
Competitive Agricultural Technology Funds in Developing Countries

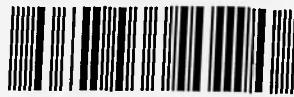
Gerard J. Gill
and
Diana Carney



Overseas Development Institute

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ODI Research Study

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Any errors of fact and interpretation remain the sole responsibility of the authors.

Acronyms and Abbreviations

AHRS	Ad hoc Research Scheme under ICAR's Agricultural Production Cess Fund
ARF	Agricultural Research Fund of KARI
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ATTF	Agricultural Technology Transfer Fund (of ASARECA)
CATF	Competed agricultural technology fund
CGIAR	Consultative Group on International Agricultural Research
CIP	<i>Centro Internacional de la Papa</i> (International Potato Centre)
CIRAD	<i>Centre de coopération internationale en recherche agronomique pour le développement</i> (Centre for International Co-operation in Agricultural Research for Development)
CNRA	<i>Comite National de Recherche Agricole</i> (National Committee on Agricultural Research), Mali
CONICYT	<i>Comisión Nacional de Investigación Científica y Tecnológica</i> (National Commission for Scientific and Technological Research), Chile
DFID	Department for International Development (UK Government)
FONDECYT	<i>Fondo Nacional de Desarrollo Científico y Tecnológico</i> (The National Fund for Scientific and Technological Development), Chile
FONDEF	<i>Fondo de Fomento del Desarrollo Científico y Tecnológico</i> (Fund for the Promotion of Scientific and Technological Development), Chile
GATT	General Agreement on Tariffs and Trade
HIPC	heavily indebted poor country
IARC	International Agricultural Research Centre (under the CGIAR)
ICAR	Indian Council of Agricultural Research
IDB	Inter-American Development Bank
IDRC	International Development Research Centre
IER	<i>Institut d'Economie Rurale</i> , Mali
ISNAR	International Support for National Agricultural Research
ISRA	<i>Institut Senegalais de Recherche Agricole</i> (Senegalese Institute for Agricultural Research)
KARI	Kenya Agricultural Research Institute

M&A	Management and Administration
M&E	Monitoring and Evaluation
NARF	National Agricultural Research Fund (Department of Research Development, Ministry of Agriculture and Cooperatives, Tanzania)
NARI	National Agricultural Research Institute
NRBAR	Natural Resource Based Agricultural Research programme of ISRA
PRA	Participatory Rural Appraisal
PRONATTA	<i>Programa Nacional de Transferencia de Tecnología Agropecuaria</i> (National Programme for the Transfer of Agricultural Technology), Colombia.
R&D	Research and Development
S&T	Science and Technology
Sida	Swedish International Development Co-operation Agency
USAID	US Agency for International Development
VBKVK	Agricultural Research Fund of the <i>Vidya Bhavan Krishi Vigyan Kendra</i> (Agricultural Science Centre), State of Rajasthan, India

1

Introduction

1.1 Background

Agricultural research and development (R&D) in developing countries has a mixed track record. In some parts of Latin America and Asia large productivity gains were achieved in the past, particularly during the 'green revolution', when national agricultural R&D systems were able to take genetic materials and agronomic techniques from CG centres, adapt them to local conditions and extend them successfully to farmers. This made the major contribution to the doubling of global cereal yields that occurred between the early 1960s and the early 1990s, as a result of which per capita food production grew rapidly – by 5% in the 1980s alone – and real world food prices fell to historic lows (Pinstrup-Andersen 1994). Although these advances were impressive, the productivity gains that gave rise to them were of limited geographical impact. They did not have any significant effect on (a) the least developed countries, (b) sub-Saharan Africa or (c) risk-prone environments (those which rely on rainfed crops, have harsh environments with uncertain rainfall, and have poor physical and social infrastructure). In such areas the impact of agricultural R&D systems has been extremely disappointing and agricultural productivity has remained extremely low. There are many institutional, social, economic and agro-ecological reasons for low productivity, but one important contributing factor has been the inefficiency and lack of client orientation of agricultural technology systems in these countries.

Unfortunately, even in the countries that did achieve large productivity gains during the green revolution, the days of growth from this source are now apparently over. Part of the reason is that the genetic potential of the technology in question has by now been almost fully realised, so that by the mid-1990s in some of the areas that had been most successful, yields were at best growing only very slowly, and at worst were actually declining (Pingali 1991, Havener 1994, Fujisaka et al. 1994). Previously successful public sector agricultural R&D institutions have also been hit by recent and often major fiscal constraints and have so far failed to adapt to new demands, constraints and challenges (Echeverría et al. 1996).

Better performance, or a return to better performance, would bring major productivity gains and improved competitiveness in agriculture, and this in turn would have a positive impact on poverty reduction,

particularly through a resumption of falling food prices¹ and through enhanced employment opportunities. An expanding rural economy means the opening out of a widening range of livelihood opportunities, not just for small farmers and not just in agriculture, but also for landless labourers and in other areas of primary production, agro-industry, trading and other forms of self-employment.²

A number of developments in recent years has caused fresh attention to be focused on the above issues. One is the failure of food production in some of the least developed countries to keep pace with population growth.³ A second is the structural adjustment process and the still-evolving function of the state from a controlling to (hopefully) an enabling role. This entails, amongst other things, the elimination of subsidies and public sector monopolies in favour of enhanced private sector involvement in the development process. Almost simultaneously economic globalisation is throwing developing economies increasingly open to market forces.

All of the above has coincided with a shift in the development assistance climate, with falling aid budgets and calls for the remaining aid to be used more efficiently. Evaluations of aid interventions now place increasing emphasis on outputs as opposed to inputs, and on impact, rather than performance, criteria. The impact (or lack thereof) of projects on the poor and disadvantaged has received particularly close attention from a growing number of donor agencies in recent years. The UK Department for International Development, for example, pledged itself in 1997 to a new Statement of Purpose, its highest aim being 'the elimination of poverty in poorer countries'.

These developments have had particular relevance to the agricultural sector, which dominates so many least developed economies. While development assistance in general has been falling, that to agriculture has been falling faster.⁴ The trade reforms associated with the 1994 General Agreement on Tariffs and Trade and the subsequent establishment of the

1. For the period until 2010 world prices for cereals, roots and tubers are projected to be stable, except for rice whose price is forecast to increase in the 10–20% range (IFPRI 1998).

2. In many countries poor households, including those of smallholders, pursue a diversified household livelihoods strategy in which income is derived from a range of different sources. For a recent review of the empirical evidence, see Ellis (1998).

3. Throughout this report the expressions 'developed', 'developing' and 'least developed' countries are used in accordance with standard UN definitions.

4. Probably the most serious example is that of USAID, which was for many years the world's largest bilateral donor, and whose budget for agriculture fell from US\$1.2bn in FY 1986 to an estimated \$240m by FY 1997. The UK budget, which has remained fairly stable, is one of the better cases.

World Trade Organisation will ensure that the subsidy-generated food surpluses of many of the richer countries, which were previously disposed of as food aid, will continue to fall. This, in turn, will exacerbate the precarious food security situation of many of the least developed countries, at least in the short term.

Public sector R&D institutions tend themselves to blame any failings on chronic lack of funding. Those outside, while accepting that funding has been scarce, and in many cases getting scarcer, accuse them of a chronic inability, or unwillingness, to prioritise allocation of their scarce resources. The fact that in the 1980s the number of researchers at such institutions increased twice as fast as the availability of research funds illustrates this poor prioritisation (Echeverría 1998). The binding constraint in such institutions is not so much staff shortages as lack of operational funds: where staff productivity is low, increasing staff numbers without providing the facilities they need will lower it still further. Other frequently-voiced criticisms are that such institutions lack:

- a list of researchable issues based on national and sectoral development priorities
- independent governance and management structures
- an agenda that is client orientated and demand driven
- transparency and professionalism in project selection, management and evaluation
- freedom from bureaucratic procedures and political interference, and
- mechanisms to decentralise decision-making

Such criticisms are hardly surprising in view of the fact that public sector institutions in developing countries are generally funded by block grant from national or state governments. There is seldom any attempt to link this funding or its continuation to either performance or impact.

Criticisms such as these are often levelled by donor agencies, and in fairness it ought perhaps to be added that, while the criticisms themselves are often true, donors are almost invariably intimately involved in formulating the research agenda as well as executing it often recruiting foreign technical assistants to help in project implementation, so they are not themselves entirely immune from blame.

1.2 Competitive Funds⁵

As part of an effort to break the vicious cycle of underdeveloped agricultural technology and rural poverty in poorer countries, efforts have been made in recent years to find means of revitalising these bodies. The establishment of competitive agricultural technology funds (CATFs) is an approach that has found increasing favour in this context, both with donor agencies and some national governments. Indeed, in the words of one well-placed source, there has been 'mushroom growth' in such funds since the early- to mid-1990s. Another insider observed that competitive funds had in the past few years 'become a fashion, almost a fad'.

The CATF is a development of a model that has been in existence for many years for funding scientific research in developed countries, and for at least 30 years in Latin America. It is one that is closely associated with private non-profit foundations and publicly-funded bodies such as scientific research councils. It is a pool of money designed to support the development of (agricultural) technology. When such a fund is established a set of rules guiding its use, management and accountability is put in place in order to help ensure that it achieves its target. Such funds can cover both research and technology delivery and uptake processes (Carney 1997). The governing body of the fund does not decide on specific projects in advance. Instead there is advance identification of priority areas in which activities will be supported. The availability of such a programme in the agreed thematic areas is advertised, and proposals solicited for evaluation and possible support. The key is open competition to work on sections of an agreed and prioritised agenda for the development and delivery of (agricultural) technology.

The advent and popularity of CATFs is also mirrored in similar developments on the social side. Social Funds, or social safety nets, have existed in developing countries for many decades. In recent years – often as a response to the social impacts of structural adjustment – there has been an explosion of new types of emergency social funds and social action programmes.⁶ Like CATFs these are generally designed to be demand-

5. Many of the views expressed in the remainder of this chapter were gathered by canvassing the opinions of people known to be active in the establishment and management of competitive funds. These views were partly obtained through e-mail exchanges and partly through a visit to Washington D.C. by one of the authors in 1998. In view of the sensitive nature of some of the views expressed, confidentiality of sources has been maintained. A list of those consulted appears in the *Acknowledgements* section.

6. Reddy (1998) reports the existence of social funds in at least 45 countries in Latin America, Africa and Asia.

driven and are often administered by independent and specially created institutions (Reddy 1998). Unlike CATFs they are, by their nature, cross-sectoral. This study does not look explicitly at such social funds but does recognise areas where the two types of funds have experienced similar problems and challenges (these would include cost management, targeting and equity issues, skill shortages and financial and institutional sustainability).

1.3 Objectives

Specific objectives of the different funds vary, but Kampen (1997) has identified a number of aims that are common to many competitive agricultural *research* funds. Most are also relevant to the wider field of competitive agricultural *technology* funds. They include the following:

- improving the adequacy and dependability of funding for priority research programmes which are designed to have significant and early impact on national objectives
- expanding opportunities for innovative research by scientists in both public and private sectors with an element of competition based on capacity
- drawing upon the comparative advantage of a wide range of appropriate institutions in both public and private sectors (The potential contribution of agricultural universities and faculties is often mentioned in this context.)
- achieving greater synergy and cost effectiveness by enhancing teamwork and collaboration and by fostering greater participation of stakeholders in formulating and funding proposals
- broadening participation of the private sector in supporting R&D in commercial agricultural commodities
- promoting stronger linkages between research and agricultural training, to enhance the quality and relevance of training, particularly post-graduate training

In addition to the above, some funds have an equity component to encourage applicants to focus on the needs of disadvantaged groups such as women, small farmers and ethnic minorities. In a similar vein, some funds have taken decentralisation as an objective, and give extra weight to applications from outside the major cities, the principal universities and the mainstream research organisations (sometimes regional quotas or allocations by area are established at the outset). The aim of this is to strengthen, widen and deepen agricultural research and technology dissemination as an inclusive national system.

Some commentators also detect a hidden agenda in the establishment of competitive funds. They argue that in countries where the public sector national agricultural research establishment is firmly entrenched, and resistant to change, the establishment of CATFs (perhaps by an informal coalition of in-country reformers and donor agencies) often has the tacit objective of undermining the existing system. The aim is to create a parallel system that begins to produce results in order to demonstrate what can be done. When the two systems are then viewed side by side, the system that has consistently failed to deliver will either be forced to reform or will collapse. Those who perceive such an agenda go on to argue that such a strategy may be appropriate to a large developing country with many public and private research institutes, but it is difficult to see it working in a small country – particularly a least developed country – because there are too few potential suppliers to provide a competitive market. Needless to say there are those who strongly dissent from such views, but the argument is persuasive.

1.4 Sustainability of Funding

Kampen's first point in the previous section relates to the adequacy and dependability of funding for priority research. This has been the focus of much attention. There is an attractive underlying hypothesis that the establishment of funds can help give birth to a virtuous circle of better – more relevant, demand-driven and cost effective – research and that this will lead to increased sustainability of funding. Once national governments, donors and the private sector are convinced that their priorities are indeed being better served through the establishment of these new funding mechanisms, they will increase their own support to the funds. However the difficulties should not be underestimated, particularly on the government side, since its role is crucial to success. Financial sustainability requires a deep and strong political commitment to the idea that the public sector should retain a strategic role in agricultural R&D,

and this is often lacking, particularly in the finance ministries of countries undergoing a rapid processes of liberalisation.

Beginning to test this hypothesis was a major – though difficult to achieve – objective of this research study. Section 2.3.7 below provides more details, but, at a general level, there is no compelling evidence that this virtuous circle is automatically generated by the establishment of CATFs; there are too many other difficulties that can get in the way.⁷ It is almost certainly too ambitious to expect a single institutional mechanism to achieve this notoriously elusive goal. More realistic are the types of steps which Ellsworth (1997) lays down in a useful ‘road map’ for institutions that wish to embark on the reform process. She identifies 10 stages (complete with milestones) along what she calls ‘the road to financial sustainability’. In her own words:

1. Organise for change.
2. Clean up the finances, starting with a major audit.
3. Conduct an organisational diagnosis.
4. Fix the governance structure.
5. Conduct a regional niche assessment.
6. Develop a preliminary strategic vision and reorganisation plan.
7. Get the internal incentives right.
8. Debug the new systems.
9. Prepare a long-term strategic plan for sustainability.
10. Compete for deals that enhance financial sustainability.

In this type of root-and-branch reform what is discarded is at least as important as what is brought in. Perhaps this is implicit in Ellsworth’s list, but vested interests being what they are, it should perhaps be made explicit. Many technology development systems are burdened with the legacy of the past, not just in terms of governance structures and management systems, but also in a whole range of other areas such as priorities, skills, buildings, equipment, experiment stations – even, unfortunately, staff. Any really fundamental reform will have to do some quite radical surgery, and it will be painful for some.

Even if the optimists are correct, and there is scope for increasing the overall productivity of the research system through the establishment of CATFs, there remains the problem of where the funding is to come from.

7. Indeed, some sceptics argue that domestic governments never expect funds to achieve this. They may welcome the establishment of the funds with donor financing because this reduces their own input into the research system, but they do nothing about genuine reform of the system. The end result may be that it becomes more entrenched than ever.

In Asia and Latin America some funds are financed entirely from domestic sources, so the answer is clear. At the other extreme, in sub-Saharan Africa bilateral donors and development banks have been amongst the major proponents of the competitive fund model, and have provided almost all the finance. Especially when this has been in grant form there has tended to be an implicit or explicit understanding that this is for 'demonstration purposes' and that once the funds are operating effectively, domestic sources of finance will materialise. So far, there is relatively little evidence of donor-established funds being 'taken over' in this way. Some have suggested that cash-strapped governments in poor countries are hardly likely to take over funding as long as a donor agency is willing to cover the cost.

