

# World Trend in Agricultural Extension

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## Introduction

Rapid change in a society demands change in agriculture and agricultural extension. This seminar hopes to discuss changes which are desirable and possible. My task is to discuss and present how extension is changing all over the world, a task which is difficult for me because extension is changing rapidly in many different directions. Agricultural extension operated differently in a country 10 years ago (Figure 1). Further variations occur in different regions in the country and for different organisations providing extension. It is quite possible that some participants in this seminar have more up-to-date knowledge than I have.

I will initially discuss changes which are needed in agricultural extension based on an Indian experience. The succeeding discussion will deal with the role of agriculture and rural extension in reducing poverty among farm families. The increasing demand for high value agricultural products offers opportunities for competent small farmers to increase their income, but others will have to combine farm and non-farm sources of livelihood (Figure 2). For different decisions farmers use different sources of information and advice, including ICT. Privatisation of extension has both advantages and disadvantages. Agricultural extension will be most successful with farmers who participated in vocational agricultural education.

## Changes in extension in India

In 1966, 500 million Indians were confronted with the fear of hunger but today, at over one billion Indian population, the country produces surpluses of cereals. This was possible because researchers at the IRRI in the Philippines, the CIMMYT in Mexico and the Indian researchers developed high yielding varieties of cereals and over 100,000 extension agents taught farmers to cultivate these varieties. Extension agent recommended to the farmers which variety to grow and how to grow them. In irrigated areas, farmers expressed gratitude over recommendations, because these increased considerably their yield and income. Farmers in rainfed areas did not get the same increase in yield, but suffered from decreased income instead owing to the increasing costs of inputs.

These rainfed farmers were supported by an NGO (BAIF) and researchers of the Indian Grassland and Fodder Research Institute. The dismal yield of their crops, mainly millets and sorghum, forced them to work in the cities in unskilled low paid jobs. The NGO staff and the researcher taught them to collect the rainwater for growing fruits and other trees and fodder for dairy production which had better market and income prospects. The NGO staff further helped them develop effective ways of marketing their products. They soon stopped working in the cities since they earned better from their own farm. They gratefully acknowledge the assistance of the NGO in achieving better harvest.

It is interesting to note that the regional supervisor of this NGO is better informed than the average staff of a regional agricultural university. His contact with farmers and knowledge about international developments in agricultural extension was leading edge in his rural development endeavors. His work covers 10,000 villages and has started so far with 10 villages. Expanding their work to 1000 villages would have tremendous impact even on the prices of products. Farmers who opt for migration to the cities were discouraged from pursuing their city life dream but to return to their farms. In so doing, extension agents face the challenge of introducing the High Yielding Varieties in the irrigated areas.

The HYV extension system was based on the following assumptions:

- High Yielding Varieties give about 200% higher yields than the traditional varieties.
- Researchers know better than farmers what is the best way to grow these varieties.

These assumptions were applicable 30 years ago in irrigated areas (Lipton, 1989), but are no longer applicable to the present situation of the rainfed farmers because:

- for choosing the optimal farming system one does not only need information from research on production technologies, but also market information including farmer's experience. Market information is especially important near the cities, where there is often a large diversity in niche markets for high value products,
- the choice of the optimal farming system does not only depend on current prices, but also on the expected prices several years forward. The risk caused by this uncertainty is felt more by the farmer rather than the extension agent. Therefore, the extension agent should not give a recommendation, but facilitate the decision making process of the farm family,
- farmers differ in their choice based on their values and situation. One farmer succeeded in breeding cows which gave him a good yield. His neighbour bought animals at low price and fed them well before selling the animals for a higher price after their condition had improved. This requires skill in bargaining. The extension agent assists the farmer in

choosing the best option in such situation. Mountain areas on the other hand, often offers a large diversity in agro-ecological situation and hence in optimal production systems (Inter Academy Council, 2004),

- producing new products profitably requires an efficient marketing system in which farmers have considerable influence. Knowledge from farmers, e.g. on the leadership pattern in their village/region is crucial in developing such a marketing system,
- to collect as much rainwater as possible in the area instead of letting it flow to the ocean (= watershed development), this requires collective decision making. Negotiation about these collective decisions requires a different kind of support from extension agents. The creation and establishment of a successful farmer's organisation for this purpose requires an understanding of the social structure of the village. Here, knowledge from the social sciences can be more useful than knowledge from hydrology.

### Poverty and agricultural extension

The World Bank (2000/2001) estimates that about 75% of poor people, defined as people who have to survive on less than one dollar a day, live in families of farmers and farm labourers. This implies that any program aimed at poverty alleviation has to give considerable attention to agricultural development. Agricultural extension is an important element in such an agricultural development program. Agricultural extension can help to reduce poverty among farm families in four ways.

1. Help farmers increase their yields of crops and animals. This is the main way in which agricultural extension has worked in the past and it can work well if the increased yields can be realised at decreased cost per unit in a limited area and hence does not have much impact on the price of the products. Candler and Kumar (1998) estimated that in India between 1977/78 and 1993/94, milk production increased by 114% and the price farmers earned from cows' milk decreased by 32%. Animal husbandry extension played an important role in this increase in milk production. The increase in production benefited consumers who had to pay less for their milk, but not for the farmers who had to bear the cost of production that keeps on increasing.

In recent decades, the price of computers has decreased a lot, because of the efficiency of the production of hardware and software increased. We see the same phenomenon in agriculture. The FAO (2002:12) estimates that between 1980 and 2000 the world market prices for agricultural commodities decreased by about 50%. Many farmers could

not decrease the production costs accordingly resulting in a decrease in income. This poses as an important cause of poverty among farmers.

