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**FINANCING OF AGRICULTURAL RESEARCH AND  
EXTENSION FOR SMALLHOLDER FARMERS IN SUB-  
SAHARAN AFRICA**



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*A range of options exist for public sector research and extension (R&E) institutions to alleviate growing financial constraints. Those that seek to make more effective use of existing resources, by making them more user-oriented and demand-responsive, are at least as important as those which seek to reduce the scope of state financing in areas where the private sector may be willing to participate or beneficiaries to pay. Most can have a positive impact in terms of fiscal, efficiency and distributional objectives. An important finding is that the scope for increased private or user financing of R&E is probably much greater than is widely recognised, although those removed from mainstream markets subsistence farmers in particular will remain largely reliant on public R&E services. In defining the most appropriate nature of the relationship between the public and private sectors, economic and institutional analysis have much to offer.*

**Policy conclusions**

- There is considerable scope for the public sector to diversify the sources of funding of research and extension through selective privatisation, user contributions and the levying of fees. Public funds should be concentrated on public good aspects of R&E.
- There is less scope for such changes where natural resource management problems are severe, where the majority of farms are small and low-resource, or where the institutional and physical infrastructure conditions do not favour private sector involvement.
- The efficiency of public expenditures can be increased by improved priority setting, competitive bids for funds, stronger client orientation, and improved R&E methodologies and management practices.

**Introduction**

Shortcomings in the provision of agricultural research and extension (R&E) services have contributed to disappointing agricultural performance in Sub-Saharan Africa (SSA). Analysis of international comparative data on funding trends up to the late 1980s suggests that the deterioration in funding may not be as severe or as universal as widely perceived. Moreover, R&E in SSA does not appear to be particularly under-financed compared with other parts of the developing world. This suggests that the management of existing resources is at least as important as aggregate levels of finance. However, the considerable diversity of experience makes regional generalisations dangerous, and more recent evidence suggests that the funding situation has deteriorated further in the 1990s.

## **The economics of research and extension**

Economic theory and the concepts of public goods and externalities, which cause private levels of financing to be socially sub-optimal, have much to offer in defining what the state should be financing. The extent to which research may be considered a public good is largely dependent on the amenability of that knowledge, or the invention or product in which it is embodied, to various exclusion mechanisms that overcome the free-rider problem and enable the appropriation of returns to research investments. This amenability to exclusion will be determined primarily by the natural characteristics of the technology, marketing strategies that promote brand loyalty, and the existence (and enforceability) of intellectual property rights (IPR) legislation. The boundary between public and private research is thus influenced significantly by institutional factors that are likely to differ widely between countries.

Basic and most strategic research are generally considered to be public goods, while applied and adaptive research possess greater private characteristics, depending on the type of research. Mechanical and chemical research, for example, are generally private as patenting arrangements are comparatively straightforward. Biological technologies are increasingly patentable, although the characteristics of self-pollinated seeds often make patent enforcement impractical (hybrid seeds are naturally protected and do not require patent legislation). Managerial (or agronomic) research is much less amenable to exclusion mechanisms.

As compared with research, much of the output of *extension* has stronger private good characteristics: the mode of delivery of some extension (by a cadre of experts) creates the opportunity for fee payment; some extension information is embodied in physical inventions or inputs for which charges can be made; some is client-specific and hence exclusive; and appropriability is stronger where the supplier of the extension is also the buyer of the produce (e.g. agro-processors). On the other hand, general information (e.g. concerning cultural and production techniques, farm management advice and marketing and processing information) is generally regarded as being a public good. However, in considering options for sustainable financing, it is also important to consider *how* financial resources might be better allocated, controlled and managed.

## **Review of alternative financing mechanisms**

Options for alleviating financial constraints to the provision of R&E services may be classified into two groups: those in which the private sector may be willing to

participate, or beneficiaries to pay; and those that improve the cost- effectiveness of services that remain in the public sector. Case studies of extension services in Chile, and of agricultural research in Kenya and Zimbabwe, are described in Boxes 1-3.

### **Reducing the scope of state financing**

*Complete state withdrawal* from the provision of certain services may occur through the privatisation of existing facilities in a planned way, or simply by ceasing service provision in the expectation of a positive private sector response.

#### *Commercialisation and cost recovery:*

beneficiaries can be induced to cover at least part of the cost of R&E services by: (i) *levies*, typically commodity specific, but also possible through irrigation charges and land taxes; (ii) *user charges*, e.g. for some extension services, for many analytical and regulatory services, and through royalties on improved seed and livestock; (iii) *contracting* of the public sector research by commercial organisations.