A particular objective of funds, in these days of liberalisation and privatisation, has been to harness the resources of the private sector. Again, this has been difficult to achieve (amongst the case studies, the Kenya Agricultural Research Fund has had some, but very limited, success in this respect). Private agribusiness is likely to have concerns over the enforcement of intellectual property rights when it funds research through public mechanisms. An alternative is to seek the contribution of users of the research (i.e. farmers). Countries such as India, Uruguay and Colombia have had success with mechanisms that fund agricultural technology R&D through taxes on agricultural produce. This may take the form of 'checkoffs', which are self-imposed taxes paid by groups of producers (Gilles, 1997). One problem with this approach is that it gives rise to demands for congruence (that is, if the wheat growers' association contributes $x\%$ to the fund it will demand that at least $x\%$ of the budget is spent on wheat R&D). If successful, such demands effectively rule out work on new commodities and in non-commodity areas. An alternative to voluntary contributions that avoids this particular difficulty is the cess, a government-imposed tax – frequently only a fraction of 1% – on sales of agricultural produce in general (ICAR 1996).

A problem common to both the cess and the checkoff approach is that the poorer the country and the more subsistence-oriented its agriculture, the less scope there is for raising revenue in this way. Nor can these least developed countries easily fund agricultural R&D from general taxation because of their generally low domestic tax base, often reduced and stretched still further by the pressures of structural adjustment. The cost of establishing and maintaining funds of the standard discussed here is high, and even if their introduction does succeed in raising cost-effectiveness, the benefits may not materialise in a form that generates either tax revenue, or revenue for producers' associations that can be ploughed back in the form

of checkoffs. This is especially true of funds with a strong focus on the problems of the poorest.

Continued donor funding is needed in such countries, but this too tends to be unreliable except within the short-term horizon of the project framework. Endowments have been suggested as a way out of this impasse. The idea is that a donor will put up a substantial sum of money which will be invested (in an interest-bearing account, stocks and shares, property, etc.) in order to generate the income required to finance the fund (Weatherly 1996). If the investment is judicious and proper allowance is made for inflation, this should certainly make the fund financially sustainable. However, the initial investment must be large; few donor agencies are prepared to make such a commitment and many are prohibited by their own governing statutes from doing so (there is a problem with depositing unallocated sums of money in partner countries).

Debt conversion is an approach with potentially exciting prospects, particularly if the proceeds are used to establish an endowment. It entails a donor or other agency using hard currency to buy discounted debt from an international creditor and delivering the debt to the central bank or other financial authority in the country concerned. The latter then tops up the non-discounted sum by an agreed percentage and earmarks the proceeds to fund agricultural and natural resource R&D (Dunn 1997). One of the attractions of this approach is the fact that so may least developed countries fall into the 'Heavily Indebted Poor Country' (HIPC) group as defined by the UN, and therefore have a great deal of debt to be converted – presumably at a relatively large discount, since the prospects of repayment without debt conversion are fairly bleak. However, the success of this approach depends upon countries (both donor and recipient) placing a high priority on agricultural research as opposed to other calls on public spending.

1.5 Management

In addition to variation by objective, funds also vary as to procedures. The following may be regarded as 'best practice' in fund operation, although few developing country funds – and perhaps no least developed country fund – could reasonably be expected to adhere rigidly to all the procedures outlined below.

10 *Competitive Agricultural Technology Funds in Developing Countries*

- autonomous or semi-autonomous status with an independent, pluralistic board that represents the entire spectrum of stakeholders and has no majority of any one
- a set of priority areas clearly derived from, and supportive of, national policy priorities in both science and technology and agricultural and rural development
- a set of rules that encourages the widest possible participation in the scheme, a practical operations manual and application forms and procedures that facilitate this wide participation
- wide advertisement of the programme and conditions for application using all available media⁸
- procedures for peer review that are clear and transparent and that facilitate professional, anonymous, constructive and independent assessments with minimum loss of time
- a financial and administrative review process that results in a prioritised final list of projects for each round of funding that balances priority and quality with cost
- integrity, independence, accountability and quality of management and adequate financial provision for discharging management responsibilities
- 'rigid adherence to the agreed schedule of fund releases' on the basis of 'timely reporting and sound progress review procedures'
- 'non-intrusive monitoring of progress by competent reviewers'
- 'institutionalisation of follow-up evaluation and impact monitoring involving independent expertise'⁹

It will be seen from this list that the improvements expected from introduction of the competed fund approach go far beyond the principle of

8. The fund operated by the Brazilian national research organisation, EMBRAPA, advertises on its Web site, which also contains the operations manual and other application documents.

9. Direct quotes are from Kampen (ibid).

competition alone, and that parallel, or collateral, reforms are also required (see Chapter 4).

The (unattainable) best is often the enemy of the (attainable) good. Indeed, some commentators argue that the appropriate criterion against which to judge funds in a given country are not a set of internationally-applicable norms such as the above, but rather a 'before and after' comparison (cost effectiveness of research spending before the fund and after). There are certainly a number of practical difficulties in applying the criteria laid out above. To take just one example, an independent peer review process is very difficult to set up in countries where the pool of qualified reviewers numbers only a small handful, and professional colleagues therefore know each other intimately. One knowledgeable commentator noted that within highly specialised disciplines this can be a problem even in a country with a scientific community as large as India's. The solution may be to set up an international or regional peer review panel, but this can be expensive. With proposals in applied science or in socio-economics, there is the problem that a foreign reviewer may be insufficiently familiar with the environment in which the proposed technology will be developed and deployed.¹⁰

1.6 Perceived Advantages and Disadvantages

A recent discussion paper by Echeverría (1998) laid out a comprehensive list of the perceived advantages and disadvantages of competitive funding of agricultural R&D. This is reproduced as Table 1 below. The number of disadvantages listed here may surprise many people, given the present great popularity among donors of this form of funding.

Some of the points on the 'disadvantages' side require amplification. The first four points underline an argument put by many, namely that competitive funds should only ever be a part of a wider mosaic of different funding mechanisms. Little funding has been put into either physical or human capital in the last decade or so, and in science both equipment and knowledge rapidly become outmoded. Most funds will not finance projects with more than a three year duration, yet there are many areas of science and agricultural technology in which the gestation period is longer. For example, it typically takes more than three years to develop a new grain variety, while it will take at least a decade to develop new varieties of tree

10. See Ellsworth (1998) for a number of practical measures for operating a competitive grant scheme for the east/central Africa region that could be adapted to other regional groupings.

Table 1: Advantages and Disadvantages of Competitive Funding Systems

Advantages	Disadvantages
<ol style="list-style-type: none"> 1. Increases research effectiveness by directing resources by merit to the most productive scientists (improves quality and accountability of research) 2. Increases research efficiency by reducing: costs via competition and co-financing schemes, duplication of effort, lack of accountability of research resources, under-utilisation of infrastructure by providing operating resources 3. Promotes the identification of and consensus on national research priorities 4. Increases flexibility to focus on newly emerging national/regional priority issues 5. Promotes a goal-oriented and demand-driven national research system 6. Strengthens links between research and extension organisations, agricultural production and agricultural policies 7. Strengthens links among national, regional and international public and private research organisations, promotes 'spill-ins' 8. More diversification of funding by involving scientists from outside traditional organisations, promotes 'system' 9. Induces institutional change in the national innovation system 10. May mobilise additional funding 11. Merit review process provides expert feedback to researchers' proposals and objectivity of the competitive process. 	<ol style="list-style-type: none"> 1. Fund only operation costs, lack of support to core budget (salaries and maintenance of research facilities) 2. Lack of support for medium- to long-term research agenda 3. Lack of support to human capital development 4. Lack of support to new research infrastructure 5. Higher funding uncertainty could affect long-term projects and reduce confidence of research staff 6. High transaction costs from grant seeking and implementation reports, less time for research 7. Reduces research flexibility to focus on additional issues when researchers discover new research opportunities 8. Higher risks involved when research consortia involve less-well-known organisations 9. Low sustainability of funding when national constituency is weak and external funding sources dry up (unless is endowment) 10. Need a research system with a minimum number of competitors (larger countries probably best suited) 11. Legal, financial, administrative and technical costs of setting up and administration 12. May increase 'equity issue' due to lack of competitive capacity of poorer/smaller organisations 13. Possibility of 'rent-seeking' in the research resource allocation process
<p><i>Source: Echeverría (1998) Table 4.</i></p>	

crops. Natural resource management is another area in which R&D has a long gestation period.

A rule of thumb put forward by one seasoned observer is that funding from competitive sources should not exceed half of the total funding for active research in a given country or area. Otherwise there is likely to be a lack of continuity and short-term themes are likely to dominate the R&D agenda. This implies that the establishment of competitive funds should be accompanied by a mechanism to ensure that there is continued investment in projects with a longer-term perspective.

Point 6 raises the issue of the cost of preparing proposals, especially for those who have no skills or experience in this area. Funds do not normally cover such costs (and, as a result, often receive inferior applications). A related issue raised by a number of scientists is the fact that a proposal represents intellectual property. Many potential applicants are worried that their own proposals may be turned down only to be successfully resubmitted in a slightly modified form by someone with insider knowledge of how the selection process works.

Lastly, it should be added that concerns about the negative effects on agricultural research of over-reliance on competitive funding are not peculiar to less developed countries. Disquiet has been expressed about this even in the US, where it has been argued on the basis of empirical investigation that the trend in that country towards competitive funding and away from federal block funding 'apparently reduces productivity of research expenditures or shifts the focus of scientific inquiry and technology development away from innovations that raise local agricultural productivity' (Huffman and Just 1994 p.757). Regardless of this, much US research is financed through competitive funding, especially at the short-term end (areas such as biotechnology); longer-term issues such as natural resources management research are not viewed as suitable for competitive funding.¹¹

1.7 Typology of Funds

There is no definitive typology of the many different types of agricultural technology funds that exist. Echeverría (1998) classifies them as either 'national' or 'regional/ international'. An alternative, hybrid, typology is presented below. Many of the funds mentioned were included as case

11. Uma Lele, personal communication.

studies in the research reported on here. Further details are provided in Chapter 2.¹²

- *National science funds* (NSFs) have a relatively long history, even in some developing countries. They tend to emphasise basic science, and although they are not exclusive to agriculture and related sectors, they may have agriculture-related programmes. Chile's FONDECYT is an example which is included as a case study here.
- *Dedicated national agricultural technology funds* have been established in many countries in recognition of the sector's distinctive characteristics and its very diverse clientele. Compared to NSFs they tend to place more emphasis on applied science and product development. Most of the case studies are of this type (namely the examples from Colombia, Kenya, Mali, Senegal, Tanzania and the fund under the Indian Council of Agricultural Research).
- *Regional funds* are a more recent innovation. One such fund, that operated by the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), is included in this report as a case study. Regional funds may be divided into two types according to whether their boundaries are political or agro-ecological. Those which simply embrace a number of adjacent countries are easier to form for practical reasons, although those based on agro-ecology make more sense from a scientific standpoint. The ASARECA fund is of the former type. The recently established Regional Fund for Agricultural Technology (FONTAGRO) in Latin America represents the agro-ecological approach. The way chosen to reach regional consensus on research priorities was to define broad agro-ecologically based research needs on the basis of purposively identified *mega-domains*, which are defined to include more than one country, so that at least two countries have to be involved in each research consortium. Members themselves contribute the funding, so that donors do not have a 'seat at the table' and the agenda is therefore regionally set.¹³ FONTAGRO funds research on generic and strategic problems of importance to all countries in the mega-domain, so that by joining a consortium a

12. For those who require further details, individual case study reports can be viewed on ODI and RIMISP websites respectively: <http://www.oneworld.org/odi/rpeg/comptech.html> and <http://www.rimisp.cl/odiprinc.html>.

13. Donors are sometimes invited to pay the contributions of small impoverished countries which wish to join the Fund, but accepting this invitation does not entitle the donor agency to voting rights on the Board.

country can reduce its research costs (IDB 1996, FONTAGRO 1997, Echeverría pers. comm.).

- *Sub-national agriculture technology funds* are established within particular areas (districts, provinces, states) of a country. The Ford Foundation-supported VBKVK scheme in Rajasthan State in India is an example that was covered in this project. Another example is the newly established Zonal Agricultural Research Funds in Tanzania.
- *International competitive funding schemes* are similar to national science funds on an international scale. They are generally funded and administered by multilateral and bilateral donors and private foundations. For example, the US Agency for International Development has for many years operated a world-wide competitive scheme for science. About a quarter of the grants have been funded agricultural R&D.

This is by no means the definitive classification. In some instances it may make more sense to classify funds by objectives (e.g. those with an equity focus, those with a 'good science' focus) or according to the point at which the funds position themselves on the research spectrum. For example, in the case studies, Chile's National Fund for Scientific and Technological Development (FONDECYT) is located at the strategic research end while ASARECA's Agricultural Technology Transfer Fund focuses at the other end on the delivery of outputs. Alternatively they could be classified by clientele, for example the whole agricultural sector or only small farmers. The funds covered as case studies for this report can be classified in terms of any or all of these variables, as will be clear from the next chapter.

1.8 The Main Report

The following section reports on ten case studies that were conducted for this study. Findings are presented by issue area with comparative tables where relevant. This narrative section is followed by a short summary of some of the major concerns relating to fund performance grouped into: management efficiency, quality and relevance and sustainability. The last section presents the conclusions of the report.

The Case Studies

This study was designed to provide information about an emerging trend in the financing of agricultural technology development and transfer. Discussions with those involved in the funding, operation and evaluation of agricultural technology had revealed an increasing interest in competitive funds as a means of simultaneously achieving greater efficiency, greater stakeholder participation and more sustainable financing. Because of the contributions to these objectives that such funds are expected to make, as well as growing despondency about traditional mechanisms of financing agricultural technology, there has been a rapid growth in such funds over the past decade (the same is true of social funds and other types of community financing mechanisms).

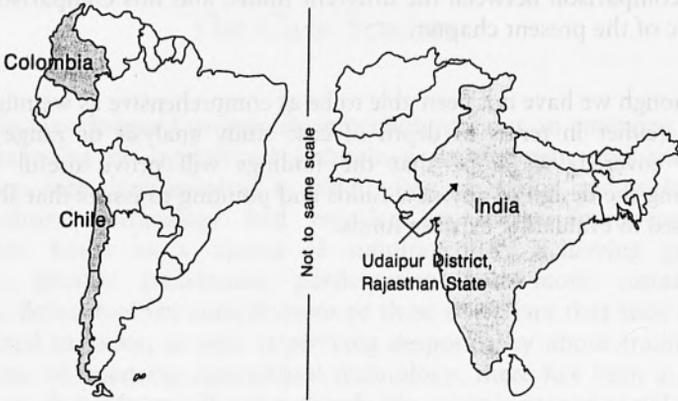
It was found, however, that new funds were and are being proposed, designed and established on the basis of extremely limited information about the performance of existing funds. This research aims to fill this gap – however roughly – and to point out both the strengths and the weaknesses of a reasonable selection of existing funds. It also aims to demonstrate the extreme diversity of the many types of mechanisms that are loosely referred to as ‘agricultural research funds’ or simply ‘research funds’. This, in turn, underlines the importance of ensuring that the design of any fund is appropriate to both its own objectives and the circumstances and capabilities of the fund’s administrators, the scientists and technologists who will bid and the farmers who are expected to benefit.

The case studies were chosen with the following considerations in mind:

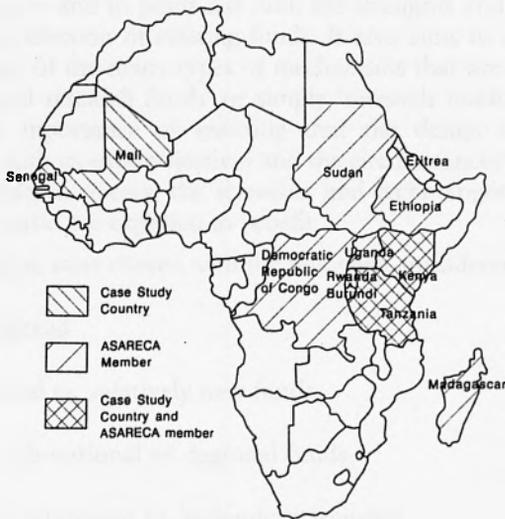
- geographic spread
- long established vs. relatively new funds
- national vs. sub-national vs. regional funds
- technology development vs. technology transfed
- donor involvement vs. no donor involvement

- A common framework of analysis was used in order to maximise scope for comparison between the different funds, and this comparison is the topic of the present chapter.

