

# ASTI

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Technology Indicators

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## **GOVERNMENT FUNDING FOR AGRICULTURAL R&D**

### **A Case Study on the Tanzanian Division of Research and Development**

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**Background paper prepared for the ASTI–IFPRI/FARA Conference**

### **AGRICULTURAL R&D: INVESTING IN AFRICA’S FUTURE Analyzing Trends, Challenges, and Opportunities**

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## Acronyms and Abbreviations

AgGDP	agricultural gross domestic product
AGRA	Alliance for a Green Revolution in Africa
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ASDP	Agricultural Sector Development Program
AVRDC	Asian Vegetable Research and Development Center
CABI	Centre for Agricultural Bioscience International
CCARDESA	Centre for the Coordination of Agricultural Research and Development for Southern Africa
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
COSTECH	Tanzania Commission for Science and Technology
CRS	Catholic Relief Services
CTA	Technical Centre for Agriculture and Rural Cooperation
DRD	Division of Research and Development
DRT	Division of Research and Training
EAAPP	East African Agricultural Productivity Program
ECABREN	Eastern and Central Africa Bean Research Network
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IFS	International Foundation for Science
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
INIBAP	International Network for the Improvement of Banana and Plantain
IPGRI	International Plant Genetic Resources Institute
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
MAFC	Ministry of Agriculture Food Security and Cooperatives
MLFD	Ministry of Livestock and Fisheries Development
MOF	Ministry of Finance
NEPAD	New Partnership for Africa's Development

## Acronyms (Continued)

NRI	Natural Resource Institute
SACCAR	Southern African Centre for Co-operation in Agriculture and Natural Resources Research and Training
SARNET	University-Community Partnerships for Social Action Research
Sida	Swedish International Development Cooperation Agency
TACRI	Tanzania Coffee Research Institute
TARDI	Tanzania Agricultural Research and Development Institute
TRIT	Tea Research Institute of Tanzania
ZARDEF	Zonal Agricultural Research and Development Fund

## Abstract

Tanzania has traditionally been highly dependent on donor contributions for agricultural research. When donor funding to the Division of Research and Development (DRD) plummeted during 2004/05, the Tanzanian government was forced to increase its funding. The higher level of government funding also reflects an increasing policy commitment to agricultural research and to the agricultural sector in general. Although funding levels have moved in a positive direction during 2005–11, disbursement procedures are often cited as an ongoing constraint. The government receives multidonor funding on a quarterly basis, depending on inflow from donors. Given uncertainty, DRD often receives only a fraction of its allocated budget, making long-term planning and implementation of R&D programs exceedingly difficult.

## **1. INTRODUCTION**

Tanzania's Division of Research and Development (DRD) is administered by the Ministry of Agriculture, Food Security and Cooperatives (MAFC). It comprises 16 agricultural research institutes located in seven agroecological zones: the northern, eastern, southern, western, central, lake, and southern highlands. DRD also operates a network of 17 research stations located across the country and employing 904 researchers, research assistants, and support staff. DRD is mandated to generate and disseminate appropriate technologies related to agricultural crops of national and zonal priority cultivated by farmers in the respective zones.

Tanzania has traditionally been highly dependent on donor contributions for agricultural research (Flaherty and Lwezaura 2010). When donor funding plummeted during 2004/05, government funding necessarily increased over time. The higher level of government funding also reflects an increasing policy commitment to agricultural research and to the agricultural sector in general. Although funding levels are moving in a positive direction, disbursement procedures are often cited as an ongoing constraint. Disbursement to the agencies depends on the availability of government revenues, which makes the planning and management of research difficult. The government receives multi-donor basket funding on a quarterly basis, depending on the flow of funding from donors. Given uncertainty, agencies sometimes receive only 70–80 percent of their budgeted funding.

## **2. BUDGET ALLOCATION AND DISBURSEMENT PROCESSES IN TANZANIA**

### **The Budgeting Process**

Budgeting processes in Tanzania follow the government's July to June fiscal year. The Ministry of Finance (MOF) sets a budget ceiling for each ministry, and they, in turn, determine their priorities and allocate available funding accordingly. The individual institutes/research stations are required to prepare and submit budgets, which are consolidated by DRD. In recent years, MAFC has determined research to be priority number three coming after national food reserve and extension for the purposes of budget allocation, and, as a result, for the past 10 years DRD has been receiving about 54 percent of its requested budget. At the Ministerial level the budget process is coordinated by the Division of Policy Planning. Once DRD's budget is scrutinized and submitted to MOF, a Parliamentary Committee responsible for agriculture, livestock, and water reviews and approves the budget. In most cases the Committee does not modify the budget. Once the government's overall budget is approved by Parliament, usually within three days of presentation on June 10 each year, annual work plans and budgets are prepared and submitted to MOF. The release of funds begins in August or September, but delays until October or November are common and have a significant effect on the implementation of activities given that in many areas, July to September is the farming season.

