

Supporting Farmers, Decision Making Processes by Agricultural Extension

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1. Introduction

A major role of agricultural extension is to help farmers to make decision through which they can realise their own goals as well as possible (van den Ban and Hawkins, 1996). Farm families have to make a number of different types of decisions, because they face different kinds of problems. Each type requires its own kind of support from agricultural extension. If the environment of the farm changes in such a way that different types of decisions become more important, experience shows that extension agents often interact with the farmers in a way which was desirable for the decision they had to make in the past, but which is not the best way to support the decision making processes in which their farmers are involved at present. For instance, around 1950 extension agents in the Netherlands played a useful role in helping their farmers to take better decision on the optimal use of fertilisers for their crops, of concentrates for cattle feed, and on plant protection measures. Usually, for these decisions, the agents could give a recipe based on research findings. Then wages started to increase rapidly and decisions to increase labour productivity by investments or specialisation became more important. The extension agents could not tell the farmer whether it would be best to specialise in pig production or in vegetable production, because they did not know how prices would change in the next decade and in which enterprise this farmer would best be able to compete with other farmers. Instead they could help the farmer to arrive at a choice himself by thinking in a systematic way about this decision. However, many extension agents continued to give a recipe based on what they would have done themselves, if they were in this farmer's shoes.

Also in other countries it has been observed that if the type of decisions on which extension agents give advice changes, their relationships with the farmers do not change accordingly. To help

extension agents and organisations to overcome this problem, this article discusses types of decisions farmers have to make and the kind of help extension agents can give to enable the farmer to make an intelligent choice. Unfortunately, our knowledge of the kinds of support by extension which is needed for the different types of decisions farmers have to make is still limited, but through the analysis in this article a more systematic discussion of this question may be possible.

On a farm, some of the decisions are taken by the male head of the family, but others are taken by his wife or children or are collective decisions in which several family members are involved. For the readability of this article, decision made by farmers are discussed, but the reader will have to take into account that other family members are often involved in making these decisions or that some decisions may not be taken by the husband, who may have a job outside agriculture, but by his wife, who runs (parts of) the farm. Similarly, extension agents can be males and females.

2. Types of decisions.

An important decision farmers have to make is:

- a. the **adoption of more productive technologies**: seeds, fertilisers, agrochemicals, mechanisation, etc. These technologies may have been developed at (government) research institutes or by private companies selling inputs to farmers, which incorporate new knowledge. Some technologies are developed by innovative farmers. Decision whether or not it is profitable to adopt a new technology usually requires farm specific information. For fertilisers, this may be based on a soil test, but information from neighbouring farmers on the results of this technology in this situation is often very helpful.

Discussion of agricultural extension are often based on the assumption that it is the role of the extension agent to help farmers to make decisions on the adoption of new technologies. However, farmers do also make quite different decisions, which are at least as important for their success in farming. Extension managers should decide whether it is the role of their organisation to help farmers with all these decisions and if so what is the best way to do so. Other decisions farmers have to make include:

- b. **management of these technologies**, e.g. application of chemicals at the right time and under good weather conditions. This type of decision is more at the operational level than the tactical decisions of type 'a'. Often this requires the ability of the farmer to observe how his crops or animals grow. An important reason for the success of the Indonesian Farmer's Field Schools is that they help to increase this ability (Roling and van de Fliert, 1998). This type of decision is more or less the same as what Bennett (1990) called "practise".
- c. **combining the available resources in an optimal way**, e.g. choosing the most profitable level of mechanisation. A major objective of courses on farm management is to teach farmers to make these kinds of decisions in such a way that their goals are more likely to be attained.
- d. **human resource management**. Selecting the right kind of people to work on the farm and motivating them to work effectively. Increasingly it becomes important that all people working on a farm not only use their muscles, but also their brains.
- e. in courses on agricultural economics one learns that a farmer has to decide how to combine his resources in land, labour and capital in optimal way. Now we realise that **knowledge and information** are often more important resources (World Bank, 1998). A part of this knowledge and information comes from making observations and collecting data on production processes on the farm. So the farmer has to decide which records to keep of the performance of the farm and how to use these records for this decision making. Through the development of Information and Communication Technologies the possibilities in this field increase rapidly. Another part of his knowledge and information the farmer obtains from outside the farm: from research, experiences of his colleagues, markets and government policies. What is the best way to collect and evaluate this knowledge and information and to integrate information from different sources into his decision making process? What to do with conflicting information? How much time and money should the farmer invest in this process? With the development of Internet and similar information systems lack of information is less the problem as it was in the past. Now the problem becomes finding the most relevant information in the overload of information available, evaluating this information

(which might be incorrect), and integrating information from different sources.

f. at the strategic level the farmer has to decide about **changes of his farming system**, e.g.,

- switching to the production of crops with a higher value,
- switching from crop to animal production,
- specialisation in certain crops or animals.
- switching to ecological agriculture,
- switching from subsistence to commercial farming.