Although we have not been able to be as comprehensive as we might have wished (either in terms of depth of case study analysis or range of case studies covered) we hope that the findings will prove useful both in informing the design of any new funds and pointing to issues that should be addressed in evaluating existing funds.



Map 1: South America and India, showing Udaipur District



Map 2: Africa, Showing Case Study Countries and the ASARECA

Table 2: Basic Socio-Economic and Agricultural Indicators for Case Study Countries

INDICATOR	Chile	Colombia	India	Kenya	Mali	Senegal	Tanzania
Human Development Index (rank out of 175 countries)	30	51	138	134	171	160	149
Adult Literacy Rate (% literate in 1995)							
Women	95.0	91.4	37.7	70.0	23.1	23.2	56.8
Men	95.4	91.2	65.5	86.3	39.4	43.0	79.4
GDP in 1994 (billion US\$)	52.0	67.3	293.6	6.9	1.9	3.9	3.4
Real per capita GDP in purchasing power parity dollars (1994)	9,129	6,107	1,348	1,404	543	1,596	656
Agricultural Production as percentage of GDP	7	14	30	29	42	17	57
Agricultural Population as Percentage of the Total (1997)	16.6	22.2	61.0	76.7	82.6	74.6	81.7
Growth Rate of per capita GNP (%)							
1965-80	0.0	3.7	1.5	3.1	2.1	-0.5	0.8
1980-93	3.6	1.5	3.0	0.3	-1.0	-ve	0.1
Population Growth Rate 1960-94 (% per annum)	1.8	2.4	2.2	3.5	2.6	2.8	3.1
Projected Population Growth Rate, 1994-2000 (% per annum)	1.4	1.7	1.6	2.3	3.1	2.7	2.4
Food Imports as % of Imports							
1980	15	12	9	9	19	25	13
1994	5	7	5	15	15	29	8
Change in FAO Crop Production Index, 1986-97 (% per annum)	3.7	1.1	3.3	1.3	4.6	-0.4	-0.1
Maize Yield (kg/ha)							
1961-65 average	2,410	1,110	990	1,020	1,080	810	1,180
1993-97 average	8,980	1,581	1,547	1,877	1,228	1,117	1,405
Percentage Growth in Maize Yields 1961-65 to 1993-97 (%)	272.6	42.4	56.3	84.0	13.5	37.9	19.1
Total External Debt as a percentage of GNP (1994)	46	30	34	112	152	99	230
Gross Domestic Savings as percentage of GDP	28	15	21	24	6	10	3
<i>Sources:</i> Based on: FAO 1971, 1996 and 1998; UNESCO 1997; UN 1997; UNDP 1997 and figures from the Government of Chile Office for Studies and Agricultural Policy							

2.1 The Case Study Countries

Maps 1 and 2 show the location of the Case Study Countries and the area covered by the African regional fund under ASARECA. There are major differences in the level of socio-economic development of these countries: some basic indicators are shown in Table 2.

Obviously the picture such figures presents is incomplete, but the differences shown are large enough to affect the prospects for success of initiatives such as competitive agricultural technology funds.

- The Human Development Index is a composite measure that combines longevity, knowledge and standard of living, giving an overall view of the state of socio-economic development of a country. Table 2 shows how large the gap is between the two South American countries on the one hand and the other case study countries on the other.
- The adult literacy rate serves as a useful proxy for a population's general level of formal education, and therefore its prospects for science- and technology-based development. More directly, literacy promotes technology adoption by facilitating both the flow of information to farmers, and feedback from them. Because educational provision is initially concentrated in urban areas, the rural hinterland tends to benefit disproportionately as literacy levels rise, so that for the agricultural population the differences between the South American and West African countries shown in Table 2 are even greater than the numbers suggest. Female adult literacy is particularly important in Africa, where so many farmers are women, yet the literacy rates for women are consistently lower than those for men. In India men tend to be the main on-farm decision-makers, but the gender division of labour is likely to make India's relatively low female literacy rate (exacerbated by limited female purchasing power) a constraint in certain areas of technology development and dissemination.
- GDP in absolute terms can serve as an indicator of the quantitative aspect of domestic demand for agricultural produce. Per capita GDP can be regarded as a qualitative indicator, because at low income levels the income elasticity of demand for quality foodstuffs such as vegetables, fruit and livestock produce are high. Both measures have profound implications for the profitability of technology adoption by farmers. Again the South American countries, particularly Chile, tend to score well on both counts, while the huge scale of India's economy helps offset its low per capita income. In contrast, the African countries are disadvantaged by both poverty and the diseconomies of small scale.
- The African countries' heavy dependence on agriculture, in terms of both GDP and employment, is another constraining factor, since the non-agricultural sectors constitute agriculture's main domestic market.
- High population growth rates in Africa have meant sluggish growth of per capita GDP and a growing food import bill. Lack of technological progress in agriculture has meant African countries have also lost out in

several global agricultural commodity markets where they were traditionally the major suppliers.

- In four of the seven countries the rate of growth of crop production (as indicated by the FAO index) has failed to keep pace with population growth, and in two it is negative in absolute terms. India's good showing here echoes some encouraging recent achievements in research, extension, marketing and input supply. In Mali high growth in the index is largely due to the spread of irrigated rice.
- The figures on maize yield were chosen to represent long term productivity trends. Obviously no one crop is ideal for this type of comparison, but at least maize is grown on a significant area in all seven countries. The comparison is of averages for two five-year periods (to smooth out unusual years). The first is a period just before the green revolution and the second is the latest five-year period for which figures are available. These statistics indicate just how far ahead of the others Chile is in terms of technology-based growth in average land productivity, with both the highest initial yield and the highest growth rate.
- All of the African countries in Table 2 are on the UN's 'Heavily Indebted Poor Country' list, and this, coupled with the low savings rate and low tax base, indicates how difficult it will be for most of them to finance agricultural R&D from domestic resources in the foreseeable future.

2.2 Characterisation of the Case Study Funds

The following ten funds were taken as case studies:

- Africa Regional ATTF/ASARECA: The Agricultural Technology Transfer Fund (ATTF) of the Association for Strengthening Agricultural Research in East and Central Africa.
- Chile FONDECYT: *Fondo Nacional de Desarrollo Científico y Tecnológico* (The National Fund for Scientific and Technological Development) under Chile's National Commission for Scientific and Technological Research.

- Chile FONDEF: *Fondo de Fomento del Desarrollo Científico y Tecnológico* (Fund for the Promotion of Scientific and Technological Development) under Chile's National Commission for Scientific and Technological Research.
- Colombia PRONATTA: *Programa Nacional de Transferencia de Tecnología Agropecuaria* (National Programme for the Transfer of Agricultural Technology) of the Ministry of Agriculture and Rural Development.
- India AHRS: The Ad hoc Research Scheme under the Agricultural Produce Cess Fund of the Indian Council of Agricultural Research.
- India VBKVK: Agricultural Research Fund of the *Vidya Bhavan Krishi Vigyan Kendra* (Agricultural Science Centre) of Udaipur, Rajasthan State, India.
- Kenya ARF: The Agricultural Research Fund managed by the Kenya Agricultural Research Institute.
- Mali IER: Fund under the *Institut d'Economie Rurale* of the *Comité National de Recherche Agricole* (National Committee on Agricultural Research).
- Senegal NRBAR: Fund under the Natural Resource Based Agricultural Research Programme of the *Institut Senegalais de Recherche Agricole* (Senegal Institute for Agricultural Research).
- Tanzania NARF: National Agricultural Research Fund of the Department of Research and Development, Ministry of Agriculture and Co-operatives.

The sample of funds is very diverse, embracing seven countries from three continents, English-, French- and Spanish-speaking traditions, a wide spectrum from upstream technology generation to downstream technology delivery, small- to large-scale, regional as well as national funds, and a rich mixture of funding levels, sources and modes. Some basic characteristics of these funds are shown in Table 3¹.

1. Individual case study reports can be viewed at the ODI and RIMISP websites, respectively: <http://www.oneworld.org/odi/> and <http://www.rimisp.cl/odiprinc.html>.

Table 3: Basic Characteristics of Case Study Funds

	Africa Regional	Chile FONDECYT	Chile FONDEF	Colombia PRONATTA	India AHRS
Date Established with Whose Backing	1994 by World Bank, USAID, and CIP	1981 as part of the government's programme to promote S&T research	1991 as part of S&T programme of the Chilean Government	In 1989 as part of the government's decentrali- sation programme	Cess 1940, AHRS 1966 by the Indian Government
Funding	Draw-down; USAID grant	Fixed annual allocation from Chilean Government	Drawdown funded by IDB and the Government	Drawdown funded by W. Bank and the Government	Cess (tax) on agricultural products
Areas eligible for funding	Transfer of agricultural technologies	Wide range of science and technology development incl. crops and livestock	Science & technology services with significant impact on production	Projects that respond to the needs & pot- ential of small rural producers	Basic and applied research
Scope of the Fund	Regional	National	National	National cov- erage, region- ally organised	National
What it finances	Transfer of a wide range of agricultural technologies	Project com- petition; Inter- national co- operation; Sectoral programmes, 'complemen- tary lines'; Doctoral theses	Sectors of economy with comparative advantage, including farming, cattle raising, forestry, fisheries	Applied and adaptive research and technological training, institutional development at regional level	3-5 year pro- jects, basic research; unforeseen research problems; research to fill critical technology gaps
Current Budget	US\$1.57m	US\$38.5 million	US\$19.5m per annum	US\$11.3m per annum	US\$6.4 m per annum
Budget trend	Increasing	Rapidly increasing	Increasing	Increasing	Increasing
Size of fund cf: a) other CATFs b) over- all pool	(Answer not clear)	a) Largest at 38% of competed funds b) Not stated	a) 20% of competed funds b) Not stated	a) Only competitive fund project in agriculture b) Not stated	a) India's largest b) 4% of ICAR and 2% of national research and education budget
National contri- bution	Nil	100%	72%	Counterpart co-financing	100%

	India ARF-VBKVK	Kenya ARF-KARI	Mali IER	Senegal NRBAR	Tanzania NARF-DRD
Date Established with Whose Backing	In 1995 by Ford Foundation	1990 on the initiative of local researchers	1994 by World Bank and CNRA	In 1991 by USAID	In 1993 by agreement between the government and donors
Funding	Drawdown funded by Ford Foundation	Drawdown; USAID and DFID grants, IDA loans	Drawdown World Bank loan	Drawdown; funded by USAID grant	Drawdown; IDA and African Devt. Bank loans
Areas eligible for funding	Adapted farmer participatory research	Mostly applied, some strategic research and technology transfer	Agricultural research; preferably applied or adaptive	Development, validation and dissemination of locally-appropriate technology	Contract and collaborative research and research grants
Scope of the Fund	Small farmers of Udaipur District	National	National	Areas with >400mm annual rainfall	National
What it finances	Short-term projects (< 3 years) focusing on problems of small farmers	Research leading directly to uptake by farmers or agribusiness	Not stated	Short to medium term in soil management, crop production, agroforestry & animal production	Grants of 1-3 years; other characteristics not stated
Current Budget	US\$37,000 per annum	US\$69,000	US\$20m	US\$400,000 per annum	US\$1.4m
Budget trend	One-off project	Fluctuating	N/A	One-off project	Increasing
Size of fund cf: a) other CATFs b) over-all pool	a) Tiny fraction overall b) Highly complementary	a) The only one in KARI b) 0.35% of KARI's budget	(Answer not clear)	a) Only such fund in agriculture b) Highly complementary	a) Not stated b) Not stated
National contribution	Nil	In-kind contribution only	US\$ 2.34 million	In-kind contribution only	US\$1.4m

2.2.1 Objectives

Most of the funds in the case studies have multiple objectives.

- achieving financial sustainability in agricultural research (India-AHRS, Chile-FONDECYT)
- making research more appropriate to local conditions (Kenya, Colombia)
- making research demand-driven by increasing stakeholder participation in agenda setting (India-VBKVK, Mali, Chile-FONDEF, Senegal, Kenya, Tanzania)
- improving utilisation/co-ordination of the country's scientific resources (Kenya, Tanzania, Colombia)
- improving linkages/co-ordination between research and users of agricultural technologies (Africa Regional, Mali, Chile-FONDEF, Colombia)
- promoting decentralisation (Colombia, Mali, Tanzania). Specifically in the case of Colombia's PRONATTA, this entailed developing a co-ordinated regional approach, with regional nodes linked to the national agricultural R&D network
- strengthening of institutions of research and technology dissemination (Colombia, Chile-FONDEF)
- promoting scientific excellence (Chile-FONDECYT, India-AHRS)
- making technological innovation a determining factor in improving the international competitiveness of the country's companies, particularly by working in areas where the nature of the activity or its high risk discourages private R&D efforts (Chile-FONDEF)
- improving natural resource management through applied/adaptive research (India VBKVK, Senegal)
- making provision for unforeseen research problems (India-AHRS)

- improving training opportunities (Kenya)
- generally improving farming and marketing (India-AHRS)

2.2.2 *Governance*

Again there is great diversity.

- The frequency of meetings varies greatly, from once yearly in the Africa Regional fund to one to three times a month (depending on the point in the project cycle) in Chile's FONDEF.
- The most complex structure is found in Chile's FONDECYT, which is based on two boards (one each for the development of science and technology) with cross-membership and alternating chairmanship. The most straightforward is in ICAR, where the fund is simply administered by the ICAR Director General and senior management.
- The governing body may represent only central government (FONDEF), but it is more common for a wider range of stakeholders to be represented. The widest range is to be found in the African regional fund, which has a large (15 member) steering committee drawn from across the region and representing NARIs, IARCs, extension, the private sector and the donor.
- Eight of the ten funds operate with donor support, and five have donor representatives on the governing body (Africa regional, Kenya ARF, Mali IER, Senegal NRBAR, Tanzania NARF). In the case of VBKVK the donor's non-involvement at this level may reflect the Ford Foundation's underlying philosophy. In the other two cases (PRONATTA and FONDEF) it probably mirrors the strong national leadership of the funds in question. The Kenya ARF case is intermediate in this sense, as the donor has only observer status.

2.2.3 *Priority Setting*

In most of the case study funds priorities are set through discussion (leading to reported consensus) within the fund's governing body. Another approach is to convene a priority-setting workshop, but in the two cases

where this approach was adopted (Tanzania NARF and India VBKRK) end-users were not involved.

In the other Indian case the 'intuitive scientific judgement of peers and senior research managers' determines priorities.

PRONATTA at central level deliberately refrains from setting priorities because a centralised definition of research topics would run counter to the fund's aim of decentralisation and the building of regional autonomy. However, at the regional ('nodal') level, a great deal of effort is put into validating research problems and assigning priorities to them. Farmers' representatives play a central role in this process. The regional nodes then use the prioritised scenario and problems to establish 'project profiles', simple descriptions of the prioritised problems, in which the problem's importance, its effects and other information referring to its magnitude and the need to solve it are stated. From these profiles, the node builds a prioritised list of research projects for the region.

In the Kenyan fund there has been a strong shift towards using the regional research centres as bases of operation, a move that has been accompanied by a shift to participatory methods: it is planned to use the findings of these to set regional priorities for the ARF in the future.

2.2.4 Management

Fund management ranges from highly sophisticated management systems to fairly simple ad hoc procedures. PRONATTA exemplifies the former and is worth presenting in some detail, as it may serve as a useful indication of what can be achieved (Box 1). Needless to say, such a presentation should not be interpreted as implying that funds from countries less developed than Colombia should be judged as failing if they do not attain this high standard. What it is meant to do is present a set of standards towards which fund managers might wish to move incrementally, within a prioritised frame and with an appropriate degree of adaptation, as they continue to develop.