2. The increase in prosperity of the consumers results in higher demand for high value agricultural products, especially horticultural and animal products both in the local and global markets. This gives Asian farmers opportunities to increase their income. Competing in the markets for these products requires that farmers have a high level of competence in production technology, knowledge of the quality the market demands and supported by an efficient marketing system. Dutch farmers conquer a large proportion of the world market for cut flowers, owing to the institutional support that makes it possible to meet these conditions. The interest of extension organisations in supporting farmers to profit from these opportunities is increasing, e.g. Sulaiman and Hall (2004), but it requires quite a different kind of competence from the extension staff than the traditional goal of increasing yields. Commercial companies often play an important role in this kind of extension work, because it opens new market opportunities.
3. Increase the proportion that the farmer gets from the sale of his product. The power of farmers and farmer's cooperatives in the market and of farmers organisations regarding political decisions on price policies and WTO Agreements play a significant role. Communication with farmers on these issues is usually not done by the same organisation which gives advice on production technologies, but farmer's organisations and cooperatives.
4. Help farmers increase their labour productivity because the differences between countries in labour productivity in agriculture are more closely related to differences in income per man than differences in land productivity (Irz et al. 2001) and there is large potential to increase labour productivity. The World Bank (2003, Table 3.3) estimates that nearly half of the world population lives in a country where the added value per worker in agriculture is less than 1% of this value in the most productive countries. In 1999-2001, this added value per worker in agriculture was about 25% in Korea. It increased in the last 20 years by 266%, more than in any other country. In a few countries, there was even a decrease in labour productivity.
  - An increase in labour productivity can be realised by an increase in production or by a decrease in the number of people working in agriculture. An increase in production may result in a decrease in the prices of agricultural products, especially when it happens in a large country. Already in 1940, Clark (1957) has shown that the proportion of the labour force which can find employment in agriculture is lower in a rich country than in a poor country. Research and experience has shown that with increasing prosperity, employment opportunities in

agriculture decrease. This causes serious social problems, such as lack of employment opportunities outside agriculture, a rapid growth of cities and of crime in cities, limited support for old age people in rural areas by their relatives, but the experience is that these problems are not always very serious. In the Netherlands, the proportion of the labour force working in agriculture decreased from 19% in 1947 to 4% now and it is expected that it will not take a long time until it reaches 2%. This decrease in employment took place in three ways. Many farm labourers, who were no longer needed on the farm, were dismissed, but usually they could find employment elsewhere in the growing economy. Farm families realised that there would be no future for (all) their children on the farm; therefore trained them for a non-agricultural job. The farmers unions had their own extension service next to the government extension service. This service is tasked to prepare their members for living in a changing environment with less employment in agriculture and therefore stimulated that not too many farm children were trained in a vocational agricultural school. Farmers who had no child to succeed them did not have to make large investments to keep their farm viable; therefore they could continue to live from their farm until retirement. This happened in a period that there was a growth in per capita income of less than 3% a year. In many Asian countries, this growth is now much faster and this may give more serious problems of decreasing agricultural employment than we faced. Also in 1947, the non-agricultural employment in the Netherlands was 80% of the labour force and about 40% in India. This implies a relatively larger need for growth of non-agricultural employment than we had in the Netherlands and in India. A book of a Dutch Chinese-speaking journalist gives vivid descriptions of the social problems rural-urban migration causes in China (van Luyn, 2004). It is very important that we try to find solutions for these problems, a task for Asian rural social scientists and for extension workers.

5. Combine farm and non-farm sources of income. Many farm families are aware of the limited possibilities to increase their income from farming, but they see brighter prospects outside farming. Therefore, some members of their family work in a non-farm job, perhaps in a city, and during a period not busy on the farm. They may also have a small shop, are involved in other kinds of trade, help others build a new house, or process some farm products, etc. (Ellis, 2000). A conclusion of a study on rural poverty reduction of the British Overseas Development Institute is: "It is important to look beyond agricultural extension to a more inclusive livelihood extension" (Farrington et al., 2002). They are right; often it is not possible to find a solution for this problem only in agriculture. There are some NGOs which help farmers through education or otherwise to

develop suitable non-farm sources of income, but most government agricultural extension services look only for income opportunities inside agriculture even if there are better opportunities elsewhere. This may have a bureaucratic reason. Suppose that a staff member of the agricultural extension service sees that the demand for tourism grows more rapidly than demand for food and therefore teaches farmers how they can earn money by providing bed and breakfast or other services for tourists. Then, his boss might get in trouble, because a staff member of the Ministry of Agriculture enters the domain of the Ministry of Tourism. A good cooperation between different government departments can be quite important for alleviating poverty among farm/rural families. However, the wider the area of responsibility of the extension service is, the more difficult it is to employ field level extension agents, who are really competent to cover the whole area.

6. For the development of their farms farmer do not only need financial capital, but also social capital (Dasgupta and Serageldin, 2000, Wu, 2003). It is important to establish relations of trust with others who can support the development process: competent colleagues, traders, government agricultural officers, leaders of various organisations, etc. A farmer, who helps others, can expect that the other will help him/her in return. Common rules, norms and sanctions can support the development process and the necessary commercial transactions. A social climate in which people try to help each other can be favourable for all people involved.

Agricultural extension is crucial for agricultural development, but it will only be successful if other institutions play other roles, which are also essential, such as marketing agricultural products, making supplies and inputs locally available, developing suitable new agricultural technologies, providing production incentives for farmers and transportation. Mosher (1966) discussed this quite clearly in his widely used book "Getting agriculture moving". This does not mean that this kind of coordinated action is always realised. An applied agricultural research station in Africa was able to do research, because of bilateral donations for 15 years. However, this had little impact on the farmers, because the extension service had very serious budget problems. When the bilateral aid for research ended an aid project for extension started, but financial problems in the research institute made it difficult to provide extension with the necessary research backing. Disconnected donor funded development projects can make it difficult to realise the coordinated approach which is needed for successful development.

