness of farmers by financing agricultural research and extension may be a more effective and less costly way. However, voters may realise what they have to pay in taxes to finance research and extension, but not what they would pay if import duties on food products were raised.

ii. Is this a kind of extension which can be done better or cheaper by the government than by others? One reason to privatise government extension services is that these are often bureaucratic organisations which are not very cost conscious. Many observers have noticed that government extension organisations, especially in developing countries, do not perform their role in a very efficient way. However, this does not imply that there are no extension roles which can be performed better by a government agency than by private consultants.

Bell (1998) stresses that a government extension organisation tries to help a community to develop, whereas a consulting firm helps individual farmers to increase their income. Without increased incomes, farmers are not willing to pay the consultancy fee which is needed by the firm to make a profit. This influences the choice of extension methods and of target groups. For example, a demonstration can be a very effective way of introducing improved farm practices in a community, but the consulting firm will not use this method if it cannot charge each farmer who learns from it.

Usually a consulting firm will work with only a small proportion of the farmers and will not stimulate them to teach other farmers what they have learned, unlike government extension services who often encourage them to pass on knowledge. Farmers who learn from opinion leaders may feel less need to pay a consultant for his services. In a situation like this a government extension service may prove to be cheaper and better than a consulting firm.

- iii. Government agricultural development programmes can be made more effective if they are combined with extension. For instance many governments subsidise improvements in infrastructure, e.g. irrigation, in order to promote agricultural development. These improvements open opportunities for farmers to increase their income by growing crops with a higher value. The sooner and more effectively they use these opportunities, the higher the rate of return on these investments in infrastructure. Extension can teach farmers to use these opportunities rapidly and effectively. Therefore the Indian government has for some years financed an extension programme as part of their irrigation projects. These investments in extension are low compared to the investments in the irrigation project.
- iv. Government should invest in agricultural extension services when public benefits which are considered necessary by society are not sufficiently provided by the private sector. For instance, much of the extension work on plant protection is done by companies selling pesticides. One would not expect them to teach farmers to reduce their use of pesticides by adopting integrated pest management (IPM), but in some situations lowered pesticide use is now possible. Since this is a change which is also desirable for environmental reasons the government may decide to finance an IPM extension programme.

Often a goal of government policy is to decrease poverty. In many countries a large proportion of the poor are small farmers, and extension can be a way to decrease their poverty. Therefore a government extension service might, but not always does, focus its attention on small farmers. This is not profitable for a commercial company or a consulting firm, unless they are paid by government for working with this target group.

In poor countries it is difficult for many farmers to find the money needed to pay for extension (e.g. Rasheed Sulaiman and Gadewar, 1994). A farmer whose family consumes 70 per cent of production and who sells 30 per cent, will usually not be able to buy the help of a consultant. From the money earned from sales the farmer also has to pay for clothes, school fees, medicines and other items needed by the family. For a poultry farmer in the Netherlands, whose family consumes 0.01 per cent of the eggs produced, the situation is quite different. Too often donors and foreign experts insist on policy changes which might be desirable for their home country but not for a developing country.

There have been other reasons to privatise government agricultural extension organisations in industrial countries. In many of these countries the pricing policy results in the over-production of agricultural products, and it is quite expensive for the government to store and dispose of these surpluses. In this situation it does not make sense for the government to finance an agricultural extension service, which has the effect of increasing agricultural production and raising the cost of disposing of these surpluses.

In many developing countries the situation is quite different. There the demand for agricultural products is increasing rapidly, both through population growth and through an increase in average income, which makes it possible to eat more expensive foods. It is often difficult to increase food production at the same rate as the increase in demand and also to find the foreign exchange needed to import food. Therefore a major goal of government policy is to increase food production (Umali and Schwartz, 1994). A danger in developing countries is the privatisation of extension services without realising the degree to which investments in extension can contribute to the national policy to meet the growing demand for food from local production.

Financing agricultural extension by the government can work well if the goals of the agricultural policy of the government are felt by the farmers to be in their interest. In European countries this was the case shortly after the war when increasing agricultural production was a major goal. However this is no longer the case now the government tries to prevent the production of surpluses of agricultural products and is seriously concerned about the environmental problems caused by intensive farming. The extension agents can only achieve changes among farmers if farmers are convinced that it is in their interests to change. By promoting changes which are popular with farmers, extension agents can come into conflict with their employers, who are attempting to realise the goals of the government agricultural policy. This was one reason for the privatisation agricultural extension in the Netherlands, where the government expected their extension agents to promote environmental policies which decreased farm income (Tacken, 1998).