The two Chilean funds, as might be expected, also have well-functioning management structures, although these do not have quite the same level of dynamism, feedback and results-orientation that characterises PRONATTA. The African regional fund has also been well-managed, largely because of its strong connections to the international agricultural research system, and the technical, administrative and management support which CGIAR centres

Box 1. PRONATTA's Management System

- Central level executive management is located within a Co-ordinating Unit under the Programme's General Co-ordinator, who is its Director and who acts as Technical Secretary of the Steering Committee.
- There are four components (Institutional Strengthening, Technological Development, Monitoring & Evaluation, Administration) and five Regional Co-ordination Units. Each has a full time professional, technical and administrative staff.
- PRONATTA considers supervision, monitoring and evaluation as critical factors for optimising the planning and execution processes, and its (M&E) System provides ordered information about results in relation to the annual and midrange objectives.
- Feedback is used to adjust strategies and modify operations in a self-learning management environment.
- A Management Information System, designed with the participation of all the Programme's technical personnel, evaluates operations based on results. This produces the Systematised Indicative Plan that specifies the actions needed to reach the Programme's objectives. It defines the objectives, the method of measurement, and the range of goals that will determine the degree of fulfilment of each of the established indicators within an agreed time frame.
- The M&E system uses progress reports before each disbursement, plus technical and financial on-site verification. This information is entered into a database that generates warning signals when a project looks in danger of falling behind schedule.
- One of the services expected to be provided as a result of this M&E is an information system for final users (small rural producers). Staff from outside the Fund are actively involved in developing this system. Development of this service is actively under development. This will allow final users to obtain the information that will enable them to choose between technological alternatives, integrate production processes and adopt marketing strategies and management schemes that will better equip them to face the challenges of competition.

have provided. In the case of the Indian AHRS it proved difficult to tease out management issues specific to the fund because it is managed as an integral part of the much larger ICAR system. Nevertheless the fund has suffered from some of the management problems listed below, particularly implementation delays.

The main management problems, which have been encountered in most funds, can be summarised as follows.

- inadequate staffing, which has made it difficult even to cope with the routine of advertising and handling applications, far less put an effective M&E system in place
- generally speaking, where there is an M&E system for the fund itself (as distinct from projects under the fund) it is limited to financial monitoring so that other measures of progress are not tracked and addressed
- irregular and unreliable flow of resources into the fund (a particular problem in Kenya as different donors have moved in and out)
- insufficient and inadequate management skills and training and inadequate equipment (computers etc.)
- irregular and unreliable financial disbursement due to poor management and excessive bureaucracy
- delay in getting referees' comments on research proposals.
- delay in revision of proposals by researchers
- difficulties in convening meetings of the project evaluation group

The two most serious cases of management problems were found in Mali and in the VBKVK fund. In the former, it was widely reported by key informants that management standards were poor. In the latter case, lack of exposure on the part of farmers, NGOs and researchers to the concepts of farmer participatory research apparently led to final and complete management dysfunction. There were also management difficulties in the Senegalese fund, but these were recognised from the outset and the donor contracted the University of Oregon to assist ISRA in managing NRBAR projects.

2.2.5 *Operational Procedures*

A number of operational procedures are compared in Table 4. These reveal some potentially important differences in variables that could well affect fund performance. A particularly important issue is that of incentives – or lack thereof – for individuals and institutions to participate in fund activities.

2.2.5.1 *Eligibility Criteria*

At least on paper, there are few restrictions on who can apply to the Case Study funds. In Kenya applicants must hold a minimum of a BSc. And in Senegal the fund was established to support a restricted number of organisations, so that only members of those organisations can apply. The same was formerly true in Kenya where, at the fund's establishment, scientists from the managing organisation – the Kenya National Agricultural Research Institute – were barred from applying.

Typically, though, any individual or group (separately or in association) in research, extension and education, whether public, NGO or private sector, can apply to these types of competitive funds if competence and experience can be demonstrated. In some cases even non-nationals can apply provided they are resident in-country (Africa regional, Kenya, Chile FONDECYT), while joint Chilean-foreign applications are permissible in the case of FONDEF. Special considerations may apply in keeping with the nature of the fund. For example, in the case of FONDEF the application must be a collaboration between the researcher or research institution and a private firm that can ensure technological transfer of results, and this must be reflected in contributions to the formulation, management, execution, transfer of results, and in the financing of the projects. The PRONATTA fund also requires co-financing, but it also actively encourages proposals from entities of widely differing size, response capacity, experience and potential.

In practice restrictions do apply in a number of cases. For example, outside the public sector, India's AHRS will accept proposals only from 'recognised' research institutions. In Senegal individual applicants must be 'ISRA confirmed' researchers, while partners in collaborative research (NGO, producers' associations, or farmers' group) must be registered with the appropriate Ministry or local authority. These are explicit exclusions, but there are also implicit ones, such as *de facto* entry barriers which often defeat the explicit purpose of the overt eligibility criteria. For example if grants from the fund do not cover salaries, this tends to exclude private sector

applicants, including NGOs. Similarly, by saying that the projects must be co-financed by the private sector, small firms tend to be excluded.

Table 4: Operational Procedures of Study Funds

	Africa Regional	Chile FONDECYT	Chile FONDEF	Colombia PRONATT A	India AHRS
Is there a Fixed Application Format or Operations Manual?	No	Yes	Yes	Yes: a floppy disc is supplied containing the pro forma	Yes
Minimum or Maximum Budget?	Up to \$40,000	Up to \$100,000	Average annual cost of projects ≈\$160,000	Up to 70m Colombian pesos	No (DG can approve pro-posals up to \$125,000)
Time limit on Projects?	4 years maximum	1-3 years	1-3 years	3 years on each call for proposals	Normally 3 years, maximum 5 years
Overheads Permissible?	No	For universities only, and then ≤ 17%	8% plus ≤ 7.5% of the grant	No	No
Casual Wages Payable?	Yes	Yes	Yes	Yes	Yes
Salaries Payable?	No	Honoraria of up to \$11,790 for entire research team (up to half for principal researcher)	Yes	No	No
Salary Supplementation Allowed?	No		Yes: 'attractive level' but no amount specified	No	No
Are Scoping Grants Allowed?	Possibly in Phase II	Not stated	Not stated	No	No

	India VBKVK	Kenya ARF-KARI	Mali CNRA	Senegal NRBAR	Tanzania NARF-DRD
Fixed Application Format or Operations Manual?	Yes	Yes	Guidelines	Yes	Yes, but needs updating
Minimum or Maximum Budget?	Maximum \$ 1250	Maximum \$37,000	Neither	US\$ 25,000 for collaborative research; otherwise US\$ 10,000	No minimum, \$30,000 maximum
Time limit on Projects?	Less than 3 years	Three years. but it can be extended if justified by achievements and anticipated impact	Not to cover more than the first phase of the strategic plan (6 years from 1995)	Three years maximum, but declining as project reached completion in July 1998	Three years maximum
Overheads Permissible?	No	Yes: 15% of grant	Not stated	10% overhead to centres and 17% overhead payable to the Scientific Director	No
Casual Wages Payable?	Yes	Yes	Yes	Yes	Yes
Salaries Payable?	Yes	20%, but no longer	No	No	No
Salary Supplementation Allowed?	Yes	No	Not stated	No	No
Are Scoping Grants Allowed?	No	Yes, but none awarded so far		No	No

2.2.5.2 Advertising

Most funds advertise widely, both through the press and directly to institutions which are likely to be interested in applying. FONDEF goes further, organising promotional meetings in regions from which there have been few applications. The Tanzanian fund is unusual in that announcements are made only through the zonal directors (Directors of Zonal Research Institutes of the Department of Research and Development - DRD), who are then supposed to pass on the information to any and all 'zonal scientists'. This perhaps helps explain the concentration of applications in a single institute, namely the DRD itself. Most funds are advertised annually (or several times a year) and a batch of applications is then processed. In a few cases (Tanzania, India-AHRS) applications can be submitted at any time, but this has been found to create processing problems, particularly when there is a part-time secretariat as is the case in Tanzania.

The African regional fund requires submission of a brief pre-project statement, but in most case study funds the full proposal is submitted.

2.2.5.3 Pre-screening

The first step after submission of applications is usually an *administrative* pre-screening process to ensure that formalities have been complied with – for example completeness of the proposal, whether it falls within the priority areas, use of the prescribed format, clarity of purpose, etc. Applications which pass this first hurdle are then usually sent to an appropriate body for *scientific* pre-screening. Pre-screening is often the responsibility of the Steering Committee or executive board. Where there is a pre-project phase, this is the stage at which it is decided whether to invite submission of a full proposal.

2.2.5.4 The Project Selection Process

Although all funds lay down selection criteria, there is in practice great variation in the rigor with which these standards are applied. In the Senegalese case it is reported that there are so few applications that virtually all are funded. At the other extreme an application might have to go through a rigorous series of steps in order to secure funding. As in the case of management issues discussed earlier, one of the South American funds (FONDEF) will be used to illustrate a rigorous process of screening and project selection (Box 2). The same proviso applies about not using such a description as any kind of yardstick against which to 'pass' or 'fail' funds in countries that are less developed than Chile.

Some other case study funds follow procedures that to a certain extent echo this process, with the other two South American funds coming closest in terms of rigor objectivity and attention to detail. All funds use committees to review proposals, but two, Senegal and Tanzania, use only internal reviewers. The Kenyan, Tanzanian and African regional funds have peer review procedures that mirror those employed by the FONDEF's Area Committees, although there is perhaps less standardisation in terms of the tests of acceptability that are applied.

In the Kenyan case a specific problem that was mentioned (and which has arisen with other funds beyond this study) arises from the very small pool of in-country scientists available to conduct peer reviews. Two concerns voiced by applicants themselves relate respectively to the worry that the confidentiality criteria might be difficult to adhere to, and the fear that intellectual property rights might not always be respected. The African regional fund to some extent circumvents these problems precisely because it is regional and can therefore call on a larger pool of reviewers, including staff of CGIAR institutes, who are less likely to be personally acquainted with applicants.

2.2.5.5 Final Selection

Decisions at this point tend to be made by the Board or Steering Committee. In some funds (e.g. FONDEF) a sub-committee of the Board collates the recommendations of the various thematic area committees and evaluates them as to overall quality and homogeneity. It then makes final recommendations to the Board. PRONATTA has a National Panel that fulfils a similar function, assessing proposals put forward by the various Regional Panels.

Interestingly, in Mali there is a similar two-stage process for final approval. A Scientific Commission, which is external to the Institut d'Economie Rurale (IER), reviews the selection of new projects and makes technical recommendations. A Financial Resources Commission examines budgets and financial plans and adjusts the proposed budgets of the projects to available funding. Recommendations from these commissions are then forwarded to the CNRA executive board for approval.

Box 2. FONDEF's Project Selection Process

- Proposals submitted to FONDEF are evaluated in terms of their compliance with the Fund's objectives. These fall into three categories: socio-economic, scientific/ technological and institutional. After scientific pre-screening (which assigns the various proposals to thematic areas under designated Area Committees), there are two stages in the evaluation: scientific/technological and socio-economic.
- The scientific/technological evaluation in turn has three stages. Based on the review of the proposals, the Area Committees designate at least two external evaluators – chosen for their professional capability and experience in the subject – for each project. Their names remain confidential. Each evaluator receives the project to be evaluated, the conditions of the competition, a scientific-technological guideline, and a contract, which has clauses regarding the confidentiality of the information contained in the project and an affirmation that there is no conflict of interest.
- For the evaluation process proper, the evaluators use a prescribed scientific-technological evaluation form that is common to all projects. This contains an exhaustive list of questions the purpose of which is to specify the criteria and the depth of the analysis. This guideline is organised into three general topics: content, management and transfer. Subsequently the evaluators must make a synthesis of evaluation conclusions in which they include their recommendations and comments.
- The final stage is an evaluation review and scoring exercise during which the Area Committees review the evaluations and conduct a definitive scientific-technological evaluation. In the same way as with the external evaluations, the Area Committee's evaluation leads to a score based on the proposal's content, management and transfer. The Area Committee's score represents the project's definitive scientific-technological rating.
- The socio-economic evaluation in many ways mirrors the above process, again with confidential external evaluators being employed. A social cost-benefit analysis of the project is conducted under uncertainty conditions using a probabilistic simulation model with Monte Carlo runs. The most reasonable and realistic assumptions are made to establish the evaluation's parameters. Indicators such as internal rate of return (IRR), net present value (NPV), net present value/total cost of the research, net present value/amount requested from FONDEF, and probability of success (probability density of obtaining a NPV greater than zero), are calculated and used in the final assessment of the submission.

Availability of funds tends to figure prominently in the final decisions of the South American funds, as they tend to have a relatively large shortfall between (a) total available funding and (b) the funding requirements of proposals that reach the final selection stage. (Some of the others have a surplus, rather than a shortfall.) Proposals emerging with a positive recommendation from the review process are therefore ranked according to technical, scientific and socio-economic merit, so that in the event that not all can be financed, funding can be allocated in the order of ranking.

In the analysis of the Tanzanian fund it was found that the number of grants a discipline or zone gets is almost linearly correlated to the number of registered applications. Although this probably does not reflect deliberate policy, it does suggest that there is some unstated egalitarian principle at work when projects are evaluated. Others funds, particularly those in South America and India's AHRS, give consideration only to the quality of the proposal itself.

2.2.5.6 Monitoring, Evaluation and Financial Reporting

It was noted earlier that the management of the PRONATTA fund views supervision, monitoring and evaluation as critical factors for optimising planning and execution. In addition, its M&E system provides ordered information on project results in relation to both annual and midrange objectives. These are then fed into the process of adjustment and re-evaluation. Although other funds have technical monitoring, the rigor with which this is conducted seems to vary a great deal, and the degree to which it then feeds back into an iterative process of adjustment and improvement is nothing like so well developed as in PRONATTA. In the least developed countries M&E is often viewed largely as a matter of ensuring that periodic reports are received on time (and in the prescribed format) together with the work plan for the next reporting period. On the financial side monitoring does tend to be more strict. It is usually necessary to show that expenditures are both legitimate and properly accounted for before the next tranche of funding is released. No reports were received of post project evaluation.

2.3 Key Concerns in Fund Performance

In planning this study, seven major concerns about fund performance were identified. These are: equity, stakeholder participation, decentralisation, efficiency, accountability, networking and sustainability of financing. These will be examined in turn.

2.3.1 Equity

Given the current concern of many donors (in particular DFID) with poverty reduction, it is important to understand whether CATFs can make a contribution in this area. This means analysing:

- whether a fund has as one of its objectives the promotion of equity
- if so, how it tries to achieve this aim and
- whether it is succeeding in doing so

Four of the Case Study funds (FONDECYT and FONDEF Chile, the AHRS Fund in India and the Kenyan ARF) do not aim to promote equity. In keeping with its primary mandate of promoting scientific excellence, FONDECYT appears to assign low priority to proposals which target geographical areas or sectors where there is a high degree of poverty. In the AHRS fund the trend of projects with equity concerns, never high to begin with, has been falling. Thus comparing 1996/97 with 1990/91, the percentage of projects directed at helping mainly small farmers has fallen from 5.2% to 2.1%, the percentage with a gender perspective has dropped from 1.9% to 1.3%, while those targeting areas with a high incidence of poverty have declined from 4.5 to 2.5%.

The Kenyan fund also seems to have witnessed declining interest in equity concerns. Initially it focused on adaptive and on-farm research but in deference to the wishes of its main clientele, the University community, strategic research and 'good science' in general now qualify for the greatest support. This may help explain why in a sample of 253 applications to this fund, a special emphasis on poor or small farmers was detected in only 14%. Only 4% of projects had a specific gender focus. Perhaps most surprisingly, only 39% of the applications in the sample were specifically targeted at rural areas.

Lack of direct equity concern is also a feature of Chile's FONDEF. Here the reason is clearly the fund's strong focus on improving the competitiveness of Chilean agro-industry. Since collaborating companies must co-finance at least 20% of costs (which is close to \$200,000 per project) even medium-scale companies are effectively ruled out, let alone small farmers. Benefits to the poor are expected to materialise indirectly in such forms as increased employment or cheaper food.