## Differences among farmers

Farmers differ in many ways and two of these differences are: *differences in expectations for the future* and *in farm size*.

In Western Europe one sees a difference between farmers over 50 years old who see that none of their children is interested to take over the farm and farmers who hope that their farm will remain in the family for a long time. Different generations of their family may have managed this farm for over 100 years. The first group will try to earn a good income on the farm until they retire or die, but they will not make major new investments on the farm to be able to compete with other farmers over a longer period. In the Netherlands 50 years ago a small farmer was a son of a small farmer or a farm labourer, who started farming with a limited amount of capital. Now the farmer who sees that he will not have a successor who will take over the farm would not make any major investment to increase the size of his farm. These farmers are more interested in production technologies which help them increase yields or decrease costs. They prefer to know how to control plant diseases than buy more land or increase their farm size.

Many farmers in the second group realise that their economic and technological environment is changing and that they can only realise their ideals of keeping the farm in the family if they use the opportunities these changes offer and make drastic changes in their farming system. In the face of changing economic situation many farmers opt to stop from farming. Only the best entrepreneurs, who are willing and able to change, can continue in farming. An arable farmer e.g. may get about a quarter of his income from sugar beets and this crop plays an important role in the crop rotation. However, as a result of the economic policy of the European Union the price he gets for this crop is based on a sugar price which is about three times higher than the world market price. An entrepreneur knows that as a result of the WTO Agreement this price will decrease drastically and therefore it may no longer be profitable to grow sugar beets. So he discusses with a consultant who helps him chose alternatives such as (1) is there another crop which would be profitable to grow, (2) can I decrease the cost of production of sugar beets so much that it is still possible to make a profit of this crop, (3) would it be better to stop farming now before I loose a lot of money. It is worth noting that this consultant differ on his capability from the traditional extension agent, who gives good advice about production technologies.

Many Asian farmers have to make similar major changes in their farming system. Around Bangkok many rice farms have been changed into tree nurseries, because it is more profitable to sell trees for the gardens of new urban middle class than to sell rice. Around Hanoi a farmer made a lot of money on a very small farm from growing turtles. To whom can your farmers turn for advise

whether or not it will be wise to switch to these new enterprises and what kind of risks are involved in this change? Often such a change will not only require knowledge about new production technologies, but also about social innovations for the provision of inputs and credit, marketing products, quality and disease control, etc.

Among farmers there is a growing interest in training in entrepreneurship to increase their ability to adjust their farming system to threats and opportunities in their changing environment (e.g. Gielen et al. 2003). Farmers learn from their own experience and from the experience of other entrepreneurs which changes in their farming system are desirable and how these changes can be realised. Creativity is another keyword to this discussion, because it is crucial to find new solutions for new problems. This requires creativity not only among farmers, but also among the partners with whom they cooperate in research, extension, commercial companies and government agencies. In some, not all, Asian universities the students are not stimulated enough to develop their creativity to be well able to play this role.

Often large farmers have more contact with extension agents and adopt technological innovations earlier than small farmers (Rogers, 1983, fig. 7.3). This is partly because they also have a higher level of education. However, there are also studies which show that this is not true for changes in their farming system. In the Netherlands during last century the demand for high value horticultural and animal products has increased a lot as a result increasing prosperity also in neighbouring countries. It has been mainly the small farmers and not the large farmers who grasped these opportunities (van den Ban and Bauwens, 1988). One reason was that it was clear to these small farmers that they could not make a living from agriculture without using these market opportunities, whereas large farmers could. Performing well in the old farming system also helped farmers earn a high status in society, an aspiration that small farmers could not appreciate. The criteria for a high social status did not change immediately when the economic situation changed. Other reasons why small Dutch farmers could not make this change in farming system successfully are:

- the strong cooperative marketing system made it possible for small farmers to buy inputs and to sell their products for about the same price as large farmers,
- the vocational agricultural education system had provided many small farmers with the knowledge they needed to implement this new farming system successfully.

Similar experiences are reported from India (e.g. Rangnekar). The rapid increase in dairy production was partly realised through a change from local to crossbred cows. With their higher production potential these crossbred cows required better feeding and better management than the traditional cows. On a



small farm the management and feeding was usually done by the farmers' wife, but on large farms this was the task of farm labourers. The farm women were much more motivated to feed and manage the cows well than the farm labourers.

In the Indian state of Bihar in the foothills of the Himalaya large social differences between powerful large farmers and poor small farmers and farm labourers occur. Some of the poor people migrated to cities like Delhi. When they came home for holiday they noticed that vegetables were much cheaper in the village than in the city. So they asked their relatives to send them vegetables, which they sell in the city. This created market opportunities for small farmers, who hence became market gardeners. It was no exception that in this way they earned more than the large, high status farmers in the village who continued to concentrate on growing cereals.

A policy in Asian countries aiming at decreasing poverty among small farmers should give much attention to the possibilities for small farmers to increase their income through the production of high value products. For this production they need not only technological knowledge e.g. on animal nutrition, but also insight in the possibilities to realise social innovations e.g. in marketing.

### **Tasks of agricultural extension**

The major task of agricultural extension should be to help farmers make decisions through which they reach their goals. In order to do this a farmer needs:

- a good insight in his own goals, e.g. the relative importance of income, risk, leisure time and social status,
- his present way of farming, his present income and the vulnerability of this income,
- his socio-economic and agro-ecological environment,
- the possible alternative ways of farming and the expected consequences he can expect from each alternative. This will require research findings and experiences from farmers who tried already some of these alternatives,
- knowledge about present and expected changes in consumer demand and markets,
- knowledge about present and expected changes in government policies.