*Other revenue generating activities* include the selling of surplus produce from research farms, the commercial farming of surplus land, and the sale of publications and other material.

### **Improving cost-effectiveness**

*Improved priority setting:* a range of techniques of varying complexity may be used to improve the allocation of financial and human resources between and within different research programmes as part of a masterplanning exercise. *Making services more user-oriented:* allowing users to exert some influence on the design and nature of services may make them more relevant and cost-effective. For example: (i) *on-farm client-oriented research* enables the development of stronger links between researchers and their clients; (ii) *participation in priority-setting and master-planning* may afford users real voice in the setting of priorities and allocation of resources; (iii) through *group- based/participatory approaches* extension may become more demand-driven, and reach more people; (iv) NGOs may serve as effective intermediaries in the identification of needs and delivery of services; (v) *decentralising* financial autonomy can improve the performance of government in providing rural services; (vi) adjusting *reward systems* may enhance accountability; (vii) distributing vouchers may make research and particularly extension more demand-driven; (viii) promoting *cost-recovery and*

### **Box 1. Semi-privatised technology transfer programmes in Chile**

Chile has the most market-oriented national system for technology transfer in Latin America, with the delivery of publicly financed extension services contracted out to private empresas. The system is graduated, with the smallest (Stage 1) farmers receiving extension free, Stage 2 farmers receiving attention in groups and contributing (in theory) 25% of the costs, while larger, commercial producers are fully responsible for sourcing and paying for their own extension advice.

An early attempt to give farmers vouchers to contract an organisation for technical assistance was abandoned. The limited availability of private extension professionals and inadequate supervision and monitoring led to widespread abuse. Empresas are now directly contracted by Government to provide a specified package of extension inputs.

Whilst production levels have risen, there is no convincing evidence to show that this is due to the use of sub-contracting and vouchers. Nor does the system appear to have been led by smallholder demands. The impact is apparently insufficient for farmers to be willing to assume the costs of extension services.

To the extent that the system has been successful, there have been specifically Chilean factors that have led to this, although there may be elements of the programme that can be incorporated into strategies elsewhere.

Source: Bebbington and Sotomayor, 1995.

*institutional pluralism* itself represents a means by which consumer demand can be expressed.

*Improving financial management and service delivery* may do much to improve the cost-effective use of existing resources. Options include: (i) using *consolidated funding mechanisms (CFMs) and agricultural research funds (ARFs)* as means of coordinating different funding sources in support of an agreed research agenda, minimising duplication; (ii) establishing *endowments* to provide a more stable source of funding; (iii) *contracting out* the implementation of R&E services through competitive bids to improve efficiency; (iv) *internal management reforms and restructuring* to improve productivity; (v) alternative *methodological approaches* to service delivery (e.g. the use of mass media, paraprofessionals, or group-based contact systems for extension) to improve the efficiency of service provision.

### Impact of different options

Limited experience to date of most of these options makes a comprehensive assessment difficult, but a number of observations can be made with respect to their likely fiscal, efficiency and distributional effects. Table 1 summarises the relative magnitude of these.

| <b>Table 1. Fiscal, efficiency and distributional effects of options to alleviate financial constraints</b> |        |            |                |
|---|--------|------------|----------------|
|   | Fiscal | Efficiency | Distributional |
| <b>Reducing scope of state financing</b>  |        |            |                |
| • state withdrawal  | [+++]  | +          | /+             |
| • commercialisation/cost recovery   | [++]   | +          | /+             |
| • other revenue generating activities   | [+]    | -          | 0              |
| <b>Improving cost-effectiveness</b>   |        |            |                |
| • priority setting  | (+)    | ++         | ?              |
| • making services more user-oriented  | (+)    | ++?        | -              |
| • improving financial management and service delivery   | (+)    | +          | 0              |

Notes: +, 0, - represent positive, neutral and negative impacts respectively; [ ] denotes a potential impact, depending largely on Treasury response and the way in which resources saved or generated are utilised; ( ) denotes indirect effect.

### Fiscal impact

*Reducing the scope of state financing:* The impact of the options in Table 1 on the

effective budgets of R&E institutions will depend substantially on Treasury responses. State withdrawal, levy financing and increased cost recovery may all prompt a reduction in central budget allocations. With respect to user charges, the principle of revenue retention is essential, but only likely to be agreed if the net financial position of the Treasury is not adversely affected. More fundamentally, R&E institutions need to be better able to demonstrate the positive benefits of their services to justify and improve their budgets.