### **Budget Overview**

Research by the Tanzania Commission for Science and Technology (COSTECH) shows that, on average, 0.2 percent of Tanzania's gross domestic product (GDP) is allocated to research related to all sectors (COSTECH 2010); if salaries are included, this share increases to about 0.5 percent. The government budget allocation to public agricultural research has been in an average of 0.5 percent of agricultural gross domestic product (AgGDP), which is lower than the African regional average of 0.61 percent (Beintema and Stads 2011). Under the New Partnership for Africa's Development (NEPAD), as agreed under the Maputo Declaration in early 2003, African countries had committed to increasing their support to agricultural development to at least 10 percent of the national budget, and to commit at

least 1 percent of GDP to research of all sectors. Under MAFC, DRD receives an average of 10 percent of the ministry's total budget allocation.

### **Government Funding**

The Government has made impressive attempts to expand potential sources of funding to agricultural research institutions, while promoting more demand-driven, client-oriented research, and funding levels have improved somewhat since the establishment of the Agricultural Sector Development Programme (ASDP) in 2007/08. The program is funded by various development partners, including the World Bank, International Fund for Agricultural Development (IFAD), Japan International Cooperation Agency (JICA), Irish Aid, and European Union. Despite these efforts, however, funding levels in agricultural research in Tanzania are still extremely low, and most of the innovative funding mechanisms introduced in the past decade have had little impact on the size of the research budget. Because of funding levels not meeting the requisite research, researchers have been demoralized, spending much of their time attempting to secure funding, in the form of contracts or grants for agricultural research and even in the form of unrelated activities, such as leasing office space, selling research byproducts, or selling other products created using station resources. Scientists have inadequate or lack the basic necessities for conducting research, including support staff, vehicles, telecommunications, computers, library materials, cold rooms, screen houses, and so on.

Under ASDP, public agricultural research funding mechanisms have become more performance oriented, based on the strong belief that competition improves the quality of research. The establishment of the Zonal Agricultural Research Development Fund (ZARDEF) for the country's seven agroecological zones emphasized competitive research proposals to ensure high-quality research results with greater participation of key stakeholders. In addition, ZARDEF funding is mostly donor dependent, making it unsustainable in the long term. To bring DRD funding to the agreed level of at least 1 percent of AgGDP would require an estimated minimum of Tshs. 49.4 billion for research activities and Tshs. 22.5 billion for staff salaries (URT 2011).

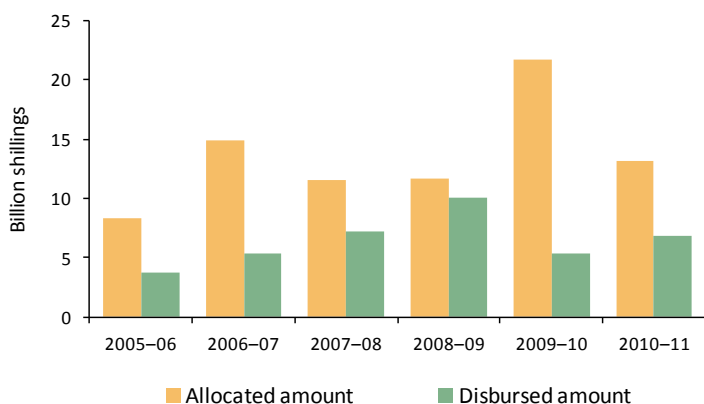
### **Budget Allocations versus Actual Funding Disbursements to the Division of Research and Development**

The government's allocation to public agricultural research has averaged less than 34 percent of estimated operating costs. For example, during the formative stages of ASDP it was estimated that resource allocations for agricultural research would increase by 20 percent per year over the five years from 2006/07. When ASDP was initiated in 2006/07, the overall budget for the seven ZARDEFs was estimated to be Tshs. 2.25 billion per year for the first seven years. Actual payments, however, totaled just Tshs. 1.35 billion during the 2009/10 and 2010/11 financial years. This funding was expected to be contributed by donors, and it was expected that by the seventh year, 80 percent of research funding would be allocated through the ZARDEFs.