During the last decade budget deficits have forced many governments to reduce their expenditures. Whether this is done by reducing the extension budget or other budgets depends partly on political power. In most developing countries urban dwellers have more political power than those in rural areas. In many industrial countries the proportion of the labour force working in agriculture has decreased to less than five per cent; as a result farmers no longer have much political power. In addition, giving subsidies to farmers may be more beneficial to politicians in helping them to be re-elected than to improving extension.

In most countries the government agricultural extension service is funded by the national government, but in the USA it is partly paid for by local government. This has the advantage that the budget of an extension unit depends partly on the citizens' satisfaction with the services provided by the local unit. If agricultural extension is paid by the national government, hard work by a group of extension agents will have very little influence on their budget. In this way some of the advantages of privatisation of extension are realised without resulting in the disadvantages mentioned in this paper.

Commercial companies

Commercial companies, including farmers' cooperatives, try to make a profit through trade. They will invest in extension only if they are convinced that this will promote their trade. It is usually in the interests of both the company and their customers that their products are used well. For example, a pesticide will not work if it is used on the wrong disease or applied at the wrong time. A farmer who uses a pesticide incorrectly may advise his or her colleagues against the pesticide, thus decreasing the sales of the pesticide company. It is therefore in the interest of the company to teach its customers how to use their products properly.

In the long term, a cooperative or commercial company will only make a profit if it is able to respond to the needs of the market. This may make it necessary to teach farmers how to produce the products for which there is a market demand. For instance, the Tamil Nadu Milk Producers' Federation, an Indian cooperative, saw that with increasing prosperity a market developed for dairy products with a higher value. Since it is only possible to produce high-value dairy products from clean milk, the Tamil Nadu Milk Producers' Federation taught farmers in some villages how to produce clean milk, for which the Federation paid a better price. This extension campaign has been quite profitable both for the farmers in these villages and for the Federation (Ambalavanan, 1999).

For a long time farmers have produced mainly bulk products. In other branches of the economy brands have been developed through which producers try to present the image that their particular product is of better quality than that of their competitors and therefore worth a

higher price. A similar development is now evolving in food production, particularly for niche markets such as organic produce. In order to be able to guarantee the quality of such produce, the marketing company aims to control the whole chain from the producer to consumer, because at each link in this chain something might happen which reduces the quality of the product.

In commercially-oriented agricultural production it is in the interests of both banks and some commercial companies that farmers are successful. The probability that a farmer is able to repay a loan from a bank depends on whether or not the loan has been invested for a good return without too much risk. Many banks have realised that it is profitable for them to advise their clients on investment decisions and sometimes also on other aspects of farm management. It can also be in the interest of input supply companies for their customers to earn well. In industrial countries many farmers will have to stop farming in the next decade because agriculture is no longer profitable. A particular input supply company wants a smaller proportion of its customers to stop farming than that of its competitors. This can make it profitable for such a company to teach its customers how to increase their income, e.g. by producing the kind and quality of products for which there is a good market. But commercial companies will only give their customers advice on a small proportion of the decisions farmers have to make because it is not profitable for them to advise on the other decisions (Schwartz, 1994).

Farmers' associations

Large and influential farmers' associations perform two main roles: (i) they try to influence collective decisions by the government and others in such a way that the interests of their members are taken into account; and (ii) they support their members in fields for which they have specialised knowledge. For example, a farmers' association may represent its members in a conflict with the government over land use regulations or tax assessment.

Government decisions are increasingly taken at a distance from farmers, e.g. in the World Trade Organisation. It is difficult to show farmers that it is profitable for them to be a member of an association which is in turn a member of an organisation, which is itself a member of an organisation representing them at these top-level decisions. For the survival of the farmers' association it is therefore important to show the farmers that it pays to be a member; this is achieved by providing individual assistance to members, i.e. through performing the second role. Such assistance can be provided through extension, but the farmers' association should find a niche in the agricultural knowledge and information system where it has a competitive advantage over other actors. This will not be the same niche in all countries.