*Improving cost effectiveness:* These measures are generally intended to have no direct effect on the budgets of the institution concerned or the Treasury, although many can themselves be expensive to implement. However, there may be a positive indirect effect for the institutions concerned if: (i) they can demonstrate that the return to investment in R&E is improved and its attractiveness relative to other sectors is enhanced, and (ii) by increasing user participation in the design and implementation of R&E, they can generate support and lobbying for their activities.

### **Efficiency impact**

*Reducing the scope of state financing:* The substitution of private for public finance will only increase overall efficiency if privatisation offers efficiency gains in service delivery and/or the public funds released are invested with higher social rates of return. Where free or heavily subsidised provision generates over-consumption of (largely private) goods or services, user contributions will increase efficiency. In addition, efficiency is likely to be increased where greater user/industry contributions are accompanied by a more direct say in the use to which R&E budgets are put.

*Improving cost-effectiveness:* All these options are designed to achieve a more efficient allocation and cost effective use of resources. For example, more quantitative forms of research priority setting seeking to maximise producer and consumer surplus are specifically aimed at improving efficiency, even though the ultimate allocation of resources invariably reflects equity and other criteria. User participation in the design of R&E programmes and allocation of resources is intended to minimise waste from developing and extending inappropriate technologies. Competitive bidding for research grants and extension contracts may well produce gains in efficiency, particularly where there is a well developed and competitive private sector and a public sector capacity to manage and monitor.

### **Distributional impact**

*Reducing the scope of state financing:* Poverty need not be a constraint to increased cost recovery or private provision of appropriate R&E services if those services are viable, and if user demand for them can be made effective through access to finance. Addressing credit constraints may therefore be a more appropriate response than providing free or heavily subsidised R&E, although the record of rural finance projects has generally been poor (moreover, a private sector focus on R&E which can be embodied into a physical and saleable product may not address the needs of women where control over finance still lies in the hands of men). In fact, greater private sector or user financing of R&E has the potential to *improve* equity where previous public funding represented a poorly targeted subsidy of largely private goods, provided that public sector savings are redirected towards maintaining services to the poor and/or alternative, possibly more efficient forms of poverty

### **Box 2. Financing agricultural research in Kenya**

Although well funded in comparison with much of the rest of Sub-Saharan Africa, public sector agricultural research in general and KARI (the Kenya Agricultural Research Institute) in particular, are facing more restricted and unreliable availability of operating resources, and an unsustainable degree of donor dependency (66% of its budget).

KARI is responding by encouraging greater industry financing of research through an extension of the levy model in tea and coffee research to other (largely cash) crops, by raising revenue through the sale of seeds and other products, by increasing user charges for certain advisory and regulatory services, and by undertaking contract research for the private sector. Critical to the success of these measures is Treasury encouragement to KARI and other parastatals to generate and retain their own revenues. Efficiency increases are being sought by more rigorous methods of priority setting, by needs assessment through various PRA approaches, and by the awarding of competitive grants through an Agricultural Research Fund. Early results are encouraging.

Significantly, the private sector already accounts for over 15% of research expenditure, and a number of reforms with respect to marketing and intellectual property rights are further stimulating this investment. There appears to be scope for a further narrowing of KARI's area of activity to make more effective use of limited resources, and a greater role for commodity-specific industry financing of research.

Source: Beynon and Mbogoh, 1996.

alleviation are implemented. Research may be effective at achieving efficiency objectives, but is often a blunt instrument for redistributive purposes.

*Improving cost-effectiveness:* The distributional impact of improved priority setting depends substantially on the criteria used, while the impact of greater user-participation in the design and implementation of R&E programmes, depends on the degree to which the poor and marginalised are able to articulate their needs and make their interests heard above the competing claims of others. Although not universally so, much of the evidence is pessimistic on this score. The prospects of strengthening local farmers organisations that aim to represent the poor and disadvantaged are, at best, long-term. Research demanded by large-scale farmers may lead to innovation by smallholders where commodities and production techniques are identical.

## **Policy implications and recommendations**

Objectives and general principles for the public financing of Government (and donor) expenditures on R&E should be aimed primarily at sustainable productivity growth through an efficient allocation of resources to appropriate R&E activities, observing the following broad principles:

- The possible roles of public and private sectors should not be considered in isolation from the overall sectoral policy framework and the institutional capacities of both.
- Public sector resources should be allocated more squarely to R&E aiming to produce public goods: the scope for increased private or user financing of R&E is probably much greater than is widely recognised.
- Financing reforms should generally be concerned with reallocating expenditures within public R&E budgets rather than reducing them, although some shift from extension to research may be warranted.
- The design of public R&E programmes to meet poverty alleviation or food security goals, for the urban consumer as well as the rural producer, should be weighed against other forms of support for such objectives which may be partial alternatives.