Anticipated funding levels have not been realized and, rather than growing, they have in fact contracted over time (Figure 1; Appendix A). In ASDP's first year (2006/07) only Tshs. 802 million was disbursed of an approved Tshs. 7.2 billion (Figure 1). In the following year (2007/08), Tshs. 2.6 billion was disbursed of an approved Tshs. 6.9 billion, which accounts for only 37 percent. The proportion of disbursed funds did, however, improve in the subsequent years and has remained at an average of more than Tshs. 4.0 billion. Funding disbursements increased during these years through contributions from development partners. Nevertheless, the level of funding under the ASDP basket fund arrangement is likely to decline further in the coming years (2011/12 and 2012/13) due to the withdrawal of funding by some of the current donors. For instance, for 2011/12 only Tshs. 2.3 billion has been allocated compared with an approved budget of Tshs. 4.0 billion in 2010/11, which is about 43 percent reduction.

Tanzania has traditionally been highly dependent on donor contributions for agricultural research. Over the past six years, donors funded 54 percent of total DRD spending.

**Figure 1. Comparison of allocated budget and disbursed funding at the Division of Research and Development, 2005/06 to 2010/11**



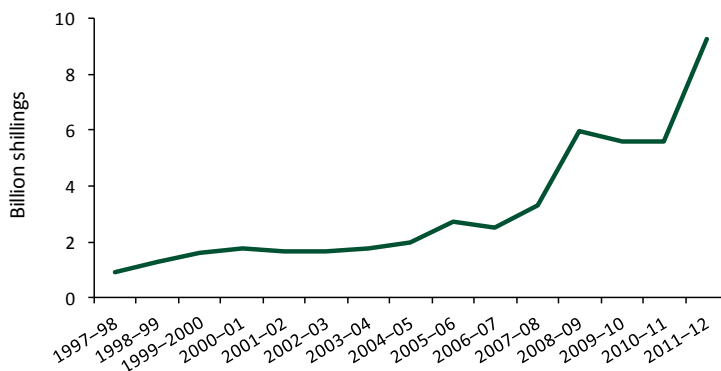
Source: DRD annual budget document review.

Funding disbursements to DRD from 2005/06 to 2010/11 has been somewhat erratic in nominal terms, increasing from 2005 to 2008, then declining in 2009. There has been nondisbursement of funds by government, particularly in terms of operating costs. Increased 2009/10 funding is primarily the result of the Eastern Africa Agricultural Productivity Program (EAAPP), which is financed through a World Bank loan. This project aims to establish a regional rice center of excellence in Tanzania at a total cost of US\$30 million over five years. Under this project, the amount going to research is US\$18.4 million.

Over the past 10 years, DRD's network of research stations has received only small increases in its government budget allocations, commensurate with salary increases (Figure 2). DRD's overall budget is closely tied to staffing costs, which represent more than 42 percent of DRD's total government budget allocation. As a result, salary increases have a significant impact on the amount of funding left over for the day-to-day operation of research programs. The increase in year 2010/11 is the result of much-needed increases in remuneration packages for agricultural researchers, which overall accounted for an 80 percent increase in these expenditures.

Despite the large aggregate increases of the salary, current DRD salaries are still low compared with those offered by the country's semiautonomous institutions (for example, the Tanzania Coffee Research Institute [TACRI], the Tea Research Institute of Tanzania [TRIT], and COSTECH). Although researcher salaries at DRD amount to Tshs. 308,840 to 1,173,730 per month, the equivalent range at the other institutions is Tshs. 630,000 to 2,927,300 per month (Appendix Table A5).

Figure 2. Salary expenditures at the Division of Research and Development, 1997/98 to 2011/12



Source: Government budget review.

### The Consequences of the Low Rate of Funding Disbursement

A large number of DRD's researchers remain poorly remunerated and dejected by the ongoing challenges that both low levels of funding and unstable funding pose. Research managers are pessimistic about the future based on continuing low budget allocations, the consequences of which include the following.