In Denmark, for example, farmers' associations have long played an important role in providing advice on production technologies (Albrecht, 1954). Farmers'

associations in the Netherlands, in contrast, have given much attention to advice on contracts for the transfer of the farm to the next generation. In recent years, however, the advisory service of the Dutch farmers' associations has developed into competing consulting firms, such as the privatised former government extension service DLV. Associations of producers of a certain crop or animal can play a useful role in giving technical and economic advice to their members. Advisers of a general extension organisation, e.g. a department of the Ministry of Agriculture, may lack the specialised knowledge to give good advice for a particular branch of agriculture. We see this for instance in an association of grape growers in India.

Farmers' associations cannot only play a useful role by employing extension agents but also by putting pressure on research and extension organisations to work in a more demand-driven and client-oriented way (Collion and Rondot, 1998). However, one difficulty might be that the farmers representing the association are themselves relatively well educated and resource rich and may not fully understand the problems of resource-poor farmers with a low level of education (Likert and Lippitt, 1953).

Consultancy and accounting firms

Consultants who advise farmers for a fee have existed in many countries for a long time. They have been able to compete with the free advice given by government extension services because they visited their customers more frequently, providing services which an educational agency could not provide (e.g. as a pest scout) and they had more specialised knowledge of specific farming systems. This last point has become more important with the increasing specialisation among farmers; to some extent private veterinarians have also been working in this way.

With the privatisation of government extension organisations the market for consultancy services has increased rapidly. In several countries the government extension organisation has been transformed into a commercial consultancy firm. The transformation required a change in attitudes of the staff members, but not everyone was able to make this change. In the Netherlands more than 60 per cent of the extension agents had to be replaced, mainly because they could not make enough profit for their firm (Duijsings, 1998). Having worked both as an extension agent and as a consultant, Bell (1998) made an interesting analysis of the differences between extension and consultancy: 'extension is a process, hopefully, to successful development and change in a farming community', whereas 'consultancy is a business activity providing services in the market place'.

Consultancy firms do business in the field of agriculture because they see a possibility to make a profit by advising farmers on particular issues. Farmers are most willing to pay for a tailor-made service, e.g. to

help them to make decisions regarding investments and other issues for which they have limited experience. Large farmers are better able to pay the necessary consultancy fee than small farmers. Consultancy firms may also enter areas related to agriculture, particularly if they see possibilities for profit: a consultancy firm may advise a municipality on the maintenance of city parks, for example. It may also expand its operations to other countries: the former Dutch government extension service, DLV, now works in over 30 countries, helping farmers to compete with Dutch farmers.

Many former government extension services which have been privatised can only make a profit if they have a contract with the government to do extension work on problems which the government considers important, e.g. the reduction in the use of agrochemicals. In several Central European countries the government gives farmers a voucher which they can use to pay part of the costs of private extension services. In Hungary the introduction of these vouchers has resulted in the establishment of a large number of small consultancy firms, but only those firms which are certified by the Ministry of Agriculture will be paid by the government for the vouchers they receive from farmers. To receive such certification the staff of these firms have to participate in training courses taught by researchers or staff members of universities to ensure that they are able to do their job well (Kozari, 1999).

In countries where farmers have to pay income tax, the accountants who prepare tax declarations have also entered into consultancy since they keep records which can be used for making better farm management decisions. Such firms also prepare the business plans required by a bank before honouring a loan application.

Non-governmental organisations

It is difficult to generalise about NGOs because they display a wide range of variation in their aims and motivations. An NGO can be a church related organisation which for religious reasons aims to improve the welfare of poor people. It can also be a group of entrepreneurs who earn their living by distributing grants from the government or from foreign donors to poor people. Another NGO might consist of a group of individuals who for political reasons want to increase the power of low status people in order for them to be able to influence their own future.

The Indian Ministry of Rural Development often uses NGOs because it found that NGOs are better able than government agencies to work with poor people from the lower castes. An important goal of the Indian development policy is to decrease poverty and to help low caste people to organise themselves in such a way that they can better influence their own future. For this purpose the Ministry might contract an NGO to achieve specified changes, e.g. to introduce crossbred cows into a region with the additional condition that more than half of these cows should be with families who are

classified as poor. A problem with this approach is that the most important changes are also the most difficult to measure; for example it is easier to measure who has a cow than who manages this animal well.

Another reason why extension services might be provided through NGOs and not through Ministry civil servants is to avoid working through an inefficient government bureaucracy. Compared to government extension agents, NGO staff are also often better trained to support group formation among farmers. These groups can play an important role in agricultural development. On the other hand, staff members of several NGOs lack the technical competence needed to advise farmers on how they can increase their productivity. The roles that NGOs can play in agricultural development have been analysed in detail by Farrington (1997).