It is hardly possible to test these changes in a research institute. Most of the information on the consequences of these changes comes from the experience of innovative farmers.

g. on a family farm the **relations between the farm and the family** may require hard decisions, such as how much to consume, to invest or to save; which children to educate to take over the farm; how to divide the inheritance; and which members of the family will work part-time or full-time outside the farm?

h. **legal and fiscal issues and the use of subsidies** are of increasing importance in many countries. Laws on land tenure and trade have been important for a long time, But in recent years environmental laws became quite important for decisions on many farms, as are various subsidy schemes.

i. The possibilities to manage a farm successfully depends to a large extent on its environment, but this **environment** is changing. These **changes** include:

- improvement in the supply of inputs and credit,
- better marketing and/or processing of products,
- increasing the proportion of what the farmer gets from what the consumer pays for agricultural products,
- improvement in transportation, drainage and irrigation,
- changes in agricultural policies of the government,

- establishment of farmers' unions and cooperatives which try to influence these changes.
- establishment of study clubs through which farmers learn collectively from their experience and from outside information sources.

The farmer can decide to adjust his farm to these changes in the environment and/or try to influence these changes in a direction which is more favorable for him, usually through his farmers' organisation. In the past, we have thought of the role of extension as supporting decision making by individual farmers, but this kind of collective decision making becomes of increasing importance for agricultural development and for the welfare of the farmers.

Hoffmann (1992) argued that an extension organisation should concentrate its limited resources on those decisions which are most important for the welfare of the farm family in the future. From this point of view, the choice of the occupation of the farmer's son will usually be more important than the decision of how much potash to give to a crop. In many countries, however, it is easier for a farmer to get advice on the use of fertilisers than on occupational choice.

One can classify the decisions farmers have to make in a different way than is done here (see e.g., Beers, Huirne and Pruis, 1996 and Engel, 1997, p. 51). The important point is that farmers face problems which require quite different types of decisions. Extension managers will have to decide on which type their organisation will focus its efforts to help farmers to make better decision and what kind of help farmers require for decisions of this nature.

3. Kinds of support by extension

The types of decisions mentioned in Section 2 differ in the **information sources** which offer relevant information for the decision making process. The major sources are:

- agricultural research findings,
- observations and experiences on this farm,
- experiences of colleagues,
- markets,
- government policies.

Especially for these last two points, the farmer should not only know the present situation, but also estimate which changes can be expected in the future. It is difficult to make accurate predictions of changes, but in the Netherlands farmers who realised at an early stage that with increasing prosperity the demand for animal and horticultural products would increase, have earned much more than those who continued with crop production (van den Ban and Bauwens, 1988).

One often assumes that extension should give information based on research findings. For many of the decisions farmers have to make, information from other sources, is however, more important. For instance, farm income depends a lot on investment decisions (c) and on decisions regarding the choice of the farming system (f) for which market information is crucial.

More and more we realise that an important role of the extension agent can be to help farmers to learn from their own experience (Rolling and Pretty, 1997 and Veldhuizen, Waters-Bayer and de Zeeuw, 1997). For realising a sustainable agriculture, it is for instance important that farmers learn how they can influence biological systems.

It is possible that all the information which is needed for a decision can come from one source. On the adoption of a new technology perhaps all information which is needed may come from the researcher who developed the technology. However, for most decisions the farmer will have to integrate information he has received from different sources. This information may be conflicting. The researcher may say, e.g., that his experiments show that a new technology gives a 25% increase in yield, whereas the experience of farmers who tried this technology is that under field conditions the increase in yield is much lower.

To be able to make good decisions, farmers need information which comes from different sources. They may also need help to intergrate this information, especially when it is conflicting. A problem is that government extension may not be quite competent to provide and not evaluate information on factors influencing market prices, such as quality requirements.