**Poor enabling environment for research**, as evidenced by (1) uncompetitive remuneration, terms and conditions of service, and incentive schemes resulting in low morale and the departure of highly trained scientists (for example, over the past 10 years, DRD has lost over 50 scientists to other organizations that offer better remuneration and conditions); (2) inadequate field and laboratory facilities, information and communications technologies, and research and irrigation infrastructure (for example, lack of on-station small irrigation facilities would not reduce time taken to develop new technologies due to dependence on one farming season per year. Irrigation facilities would allow to have data analyzed for two farming season in the year); (3) limited opportunities to undertake training or upgrade skills;

**Poor research management and coordination** in the areas of (1) human resource capacity development and management (due to a recruitment freeze during 1992–99 and the resulting aging and retirement of senior staff, DRD lacks experienced middle-level researchers and technicians); (2) poor research planning, monitoring, and evaluation; and (3) poor information management and communication.

**Inadequate promotion of modern technologies** in areas such as (1) tissue culture and micropropagation; (2) molecular markers and genetic engineering; (3) bioinformatics and gene technology; and (4) information and communications technologies.

### 3. SUPPORT FROM REGIONAL AND INTERNATIONAL ORGANIZATIONS

DRD has well established linkages and collaboration with regional and international organizations, such as Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), International Potato Center (CIP), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Maize and Wheat Improvement Center (CIMMYT), International Network for the Improvement of Banana and Plantain (INIBAP), International Center for Tropical Agriculture (CIAT), International Institute of Tropical Agriculture (IITA), and other research centers of the Consultative



Group on International Agricultural Research (CGIAR). Linkages are also established in the areas of (1) research information exchange (the Food and Agriculture Organization of the United Nations [FAO], the Technical Centre for Agriculture and Rural Cooperation [CTA], ASARECA, International Plant Genetic Resources Institute [IPGRI], Centre for Agricultural Bioscience International [CABI], and so on); (2) research grants (International Foundation for Science [IFS], the Swedish International Development Cooperation Agency [Sida], International Livestock Research Institute [ILRI], the Bill and Melinda Gates Foundation, and so on); (3) networking (ICRISAT, University-Community Partnerships for Social Action Research [SARNET], CIMMYT, AfricaRice, and so on); and (d) scientific meetings, workshops, and conferences. The main institutions currently providing financial support to DRD researchers and institutions are presented in Table 1.

**Table 1. International Institutions collaborating with National Research Institutes**

International center/institute	Research program	Collaborating national institution
ICRISAT	Sorghum, millet, chickpeas, groundnuts, and pigeon peas	Ilonga, Hombolo, Ukiriguru, Naliendele, and Selian
IITA	Roots and tubers (cassava, sweet potato, and yams) and grain legumes (soya beans and cowpeas)	Kibaha, Ukiriguru, Uyole, and Ilonga
AVRDC	Horticultural crops	Hombolo and Tengeru
CIMMYT	Maize and wheat	Ilonga, Selian, Hombolo, and Tumbi
McKnight Foundation	Beans, cowpeas, and oil seeds	Uyole, Ilonga, and Naliendele
CIAT	Beans	Selian and Uyole
CIP	Sweet and round potatoes	Ukiriguru, Uyole, and Horti-Tengeru
NRI	Sesame seed	Naliendele
IRRI	Rice	Katrin/Cholima
JICA	Rice	Ukiriguru, Uyole, and Katrin
ECABREN	Beans	Selian
CRS	Sweet potato and cassava	Ukiriguru and Uyole
PROGRA	Maize and beans (seed systems)	Selian and Uyole
AGRA	Maize, beans, and soils	Uyole, Ukiriguru, and Maruku
ASARECA	All research programs	All research zones

Source: Compiled by author.

Note: See the acronym and abbreviation list for full names of international centers/institutes.