4 SOME IMPLICATIONS OF THE WAY AGRICULTURAL EXTENSION IS FINANCED

There has been little research into the implications of the way extension is financed for the way extension is given or for the way the extension organisations operate. It may be useful to outline some topics which deserve further study.

Flow of knowledge

A feature of successful government agricultural extension organisations in several countries was the free flow of knowledge between researchers in different disciplines, extension agents and farmers. This made it possible to develop solutions for farmers' problems by integrating knowledge from different sources. Although the extension organisation usually lacked the staff to contact more than half of the farmers on a regular basis, local opinion leaders were often able to influence other farmers by way of example and through discussions with colleagues (van den Ban, 1965). This has changed drastically with the privatisation of extension services. Duijsings (1998), the deputy Chief Executive Officer of DLV, observed that privatisation and reduced government funding create competition within the knowledge system, hampering the communication of extension with research, education, farmers' associations, private consultants, sales representatives and suppliers. Similar experiences in West Australia are reported by Marsh and Panelli (1998).

Farmers who have paid for information and advice are less inclined to share this knowledge freely with their colleagues. This 'commoditisation' of knowledge may also reduce the consultants' access to farmers' experience and the freedom to use this information to help other farmers. Tacken (1998) the Chief Executive Officer of DLV reveals that the information his company needs to be able to give good advice comes to a large extent from farmers themselves. Although farmers have to pay for the information they receive from DLV, DLV does not pay farmers for the information it receives

from them. How long are farmers willing to provide a consultancy firm with the information it needs to be able to earn money? In several countries farmers are reportedly now less willing to receive excursions of researchers or extensionists/consultants onto their farm than in the past, when knowledge was available for free. A good extension agent – by asking the right questions in a counselling process or by facilitating a group discussion among farmers – allowed farmers to realise for themselves the need for new management practices. Are farmers willing to pay the consultancy fee for an extension agent who continues to use this methodology? Donors have financed many consultancy firms to help governments develop and implement agricultural development strategies. In their reports one can find valuable information for development planning, but after the consultant has left the country it is often very difficult to find these reports. A similar development might happen now that consultants advise individual farmers. A firm which has developed an effective methodology for making farm plans will often try to prevent competing firms from learning this methodology, whereas a government agent who developed such a methodology was proud if his colleagues also used it.

Knowledge management

The system of research–extension linkage is an important factor influencing the success of an extension organisation (Agbamu et al., this issue). In several government extension organisations there is a well established system of subject-matter specialists who keep field workers informed about relevant new developments in research and inform researchers about the problems and experiences of farmers. It can be difficult to organise this linkage in a consulting firm. There are many small consulting firms, and researchers do not have the time to interact with all of them. Competition may make it difficult to bring consultants from different firms together in a training course. The advisers in the consulting firm are under pressure to work as many declarable hours as possible (Duijsings, 1998), making it difficult for them to spend enough time interacting with researchers. On the other hand, a consulting firm may realise that their firm can only survive if their staff are made aware of new developments in agriculture earlier than the staff of competing firms. By working in more countries they may gather a wider range of experience than staff members in national extension. Similarly, in commercial companies the staff will usually be quite well informed about the research done by its own research institutes, but they may have less access to the research done elsewhere, especially in the research institutes of competing firms.

An advantage of extension by commercial companies is that they are able to realise an integration of communication of new knowledge, input supply, marketing and often also credit supply. Government

extension organisations may make recommendations for which the necessary inputs or credit are not available to their farmers, or which result in an increase in production which cannot then be sold in the market. This is much less likely with commercial extension, as shown by the example of cotton production in francophone African countries.

There are NGOs which have a good linkage with agricultural research. For example, a large Indian NGO, Bharatiya Agro-Industries Foundation (BAIF), which works mainly in the field of animal husbandry, has its own research station with competent researchers. Its training centre not only gives training to staff members of BAIF but also to other NGOs and even government agencies. BAIF field staff are often considered to be more dynamic and more capable of helping farmers than the staff of the State Department of Animal Husbandry. However, it is often difficult to establish good linkages between staff of NGOs and those of agricultural research institutes and universities, because:

- NGOs may see each other as competitors for government or donor funds. The researchers do not have the time to work with all NGOs separately, yet it is also difficult to bring them together for a regular exchange of experiences.
- As mentioned previously, many staff members of NGOs are social scientists, who lack a basic training in agriculture.
- Most of the research in developing countries is financed by the government and one of the roles of the researchers is to support government development agencies.