The extension agent can give the farmer a **recommendation** regarding which decision to make or he can **guide him with the decision making process**. This guidance can include:

- help to recognize a problem at an early stage.
- assistance in deciding which observations to make or which data to collect on the production process in order to diagnose the problem correctly,
- assistance in how to analyse these data,
- help to analyse which alternatives are available to solve the problem and to predict the consequences of each alternative,
- help to use simulation models,
- help the farmer to become aware of the role values, emotions and group norms play in the decision making process, often through counselling,
- help the farmer to prioritise his goals; this is necessary when it is impossible to take a decision through which all his goals are realised,
- help a (group of) farmer(s) to become aware of the social consequences they can expect of their decision, e.g. a change in social status,
- help the farm family to make a decision to which all members contribute according to their capabilities and which is accepted by all members as the best decision possible,
- help the farmer to make full use of the capabilities of his employees to contribute to the decision making process and to increase their motivation to implement the decisions.

In the way mentioned above, the extension agent can help the farmer to make one difficult or important decision, but his aim can also be to increase the decision making capability of the farmer through on the job training by making the decision in a systematic way. Often the farmer will not need help with all of these aspects of his decision making process, but only with one or a few of them. It is also possible that the extension agent is only able to provide help with some of these aspects and not with others. A technically trained agent may well be able to discuss with the farmer alternative solutions and their consequences, but not to help the farmer to prioritise his goals through counselling.

This last point is related to question whether or not it is desirable to give the farmer **directive advice**, i.e, a recommendation how to solve his problem (van den Ban,1988). This discussion will have made clear that the idea that it is the role of the extension agent to give recommendations to his farmers is not correct for many of the types of decisions they have to make. For some types of decisions, it is desirable that all farmers make the same choice, e.g. on the timing of disease control measures. However, which choice helps a farmer most to realise his goals often depends on his access to land, capital and other resources, his capabilities and his goals. It is more an exception than a rule that it is desirable that extension agents give a standard recommendation to all their farmers, although we often see that this is done. One reason is that agronomic research may have shown which technology gives the highest yield per ha or per animal, so it is recommended. However, for the farmer the highest yield per dollar invested or per man day during a busy period is often more important, but agricultural research may not be able to provide this information.

The types of decisions will also differ on the possibility to give a reliable **prediction of the consequences** of different alternatives. It may be easier to predict how much labour a new machine will save than what the costs of the labour will be five years from now. The farmer expects his extension agent to decrease the uncertainty of the information on which he bases his decisions, but the agent may be able to do this only to a limited extent.

The role **values** play differs according to the type of decision. For instance, a change in farming system from cereal to vegetable production may be expected to result in a higher average income, but also in more risk and it will require more work. The values of the farmer and not those of the extension agent determine whether such a change is desirable. For a decision to use pesticides at the moment they have the most effect, values are of hardly any importance, but for decisions on the relationship between the farm and the family values are quite important. The farmer may need help to realise what his values are and not set priorities among conflicting values.

In the past, extension has mainly supported decision making by individual farmers, but in the present era **collective decision** through which farmers try to influence their environment (type i) are at least as important. Supporting these decisions may require quite a different kind

of competence from the extension agents, as Diagne and Pesche (1995) have shown, for supporting farmers to establish farmers' organisation. A difficulty in collective decision making is often to reconcile conflicts of interests between different groups of farmers and/or farmers and other citizens.

Groot (1997) made a useful distinction between three extension models:

- the **transfer of technology model**, where the extension service assumes that it knows which changes in technology help farmers to realise their goals better. This assumption is sometimes correct, but the model has also been used frequently in situations where it is not correct. One difficulty with this model is that it often does not take into account the existing difference between farms and farmers. A result is that technologies which are suitable for some farms and/or some farmers are recommended to all farms or farmers (van den Ban and Mkwawa, 1997).
- the **advisory model** in which extension agent and farmer cooperate to find together the best solution for the problem of this farmer and/or to find and process the relevant information. This can be at the same time a way to increase the problem solving ability of this farmer.
- the **facilitation of learning model** in which the farmer gets help to learn more effectively from his own experience and from those of his colleagues, e.g. in a study club where the members observe the growth of the crops of all members and analyse how this growth is influenced by cultivation practices.

One cannot say that one of these models is in all situations superior to the other models. If the farmer learns how to make good decisions without the help of an extension agent, a change is realised which may have a long term impact on improving the management of his farm. However, it is not realistic to expect that this can be realised for all problems on the farm. The rapid development of biotechnology and information and communication technology are likely to offer new opportunities to solve farmers' problems, which cannot be realised without expert advice.

