Where to put your agricultural research budget so it is used most effectively?

Agricultural research aims to develop knowledge and technologies that enable the poor to help themselves. Such research outputs might include genomic tools like molecular markers, to improve plant breeding techniques. In any case these outputs need to take account of the conditions faced by the poor, including those living in 'marginal' or 'low potential' areas.

Research funded by the UK's Department for International Development and undertaken by the Overseas Development Group at the University of East Anglia aimed to help policymakers decide what areas of agricultural research deserve funding. The idea was to enable research to be directed to the people whom policymakers really wish to help.

The researchers developed a new method for estimating the number of potential users of alternative proposed technologies, even before they have been developed. The model the researchers developed does two things. It compares the benefits the new technology should deliver with the benefits that farmers actually want. Secondly, it compares the resources that are needed to use a prospective technology with the resources that are likely to be available to farmers. Different sorts of people have different access to resources. Once these tasks have been completed, the model highlights which groups or segments of farmers are likely to be BOTH interested in the benefits that the technology offers AND able to find the resources that they would need in order to use it. Only people who satisfy both of these conditions are considered likely to use the technology.

An example

In Southern Ghana, one objective of agricultural research policy is to provide technology options to the poorest producers, with a particular focus on women. The technologies that might be developed include:

- the legume mucuna (*Mucuna pruriens*) for dry season green manure;
- a disease resistant cassava variety; (using molecular markers to pyramid gene resistance might be a faster way to breed varieties that are resistant to many strains of disease.)
- a dual-purpose (grain and fodder) cowpea variety.

Each of these has received research attention in West Africa over the last two decades. The question is, with only limited resources to invest, which *of these has the greatest potential for policy relevant impact?*

The researchers used descriptions of each of these possible technologies. These descriptions included the resources that would be needed in order to use each of the new technologies, were they actually to be developed. These requirements, in terms of land and labour, as well as types of location, were entered into the computer. The description of each possible new technology also includes details of the benefits that it would give to

the user. These descriptions should ideally be supplied by a specialised scientist who proposes to develop the technology in question, perhaps as part of the process of applying for research funding. The information is of course tentative as the technology hasn't been developed yet!

Next, data is required about the circumstances and preferences of the different kinds of people who are potential users of the new technologies. In our example this information was gleaned from a panel of social scientists who have years of field experience in the region. The decision support system can then use this information to divide the potential users into distinct groups, or market segments, based on how they are likely to respond to different new technologies

For example in Southern Ghana 49% of the population was identified as within a market segment that is 'really struggling.' This segment was 95% female. The other segments were defined as those 'Trying to Get Established', 'Getting By' and 'Winners'.

In our hypothetical example in Southern Ghana, policymakers were interested in investing in technologies that would help the poorest section of society, the women who were 'really struggling.' The researchers used the new method to examine which technologies and crops might help them most and found that the disease resistant cassava variety, if developed, was the only technology of the three that is likely to be used by this target group. The dual purpose cow pea technology was inappropriate for this segment because these people do not have access to the additional resources required (purchased inputs, extra labour and technical information).

These results are in line with experience in West Africa, where the use and impact of improved cassava varieties, many of which incorporate disease resistance, has been considerable.

Who is it for?

The work is aimed at decision makers who are considering which technologies to invest in. Such people work at the level of research programme co-ordinators or institute directors and sub-programme leaders or departmental heads. Priority-setting at these levels offers the greatest potential to help defined groups of farmers actually make use of research results, as these decisions determine to a large degree the nature and characteristics of the eventual technologies.

The model thus enables decision-makers to take social factors into account when examining whether a technology will benefit a particular segment of the population. The model aims to provide a more systematic way of making decisions about developing many aspects of agricultural technology. A prototype of a computerised version of this decision support system was also developed called *Interface, h*owever it has not yet been validated.

For more information contact Dr David Reece, 44+(0) 1392 262044

The two papers of direct relevance are:

Reece, D., J. Sumberg and L. Pommier. (2004). Matching technologies with potential end users: a knowledge engineering approach for agricultural research management. *Journal of Agricultural Economics* 55(1): 25-40.

Reece, D. and J. Sumberg (2003). More clients, less resources: towards a new conceptual framework for agricultural research in marginal areas. *Technovation* 23(5): 409-421.