The remainder of the funds do have equity as a primary concern. By its definition and mission, PRONATTA co-finances exclusively projects and training activities for small rural producers who, in turn, are located in geographic areas in which rural poverty is usually concentrated. Although only 6% of PRONATTA-funded projects specifically mention women, it is thought that many other projects are of relevance to them. This is the only fund for which there is evidence of specific targeting of ethnically disadvantaged groups.

The African regional fund has also been successful at translating its central equity concern into fund activity: all 16 of the projects so far approved were small-farmer focused and 31% specifically targeted women as ultimate beneficiaries. In practice, since women constitute the majority of smallholders in the region, the positive impact on women could be higher than this latter figure suggests. The project also seems to have contributed substantially to equity in funding across countries, disciplines and type of implementing agency.

Having an equity focus does not of course in itself guarantee that inequity will be reduced by the activities which are funded. For example, in the Mali fund there is a strong gender focus, but the effectiveness of training provided under its auspices varies regionally and does not always reach very far down the line from sensitisation to application. For gender sensitisation to make a real difference to new research activities, training would need to be extended to all staff, including field workers. The fact that the courses in question are taught only in French, and not in local languages, precludes this.

The Senegalese fund also promotes gender equity, but implementation of this policy has been constrained by socio-cultural practices and the land tenure regime. One project under the Senegalese fund is specifically women-oriented, but the evaluation found that participation of women in the project design was insufficient. Similarly, although this fund targets areas of high incidence of poverty, within such areas the projects do not target the poorest 10% of the population.² There are also sometimes problems of interpretation. Again taking the example of the Senegalese fund, the definition of a 'small' ranges from 0.5 to 11 hectares. Most farms in this range would not be considered small by west African standards.

Overall, then, it is hard to claim that the funds are making a significant contribution to the promotion of equity within agricultural technology development and transfer. This does not mean that such types of funding

2. In fairness it must be added that it is extremely difficult to help people at this end of the poverty spectrum through technology development, as they do not have the resources to invest, and often are not even farmers.

mechanism may not make a positive contribution in this area in the future, but it does underline the fact that the funding mechanism alone is unlikely to be able to achieve this. If a substantial improvement were to be achieved here, CATFs would need to be part of a more equity-focused overall technology system, which provides adequate training to workers and scientists and has available to it adequate information about the needs and objectives of poorer people in rural areas.

It is notable that social funds have also experienced 'serious challenges' in reaching the poor. Reddy (1998) cites the following as contributing reasons:

- the lower capacity of the poor to formulate and present projects
- the requirement for co-financing which can act as a disincentive for the poor to apply
- mistrust amongst poorer (especially rural) communities about fund motivations
- the requirement of broad (rather than narrow, targeted) coverage if funds are to prove politically sustainable

He notes that some social funds have established schemes to help upgrade the skills of the poor but that these have often turned into de facto project preparation units, thereby undermining the demand driven objectives of the funds in question. A further interesting finding of Reddy's study is that those funds which are 'supply driven' (i.e. in which management designs the projects) have had greater success in achieving poverty reach than those which are 'demand-driven' (where projects are financed in response to proposals from potential beneficiaries or those working on their behalf). Demand drive was the second key concern studied in this research.

2.3.2 Demand Drive and Stakeholder Participation

Table 5 shows the participation of various stakeholders at major points in the project cycle of the case study funds. One important omission revealed in the Table is the lack of consumer involvement in the project cycle. The only exception here is for FONDEF, which requires that market research findings be presented as part of the justification for proposals.

This gap is perhaps not too surprising, given the fact that the agricultural technology agenda has traditionally been set by scientists, extensionists and

Table 5: Stakeholder Participation in the Project Cycle of Case Study Funds

STAKEHOLDER	Phase of the Project Cycle						
	Initiation	Administrative Pre-Screening	Scientific Pre-screening	Peer Review	Final Project Selection	Management	M&E
Small Farmers	A, C, D, F, g, h, I, j						I
Large Farmers	C						
Farmers' Organisations	D, H, I	D, H	H	H	D, H		D, H, I
NGOs	F, I	I		I	F, I	F, i	F, I
Agro-Industry	C, H				G, J	G, J	I
Extension	H	H					
Consumers	C						
Researchers	A, B, C, D, E, F, G, H, I, J	A, I	A, B, C, E, H, I	B, C, E, H, I	A, B, E, F, H, I	A, D, E, F, G, I, J	A, C, E, F, G, H, I, J
External Reviewers				A, D, E, G, J			
Policy Makers	C, I		G, H	H	D, G, H, J	E, G, J	G, J
Administrators	A, C, E, F, I	A, B, C, D, E, G, H, I, J	A, E, H, I, J	A, C, H, I	A, C, E, F, G, H, I, J	B, D, E, F, G, H, I, J	B, C, D, E, F, G, H, I, J

KEY: A = Africa Regional-ASARECA; B = Chile FONDECYT; C = Chile FONDEF; D = Colombia PRONATTA; E = India AHRS; F = India VBKVK; G = Kenya ARF; H = Mali CNRA; I = Senegal NRBAR;
J = Tanzania NARF.
UPPER CASE = Major involvement; lower case = minor/indirect involvement.

policy makers with even the producer being excluded. Indeed, it represents a significant improvement that so many of the funds studied do involve small farmers (though their involvement in the two funds from east Africa is very minimal). However, their lack of involvement after the initiation phase stands out very clearly here. For a number of reasons – small farmers' lack of familiarity with technological change and with market requirements, the complexity of their farming systems, their socio-economic heterogeneity – there is need for constant interaction with smallholders as the new technologies are developed and deployed so as to ensure that unforeseen problems and changing circumstances are addressed promptly and effectively. At present this is unlikely to be happening. Even where funds are,

in principle, backed up by participatory appraisal exercises conducted amongst small farmers, it is not at all clear that the findings are then incorporated in the agenda set out in the calls for proposals.

Of all the case studies, PRONATTA stands out for the systematic way in which it involves farmers throughout the project cycle. Through their organisations farmers are involved in problem definition, assignment of priorities to research topics, creation of partnerships with institutions of technological change, proposal assessment, and evaluation of the results of the projects – including impact assessment. A number of other funds, particularly the one in Mali, involve farmers indirectly through farmers' organisations. Where the latter are elected and representative of all farmers, this is a viable and efficient alternative or adjunct to PRA, but the problem is that in developing countries, farmers' organisations are so often representative only of some farmers – primarily those who are male, influential and relatively well-off (Carney 1996). This certainly appears to be the case in Mali.

Overall, increasing the links with farmers throughout the fund management and allocation process, as a means of increasing the demand-drive of overall fund-financed portfolios is an area requiring considerable attention and improvement.

2.3.3 Decentralisation

Half of the case study funds have decentralisation as a specific objective. The African regional fund is decentralised in both definition and design, though there has been little decentralisation in either the determination of the thematic agenda (which has not changed from the outset) or the evaluation of proposals (which has been mainly done by the various IARCs). There has, nonetheless, been affirmative action in terms of distribution of awards by ensuring that as many countries as possible are involved. Thus, the single applications that were received from two of the member countries were both funded while only 12% of the 100 applications received from three large member countries were funded. The VBKVK fund in India is also decentralised by definition and by design (in the sense of being devolved to a single district) but in practice there seems to have been little decentralisation beyond the NGO which runs the fund. The Mali fund is also designed to be decentralised, with five regional directorates. These define the thematic agenda and evaluate proposals in the first instance. However in practice there is some disarray in how the fund operates, with an ill-defined financial management structure and a

bifurcated reporting system that has led to confused lines of communication and management. These aspects of the fund are currently in process of being reorganised. The Senegal fund has had decentralisation as an explicit priority only since 1996, when four regional research centres were granted autonomy in defining the thematic agenda and greater authority was given to the Centre Directors. However, the submission and selection of proposals follow the same process as the other types of projects and are approved or rejected by the Committee in the capital, Dakar. Financial reports are still centralised, as are disbursement procedures.

Colombia's PRONATTA stands out as model of decentralisation in both principle and practice. This makes the fund congruent with a general decentralisation process that has been taking place in Colombia over the past ten years. For the purposes of awarding grants, the country is divided into five regions, each with a Regional Co-ordinating Unit and professional staff. This is the level at which institutional strengthening takes place, priorities are set, the project selection process is initiated, and recommendations for the final approval of the Fund's annual portfolio are made. To assist in this process there are Regional Project Selection Panels made up of technicians who know local conditions and who select projects and institutions that will benefit from PRONATTA funding. The role of farmers' organisations in this process was described earlier. Final approval of the annual project portfolio is centralised, but is based on the recommendations of the regional panels. Technology transfer is decentralised to the level of the Municipalities, which have created Municipal Units for Technical Assistance (UMATAs) for that purpose. The institutions that conduct applied and adaptive research operate at this level and, in general, work in collaboration with the UMATAs.

Decentralisation is decidedly not an objective of either of the Chilean funds, where between 50 and 70% of projects have gone to the Metropolitan Region, while some peripheral regions have received nothing. The same is broadly true of the Indian AHRS and the Kenya fund. In Tanzania it has been argued that the operation of the National Agricultural Research Fund has led to decentralisation by default. Because of administrative and management problems in the operation of the national fund, new Zonal Research Funds are in the process of being established. It is hoped and expected that these will be more efficient in their operation and will bring research closer to the ultimate beneficiaries (though the National fund is expected to remain to handle research matters of national importance or which affect a number of zones).

2.3.4 *Efficiency*

Five factors were considered in adjudging the efficiency with which the case study funds operate: timeliness, regularity of cash flow, factors impeding application to the fund, management and administrative costs, and post-approval administrative demands on awardees' time.

2.3.4.1 *Timeliness*

The period from submission of tenders to project start is generally in the range six to nine months. The Senegal fund is the record holder, taking only four to eight weeks, possibly due to the fact the fund was managed by a US university. At the other extreme are the Mali and Kenya funds, which can take more than a year and the Tanzania fund which, despite a target of six months, can take from two to three years.

2.3.4.2 *Cash Flow*

Two measures were considered: flow of resources into the fund and disbursements from it. In the case of the Kenya fund, financial inflows have been quite irregular, partly due to a change in donors, which left a two-year gap when there was no funding, but also partly due to varying input from the same donor: from 1991-93 USAID donations were steady at around \$59,000 per year, then in 1994 increased to \$212,000, before ceasing altogether in 1995. It was not possible to learn from either the appointed members or from the donors why no action has been taken to correct this extremely disruptive situation. In no other case was regularity of cash inflow a problem, though in Mali overall funding was suspended by the donor in 1997 pending restructuring of the fund.

In half of the case studies (the Africa regional, FONDEF, both Indian funds and PRONATTA) no problems were reported with disbursement of funds to researchers. The other five cases are disturbing, because one of the major problems ATFs are supposed to address is that of shortage of operating funds available to researchers. Given its excellent performance in other respects, the problems identified with the FONDECYT fund are the most surprising. There is never a problem with the first annual instalment of a grant, but in subsequent years disbursement depends on the approval of progress reports and on rendering accounts. Securing this approval can take two to three months.

Similar problems afflict the Senegal fund. Both the Mali and Senegal CATFs provide a revolving fund to grantees that is topped up every quarter after receipt of the financial report. At least in Senegal there were complaints about delays in approval which affect project activities, and these are

ongoing. This being the case, researchers argue that the size of the revolving fund should be increased from the outset to accommodate delays in replenishment, but this has not been done.

The worst problems are found in Kenya, Mali and Tanzania, but the causes are different in each case. In Kenya the problems can be attributed to the irregular and unreliable inflow mentioned above, and the apparent inability of fund managers to solve this problem. In the Mali case all project budgets for a given region are pooled and managed by the regional centre managers. Failure in financial management by some project managers therefore affects the flow of funds to all the others. This situation has resulted in lengthy delays and even suspension of the fund. In Tanzania fear of fraud appears to be so great that disbursements from the fund have been marked by extreme caution. While there are certainly merits to displaying caution, excessive caution disrupts the flow of finances and undermines the research itself.

2.3.4.3 Factors Impeding Application

One of the problems faced by fund managers, particularly in 'least developed' countries such as Tanzania and Senegal, is that there are too few applications. Good researchers have other options (consultancy work, contract research, etc.) which bring material benefits, as well as professional rewards, so funds in these countries are often under-subscribed.

The views of both potential applicants who do not apply to a fund and of recipients who decline to apply a second time, are valuable guides to fund performance. However, in assessing such views, some scepticism is always necessary: disappointed applicants are naturally liable to use opportunities such as the present survey to air grievances without necessarily giving the other side of the picture.³ Bearing this point in mind, the major reasons why people do not apply to the funds – other than financial delays which have already been noted – were found to be as follows:

- Approval of projects is very difficult and factors other than the quality of the projects (e.g. researcher's c.v.) help determine success (FONDECYT).
- The fund favours those who have already secured grants over new applicants (FONDECYT, Tanzania).

3. It must be stressed here that the list of factors is not derived from any sort of randomly selected sample, but rather through a limited number of interviews with subjectively selected group of key informants.

- The fund sometimes disallows certain expenses, and there is no appeal against this (FONDECYT).
- There are limits on the number of projects in which one can participate (FONDECYT).
- There is inadequate information/knowledge about the objectives, scope and financing possibilities of the fund (FONDEF, Tanzania).
- It is hard to secure the support of private business because of co-financing requirements (FONDEF).
- The application process requires economic evaluations for which it is necessary to hire a specialist, and research institutions in general are not ready to pay for this (FONDEF).
- The fund imposes excessive bureaucratic loads (FONDEF, Senegal).
- The proposal evaluation process takes too long (India AHRS).
- The monitoring and evaluation procedures are too rigorous, and scientists are not used to this (India AHRS).
- The concept of farmer participatory research is promoted by the fund, but it is unfamiliar to stakeholders (India VBKVK).
- Cash incentives provided by the funds to grantees are converted by the grantee's employing university into overhead, with nothing being provided in return (Kenya).
- There are general 'management inefficiencies' (Mali, Senegal, Tanzania).
- The fund's constitution biases its awards towards the department that runs it (Tanzania).
- Competition from commercial contract research provide better cash incentives for researchers (Kenya, Tanzania).

It should, however, be noted that in two of the funds - the Africa regional fund and PRONATTA - the study identified no disincentives to application. For example, the disallowing of certain expenses and the co-financing requirement which were problematic for FONDECYT and FONDEF respectively, were specifically stated not to cause applicants problems with the Colombian fund, because the conditions are well publicised in advance.

Contrary to our expectations, one disincentive to application that was not cited was the refusal of most of the funds to pay overhead costs to the employing institutions of the scientists who win awards.⁴ A cynical explanation for this proving unproblematic might be that many research organisations are so poorly managed that there is no clear idea of the full economic cost of doing business. Under such circumstances managers of some institutions are probably happy to accept any inflow of funds. A more charitable view would be that the opportunity costs to an institution of its scientists accepting projects is quite low and that the proportion of consultancy fees which they receive is viewed as sufficient incentive.

2.3.4.4 Management and Administration Costs

It was possible to obtain relatively detailed cost information for six of the ten case study funds. Management and administration costs for these were as follows.

Africa regional: 5% of budget in the first phase, when there was no secretariat and the project co-ordinator in CIP assisted by various IARC scientists volunteered their time. When M&A costs are charged in Phase II they will amount to 43% of the overall budget of \$1.57m.

FONDEF: 5% of the annual budget of \$20m.

PRONATTA: 6% of the budget of \$56.4m.

India VBKVK: 36% of the budget of \$111,000.

Tanzania: 37% of the budget of \$1.4m in Phase I.

Kenya: 15% of the total sum available within the ARF (which varies considerably, as mentioned above) for variable costs such as peer review, meetings, advertising, etc. At present salary costs of secretariat members are covered through the host institution. If these were to be included, it is estimated that management costs would rise to about 20% of the total fund amount.

The differences between the percentage spent on M&A in South American funds and the other three are particularly surprising given the relatively high levels of permanent staff employed in the Colombian and

4. However a substantial overhead will be paid to CIP from the funding agency in the second phase of the ASARECA-supported fund.

Chilean funds. Intuitively one would say that the higher the levels of permanent staff employed on a fund the higher will the management costs tend to be, but the opposite seems to be the case here.