#### 4. MEASURES TAKEN IN RESPONSE TO LOW GOVERNMENT AND DONOR FUNDING LEVELS

In order to counteract the problem of donor dependence and low government funding, several attempts have been made in the past decade to promote more focused and coherent research. This includes a focus on priority setting, restructuring, station closings (“right-sizing”), decentralization, privatization, client-oriented approaches, farming systems approaches, and increased private-sector funding. The aim is to establish a few well-focused and cost-effective priority research programs and topics whose results could have immediate impact on farm productivity. Farmers, extension groups, agro-industries, nongovernmental organizations, and researchers worked together to develop the zone-specific research priorities, resulting in three categories of priorities (whereby more funds are allocated to Priority 1 compared with either Priority 2 or Priority 3). The current ranking of priorities, developed in 2010, is as follows:

1. Maize, rice, tomatoes, cassava, beans, sorghum, sunflower, groundnuts, sweet potatoes, bananas, and cashew nuts.
2. Cabbage, onions, cotton, mangoes, citrus fruit, indigenous vegetables, pineapple, pigeon peas, avocados, sesame seed, cowpeas, sugarcane, pearl millet, wheat, apples, spices, passionfruit, Irish potatoes, chickpeas, coconuts, sisal, and grapes.
3. Pears, carrots, pyrethrum, finger millet, peppers, oil palm, soybeans, green gram, mushrooms, cocoa, barley, cucurbits, pawpaw, safflower, oilseed crop, yams, and bambaranut (a legume).

By the end of 2005, research had been privatized for three commodities: Coffee, Tea, and Tobacco. TRIT was established in 1996 through a merger of two public research stations (Kifyulilo and Marikitanda) with a private tea research institute (at Ngwazi); TACRI was registered in October 2000 taking over the coffee research activities of three research stations (Lyamungu, Ugano, and Maruku); and the tobacco industry agreed to take over tobacco research in 1996.

There has been other recent commitment by the government to funding research (all sectors) in the country to increasing funding from current level of 0.5 percent to 1 percent of GDP. The commitment started during 2010/11 though the funds were channeled through Commission for Science and Technology (COSTECH) which is a research coordinating body in the country. Under this initiative a total of Tshs. 30 billion was allocated through COSTECH in 2010/11 (for all sectors). The funds were earmarked solely for research operating costs disbursed subject to competitive research proposals. Out of the total 109 Concept Notes submitted, only 34 qualified for writing full proposals. However, at the close of the year 2010/11, there was no research proposal that was approved for funding. Other funds will be disbursed to cater for capacity building through long term training including MSc and PhD for researchers. A total of 33 MSc and 11 PhD researchers were recruited in 2010/11 at Sokoine University of Agriculture. However, at the time of writing, it was still not clear how much exactly will be disbursed to DRD.

## **5. THE ZONAL AGRICULTURAL RESEARCH DEVELOPMENT FUND**

### **Management of the Fund**

ASDP is comprised of two main components: local level support and national level support. One of the national level subcomponents is agricultural services, focusing on making research, extension, and training more responsive to the demands of empowered farmers and other clients through establishment of the aforementioned ZARDEFs. A portion of the program's loan for the period 2006/07 to 2013/14 is allocated to the ZARDEFs in the country's seven agroecological zones for the purposes of executing competitively approved research projects. Any Tanzanian registered research service provider is entitled to apply for funding. At the zonal level, the overall responsibility of managing the funds falls to zonal steering committees, each comprising 10 stakeholders, including farmers and representatives of agribusiness, local government authorities, and nongovernmental organizations. The committees allocate the yearly budget and approve quarterly and annual financial reports. Zonal level funds are allocated within three main areas: (1) mainstream development-oriented subprojects (75 percent of the total budget); (2) administration and management (20 percent of the total budget); and (3) research awards for outstanding performance and output (5 percent of the total budget). Each zone also has a ZARDEF Technical Committee whose role is to undertake reviews of sub-research project proposals and forward these for approval by ZSC.

Funds for administration and management include expenses related to the committee (ZSC and ZaTCs) meetings, as well as committee monitoring, evaluation, and training. Funding for research awards includes payment to scientists who have produced outstanding outputs from research and

includes the preparation of brochures, field notes, reports, and publication in recognized international journals. Agricultural Services Thematic Working Group, which manages the fund at national level can also authorize payment, if the intended activity is aimed at improving the Fund management.

### The Budget for the Fund

The budget for the ZARDEFs averages Tshs. 1.4 billion per year. Two different ministries—MAFC and Ministry of Livestock and Fishery Development (MLFD)—provide funding for the ZARDEFs. MLFD has allocated an average of Tsh 0.6 billion per year, but actual disbursements have fluctuated, with the result that funding levels have been inadequate for research on both crops and livestock.