All farmers are aware of these insights and knowledge. They know more about their own situation and experience and those of their colleagues which extension agents do not. In some cases, the opposite could be true where extension agents have better knowledge of the farmers situation which the farmers do not know. There may also be others, e.g. commercial companies, which

have relevant knowledge which neither the farmers or the extension agents have. An important task of extension agents is therefore to initiate a process through which knowledge and insight from different sources are integrated. It can be quite useful if they help farmers ask questions and clarifications about their own goals (=counselling, see van den Ban and Hawkins, 1996). It is usual that people, including farmers, have different goals.

In many countries extension agents are only trained for some specific tasks and not for all of the tasks commensurate with a good extension agent. He may be trained in agricultural production technologies, but not in farm management, marketing, strengthening farmers' organisations, communication, etc. One way to overcome this limitation is to hold in-service training. Another way is to cooperate with other organisations, having staff members with strength and weakness. Staff of a governmental agricultural extension service is usually well trained in production technologies, but is less competent in strengthening farmers' organisations, in contrast with the NGO staff (Farrington, 1997). A good cooperation between them would be in the interest of farmers, but this requires that both organisations are willing to recognise their own strengths and weaknesses.

### **Different decisions farmers have to make**

The kind of support farmers need from agricultural extension depends on the kind of decisions they have to make. In order to be successful a farmer has to make many different decisions:

1. What technological options can be used profitably in his situation and how can these technologies be managed? (plant and animal nutrition, disease control, choice of varieties, etc.)
2. Which investments in the farm will be profitable?
3. How and when to change the farming system? (e.g. from crop production to vegetable production)
4. How to integrate different branches in the farming system? (e.g. crop production and animal production)
5. For which type and quality of products is there a good demand in the market?
6. How, when and where to buy inputs and to sell products?
7. Whether and how to combine farming with other sources of livelihood or to leave agriculture?
8. How to make decisions collectively on resource use, marketing and influencing government policies?
9. Whether or not and how to establish and to participate in farmers' organisations in order to increase the power of farmers in the society?

10. How to transfer the farm to the next generation?
11. How to find quickly the most relevant and reliable knowledge and information?

It will seldom be possible to find one extension agent or even one extension organisation who is capable to support all these decisions. It can be wise for farmers to ask help from different extension organisations for different decisions. Decisions 2, 7 and 10 requires a good knowledge on laws and taxation, whereas other decisions may require information on production technologies.

It is no exception that the most important decisions on a farm are taken by not taking a decision. If the environment changes, the farm may not remain profitable if the farming system does not change, e.g. it may have to adjust to decreasing prices of farm products. The farmer may not see a possibility to adjust his farm to the new situation, in a way which does not have unpleasant consequences. In such a situation the extension agent can help the farmer realise that it is necessary to adjust his farm to the changing environment.

### **Different kinds of knowledge and information**

Investments in knowledge and information often give a higher rate of return for the society than other investments in agricultural development (Ruttan, 2001, Ch. 6). If a farmer gets subsidised fertilisers, he can earn this year a higher income, but next year he will have to buy fertilisers again, whereas knowledge on the optimal use of fertilisers can be used for many years. If he gives the fertilisers to a neighbour he can not use it himself, but if he passes the knowledge he received on to neighbour he can still use it himself. He may even be able to use it better, because in the discussion of this knowledge with a colleague he earns more knowledge about it. Teaching farmers how to learn from experience and stimulating discussions where farmers learn from each other are important roles of extension agents.

The President of the World Bank, Wofensohn, said: "We used to think of capital as the scarce factor in production and of transfer of capital as the key factor in growth. Knowledge is now as, if not more important a factor in development" (FAO/World Bank, 2000). If a banker says to extension people that their knowledge can contribute more to development than his money, it is wise to consider this carefully and to analyse what kind of knowledge can make this contribution.

One makes distinctions between knowledge which is used in different ways (Carney, 1998, Beynon, 1998 and Katz, 2002). Important is the distinction between knowledge as a *public* and a *private* good. A public good is both non-excludable (you cannot exclude anybody from using it) and non-subtractable (its consumption by one person does not diminish its supply to others). This is the case with a

large proportion of the knowledge about agricultural production. A private good is relevant for one person or one organisation, e.g. a business plan. The methodology of developing a business plan, becomes more a public good as the same methodology can be used on different farms.

This distinction influences what kind of knowledge is shared with others under what conditions. If knowledge is made available free to farmers by agricultural research, education and extension, these farmers will often share it with friends and colleagues. This is important for the diffusion of innovations, because farmers will often only take the risk to adopt an innovation, if they have heard from somebody they trust that this innovation works well in a situation similar to their own situation. If they have seen this themselves, this is even more convincing. However, there is not much financial incentive for entrepreneurs to develop knowledge, which is a public good. One can not earn money by selling this knowledge, but developing this knowledge may increase your status in the community.

### **Agricultural Knowledge and Information System**

It will be clear that for decision making in agricultural development many different kinds of knowledge and information have to be developed, stored, retrieved and shared with other people and organisations. In recent years many studies have analysed how this Agricultural Knowledge and Information System (=AKIS) works in different countries or for different groups of farmers (Leeuwis with van den Ban, 2004). This makes it possible to discover where there are gaps in knowledge, bottlenecks in sharing knowledge among farmers and between farmers, extension agents and others, who influences what kind of knowledge is developed and how they are rewarded for performing this role, etc. This kind of information is useful for improving the effectiveness of the AKIS. A general conclusion from these studies is that in an effective AKIS farmers have considerable influence on the kind of research which is done and on which other kind of knowledge is developed elsewhere and can ensure that relevant and reliable new knowledge reaches them rapidly.