## **Specific recommendations and operational guidelines**

A number of specific recommendations can be made:

- The state should ultimately withdraw from much applied and adaptive research of a chemical or mechanical nature, and of hybrid seed varieties and animal breeding. The focus of public finance should be on more strategic research, on applied research into open-pollinated seed varieties and research of an agronomic nature, on products or technologies where a high proportion of the benefits go to consumers (particularly non-tradable products with inelastic demand, such as staple foods), and on health, safety and environmental issues unlikely to interest the commercial sector.
- The state should also ultimately withdraw from the provision of specialised commercially-oriented extension advice, focusing instead on the provision of more general extension advice, mass media forms of broadcasting, and extension aimed at environmental concerns and health and safety issues.

- *Prior* to such withdrawal, the conditions for successful private sector entry need to be in place. The liberalisation of input supply markets is crucial, as are a consistent macroeconomic and sectoral policy framework conducive to private sector activity, improved access to finance, a judicious strengthening of IPR legislation and mechanisms for enforcement, the removal of restrictions on technology imports, continued investment in human capital, and tax breaks on private research expenditures.
- Greater regional collaboration in research, especially at the more strategic end of the spectrum, should be promoted to take advantage of economies of scale. The international agricultural research centres have a significant role to play and merit continued support from the international community. Open and equal access to IARC material should be encouraged.
- The introduction of commodity specific levies to finance R&E should be encouraged where marketing systems or producer groups can collect levies in ways which minimise free-rider problems. Consideration should also be given to matching grants, particularly where domestic consumers are key beneficiaries of research.
- User charges for most analytical and regulatory functions should be increased towards full cost recovery levels, with subsidies for the poor only where alternative forms of support are less efficient. Where there are public health and safety or environmental issues, some degree of subsidy for such services may be justified.
- The pursuit of other revenue generating activities, in particular the commercial farming by public institutes of surplus land, should be discouraged. Sale or lease of surplus facilities probably represent better options.
- Priority setting processes should be supported in ways that encourage staff and beneficiary participation.
- Measures to strengthen farmer organisations (primarily in management, administration, needs assessment and negotiation skills), particularly those representing the poor, are warranted. Training of government R&E staff in participatory needs assessment especially among women and the poor is also necessary. Criteria for the evaluation of research proposals will need to be modified if the needs of women are to be specifically addressed.
- Consolidated funding mechanisms (CFMs) represent a potentially highly effective way of financing agricultural research and should be encouraged. Support should also be given to improving financial management procedures.
- Donors should also shift from project to programme approaches to R&E funding, in line with CFM/ masterplanning exercises. In the short-term at least, greater flexibility in the allocation of donor funds to support recurrent expenditures is required.

### **Box 3. Financing agricultural research in Zimbabwe**

Although still well funded in comparison with most of Sub-Saharan Africa, public sector agricultural research expenditures in Zimbabwe have declined sharply since the late 1980s. Personnel costs consume 70% of the budget of the Department of Research and Specialist Services (DRSS), capital development has been negligible, and donor contributions have been relatively small (c.25%) and erratic. In response, DRSS has spread its resources more thinly with adverse implications for the effectiveness and coverage. On-farm trials have been particularly badly affected. All research targeted at communal areas is still deemed to be public in nature. There is considerable mistrust of the private



sector's ability or willingness to meet the needs of these.

DRSS is seeking to re-establish a largely independent Agricultural Research Council, primarily to gain greater control over its own finances, and partly to ensure greater accountability and responsiveness to its stakeholders. More participatory approaches to research planning and formulation are being introduced. In addition, DRSS plans to raise revenue by increased user charges for most services, royalties from breeder material, commercial farming, and contract research. The Ministry of Finance has now granted DRSS greater financial autonomy, subject to its own net revenue base being retained.

Private sector research activity, however, has grown rapidly, and now accounts for at least 30% of total research expenditure. The powerful producer associations affiliated to the Commercial Farmers Union (CFU) channel significant sums to their own Agricultural Research Trust farm, rather than to DRSS. Compulsory union membership and the single channel marketing system have been of critical importance in the collection of levies and the elimination of the free-rider problem. Reforms to both are forcing a significant change in CFU strategy, but the associations are optimistic of retaining their membership and revenue base. However, such a model can be introduced elsewhere only where highly concentrated commodity marketing or processing channels exist.

Source: Beynon and Mudimu, 1996.

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