The long-term success of an extension organisation depends to a large extent on the quality of the knowledge management in the organisation (e.g. van den Ban, 1999). It is quite important that all staff members are eager to discover and to develop new knowledge which is relevant for the work of the organisation. In some extension organisations managers see it as an important aspect of their task to stimulate new knowledge (Duijsings, 1998). Yet there are also government extension organisations in which managers are trained to maintain rules and regulations and do not stimulate the creativity of their staff or encourage them to learn from farmers' experience.

Goals and accountability

The goals an extension organisation tries to achieve are related to whom the staff of the organisation feel accountable. In a government organisation they may feel accountable to politicians who decide about the budget for extension and higher-ranking government officers who decide which staff member will be promoted. Alternatively, an extension agent may feel accountable to their farmers since it is the farmers who influence their status in the community. In many developing countries extension staff tend not to feel accountable to farmers since farmers often have a low

status in society. In contrast, Dutch field-level extension agents largely used to feel accountable to farmers, particularly around 1970 when the budget for the extension service was secure and farmers had a higher social status in the community: they themselves would have liked to be farmers, but they lacked the required access to land and capital.

The issue of accountability in NGOs is thoroughly discussed by Edwards and Hulme (1996). Since the financing of many NGOs is often insecure, both the management and staff try to please (potential) financiers because otherwise the continuity of their organisation would be in danger. NGO staff may also feel accountable to their directors or board of trustees who are often ideologically motivated, e.g. to empower poor people. On the other hand, it is also possible that the managers established their NGO in order to increase their own income: although they operate in a similar way to a consultancy firm, by calling themselves an NGO it may be easier to obtain money from donors. Such an NGO may not feel a high degree of responsibility towards its beneficiaries.

The main goal of some NGOs is to implement welfare policies rather than to enhance the capabilities and knowledge that would allow rural people to increase their productivity. Politicians and rural people in developing countries often do not recognise that increasing knowledge can be a major way to improve productivity and hence to increase the income of poor people. In some countries NGOs are only allowed to work with permission of government regulators. Therefore the management of the NGOs tries to please these regulators, who may not approve of NGO attempts to change the power structure in the society. An NGO which is partly financed by the national government may also be unable to change this structure, even if the staff would like to do so. However, if it is financed by a foreign NGO, the contribution it makes to such a change in power structure may be an important criterion for the evaluation of its performance.

In commercial companies and consulting firms the field staff feel accountable mainly to the management of their firm, which tries to judge how much each staff member contributes to its profit. Educating farmers to increase their capability to make better decisions is seldom seen as an effective way to increase this profit. It may be better for the company if the farmers remain dependant on the support of their (commercial) extension agent. These companies will try to increase the income of their customers and to obtain a small share of this increase for their company.

The effectiveness of government extension organisations can be decreased by the influence of politicians on the selection of staff members, target groups and messages. For example, extension agents may come into difficulties if they refuse to spread propaganda for the party of the local member of parliament. Does privatisation of extension decrease these problems?

An important reason for governments to privatise their agricultural extension service has been that they have felt that they lack the budget to finance a large agricultural extension service. Therefore they have delegated this responsibility to organisations which raise their own budgets, e.g. farmers' associations, consulting firms or commercial companies. At the same time the government may use more money from its taxpayers or raise the prices of agricultural products to finance subsidy programmes for farmers. This may give a lower economic rate of return than investing in extension, but a higher political rate of return because the recipients of these subsidies or higher prices are willing to vote for politicians who supported the programmes. If this results in a lower increase in the productivity of agriculture, one should wonder whether the government can afford not to pay for agricultural extension.

Everyone occasionally makes mistakes, and the same is true of extension agents. If a farmer follows incorrect advice from an extension agent, he or she may lose a lot of money. Is the extension organisation liable for these consequences or does the farmer have to pay for this loss? In this regard the laws and the jurisprudence are different in different countries. Government extension services may not be liable, but consulting firms often are. Therefore these firms may do all that is possible to prevent such mistakes, including not making recommendations in cases where some risk is involved. For extension provided by a commercial company the farmer can not only try to get the loss refunded in court but can also withhold his or her custom until the loss is refunded.