At least for the larger and more sophisticated Latin American funds these levels of cost are quite similar to those for social funds. Reddy (1998) reports figures from various sources which show fund administration costs to vary between 2.5% and 10% of expenditure. One survey showed a median value of 9% for Latin American social funds. These costs are considered relatively low compared to other targeted problems. Nevertheless, there has been some criticism of the social funds for needless duplication of the functions, and lack of co-ordination with the activities of existing ministries. Although this was not explicitly addressed in this study, it could be argued that CATFs are expensive in that they needlessly duplicate existing resource allocation procedures.

2.3.4.5 Post-Approval Administrative Demands on Awardees' Time

In the Tanzanian, Kenyan and African regional cases, the limited number of awardees who were interviewed did not find time requirements for reporting to be unreasonable or burdensome (except for those unfamiliar with such requirements, who needed some assistance at first). In the Kenya case it was reported that the short reporting format and clear instructions for completion considerably eased this task.

This satisfaction was not matched elsewhere. FONDECYT was an intermediate case, in that time demands for technical reports were felt to be reasonable, but those for financial reporting were regarded as excessive. In four other cases (India's AHRS, Mali, Senegal and FONDEF), it was felt that time requirements for all reporting were excessive to the extent of cutting into time available for research. FONDEF requires the use of proprietary computer software, *Microsoft Project*, for reports, and this is complicated for many who are not familiar with it. The 10% of total time required for reporting in the Indian case is excessive by any standards.

PRONATTA at least strives towards efficiency by providing awardees with a floppy disk containing the technical and financial report formats. The technical format has eight sections that summarise general and specific information in relation to the progress of research activities and any changes in either technical or administrative matters. The financial report format has four tables in which basic information must be entered in order for the programme to calculate balances and spending indicators.

2.3.5 *Accountability*

One of the main justifications for the establishment of competitive funds has been that they will increase accountability to stakeholders. Part of this was covered in Section 2.3.2 above. Another core aspect of accountability relates to monitoring and evaluation systems, of both the fund itself and of the projects that it finances.

2.3.5.1 *Monitoring and Evaluation of the Fund*

The Indian AHRS fund does not have regular M&E, but there is periodic review of the Fund by specially-constituted committees. Most other funds are the subject of financial monitoring by their funding agencies (donors and/or national government) but the purpose is generally limited to ensuring that expenditure is properly accounted for. It was noted in the case of the Tanzania fund, one of those that has been performing poorly in the matter of disbursement to projects, that this aspect of financial management (as opposed to monitoring expenditure of the total disbursement to the Department of Research) is not subject to monitoring by the funding agency. Moreover reviews are not usually conducted in the early stages of a fund's operation, so that problems accumulate. Donors could be more helpful in this respect. However with some funds this is changing, and the services of Canada's International Development Research Centre (IDRC) have recently been secured to conduct evaluations of both Chilean funds. In the case of Kenya, the donors have agreed to join in funding an impact study on their contribution to KARI to date, but it is not clear that the ARF will be separately evaluated. The African regional fund was the subject of an external evaluation after completion of Phase I. This concluded that, by and large, the funded projects have achieved their aim with a good degree of efficiency.

PRONATTA has put in place what has been called a 'Managerial Information System' to produce evaluation reports for the fund partners. This system produces the 'Systematised Indicative Plan' which indicates achievement of objectives through the compilation of annual work plans. This indicative plan defines objectives, quantifies results and gives the range of activities and products. This later permits the level of achievement to be estimated objectively. In addition, the loan contract between the Colombian Government and the World Bank, through which the fund was established, stipulates that there will be both a midterm and a final external evaluation.

Not many funds are operated within 'logical frameworks' (log frames) or use milestones for the funds themselves (as distinct from the projects they fund). A log frame incorporating milestones and objectively verifiable

indicators is planned for the second phase of the Africa regional fund. The Senegal and Mali funds have milestones of a sort, but they are purely financial.

The establishment of the Senegal fund contributed to strengthening the monitoring and evaluation system within ISRA as a whole, as training sessions in these areas were offered to researchers. Financial accountability as well as accountability towards end users were reported to have improved.

2.3.5.2 Monitoring and Evaluation of Projects

All of the case study funds have M&E systems in place for the projects they fund, although the coverage and the use made of the data generated both vary considerably. It seems to be a general weakness of fund management that much more attention is paid to monitoring financial progress than technical accomplishments, and that when the latter are examined, more attention is paid to the completion of tasks than to results and impact. Two case study funds are exceptions to this rule. One is PRONATTA, whose 'modification committees' do revise technical aspects of research projects. Second, the management of FONDEF conducts post-project evaluations that look at a broad range of issues including: the coherence of scientific-technological execution with what was proposed; scientific-technological impact; socio-economic validity; eventual patentability of technologies generated (and other forms of protection of the research results); management quality; accounting records; and documentation of the financial execution of the project.

All funds require technical and financial progress reports, the frequency of which varies from quarterly to annual. In a number of cases there is also a regular programme of annual field visits (Kenya, Tanzania, Mali, FONDEF and Senegal), which tend to be task-oriented. The Tanzania fund is conspicuous in the way it devotes resources to M&E visits: teams of up to five people take part in field visits and almost a third of the entire budget of the fund is spent on M&E!

Some of the funds (but not the Tanzania NARF) require projects to specify specific milestones, and in two cases (Africa regional and Senegal) these are derived from a log frame approach. However, either the funds are performing exceptionally well, or this monitoring is not too rigorous, because it is very rare for technical reports to be rejected; only a small minority of reports in a small minority of funds has ever been sent back for revision. Project termination is similarly rare, and where this happens it is usually because the researcher or principal researcher has moved elsewhere. In the case of the Indian AHRS fund there is no termination of contracts or rejection of reports because projects are short-term and researchers adhere to

what fund management regards as at least minimum acceptable standards. All of this contrasts with the situation reported above regarding financial reports, where rejection or requests for revision are not at all uncommon and delays in execution a normal result.

2.3.6 Networking

Three of the funds – the Indian AHRS, FONDECYT and the Tanzanian fund – do not have networking as a specific objective and projects therefore tend to be mono-institutional. In all the other cases institutional collaboration is either a requirement or at least counts as a positive factor in the assessment of funding submissions. Of all the case studies, FONDEF probably has networking most deeply embedded in its *modus operandi*, as its purpose is to bring together research institutions and commercial companies jointly to develop products that will improve the country's competitive advantage. The African regional fund is also strongly network-oriented, bringing together international and national research organisations in projects in which the former commit a quite high level of mentoring. Other networks bring together public sector institutions and not-for-profit organisations (NGOs, farmer organisations). Outside of FONDEF and the African regional fund, no instances were found of collaboration with the commercial private sector. Where networking is specified as an aim, funds tend to have three common features.

- They are more likely to finance interdisciplinary projects.
- They tend to cover a greater number of stages within the technology spectrum (ranging from basic research to technology delivery). An exception here, however, is the African regional fund, which is concerned purely with delivery of proven technologies.
- Successful projects tend to come from a wider range of institutional types. Taking the three 'non-networking' funds, FONDECYT has historically been dominated by universities; 76-87% of awards from the AHRS fund in India have gone to ICAR institutes and state agricultural universities, and over 90% of the Tanzanian fund's successful applications have been from the host department of the Ministry.

2.3.7 Sustainability of Financing

If longevity is a proof of sustainability, the two strongest funds among the case studies are Chile's FONDECYT and India's AHRS. The former, which was established by a Decree of the Chilean State in 1981, has survived changes of government and the transition back to democracy. The Indian fund has existed even longer, and has a similar level of backing and commitment. It too has a legal basis, the *cess*, which underpins it, having been established by Act of the Imperial Government in 1940. It has survived the transition to independence in 1947 and numerous changes of government since that time. Chile's FONDEF has a much shorter history and no distinct legal status, but both the present governing party and the opposition parties have expressed satisfaction with the fund, so that *de facto* it seems to be quite sustainable from the viewpoint of political commitment.

The other Case Study funds appear more transient in nature and their ongoing existence seems to depend more on the will of the donor than anything else. This is true even for a relatively affluent country like Colombia, where the continued existence of PRONATTA depends critically on whether the national treasury is prepared to take on the fund's financial requirements after the present agreement with the World Bank expires, and there is as yet no clear sign whether this will happen. This largely 'external' character of most of the CATFs is another feature that they share in common with social funds. Reddy (1998) reports a recent study which found that the proportion of external funding to social funds varied from 78%-100% in Africa (averaging 88%) and from 43%-95% (averaging 72%) in Latin America excluding Mexico. This high proportion of external funding represents an opportunity in that additional money is flowing into the system but it threatens the long-term sustainability of the funds.⁵

In the Kenya case study some interviewees felt that the extremely irregular nature of commitments to the fund was due to the fact that donors, or perhaps local managers of donor operations, are not really committed to competitive funds, which are seen by some as 'yet another of the many transient fads donors engage in from time to time'. Others have even stronger reservations. Some insiders see it as an attempt to commercialise research results, and take the view that, far from contributing to the Institute's quest for financial sustainability, it acts as a diversion. Certainly, little evidence was thrown up by the case studies that there is the type of political support for the other funds that there is for the Chilean and Indian

5. It should be noted that money flowing to CATFs can probably not be considered to be 'additional' since many agricultural technology systems, especially in Africa, have long been dependent upon external financing to cover much of their cost base.

funds discussed earlier, and this is reflected in the funding mechanisms in use.

An important indicator of stakeholder support is financial input. This takes the form of annual budget subventions in the case of FONDECYT and the cess on agricultural produce that supports the AHRS – at a rate that has been revised over the years to ensure that the inflow into the fund remains constant. FONDEF receives financial support from stakeholders other than government, since it requires that both the lead institution and the collaborating company each contribute a minimum of 20% of project costs. PRONATTA also requires co-financing from stakeholders. Co-financing for applied research must be 50% of project costs, but for training activities it is limited to 15% of total.

There is also an element of co-financing in the African regional fund Phase II project, and this can be high. For example the main private sector recipient group is using project finances as a supplement to its own investment, with the latter amounting to 66% of the total project cost of \$55,471. However, the mere fact of contributions by the recipient should not necessarily be taken as proof of commitment and therefore sustainability unless the resources that are contributed are truly scarce. When the recipient institution's contribution takes the form of staff time and other in-kind resources, the opportunity costs may be low or even zero, since these institutions are often so short of operating funds that their fixed resources are seriously underemployed or even unemployed.

It was already mentioned that the Kenya fund has suffered huge fluctuations in income, exacerbated by switching from donor to donor. A similar situation has obtained in Mali, with a temporary shut-down at one point. The VBKVK fund in India also faces an uncertain future, as Ford Foundation funding has terminated and replacement finances are not yet fully in place. In Senegal the fund ended mid-July 1998, at which point all projects were officially terminated, pending support from another donor. It seems unlikely that another source of finance will be found since, as in Mali and Tanzania, fund management structures are so weak as to seriously undermine the functioning of the fund. Clearly these are not circumstances in which the fund can be said to have contributed much to financial sustainability.

Many donors aim to provide only 'start up' funding to CATFs to test whether the approach works. If it does, the hope is that the fund will attract its own, more sustainable sources of finance. In the current climate of structural adjustment a major hope has been for private sector finance. This has been forthcoming in some of the South American funds but such a breakthrough has yet to be achieved in most of the African funds examined

here. In Kenya those firms and organisations (such as Kenya Breweries, the Kenya Seed Company and the Pyrethrum Board) that have made contributions to agricultural research have chosen to channel this into direct contract research rather than through the less 'controllable' mechanism of a CATF. Contract research also tends to be more financially attractive to researchers, with the result that it can attract the best in the field.

3

Conclusions

When CATFs are set up as a result of a decision of the national government backed up by domestic funds, this demonstrates commitment in a way that nothing else does. Some of the older funds were set up in this manner, but the model has grown far beyond such boundaries and appears to have won a great deal of allegiance among the donor community, gaining a corresponding degree of impetus in the process. This popularity is puzzling, since available information on its modalities and performance has been so fragmentary. No comprehensive inventory of competitive funds has been compiled and few systematic evaluations of existing funds have been conducted.

There are negative as well as positive aspects in the genesis of this model, and its enthusiastic adoption appears to owe at least as much to donor (and often domestic government) fatigue with traditional agricultural research and technology transfer projects as it does to faith in the CATF model as such. The CATF appears to promise a ready mechanism to make agricultural R&D more efficient, effective, relevant and accountable. However it is clear from the present survey that fund performance has in too many cases been disappointing. The enthusiasm with which funds have been promoted has not always been matched by care to ensure that the environment is actually conducive to success.

A donor agency wishing to set up a CATF should take the following considerations into account.

3.1 The Role of the Public Sector

The first consideration is whether there is a role for the public sector at all in agricultural R&D. The general consensus is that the answer is yes, particularly in a situation of market failure and particularly when the agricultural sector is dominated by small farmers who cannot pay the full development cost of new technologies. The question is not if, so much as how, the state should be involved in agricultural R&D, since the old system of block grants and non-accountability has in most settings failed to provide high quality relevant technologies.

There is already a wide range of non-public sector providers of agricultural R&D in developing countries: multinational corporations,

domestic private firms, commodity boards, NGOs, private individuals, farmers' organisations and the farmers themselves. The for-profit sector can be expected to fund its own downstream research, particularly if it is encouraged to do. Encouragement can take both positive and negative forms. The former include targeted tax breaks for R&D investment, legal protection for intellectual property rights, contract enforcement mechanisms and the provision of public goods, particularly through government support for upstream R&D to generate technologies which can then be taken up by the private sector and become the basis of profit-making enterprises. The simplest negative form of inducement is for the public sector to first identify and then withdraw from R&D areas that are suitable for private investment, for as long as the public sector is prepared to invest in generating technologies the private sector will be content to let this happen.

Moving along the spectrum from private to public goods, governments have a growing funding role to play, but funding the work does not necessarily mean doing it through public sector institutions, as has been done in the past. This is where the CATF model has the potential to score so highly, by improving quality and relevance through open competition and rigorous evaluation of applications, by bringing in new partners from the profit-oriented and not-for-profit private sectors, by providing the stimulus that could free public sector R&D institutions of bureaucratic incentive-destroying rules, by acting as midwife to the birth of new coalitions and partnerships, by ceding decision-making power to user group representatives, and by involving donors and other funding agencies in new and imaginative ways of sharing the financial burdens of doing all this.

Just to list these desiderata is sufficient indication that simply setting up a competitive fund is not enough. A great many parallel changes have to be ushered in to make the idea workable.

3.2 Competitive and Collateral Elements

It emerges from the case studies that when funds are established two separate sets of characteristics are often confused. The first is directly implied by the competitive nature of the allocation mechanism. The fact that researchers have to compete against each other for funding implies certain benefits, at least in theory. These include expanding opportunities for innovative research, improving the scientific and technical quality of research proposals and allocating funds to higher quality proposals. This in turn should feed into a better end product. These objectives can be

achieved simply by introducing competition where previously there was none.

Collateral objectives are those which are not derived from the fact that the funding is competitive, but which when included tend to make the competitive element more effective. Many of these also feed into a better quality and more relevant product, and include improving the adequacy and dependability of funding, drawing upon the comparative advantage of a wide range of institutions, achieving greater synergy by enhancing networking and teamwork, and improving management structures by making them more decentralised, flexible, accountable and transparent. Other collateral objectives will make the end product more relevant and problem-oriented, particularly those that relate to prioritisation of the research agenda and the participation of end users at relevant points in the cycle. The Latin American case studies in particular show that it is possible to have competitive mechanisms and still not move at all towards bringing in these collateral objectives. The latter can be achieved only if they are put into operation through appropriate eligibility, screening and prioritisation criteria, and through appropriate management procedures that are followed throughout.

Neither competitive nor collateral objectives and the fund characteristics they imply – transparency, accountability, stakeholder participation, demand-drive, independent governance, open competition, efficient management, anonymous and independent peer review, diagnostic and action-prompting monitoring and evaluation – have been the traditional hallmarks of agricultural R&D systems, particularly in the least developed countries. Without significant reform in these areas, competitive agricultural technology funds (CATFs) are in danger of becoming a temporary, non-sustainable and expensive means of easing the chronic problem of shortage of operating funds.