In many countries a difficulty in building an effective AKIS is the reward system for agricultural researchers. They are often rewarded for contributing to the development of theory in their discipline, but not for problem solving research (Caldwell, 2004). The publication of their articles in international journals in their discipline may increase the probability that they get a promotion. Research which contributes to solving an important problem of farmers usually has to integrate knowledge from different disciplines, especially biological and technical disciplines and social sciences. A few years ago I saw on a fruit market near China Agricultural University in Beijing apples which looked nice and tasted well. So I asked whether they export these apples to Japan. The answer was: "No, because Japan has very strict standards for pollution by chemicals on food and we can

not meet these standards". Developing a control system for chemical pollution requires a different kind of competence than studying the cause of a fungus disease, but it may give less rewards to a scientist.

In problem solving, it is essential that researchers are willing to learn from farmers and know which problems are important to them and assess as well the advantages and disadvantages of the different solutions for these problems. Researchers need to spend time in listening to farmers. Van Schoubroek (1999) studied an insect infesting oranges in Bhutan and developed together with the farmers a biological control method. As an entomologist he had knowledge about the life cycle of insects which the farmers did not have. However, these insects crossed the borders between the land of different farmers. So the control method required collective action from all the farmers in the village. The farmers had much better ideas how this collective action could be organised than the entomologist. This study resulted in a Ph.D. thesis which was jointly supervised by the professor in entomology and the professor in extension education. Not all AKIS could come up with an interdisciplinary research.

Some agricultural knowledge can only be developed by researchers such as the development on biotechnology of new plant varieties resistant to an important disease. Or they may discover that the soil in a particular field is short of a trace element and it is possible to double crop yield by using a fertiliser containing the said trace element. In many cases, however, research can only provide enough knowledge to increase the profitability of the farm. Other knowledge can be extracted from the experiences of successful farmers. It may be profitable to switch from cereal production to horticultural crops. Researchers or extension agents may know more about crop cultivation than the local farmers. These new crops will usually also require more labour at different times of the year, more capital and may involve more risks. These management problems can better be learned from the experience on a commercial farm than from research on a government-owned experiment station.

This kind of change in the farming system requires changes in the input supply and marketing system. Commercial companies may be willing to solve this problem, but in a way which is profitable for them but not necessarily profitable for the farmers. If farmers themselves are involved in developing this new marketing system, e.g. through a cooperative, the system evolved maybe better for these farmers. This can only be done successfully by farmers' groups with competent, honest and reliable leaders. Farmers will usually be better able to find such leaders than government officers.

For realising innovation in agriculture often partnerships are required between different actors in agricultural development (Hall et al., eds., 2004). Researchers, extensionists, and commercial companies can provide inputs and credit at the local level and on marketing the products. The government may also have to change price policies and regulations and ensure that these regulations are

implemented. Many researchers are not trained in developing these kinds of partnerships and/or not rewarded for spending time on these kind of activities. Their reward may come in the form of a travel budget to an international conference where they can present their research findings but not interaction with extension agents or farmers who have valuable ideas on the development and implementation of problem solutions. Here again learning from field experience is crucial.

### **Different sources of information and advice**

Farmers get information and advice from many different sources. Often, institutions also invest in giving information and advice.

1. Government extension service is the major source of information and advice for farmers in many countries during most of the last century. Governments saw this as a way to increase efficiency of agricultural production, stimulate economic growth in the country and decrease poverty among farm families. More recently another reason was to inform the population about government policies on agriculture and the environment and explain why the government introduced these policies hoping that many farmers would follow the new regulations voluntarily. Government policies should be in the interest of the population as a whole and not only in the interest of the farmers. Many farmers felt that these policies were against their interests and extension agents who had to promote these government policies, lost the trust of farmers.
2. Success in farming requires competent farmers and farm workers. This implies that they need to continue learning even after they have left the vocational agricultural school. Adult education in agriculture is necessary to teach not only youngsters, but to offer also courses on new developments for people working already in agriculture. Cooperation of agricultural extension services, research institutes and farmers' associations may also be enlisted for this purpose.
3. In order to serve the interests of members many farmers' associations also offer extension advice. Denmark has successfully done this for more than 100 years. The extension service may specialise in certain kinds of advice. In the Netherlands farmers' associations had offices which keep accounts for farmers, mainly for tax purposes. Some extension service gives advice in how to keep and analyse accounts. They will also give useful advice on the transfer of the farm to the next generation, an issue which can cause serious conflicts within the family.
4. Study clubs can be an effective way for farmers to share knowledge and to learn from each other's experience. In these clubs 10 or 20 farmers come together regularly to visit the farm of one of their members and to

discuss the production technologies he uses and observe the results obtained (Oerlemans et al. 1997, Gielen et al., 2003). Extension agents often like to participate in the discussion of these study clubs, because they can reach in this way a larger number of farmers than through individual farm visits.