Extension messages

In many government extension organisations the choice of the extension messages is based either on the goals of the government policy or on research findings which are considered to be important for farmers. A consultant cannot earn a living by working in this way because farmers are only willing to pay for information or other help for which they feel a need. A good consultant can help farmers to discover that changes in their environment may mean that they need help with different problems than they encountered in the past. A major reason to privatise government extension services was that these services were not very effective in many countries because they did not provide the information which farmers felt they needed. Farmers are free to listen or not to listen to their extension agent: they will only take notice if they are convinced that the information the agent provides will help them to realise their goals or if they consider him a nice fellow.

Increasingly extension agents are not only talking about production technologies but also about government rules and regulations and subsidy schemes, e.g. to reduce environmental problems. Government policies are most effective if farmers follow these rules and regulations voluntarily and use the subsidy schemes in the way they were intended by the government. This

is most likely to happen if farmers are convinced that the government has made the right kind of policies. However, many farmers feel threatened in their ability to earn a good income and in their freedom to manage their farm in the way they like as a result of such policies. They may follow the rules out of fear of punishment but will change as little as possible. In this situation one cannot expect farmers to be eager to learn about these policies (Bahn, 1999). The chance that farmers accept these policies is highest when farmers themselves have participated in their design (van Woerkum, 1999). Farmers, leaders of environmental groups, policy makers and others may learn from each other by meeting to discuss the alternatives available to solve the problems involved. However, even if farmers are involved in designing these policies it is usually only a few leaders of farmers' associations who actively take part.

Extension messages about government policies are quite important, but what type of organisation is willing to promote such messages? It is most likely that farmers will accept this information if it is provided by extension agents from their own farmers' association, even if the association is paid by the government for this work. However, there are two reasons why an association may not be willing to offer extension messages about government policies. Firstly, the association may lose members as a result. Secondly, the position of the farmers' association in its policy negotiations with the government may be weakened. Although the government may also want to contract a private consulting firm to teach farmers how they can reduce environmental problems, the firm may not be willing to accept this contract unless the extension messages are perceived by farmers to be in their interests. Commercial companies seldom see it as their task to explain government policies to their customers, though they would be willing to inform farmers about the subsidies available to buy their product. In cases where government extension services have been privatised, a unit is often maintained in the Ministry of Agriculture to explain government policies to farmers. This unit may find it difficult to work effectively owing to a lack of understanding of the problems faced by farmers. Consequently there may be a lack of trust on the farmers' part.

It is not only important that farmers understand government policies but also that policy makers understand farming and farmers. With a decreasing proportion of the labour force working in agriculture in many countries this becomes more important, yet at the same time more difficult. In many industrial countries farmers' associations have a public relations division to promote this understanding. In the Netherlands a commercial television station broadcasts a programme to illustrate how the most entrepreneurial farmers work and what problems they face.

Since it is possible that commercial companies may try to cheat farmers by providing biased information, it is important that farmers are able to check whether the

information is true. In some countries farmers' associations or the government extension service play this role.

Extension methods and approaches

Many extension scientists are now convinced that it is no longer desirable to use a transfer of technology approach in which the extension administrators decide on the targets to be realised by the field-level extension agents. A more participatory approach is instead preferred, in which farmers decide which changes are desirable and what kinds of support are needed from extension to realise these changes (Roling and de Jong, 1999; Haug, 1999). How are the possibilities for realising the changes needed related to the ways of financing the extension organisation? A participatory approach requires that the extension organisation becomes a learning organisation with the ability to discover which changes are desirable in each specific situation. It is easier to adopt a participatory approach or a farmer-led extension system within an NGO or a farmers' association than in a government extension organisation. To what extent can a government organisation which works nationwide adopt a participatory approach to extension? Which options do consultancy firms or commercial services have to select different extension approaches?

One problem with a participatory approach can be that some farmers expect their extension agent to provide services for them (i.e. how to solve a problem), whereas the extension agent sees himself as an adult educator, whose role is to encourage farmers to develop solutions for themselves. For a consultant who needs the fees from his customers to earn a living, it can be more difficult to realise this educational role than for a government extension officer, who will not be financially penalised if he refuses to perform a service role. A farmer can put pressure on the extension agent of a commercial company to provide free services by threatening not to buy the company's products any longer.