3.3 Viewing Funds in the Context of a National System

Defining the CATF to include both the competitive and collateral objectives described above, it can be said that a very helpful feature of the model is the fact that it helps to go beyond the concept of a national agricultural research *institute* and develop the concept of a national agricultural research *system*. To do this the competitive element must throw the grant-making process open to competition from those outside the core public sector institute: universities, NGOs and the for-profit private sector, while the collateral component fosters partnerships,

coalition and, hopefully, synergy. An important caveat is to watch out for hidden agendas in this process, because competition obviously threatens vested interests. The competitive element is sometimes effectively blunted or even eliminated, by eligibility and screening criteria, by procedures and administrative requirements that impose *de facto* entry barriers. For example, many funds state that they welcome the participation of the private sector and NGOs, but then go on to establish that the fund will not pay for salaries and wages of permanent staff. This is a *de facto* entry barrier for organisations whose salaries must be financed through the grants and contracts that are won.

Even broadly defined, CATFs can only ever be a component of the system. As shown earlier, unless it has guaranteed long-term funding, it is not a suitable vehicle for financing work with a long gestation period. Even if it does have assured access to long-term funding, it is still not a suitable vehicle for building up other aspects of the national *system*, such as creating research infrastructure or investing in staff training at postgraduate level. A problem here is that many funds seem to have been established on the implicit assumption that the other components of the national system were already in place and able to contribute effectively. Unfortunately this is not often the case. When agricultural R&D in Third World countries was to the forefront of development thinking, donors invested considerable sums in research infrastructure and human resource development (HRD). But it is now many years since this was the case, so that such skills as were created are now out-dated, and few new ones are being created to replace them. There is often a similar problem with growing obsolescence of equipment and deterioration of buildings and other physical resources. Higher education in many developing countries has suffered similar neglect to that experienced by agricultural R&D, and as a result many Third World universities have become quite inward-looking. This in turn means that young scientists emerging from such institutions are ill-equipped for the challenges of the 21st century.

It makes sense to view CATFs as one component in a necessarily pluralistic system: the national system cannot be run as a competitive fund and a competitive fund cannot be run without a national system. There is therefore a continuing need for other forms of funding. In some cases this will include block grants to fund the type of 'lumpy', expensive investment the system needs and CATFs do not fund (e.g. land purchase, laboratories, offices, staff housing, equipment and high-level HRD). This demands an integrated approach, ideally with a coalition of partners (including the national government, private finance and donors), each willing to fund development of different parts of the system but recognising the synergistic

relationship between all these parts. Some donors, particularly lending agencies, already recognise this need and make funding for CATFs only a component of a larger commitment, but others do not and seem to treat funds almost as though they could generate success in an institutional and financial vacuum.

Another key question is whether there is a sufficient supply of agricultural R&D capacity in-country to constitute an effective and competitive market in the supply of such services. Where such capacity exists a crucial role for a competitive fund will lie in helping to create a level playing field on which competition can be truly free and open. Where it does not, it is perhaps better to concentrate on building up this capacity through institutional development across all sectors (not just in the public sector as in the past), rather than try to foster competition in a market where there is basically only one, or perhaps two, potential suppliers.

Where competition exists, there is an issue of determining whether a country is best served by expecting a single fund to serve all development objectives, or if perhaps it is often more reasonable to set up several funds, each with a more restricted mission (e.g. one fund serving the needs of 'good basic science', another concerned with small farmers and marginalised regions, etc.). The modalities will not be the same for each type of fund.

Timing of the introduction of the competitive principle into a traditional public sector institution is also important. Studies in India suggest that particular care is needed in phasing in CATFs in situation where there is already substantial core-funded public sector research capacity (Farrington et al. 1998). On the one hand, a rapid reduction of core funding would threaten the maintenance of physical infrastructure and of human resource skills; on the other, to leave core funding at existing (often 100%) levels means that there is very little incentive to compete for further funding. Local circumstances differ widely, and no hare and fast rules can be applied. However, it may be reasonable to reduce core funding by up to 10% initially, indicating that any deficit thus created has to be made good by winning competed grants. Successive reductions may subsequently be made, depending on how successful the early rounds of competed funding have been, down to a situation in which around one-half of public sector institute budgets are met by core funds and the other half by competed funds. Careful monitoring will be necessary as these proportions are approached, to ensure that the basic fabric of research capability is not being undermined.

3.4 Institutional Reform

The case studies indicate that funds have worked best where government, or at least an important element within government, is genuinely committed to reform. Although it is preferable, it is not essential for this commitment to be shared by the core public sector agricultural R&D system, for reform can be imposed from above. Many people quote the example of Ghana, where the government announced in 1997 that the Council for Scientific and Industrial Research would have to raise 30% of its funding from non-government sources within three years.¹ This has reportedly prompted a major and serious rethinking process within the Council

Institutional reform is a long-term process not a one-off event, and the incremental nature of the change has to be recognised. However once the reform process receives the necessary commitment from above, a competitive fund can make a vital contribution to its implementation. The skills required to manage and operate competitive funds – in non-scientific areas such as management, accountancy, full cost accounting and administration – are often scarce within traditional research institutions. If they can be developed with external support, centred initially on a competitive fund, they could prove invaluable to a host institution moving forward.² Likewise, for a poverty-focused fund to operate effectively it is likely that there will have to be accompanying training for scientists in areas such as gender analysis and participatory rural appraisal. Again, these skills can contribute to the wider effectiveness of the research system.

The most successful funds have been those which are located outside the mainstream agricultural R&D system in a specialist organisation. Ideally such an organisation would not itself be involved in research; this should help ensure even-handedness in dealing with applicants and grant holders. Within the existing government structures options for institutional 'homes' include the Planning Commission and the Ministry of Finance. Finance ministries are very powerful and have often been at the forefront of demands to reduce block grants to public sector R&D institutions on the grounds that they do not represent value for money. The alternative of setting up a free-standing foundation completely free from government control looks attractive from many angles, including that of inducing institutional reform. However, such institutions are expensive to establish, endow and manage

1. Efforts to confirm these reports through email contact with the Council for Scientific and Industrial Research in Accra have not proved successful.

2. The caveat 'if the skills in question can be retained' has to be added, for these are highly marketable assets for any individual to possess.

(see 3.8 below). The commonly chosen option of locating a fund within a country's core public sector agricultural research institute – often an organisation that does not have a culture of competition, that jealously guards its monopoly privileges, where staff are bound by civil service rules, and where effort, enterprise and competence are not always rewarded – significantly reduces the chances of success.

For smaller countries that do not have sufficiently large research systems to create a genuinely competitive market, regional funds hold out two main attractions. First, given that agro-ecological regions (and associated problems) cross national frontiers, scale economies can be achieved by pooling resources and through cross-fertilisation of ideas. Second, regionalisation frees the fund from national civil service regulations and restrictions, which are so often incompatible with attracting and retaining the best staff and supporting them to conduct relevant and high quality work. The experience of the African regional fund studied here has been encouraging in its early stages, and its external evaluation was very positive. However it is at present entirely supported by donor contributions and it remains to be seen whether this type of fund will attract both political support and funding from member countries.

3.5 Management Efficiency

Management systems and structures of the case study funds vary from the highly sophisticated and effective to the barely functional, so it has been possible to draw both positive and negative lessons from them. Inadequate staffing levels, the prevalence of part-timers among senior staff, bureaucratic time-consuming procedures and inadequately trained staff have been major management headaches in most of the smaller funds. These problems are sometimes compounded by either non-availability of modern equipment or inability to use it when it is available. Inadequate use of modern communications methods like email and fax is found even in otherwise well-managed funds. Even the most efficient funds can have difficulty in handling changes in projects and in responding to changing circumstances. The scope for increasing flexibility of rules and management structures is an area that needs careful investigation.

Reliance on volunteer inputs for functions such as pre-screening, peer review and proposal evaluation in countries where professional salaries are very low often leads to serious processing delays. This is presumably because of the opportunity cost of the time involved, a conclusion that is strengthened by the fact that in the one fund where such volunteer inputs are

provided by well-paid international scientists (the African regional fund), no problems with processing delays were reported. A related issue is confidentiality of the above processes. In large countries with correspondingly large scientific establishments, anonymity and confidentiality can be maintained with relative ease, but this becomes increasingly difficult the smaller the scientific community. In small, least developed countries, it is difficult to see how effective and anonymous scientific review can take place as long as the process remains in-country.

Another disadvantage faced in smaller countries is that there are very clear diseconomies of scale in management and administration. From the Case Studies it emerges that while some of the larger funds cost around 5-6% to manage, the smaller ones can cost as much as 36-43%. And this is in spite of the fact that the larger funds have much higher numbers of permanent staff. Not all of this variation may be attributable to scale, however, as the smaller funds tend to be more recently established than the larger ones. It is conceivable that with experience it will be possible to reduce the cost of administration even in smaller funds by improving management efficiency. However it has to be admitted that the prospects of making very significant cost reductions in this way do not seem great. Some funds may simply be too small to support an elaborate and expensive management structure, so either agreement will have to be reached regarding the minimum acceptable management structures, or it may have to be acknowledged that below certain funding levels CATFs are not an appropriate funding mechanism.

Most funds advertise the availability of their grants openly and widely. Where this is not the case, examination of the distribution of awards supports accusations that restrictive practices are in operation. Because of this the advertising medium or media that are used is very important. Many developing countries now have internet access, and the experience of funds that have used this medium to advertise their programmes indicates major potential at relatively low cost. A potentially very useful approach used in one Chilean fund is that of backing up the advertising campaign with promotional meetings in parts of the country where the response to advertising has been poor.

Eligibility requirements that apply in certain funds could be used to exclude certain individuals or groups. There is reason to believe that this is so in at least one case study, where in theory scientists from any institution in the country can apply, but in practice applications are overwhelmingly from the executing agency's own scientists.

Monitoring and evaluation of funds tend to concentrate on financial aspects. Independent evaluation of technical progress, or even of compliance

with objectives, is much less routine. Evaluation of the fund's impact on intended beneficiaries is even rarer (though most of the case study funds are relatively recent, and it may therefore be unrealistic to expect any such impact). Even in long-established funds there has been little effort devoted to this area, though there are some signs that this may be changing.

The logical framework approach can be a useful way of ensuring that both funds themselves and awards granted under them stay on-target and on schedule. However, even where this approach is adopted, there is not always enough attention paid to a regular audit of the management aspects of the fund to ensure that progress measures up to the milestones.

Monitoring and evaluation of projects tend to mirror that of funds themselves, again with greater concentration on financial, as opposed to technical, performance. It is very rare for technical progress reports to be rejected or returned for amendment, and no case was identified of a project being terminated for poor technical performance. Even when technical evaluations are conducted, these tend to concentrate on task completion rather than impact. FONDEF in Chile is an exception in that it does evaluate project impact. Among the successful innovations this fund has financed has been the development of technologies for producing and processing fruits and vegetables that take into account the long distance between Chile and its export markets.

With only one exception, the flow of finances into the case study funds has been smooth and regular. It is therefore disappointing to find that this smooth inflow of resources to the funds has not always been matched by an equally smooth outflow to grantees. This is particularly unfortunate, given that one of the primary advantages claimed for the competitive funds approach is that it addresses the perennial problem of inadequate and irregular flow of operational funds to projects. The reasons for irregular outflow vary from fund to fund: unduly centralised financial management systems, processing delays attributable to under-staffing, awardees' failure (in the eyes of fund managers) properly to account for advances, and extreme caution in disbursement bred by fear of fraud. Whatever the justification, uncertain and irregular disbursement is extremely disruptive, especially in agriculture and other life sciences, where even short delays can nullify previous work.

The provision of clear guidelines at all points in the project cycle is widely appreciated, and where there is a well thought-out pro forma, grantees do not seem to find application and reporting requirements unduly burdensome. Pro formas and guidelines are needed at all stages from initial application forms, through technical and financial progress reporting to M&E procedures. The management of the longer-established funds often

spent years in developing these, and a great deal can be learned from their experience. Since many of the most successful funds are in Latin America, tapping into this experience for an English-speaking audience requires investment in locating these documents and translating them, but such an effort would be amply repaid by not having to meet the cost of reinventing the wheel.

3.6 Quality and Relevance

A fund can support work of a high scientific standard which is of little or no relevance to the agricultural and economic challenges the country faces. Alternatively the issues that are addressed may be highly relevant to the country's needs, but the work could be of such poor quality that the findings are robbed of all practical value. These two issues are therefore separate but highly inter-related.

The fact that there are so few impact evaluations to draw on makes it difficult to arrive directly at conclusions about the CATF as a model for improving the quality and relevance of R&D. The second best approach is to look at the modalities of funds to see if they are likely to promote these qualities.

3.6.1 *Priority Setting and Board Composition*

The priority setting exercise is clearly a crucial determinant of relevance, and the fact that the governing bodies of most of the case study funds are dominated by the public sector calls the relevance of the research agenda into question. In cases where there is provision for representation of farmers, NGOs and agribusiness and the positions are not filled, this suggests either a lack of seriousness about creating a genuinely pluralistic board or a lack of conviction on the part of potential private sector representatives that they will be able to influence decisions. In cases where such representatives have been appointed but do not attend board meetings, this also suggests a lack of faith in their ability to influence decision-making. It is not enough to have non-government representatives on the board: there must be a balanced board if the priority-setting exercise is to create a relevant research agenda. If the fund has an equity orientation there must be strong representation from farmers and NGOs. Gender balance is always important, but particularly so with this type of fund. If the fund has a commercial orientation, trying to improve the

competitiveness of the agricultural sector, both farmers' and private agribusiness representation is essential. The question of who selects the representatives from the non-government sector is also important. Election by the relevant user groups and associations is a useful way to foster pluralism and independence.

The above issues can be seen in sharp relief when the method of setting priorities is examined. In quite a number of case studies priorities were said to emerge as a consensus of the governing body's discussions. This tells us little, except perhaps that transparency is not a hallmark of these particular bodies' decision-making process. Where it exists, the combination of an unrepresentative board and opaque priority-setting exercise does not augur well for the relevance of the priorities that emerge.

Other methods of priority setting, such as the use of 'intuitive scientific judgement of peers and senior research managers', which was cited in one case study, are equally open to question, because this too signifies dominance by only one set of stakeholders, introducing distortions into the decision-making process. This particular problem was encountered in more than one case study, and represents a continuation of an old and discredited tradition. Allowing scientists alone to set the priorities may make for high scientific quality, but relevance is another issue. This is obviously the case in funds with an equity focus, but it is equally so in funds that try to improve the competitiveness and market orientation of the agricultural sector: scientists' training leads them to think in terms of what can efficiently be produced, when decisions in commercial agriculture are dominated instead by what can profitably be sold.

3.6.2 Demand Drive

The fact that most funds require beneficiaries to be fully involved in proposal preparation is encouraging, but the wide variation in the standard of proof required is less so. When applicants are merely asked to state how results will be useful to clients, as happens in at least one case, the standard of proof is clearly quite lax. In this context it is unfortunate that the powerful potential offered by scoping grants (which can finance studies that establish where demand lies) has yet to be fully exploited. It is disappointing that in the one case study fund which makes provision for such grants no such award has ever been made.

Where the purpose of the fund is to promote commercialisation and competitiveness, the example of FONDEF – which requires market research as a precondition for considering a proposal – is worth following. This is an

area in which scoping grants have a considerable role to play, because such research is expensive if it is rigorous.

Care obviously has to be taken to strike an appropriate balance between the views of the different stakeholders when allocating resources. Interpreting 'demand driven' only in the sense of 'farmer driven' can produce results which, in terms of efficiency in allocating R&D funds, are as far below optimum as allowing only the scientists to set the agenda. The greatest danger is that the system will become supply-driven, rather than demand-driven. Farmers, particularly small farmers in poorer countries, are basically subsistence producers. If a major plank of national agricultural policy is to capture the gains of comparative advantage and specialisation through commercialisation of smallholdings, then basing the R&D agenda on the subsistence farmer's perceptions is most unlikely to produce optimal results, because such farmers are unfamiliar with the disciplines and imperatives of producing for the market. Ultimately in market-based agriculture, 'demand drive' implies that it is the consumer, not the farmer, who should set the agenda.