5. Consultants, who are paid by the farmer per hour or per service rendered. The consultant provides specialised knowledge for a decision made or service rendered such as developing a business plan or the designing of new farm buildings. He may also observe and check regularly the growth of plants or animals grow and make interventions or recommendations when something goes wrong. Fortnightly checking on sight and knowledge of pests and diseases are necessary for the consultant to decide how they can be controlled.
6. Companies selling inputs or marketing products often employ not only salesmen, but also advisers. A dissatisfied farmer using the right pesticide the wrong way may not get good results and discourage or influence others from using the said product. Satisfied customers are the best salesmen. A marketing company can command good price for a product, if it can guarantee that it is of good quality. The company therefore, sees to it that the farmer uses the best production techniques and do not pollute their product with chemicals. The farmer pays for the costs of this advice and the products, but he may not realise this. Many Dutch farmers rely on the advice of company personnel concerning production technologies. This advice from a commercial company can work well in situations where the interest of the company and the farmer coincide. Preventing poultry diseases is the primary interest of the farmer as well as the feed company, but a pesticide company is not interested to teach farmers that they can reduce the use of pesticides through IPM without decreasing their yields. Clearly some companies try to make a profit by withholding relevant information advantageous to the farmers so that the latter will depend primarily on their product.
7. Farmers usually get the first information about agricultural innovations from the farm papers. These papers may be sold to subscribers, but they may also be published by a farmers' association for all their members or by a commercial company for their customers.
8. In many developing countries the role of Non-Governmental Organisations (NGOs) is growing rapidly. There are many different kinds of NGOs. Most are financed by donations from private people or commercial companies, others by churches or by national or foreign governments. Governments see this as a way to work around ineffective government bureaucracies. Most of the staff members of government extension services are trained in agriculture or animal husbandry, but staff members

of NGOs are often social scientists who are motivated to help decrease the poverty in rural areas. Reducing poverty requires motivation, understanding social systems and technical competence. NGOs may lack competence but are highly motivated and knowledgeable of social systems. On the other hand, staff of government agencies fell short in motivation and understanding of social systems but they are usually better technically equipped than the NGOs.

9. The Internet also provide farmers selective information the latter needs. The information is usually crop or animalspecific but its information is usually more up-to-date. The farmer or the extension agent can also consult a data base on the Net.
10. Successful colleagues are a very important sources of information for farmers especially those who work under similar agro-ecological and socio-economic conditions. Scientists may know a lot about a specialised field of research, but a farmer needs a holistic view of the problems and opportunities for his farm. In this regard the experience of his colleagues is very useful. In many countries farmers fail to harness the knowledge of fellow farmers and their family members for resource development. Many farmers maybe more intelligent than researchers. Their own experience of experimentation can play a large role in developing location-specific knowledge which other farmers need.

A good farmer will try to find the combination of information that best solve a particular problem. His own experience will also play a large role in this process. We now move from a government extension service to a pluralistic system where many different agencies provide different kinds of information and advice.

### **Information and communication technology**

In the last decade the costs of computers and of telephone calls have decreased rapidly (World Bank, 1998/99)but the costs of labour increased in Asian countries. Extension organisations should try to replace labour by Information and Communication Technologies (ICT). The use of ICT in extension is possible and desirable, although some people are better able to handle a computer than others particularly the younger generation.

In designing applications of the Internet in agricultural extension one has to be clear who will use it and for which purpose (See Leeuwis, 2004: 206). The Internet can be used to support decisions by extension agents and by farmers by providing them with a database. An extension agent, who gives good advise on plant protection will gain the confidence of his farmers, but he may not be able to recognise all plant diseases in all crops grown in his area and he may not know which control method can be used for a particular disease. It is possible to provide him access to a data base, where he can find up-to-date information on topics of need. This can prevent unsolicited and wrong advice.



Before deciding which rice variety to grow a farmer can check a data base with information on the characteristics of all available varieties. This data base is updated by the rice research institute which tries to provide reliable information, or by a plant breeder, who uses the database to advertise his varieties. A farmer may sell his products in different markets. It is important for him to know which market fetches the best price. Up-to-date information on these prices can be provided on the Internet on condition that there is an agency which invests in keeping reliable price records.

ITC makes it also possible to give a tailor made advice. If a strong cow gets more concentrates than she needs this feed is wasted. Cows that do not get the feeds they need will produce less milk. Therefore it is desirable to give each cow the optimal level of concentrates. In order to do this many Dutch cows carry a radio which connects them with a computer and with the feeding trough. The computer contains information on the milk production of each cow in the herd, the quality of the silage to which all cows have free access, the quality of the concentrates of which each cow gets the correct ration and a computer model which calculates what is this correct quantity. When a cow approaches the feeding trough the radio send the message: "I am Beatrix 57; I give my boss each day 25 litre milk, therefore I am entitled to 11 kg of concentrates a day. Today I got only 3 kg; please, give me some more." Before leaving she says: "Thank you, I got 4 more kg; For the rest I come back later". This information is recorded much more accurately in the computer than relying plainly on brainpower of the farmer. The task of an extension agent is to teach the farmer which information he should feed in the computer and to compare the results with his own observations in order to check whether the right model is used. If the cow produces less milk than was predicted, this is a warning that something is wrong. It is the task of the farmer to discover what caused the problem. This warning is similar to a thermometer that indicates the absence or presence of fever. Similar simulation models can be used for creating optimal models of plant growth. They work well if the farmer is confident that this model represents the reality on his farm.

A good farmer learns a lot from his experience. This learning can be enhanced by memory and feedback systems, which register the conditions under which plant or animals grow and how well they grow. This helps farmers to discover the optimal conditions for growth.

Not all farmers have access to the Internet particularly in poor countries with many illiterates. Many Indians do not have access to a telephone, but a neighbour who owns a telephone booth can allow them to make a call for a fee. The same idea is now used by Internet booth (=kiosk) which are often operated by unemployed agricultural graduates. They can ask for subsidy from the government for the investments in the equipment and connections needed for the Internet. Training courses can be offered to teach them how to operate an IT kiosk. Farmers have a lot of interest in information about markets, weather forecasts and

connection with business men, government offices or relatives in the city. The people who operate an Internet kiosk may also earn money by providing their customers with the inputs they need, by helping them market their products or by providing private extension services. To be successful as an IT kiosk manager one has to be an entrepreneur, who looks continuously for new opportunities to earn money. Information on this approach is found in a journal on information for development: IT4Development.