Target groups

Whilst government extension organisations have been quite successful in increasing agricultural production through the introduction of high yielding varieties in high-potential, irrigated areas, they have been much less successful in helping farmers in diverse and risk-prone rainfed areas to increase their income. Unfortunately we cannot claim that we know how best to assist farmers in complex and risk-prone environments. Some NGOs have been rather successful in helping farmers to increase their income and/or in making their farming system more sustainable through the use of participatory extension approaches. So far, however, these approaches have been successful only in small-scale projects (Garforth, 1997). We have yet to discover how such approaches can be scaled up to increase the productivity of millions of farmers, as is needed in many countries (Farrington, 1994).

Many of the poorest people in the world are small farmers with a low level of productivity. Although

agricultural research and extension ought to be able to offer opportunities to increase their productivity and hence their income, these poor farmers do not constitute an attractive target group for a consultancy firm or the extension division of a commercial company because there is little profit to be earned from working with these people. The very poorest farmers are seldom members of farmers' associations and therefore they do not form the target group of the extension service of such associations. Poor farmers can be an important target group for a government extension service where the goal of government extension is to decrease income differences. However, experience shows that even government extension services work mainly with the larger farmers. This may be because increasing national food production is a more important policy goal than decreasing income differences; because poor farmers have little political power; because it is difficult to work with resource poor farmers who have a low level of education; or simply because neither extension agents nor researchers know how to increase the income of poor farmers.

Consequently, it is often left to NGOs to target the poorest farmers. In some cases NGOs have been successful in helping these farmers, especially where there is an increased market demand for products which can be produced on small farms with a surplus of labour, e.g. vegetables. If a government is not willing to finance support to these poor farmers, it can expect that serious social problems will develop in the country (Sachs, 1999). The international community is beginning to realise that the increasing income difference between rich and poor countries is a serious danger for social and political stability.

The target group with which an extension organisation works depends partly on decisions made by the organisation but also on decisions made by farmers. This second possibility is often neglected in the literature, but some farmers realise that in order to compete with other farmers they need good advice. In general we see that those who have most knowledge are also more eager to obtain new knowledge from extension organisations and other information sources. Farmers will also decide from which extension organisation to seek advice. This decision is partly based on costs and partly on confidence. For example, a farmer may know the cost of the fee needed to pay a consultancy firm for their advice, but not how much he or she pays for this advice from a commercial company where these costs are included in the price of the product. A farmer may have more confidence in the ability of his or her own farmers' association to serve his/her interests than that of a government extension service. However, the personality of the field-level extension agent is often more important than the organisation for which he works.

It has been mentioned above that extension from a consultancy is mainly useful in helping a farmer to solve a specific problem rather than a problem which is faced by many farmers. These specific problems are probably

more frequent now than they were a generation ago because farms have become more specialised; farmers try to produce more for niche markets and often combine farming with off-farm income sources (Schwartz, 1994). In consultancy more attention is probably given to management advice than to the adoption of new technologies and practices: In which situations is this desirable?

Management of the extension organisation

In commercial companies and in consulting firms profit is an important criterion for management decisions. Staff members are not paid according to their age or level of education, as was often the case in government organisations, but according to the contribution they make to realising this profit. How valid are the criteria which are used to measure this contribution? What are the consequences of the use of these criteria for the relationship between farmers and the consultants?

When a farmer asks for help from a consulting firm, he/she knows the cost of this advice. The cost of help provided by a commercial company is hidden in the price of the product, possibly reducing the incentive for cooperation in a cost-effective way between the farmer and the adviser. If extension is free many farmers prefer to receive services rather than education. It is argued that the cost of extension provided through consulting firms or commercial companies is lower than through a government extension service, because these firms and companies have to be cost conscious in order to make a profit. On the other hand, in situations where there may be many different firms, companies or NGOs working in the same area, the combined costs of travelling and of staff training will be higher than for one government extension service. We do not yet know which way of financing agricultural extension is most costly.

It has also been suggested that the cost of extension might be reduced by replacing personal contact between farmers and extension agents by mass media or by information and communication technology. Whilst these are undoubtedly useful, research has clearly shown that they are mainly effective in the first stages of the adoption process and have to be supplemented by interpersonal communication in later stages (e.g. van den Ban and Hawkins, 1996).