Another danger of an exclusively farmer-driven approach is that the R&D agenda becomes fragmented, with resources being devoted to solving small local issues while major regional and national problems remain as constraints on agricultural development. Clearly a sensible balance must be struck between the views and interests of the many different stakeholders, the precise nature of which will depend on both individual circumstances and the objectives of the fund.

3.6.3 Equity and Poverty Alleviation

Case study funds with an equity focus have been more successful at addressing poverty issues than gender issues. Because of the gender division of labour, and because there are so few women change agents in developing countries, women's special technological needs tend to be overlooked. Women already typically have much longer working days than men, and successfully addressing men's technology needs may actually increase women's workloads, for example in crop processing. Although there are exceptions, the case studies have produced little evidence that gender-specificity in technology development and delivery is generally recognised as a separate issue.³ One reason for this appears to be inadequate training and sensitisation to such issues amongst those

3. Funds seem to have had even less success in addressing the problems of groups that are disadvantaged on ethnic grounds.

awarded grants. Success at addressing poverty issues, it must be added, seems to have been only relative: it is notoriously difficult to capture a representative voice of poor farmers in setting the agenda for technology development and delivery.

A number of funds require a cash contribution from farmers in order to demonstrate demand drive, and hence relevance. An obvious problem with this is that such an approach tends to exclude poor and disadvantaged farmers, and it is difficult to see how cash contributions can be justified when equity and poverty reduction are important objectives of a fund. Participatory rural appraisal (PRA) is widely seen as an alternative and more equitable means of establishing where demand lies. It is particularly useful in ensuring that the needs of the poorest and most disadvantaged sections of the community are equitably represented in setting the agenda for development activities. This has obvious relevance to CATFs whose purpose is poverty-reduction or equity enhancement.

The fact that a number of the African funds conduct PRAs among intended beneficiaries is encouraging, but clearly a great deal more has to be done to incorporate the findings into the prioritisation process. For fund managers under pressure to produce quick results, a difficulty – and one that is quite poorly understood – of using the PRA approach is that it is time-consuming and requires painstaking effort. (The misunderstanding probably owes a great deal to the fact that one of the principal forebears of PRA is *rapid* rural appraisal.) Moreover, if it is to be of real value PRA has to be an iterative process, with findings factored into decision making at all levels, from calls for proposals through monitoring of progress to assessment of final results. One of the greatest weaknesses of the funds that were studied here is the fact that even when small farmers are involved in the initiation phase, it is almost unknown for them to be involved at subsequent stages.

There is actually a quite fundamental problem in adopting a specific anti-poverty focus within a model whose basic thrust is technology development and dissemination. Poor farmers are notoriously risk-averse, yet the adoption of new and unfamiliar technology is inherently risky, so that the early adopters are almost always the relatively well-to-do. This raises the challenge of how to strike the right balance between the focus of a fund and the amount of time required to achieve impact. If a specific equity or anti-poverty focus is adopted for a CATF it must generally be accepted that this entails long-term commitment.

An even more fundamental poverty issue in some countries and regions is whether the poorest among the rural population are farmers at all:

frequently they are landless labourers.⁴ Yet the technologies that farmers – even quite poor farmers – want are often labour-displacing. On the other hand labour-displacement in crucial bottleneck operations can increase factor productivity and ultimately lead to cheaper food (as in the case of the green revolution), thus benefiting the poorest people in both rural and urban areas.

This raises the important point that funds need not have a specific equity focus in order to be relevant to the needs of the disadvantaged. Funds which focus on the strategic end of the research spectrum (basic research, strategic research, or simply ‘good science’) may not directly concern themselves with equity issues, but if the work they support ultimately lowers the price of food or significantly affects employment opportunities (either positively or negatively) it is of great relevance to the disadvantaged. The case study evidence is inconclusive here. There are certainly case study funds which are oriented towards the upstream end of the research spectrum and these funds have little or no direct concern with equity or poverty issues. However it is impossible to say whether they have had positive or negative indirect impact on issues that concern the poor and the disadvantaged. This again underlines the fact that lack of provision for medium- to long-term impact evaluation is a general weakness of the case study funds.

3.6.4 Other Concerns

Decentralisation is one of the areas in which there may be a trade-off between quality and relevance. Decentralisation has been resisted in one case study fund because it was felt that it would compromise quality; it was promoted in another because of a belief that it would increase relevance. One thing is clear: where there is no affirmative action in favour of the periphery *vis-à-vis* the centre, the centre tends to benefit disproportionately. This may be due to the merit of applications, but it also seems to relate to communications difficulties and a certain degree of ‘metro-centric’ bias.

4. In their seminal work on poverty Jazairy and his colleagues introduced the concept of *functionally vulnerable groups*, defined as groups which are ‘economically insecure and thus particularly sensitive to the slightest change in external factors’. Globally around 64% of the total are smallholders, while 29% are landless, but there is great variation by region. In sub-Saharan Africa the figures are 73% and 11% respectively, while in Asia they are 49% and 26%. The figure for the landless is even higher in Latin America and the Caribbean, where they account for 31% of the functionally vulnerable (Jazairy et al. 1992).

One of the advantages claimed for funds is that they encourage networking, and that this in turn generates synergy. The case studies do clearly show that where networking is a specified aim of a fund, there tends to be a relatively high level of inter-disciplinarity and institutional complementarity, and a relatively wide range of activities within the research-to-delivery spectrum. However, although networking is a fairly common objective among the funds studied, this does not usually involve the commercial sector: public-public and public-NGO networking is far more common. There is a great deal to be learned from the one case study fund that does bring together commercial and non-commercial institutions, because here great strides have been made in terms of dispelling myths and changing attitudes, which in turn has helped to build confidence between partners with very different expertise and complementary comparative advantage.

A final observation about the relevance of the CATF model concerns the type of project it will normally fund. When they are donor-financed, funds can be committed to grantees for only a relatively short period of time, typically three years in the case studies. Renewal of the fund itself depends on performance in the initial phase. Few grants can normally be made in the first year of a fund's operation, given the lead time required to set it up and provide training. This means that the longest-term project that can be funded in the first round is less than three years, a period that steadily reduces in subsequent rounds. This in turn excludes many projects which require a longer time horizon, such as research on natural resource management, forestry, livestock and plant breeding. The only way such activities can be included is if the proposers are able to show considerable ingenuity in breaking up such projects into short phases and then submitting separate applications for each phase (assuming the fund is renewed). Since there is no guarantee that the second and subsequent applications will be accepted, this has a considerable disincentive effect. This in turn means that the research agenda is inevitably biased towards short term issues, regardless of relevance to the country's needs and priorities. Examination of the type of project funded in the case studies of donor-financed funds has confirmed this to be the case.

3.7 Monitoring and Evaluation

Many observers agree that the funds which have historically been most successful are those operated by international foundations such as Ford and Rockefeller. The approach of these institutions has always been to pick the right person or team with the right ideas, give them the resources

they need and then get out of the way and let them get on with the job. The implicit view is that it is better to take the risk of financial mismanagement than to allow the work to be hampered by excessive caution and mistrust. This may have resulted in some degree of illicit enrichment, but it has also produced some handsome benefits in terms of outputs. Unfortunately, when taxpayer's money is used to fund activities this is not an option, but the basic approach of the minimum degree of monitoring consistent with accountability is the most productive.

The case studies clearly indicate that monitoring of publicly-financed funds tends to concentrate on financial aspects, that independent assessment of technical progress is much less routine, and that evaluation of the fund's impact on intended beneficiaries is even rarer. Monitoring is a management tool designed primarily to ensure that a project is on schedule and that difficulties are dealt with in a timely fashion so as to minimise delay, disruption and failure. While financial monitoring is an essential part of this process, it must not be allowed to dominate. If it does, projects may fail due to the neglect of problems which lie outside the financial area. Placing undue emphasis on aspects of financial management also risks causing major disruption if projects are stalled while financial problems are straightened out. The nature of agricultural research is such that most projects cannot accommodate 'stop-go' financing. Indeed, one of the great disappointments of competitive funds, as revealed by the case studies, is that they have not managed to ensure a smooth and timely flow of resources to financed projects, even when donors have succeeded in ensuring such an inflow of money into the fund itself.

The logical framework approach is a useful management tool for ensuring that problems are identified early on. However, in the few funds where such an approach is adopted, milestones and other indicators are not closely adhered to.

Evaluation is an ex-post management tool used to assess the extent to which a project's objectives have been met and to derive lessons for future activities. It is fairly normal today for evaluations to focus on outputs rather than inputs, but the evidence from the case study funds indicates that even when technical evaluations are conducted, these tend to concentrate on task completion rather than longer-term impact. This is admittedly a difficult issue for a donor to handle, because it involves expenditure of funding perhaps long after termination of the project. There is therefore a case to be made for separately-funded post-project impact assessment.

3.8 Financial Sustainability

Funds which emerge from the case studies as having a wide basis of support tend to be found in countries that have a tradition of reasonably successful research and extension, for example during the green revolution. In these same countries the national authorities, rather than donor agencies, have tended to take the lead in establishing the fund. This indicates an underlying level of experience and self confidence which the newer national systems seem to lack. In terms of their objectives, too, funds that have their origins in national initiatives tend to be carefully targeted on clearly identified problems and issues. This can only enhance their prospects of success, which in will turn feed into better sustainability prospects. In contrast to this, many of the newer funds – particularly those in sub-Saharan Africa – tend to exhibit a certain similarity of objectives, and as these are much in keeping with current development thinking, it is often difficult to dismiss the suspicion that they are 'donor driven', lack a sense of domestic ownership, and are therefore inherently unsustainable.

Funds in which donors have had close involvement in establishing modalities tend to have a strong equity focus. However, on the basis of the evidence uncovered in the present study, it seems that the funds that have proved most sustainable have no such remit. Lacking this, fund managers have been able to concentrate on serving clients who have both their own resources and the political influence to ensure that financial inflows can be sustained. Such funds also have the advantage of working with a clientele which can afford the risks of innovation, so that the chance of achieving real impact is maximised. Funds with a poverty focus have none of these advantages.

The greatest degree of sustainability is found where there is a legal basis for the fund and where funding is from the national budget, or from a dedicated tax, such as the agricultural cess in India. Such arrangements reflect strong national determination for the fund to succeed.

Further evidence of the seriousness with which the government regards the fund is to be found in the governance body and its composition. It is even significant that the more established funds tend to have boards of directors, while project-based ones tend to have steering committees. The governing bodies with the highest profiles are found in Chile, where the boards of both case study funds are led by the chair of the National Commission for Scientific and Technological Research, who is appointed by the President of the Republic. Members of the FONDECYT board are also directly appointed by the President, from a short list supplied by the Board.

At the other end of the spectrum, the fact that insiders in at least one African fund-administering body regard competitive funds as 'transient', 'donor-imposed' and 'faddish' does not augur well for the sustainability of this approach in countries where donors have taken the lead in establishing funds. Many of these countries have had negative experiences with other donor-inspired approaches, such as farming systems research, in which they invested time, resources, effort, and personal and institutional credibility, only to find that the concept went out of fashion almost as quickly as it came in.

Where a fund relies on donor support, it is almost by definition relying on mechanisms with a short time horizon. The basic premise on the donor side seems to be that if the fund is successful it will attract longer-term funding from other sources, and that this financing will increase to take over as donor support is scaled down or phased out. The other potential sources are basically the domestic public sector, the private sector and other donors.

Turning to the first of these, it has to be said that managers of agricultural R&D organisations in developing countries have (at least until quite recently) done a good job of selling their institutions to donors, but they have been much less effective at convincing a domestic audience of their value. National governments, at least in the poorest countries, tend to be sceptical of the worth of these institutions, and insufficient effort is made to alter this situation. This means that when a fund is established on the initiative of a donor (perhaps with the backing of the public sector host institution which stands to benefit the most), it is not at all clear that the political will exists for funding ultimately to be transferred to the national budget, especially given the extremely tight fiscal constraints faced by so many of the poorer countries. Even the backing of the host institution can be something of a double-edged weapon, as at least one case study fund has demonstrated, because the price paid for this support can be an inward-looking awards procedure that effectively excludes outside applicants.

Nor do managers of R&D institutions seem to have been very successful in attracting support from the private sector. Some informants report that managers seem to assume that if they do a good job of work (which is not always demonstrably the case) this support will automatically be forthcoming. Certainly the record has not been one of attracting private companies away from more established funding mechanisms such as contract research. However in the FONDEF case, where the fund was specifically set up to encourage collaboration between the research institutions and private agribusiness, the record has been much better. It seems that mechanisms for attracting private finance have the greatest

chance of success if they are purposively built into the fund's modus operandi.

There is not enough evidence from the case studies to indicate whether the record in attracting other donors to a support consortium has been better. The only case study where this occurred is an unfortunate one, because shifting support from donor to donor has been associated with extreme year-to-year fluctuations in cash inflow. The cause of this particular problem is not clear, but in any case it remains questionable whether a consortium approach to donor support is in the longer-term inherently more sustainable than having only a single donor.

Competitive funds are much more expensive to run than the traditional system of using block grants. In addition the mechanisms they must use are much more complex, and problems in their structure and procedures will not be ironed out quickly. Chile, which many regard as providing a model in this area, has had 15 years experience of operating this type of scheme, and it took many years to resolve the various problems. Australia has had a similar experience. One way of saving time and resources is for those who are designing funds to place more emphasis on learning from others (for example, adapting a successful fund's operational manual, rather than starting from scratch). Nevertheless, funds should be established to meet the peculiar needs and resources of a given geographical area, and a considerable degree of local adaptation will always be required.

An important issue on the sustainability front concerns the burdens a fund imposes on local institutions. If grants made by competitive funds cover operational expenses but not recurring costs such as salaries, close to intolerable burdens will be imposed on the organisations that employ fund applicants. This is a particular problem for newer entrants such as NGOs and fledgling private sector organisations. Some commentators seem to take an almost moral stance against allowing salary top-ups for applicants from public sector institutions. This may be fine in principle, but in practice salaries at such institutions, particularly in the least developed countries, are so low that scientists and technologists are obliged to 'moonlight' in order to make ends meet. It may be more realistic to allow top-ups than to allow the fund to fail because the most competent staff identify other opportunities (e.g. in contract research) and are therefore not interested in applying.

The main concern about sustainability relates to the financial sustainability of the fund itself. There is a problem of circularity here: while the programme is unproven, it is difficult for donors to commit longer term funds, yet until long-term commitments are made it is difficult for the fund to prove itself. This issue is compounded in places where donor agencies have acquired the reputation for faddishness that was mentioned earlier.

Perhaps the time has now come for the donors to make a more serious commitment. In a few test cases, where the national government has made a clear commitment to reform and has proved this by taking a significant number of hard decisions and sticking to them – and there are a few such countries in for example Africa – a donor agency might usefully decide to fund a CATF foundation via debt conversion. However, were this to be the case, it would be vital for all of the lessons that have been learned so far to be incorporated into fund design.

If donors are not willing to do this, or if their internal rules do not permit them to do so, perhaps the most positive contribution they could make would be to fund policy analysis on how best, in the circumstances of a particular national setting, to design, establish and manage new financing models for agricultural R&D – whether they include the competitive element or not – and then to nurture them during their introduction and consolidation phases.

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ODI Research Studies

Competitive Agricultural Technology Funds in Developing Countries

Gerard J. Gill and Diana Carney

How can the productivity of agricultural research be improved? How can researchers be made more responsive to the needs of clients? Does a reorganisation of the ways research is funded offer answers to these questions? Donors, in particular, have been pressing for a reduction in core-funding and the introduction of competed research funds. However, evidence on how these are working remains fragmentary.

This study, drawing on new evidence from ten funds operated under very different conditions in Africa, Asia and Latin America, draws out lessons in relation to governance, tendering, monitoring and other aspects of fund management. It provides a reassessment of what funds can and cannot be expected to achieve and suggests how they might best be managed.

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