Thousands of these IT kiosks are found in Indian villages, but its use is hardly evaluated for their impact. Meera et al. (2004) found that these IT kiosks are much more used by males than by females, but also by many poor males. Most of the users were rather young and had a relatively high level of education, although some were illiterates. There is considerable discussion that the Internet may increase the gap in the level of income and access to technology between rich and poor countries and between rich and poor farmers within a country. People also argue that providing information by the Internet is so much cheaper than doing this in any other way.

What can be the role of extension agents to help farmers make effective use of the Internet and computers? The Internet offers a large information overload. The farmer gets overwhelmed where to get his information relevant for his problem. Teaching search strategies is important, but these strategies can only be successful if the farmer knows what his problems are. This may require help through counselling.

Some of the information on the Net is very valuable, but some information only intend to fool by drawing the conclusions that the author does not know. Learning to evaluate which information is reliable is quite important.

Problem solving necessitates the integration of information from different disciplines, different actors and the farmer's own experience. It is also necessary to integrate information from different sources on the Internet. This may be difficult because of the difference in language that the actors use and the differences in their goals. It becomes easier if one could use a blue print process for problem solving where one decides in advance how to tackle the problem solving process. However, this is usually not possible, but one has to use an interactive process in which one learns from the experience gained during the process.

The use of the Internet for agricultural development is certainly an area where we have to learn from experience. A first attempt will certainly not be optimal, but experience can teach us how the Internet can be used effectively for different target groups and different purposes. Evaluation research can help us learn more rapidly, especially if the results of this research become freely available.

## Vocational agricultural education

The ability of a country to compete in the field of agriculture with other countries depends to a large extent on the competencies of its farmers. This was the reason why in Europe schools and courses for farming was started some 125 years ago. Most European farmers have followed this kind of vocational agricultural education with 80% in the Netherlands alone. Agriculture is changing rapidly that it has to be followed by permanent education. A farmer may have to study at age 50 a course on the use of computers for farm management decisions, because this was not taught when he was in agricultural school. This gives farmers the basic knowledge where extension can be based. These farmers are usually well educated who take advantage of agricultural extension. Most vocational agricultural schools not only train their students to become farmers, but they prepare them also for jobs in the whole agri-food complex, including agri-business companies and government agencies dealing with land management and food safety. The schools emphasize teaching students to learn rather than memorizing content which will be outdated long before their students retire.

Some Asian countries also apply this kind of education. In the Philippines, it is not surprising to find young lady farmers having undergone two-year agricultural education after high school. In India where most farm women are illiterate, you can not expect such an encounter. This makes it easier for traders to cheat Indian farmers than Filipino farmers. India has many agricultural universities which train people for a Baccalaureate degree to qualify for a government job that is only available for about 20% of them. I am convinced that the country would be better off if less money is invested on agricultural universities and more in vocational agricultural schools and courses. Attempt to solve this problem was done by establishing a Farm Science Centre (KVK) in each district of about 200 000 farm families where about 8 scientists give short courses for a few days to farmers, farm women and farm youth. However, this system proved too expensive to reach a large proportion of the farm families. At the rate the KVKs are doing their jobs and if farm families would not change, it would take some 300 years until one member of each family had followed such a short course (van den Ban et al., 2002).

The reason why we could reach in the Netherlands a much larger proportion of the farmers, is that we had a much cheaper system of education. Sixty years ago young men intending to become a farmer visited often the lower agricultural school after primary school. This meant 3 days a week in school during the first year than 1 day a week for 3 years. The rest of the days the boy works and learns from on his father's farm. Such a school only needs one teacher and one classroom. Now, agricultural schooling has become more complicated, most of these kind of youngsters attend vocational agricultural school for 2 to 4 years.

Before the privatisation of agricultural extension the budget of European governments for vocational agricultural education was higher than that for agricultural extension, in contrast to the World Bank's preference for spending money more on extension than on agricultural education. Personal conviction dictates that this is not the most effective way to support agricultural development, although it is clear that extension gives rapid return on investment than education.

In recent years much attention has been given to Farmer Field Schools aimed at helping farmers achieve better profitability in rice cultivation by using Integrated Pest Management. In these schools farmers visit a rice field once a week during the growing season and study the rice pests and diseases in this field. These observations help them assess how they can influence the incidence of these pests and how pesticides may increase this incidence by killing the enemies of these pests (Scarborough et al., 1997). The experience is that farmers look holistically at the growth of the rice crop and may also discover other ways to improve rice production, e.g. better irrigation or use of fertilisers (van de Fliert, 1993). Many people are convinced that these schools are very effective and therefore they have been used on a large scale in South and Southeast Asia, but a World Bank evaluation study in Indonesia failed to find evidence that they resulted in an increase in rice yields or a decrease in the use of pesticides (Feder et al., 2003). Possibly the difficulty in the implementation of the program on a large scale was the reason behind since this was proven effective in a pilot scale. The budget was not always released in time and it was difficult to find high quality field training organisers for tens of thousands of villages. Donors often do not take the time to determine which is needed to introduce the new extension and education scheme.

### **Privatisation of extension**

This section discusses briefly why many government extension services have been privatised and the consequences of such move.

Some reasons to privatise government extension services are:

1. Many governments had serious budget problems and had to find a way to reduce their expenditures. This could be done by downsizing or privatising the large agricultural extension service.
2. Many extension services were not very successful in providing farmers with the information they need to be able to make good decisions. A government officer will continue to earn a salary whether he provides farmers with useful information or not, whereas farmers are only willing to pay a consultancy fee to consultants, who help them increase their income.