A study on the privatisation of different government organisations in the Netherlands found that after privatisation their performance increased by 30 to 200 per cent, partly because the staff services decreased in number and in size (de Koning et al., 1997). Similar findings have also been reported for the extension service (Tacken, 1998). With privatisation, the extension management system changed from an input-directed system to an output-directed system: i.e. the criteria for evaluation changed from inputs (e.g. the number of farmers' meetings) to outputs such as change at the farm level. Such a change in organisational culture is not easy to realise.

In many developing countries the salaries of the government extension agents are so low that they have to find an extra source of income for the survival of their family. One possibility is to ask the farmers they visit to give them some of their products.

It is also possible that the extension agent can earn extra money by selling seeds, agrochemicals, etc. The danger in this is that agents may recommend those products for which they or their organisation can earn most, rather than those which are most beneficial to the farmer. This apparently happens sometimes in the Chinese government extension service, which is expected to earn part of its budget by selling inputs to farmers. On the other hand, there is no use in advising farmers to apply inputs which they cannot access because the input distribution system is ineffective.

Economic theories

The most influential publications on the privatisation of extension are written by economists who often work with the World Bank (e.g. Umali and Schwartz, 1994). One wonders whether the economic theories they use to analyse this topic are still valid in the present era. A basic assumption of these theories is that if costs of production decrease, production will increase and suppliers can sell their products for a lower price, leading to an increase in demand. In this way a new balance between supply and demand is achieved. However, as Shapiro and Varian (1999) have shown, this assumption is not valid for the production of knowledge distributed through a communication network such as the Internet. Here a decrease in price results in an increase in the number of participants in the network and in this way in an increase in the supply of knowledge which is available. Contrary to economic theory, the distribution of scarce goods is no longer the basic problem, and the cost of multiplying information has been lowered. Instead, the problem becomes one of electing the most relevant knowledge and integrating knowledge from different sources. It is not yet clear what implications this paradigm shift in economic theory might have for decisions on financing agricultural extension.

5 CONCLUSIONS

In many countries we see the development of a pluriform extension system in which only a part of the extension service is either provided or funded by the Ministry of Agriculture. Other organisations such as commercial companies or NGOs may be involved both in providing and funding extension services, and farmers themselves may also help to finance these services. The question of how one can promote cooperation and coordination between these various organisations is discussed by Rivera and Gustafson (1991). Although it is hard to defend public funding of agricultural extension if the benefit is only for the farmers who use this service, there are many situations where the public at large also profits from the extension services, e.g. by lower prices for their food or a reduction in environmental problems brought about by a change in production.

The analysis presented in this paper broadly confirms the findings of Rivera and Cary (1997), who conclude that government-funded extension is likely to focus its activities on public good activities which the market place is unlikely to provide. Such activities include 'broad' rather than 'specific' technology transfer, dissemination of environmental and resource technology, and human resource development. Some additional points can also be made:

- It is important to analyse what effects the financing of extension (and research) will have on the flow and management of information, the choice of extension goals, methods used and the groups targeted.
- In deciding who pays for extension one should take into account the wider benefits brought about by an increase in the efficiency of agricultural production and associated decrease in the cost of food.
- In countries with the highest levels of productivity, agricultural labour productivity is over 100 times as high as in the countries with the lowest levels of productivity (World Bank, 1998). Extension in countries with high productivity levels should be financed quite differently from those with low productivity levels.
- In countries where the price policy causes surpluses of agricultural products, one cannot expect that the government will be willing to pay an extension service to increase agricultural production.
- Farmers have to make a range of very different decisions. The optimal way of financing agricultural extension depends on which type of decisions one tries to improve. Advice from a consultant paid by the farmer is most desirable for farm-specific investment decisions.
- The way of financing agricultural extension influences to whom the extension agents feel that they are accountable. This affects whether they try to work in the interest of (a certain group of) farmers, government policies, politicians, managers/shareholders of their organisation or others.
- Extension messages about government policies should be financed in a different way from extension which tries to help farmers to increase their productivity and their income.

Decisions on the privatisation of agricultural extension are often based on very limited knowledge about the consequences of such a change. More research in this area is urgently needed. There is more experience of privatisation in industrial countries than in developing countries. Extension administrators in developing countries should make use of this experience in their decisions. But of course, they may also have to consider whether the recommendations of a consultant from an industrial country are really valid in their situation.

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ENDNOTES

- 1 Technologies and practices can also be combined, e.g. with the introduction of a new seed variety which gives an optimal yield when it is sown at a different time than the varieties used in the past (Bennett, 1996).

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