4. Need for further research.

There is a serious lack of systematic thinking regarding which kind of extension support is needed for each type of decisions. The following is an analysis of which kind of support is needed for some types of decisions. Hopefully, this will stimulate others to improve my analysis and/or to make such an analysis for other types of decisions.

Let me illustrate what should be done by discussing the support on decisions for heat detection in cows. Cows only give milk after they have had a calf and they only have a calf if they receive the semen during the short period they are in heat. Traditionally, it was decided by bulls grazing together with cows what was the right moment to give the semen. Bulls were quite capable to choose this moment. Now many farmers have switched to artificial insemination in order to use semen from top quality bulls. Therefore, the farmer or in some countries, like India, his wife who feeds and milks the cow, has to learn how to recognize when the cow is in heat. Veterinarians know well which signs show this and it is difficult for the farmer to discover this knowledge. So transfer of knowledge is the right strategy. However, what is the best way to transfer this sexually sensitive knowledge from the extension agent, who is in India nearly always a male, to the wife of the farmer? I do not know of any research which gives an answer to this question. Here creativity is required/ There are several reasons why we can expect better results from the creativity of the farmers and especially from their wives than from the creativity of the extension agents:

- they have better knowledge of the social relations and the norms in the rural community,
- they have better seen how rural people react on the communication methods used at present for transferring this knowledge than the extension agents,
- together they have more brains than the extension agents, because they are much larger in number.

For each type of decisions, a similar discussion would be needed with farmers on their reactions on the kind of support they received from extension so far. Also one should discuss what kind of support farmers feel they need in the future and the best way to provide this support.

Through this discussion one can try to integrate ideas from farmers and from extension agents. Which way is desirable depends on the kind of difficulty the farmer has in making good decisions without external help. Usually, there are only some elements in this decision making process for which help is needed. A difficulty in using farmers' experience can be that it is easier to observe which results are obtained in the short run than in the long run. By giving only nitrogen fertilisers, e.g., a farmer may increase his yields in the short run, but decrease his soil fertility in the long run because with these increased yields also more potash and other minerals are removed from the field. It can be a difficult task of the extension agent convince the farmers that they should also give attention to these long range effects, if they plan to continue to be a farmer on this farm.

Decisions concerning savings, consumption levels and investments are often influenced by group norms. Lewin (1953) has already shown that group discussion can influence these norms, e.g., by analysing the consequences of the present norms. For instance, in some Dutch villages the norm was to invite all other villagers for a marriage. With the increase in population that became very costly, but deviating from this norm would have resulted in a serious loss in social status. Socio-economic advisers of the farmers unions organised discussions on the consequences and the desirability of these consequences, which made it socially acceptable to invite a much smaller number of people.

Looking at the quite different types of decisions discussed in section 2, it will be clear that it will seldom be possible to find an extension agent who is capable to give his farmers the support they need with all these types of decisions, for instance with decisions on plant protection (a and b) as well as with decisions on establishing a successful farmers' organisation. Analyses of the Agricultural Knowledge and Information System show that in many countries farmers use many different information sources to support their decision making processes (Roling 1994). We need more research regarding sources farmers use for each type of decisions they have to make. It seems, e.g., that extension agents of some feed companies help farmers satisfactorily with operational decisions on the management of technologies based on systematic observations and computerised analysis of the performance of these technologies. For his strategic decisions, e.g., on large investments, the farmer may prefer to turn to an extension agent who works for fee,

because he can be sure that this agent will give advice which is in his interest and he does not have to fear that an advice is given because it is in the interest of the feed company (personal information from Dutch farmers). For operational decision, e.g., when to apply fertilisers, free advice from the input supply company may be preferred.

5. Conclusion

In the past, extension has given farmers support mainly to make good decisions on the adoption of new technologies. However, farmers have also to make many other decisions either individually or collectively. Extension science should give more attention to the question what is the most effective way in which an agent can provide the support farmers need in making each type of decision. These types of decisions differ in the extent to which it is desirable:

- to recommend a farmer what to decide,
- to provide information which enables the farmer to make his own decision or
- to facilitate a process through which the farmer learns from his own experience and from those of his colleagues,
- and in the role values, group norms and emoting playing the decision making process.

Providing farmers with information about research findings is only one of the ways through which extension can support their decision making processes. Many other kinds of support are also necessary. This article gives a typology of the types of decisions farmers have to make and of the kinds of support to the decision making extension can provide. More attention has to be given to the question of the support required for various types of decisions.

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