3. Much pressure towards privatisation was exerted by economists of the World Bank and the International Monetary Fund, who do not know how extension works in the field. They often do not realise that giving good advice to one farmer influences other farmers and that it is not mainly the consumers and farmers who profit from good agricultural research and extension which results in higher agricultural production and, hence, lower food prices.
4. In many countries Ministers of Finance had to pay large amounts of money to get rid of the agricultural surpluses, which were produced as a result of the farm subsidies. They fail to see the reason of paying also for extension service which increased the size of these surpluses.
5. Farms became more and more specialised and as a result extension became more a private and less a public good.

Some of the consequences of privatisation experienced are:

1. It influenced the flow of information:
  - government extension agents who discover an effective extension method proudly banners his discovery to his colleagues but a consulting firm hides its trade secrets with its competitors.
  - farmers who get free information from their extension agent, willingly share this information with other farmers to increase their social status, but became cautious with sharing their knowledge when they had to pay the consultant and other farmers tried to get this information for free from them.
  - a major role of the government extension service is to learn from the experience of the best farmers and to extend to other farmers, but former are usually not willing to spend time and effort for free to teach the extension agent nor other farmers.
  - research institutes are willing to share their information or research findings with the extension service to benefit more farmers. The extension service provides these institutes with information needed for planning a research programme. Research institutes with budget problems are cautious in giving free information to consulting firms for fear these firms will sell this information to farmers. Researchers also find it difficult to establish effective communication system with a number of competing consulting firms.
2. A government extension service has a wide range of selecting methods, but a consulting firm normally selects the communication method through which it can make most profit. Demonstration is an effective extension method but consulting firms will not use this method, unless it can charge money from farmers.

3. Farmers who are not able or willing to pay the consultancy fee are not supported by extension, which makes it difficult for them to compete in the market.

In an important paper Rivera and Alex (2004) state that governments need extension for:

- implementation of public policies. Many rural development policies can not be implemented unless farmers know these policies and understand why the government has chosen these policies. The implementation of these policies often requires the education and mobilisation of rural people. Poverty alleviation is a clear example.
- designing effective policies needs information on the socio-economic situation of rural people and knowledge why they behave in a certain way. Feedback on the reaction of the people on these policies is also needed to ensure that the goals of these policies are realised. Who can provide this information, if there are no staff members of the government extension service in the villages?
- dealing with emerging concerns, such as pollution problems and HIV/AIDS. Export markets may be lost, if some farmers sell polluted products,
- responding to emergencies such as the mad cows disease and floods.

Effective extension by NGOs and private companies may also require support by the government. The government may e.g. be better able to develop effective staff training programmes than many small organisations. The role of the government is to ensure that to validate the information these organisations give.

In choosing between a government and a privatised agricultural extension service, one should consider carefully which advantages and which disadvantages one can expect from each system in the given situation. In my opinion World Bank publications often do not give enough attention to the disadvantages (van den Ban, 2000). We are moving towards a plural extension system in which different extension organisations play different roles. Some of these roles may be performed by a privatised extension service or an NGO. The government can fund the extension service which employs civil servants, but also the extension work from private companies or NGOs, if they believe that these organisations work more efficient than a government bureaucracy (Chapman and Trip, 2003). This requires that clear targets can be formulated which the extension service has to realise. It is difficult to formulate these targets e.g. for increasing the awareness of the farmers of the need to adjust their farming system at the changing society or for teaching farmers how to learn from their own experience and from that of their colleagues. Another possibility

is for the government to give vouchers to farmers, for payment of the extension service.

## Overview of trends in extension

Sulaiman and Hall (2004) gave useful overview of trends in agricultural extension.

In form and content they see a change from

- Technology dissemination to supporting rural livelihood
- Improving farm productivity to improving farm and non-farm income
- Forming farmers groups to building independent farmer-operated organisations
- Providing services to enabling farmers to access services from other agencies
- Market information to market development
- Monitoring and evaluation changes from measuring input and output targets to promoting learning from experience.
- Planning and implementation strategy changes from doing it alone to partnerships with other organisations.
- Sources of innovation in extension changes from centrally-generated to evolve through local experimentation.
- Fixed and uniform approaches to becoming diverse and evolving.
- Introduction of new working practices by staff training to action learning by changing the organisational culture.
- The underpinning paradigm was transfer of technology but changes in innovation system.

Major changes had occurred in the way agricultural extension is operating. It become much less the bosses who decide what the extension service will do and how it will do this and much more the field staff who learn from experience how they can work in their situation most effectively. The task of the bosses becomes more to facilitating this learning process and the process of decision making regarding the goals of the organisation. One reason to realise these changes in agricultural extension is that one has got a different view of the role of farmers. They will not follow obediently the recommendations of scientists and extension agents, but make up their own mind to decide what is the best way to manage their farm in a way which is adjusted to their local situation, their resources and their goals. For this purpose they will use all available sources of information and not only information from extension.

## Concluding remark

You probably know that in recent years a lot of attention has been given to the role of extension in developing sustainable agriculture and to the role of gender in agricultural development, e.g. Röling and Wagemakers, 1998 and Saito and Spurling, 1992. Not much attention had been discussed in this paper but such are important issues in agricultural extension.

From:	To:
supporting individual decision making	also collective decision making
technology dissemination	supporting rural livelihood
improving farm productivity	improving farm and non-farm income
adjusting farmers to their political environment	helping farmers to influence their environment through organizations
disseminating knowledge from research	utilizing all sources of knowledge including market information and farmer's experience
uniform extension programme	extension programme adjusted to local situation and farmer's needs
government extension service	multiform extension system

Fig 1. Focus of change in agricultural extension.

Country	Added value	% change
Korea, Republic	13782	266
China	334	107
India	402	49
Philippines	1428	3
France	58177	201
USA	50777	146
Kenya	216	-18

Fig 2. Value for 1999-2001 in dollar (\$) and the change in this value in the last 20 years.



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