### The Impact of the Fund on Government Allocations

Interviews with DRD’s zonal directors for research and development and its research managers indicate that the establishment of ZARDEF has negatively affected the government’s allocation for both the recurrent and development budget. For example, in ASDP’s first three years, no government counterpart funding was disbursed. The government allocated Tzs 0.2 billion (for parallel activities under ASDP) for both 2009/10 and 2010/11, but the allocation specifically to ZARDEF has been reduced from Tsh. 1.4 billion in 2010/11 to Tsh. 0.6 billion in 2011/12 due to the withdrawal of certain development partners.

Since the establishment of ZARDEF very little funding for research operating costs has been allocated by the government. It is only operating costs including payment for electricity, water, casual laborers which have been released by the government. There is a general sense that ZARDEF funds going to research sub-projects are currently too small and might have yielded little impact. This is due to the fact that the budget ceiling allowed per research subproject is Tzs 30,000,000 (US\$20,000) for the period of three years, which means that each year the ceiling per project is just Tsh. 10,000,000. The concern of researchers is that this amount is too meager to fund a coherent research agenda. On the other hand, young researchers have not benefited from ZARDEF because of their inexperience with writing research proposals. Their main role has been to collaborate on approved research projects whose principal investigators are very senior researchers.

As of April 2011, 240 subprojects focusing on crops and livestock had been implemented with ZARDEF funding, and of these, only 12 projects had been completed (all socioeconomic studies). Approved and implemented projects represented about 47 percent of the submitted proposals, seemingly due to inadequate funding levels (Table 2).

**Table 2. Submitted versus approved project under ZARDEF**

Year	Number of projects		Share of proposals approved (%)
	Submitted	Approved	
2008/09	171	95	56
2009/10	172	90	52
2010/11	160	55	34
<b>Total</b>	<b>503</b>	<b>240</b>	<b>48</b>

Source: Compiled by author from ASDP progress report 2010.

It is expected that most of the projects will be completed in 2011/12. The total budget allocated to ZARDEF for 2007/08 to 2010/11 is Tshs. 4.7 billion (Table 3), and it is expected that funding will contract in the next two years. It is anticipated that after the end of ASDP (2013/14) while phase II is at a formative stage, there would not be any funds going to ZARDEF. It would imply that in two years time ZARDEF will no longer be operational.

**Table 3. The allocation of ZARDEF funding during 2007/08 to 2010/11**

Year	Research operating costs	Administrative costs (Billion Tshs.)	Disbursed amount
2007/08	0.69	0.23	0.93
2008/09	0.82	0.21	1.03
2009/10	1.01	0.34	1.35
2010/11	1.08	0.27	1.35
<b>Total</b>	<b>3.61</b>	<b>1.04</b>	<b>4.65</b>

Source: Compiled by author from ZARDEF progress reports.

## 6. FUTURE FUNDING MECHANISMS FOR THE DIVISION OF RESEARCH AND DEVELOPMENT

In 2011, a taskforce consisting of seven senior experts was appointed by MAFC to study Tanzania’s existing national agricultural research system and DRD in particular, with a view to recommending the transformation of the Division into a semiautonomous institute that could contribute more efficiently and effectively to the delivery of agricultural research services. The goal underlying the prospective transformation is to:

- establish a stable institution with independent legal status and flexible operating policies;
- streamline the decision making process and improve research management and coordination, client responsiveness, efficiency, effectiveness, and accountability;
- improve human resource capacity through training and staff retention; and
- enhance the capacity to compete with existing and emerging regional and international research institutions for resources.

The organization, proposed to be called the Tanzania Agricultural Research and Development Institute, or TARDI, would assume the current functions of DRD and be largely dependent on government funding. A further US\$46,380 per year for the first five years has been estimated to be required to establish the prospective institute. Initiatives would, however, be introduced to enable additional research resources to be generated focusing on the private sector public–private partnerships in particular. Possible funding mechanisms to be explored are discussed in turn below.

**Government Funding.** Agricultural research will continue to be the predominant responsibility of the government. The current weakness in the research system stems from low funding levels. If the prospective institute is to function efficiently and effectively it will be necessary for the government to substantially increase its budget allocation in the medium term, which aligns with its recent commitment to increase funding for research to 1 percent of the GDP (covering all sectors, not just agriculture).

**Contract-Based Research.** Contract research has proved to be a good source of funding for research conducted by national agricultural research systems in developed countries, but it has not been well tapped by DRD. In order to attract industry, institutes need to create awareness of the services they can provide and the inherent benefits of these services. One strategy would be for TARDI to widely publicize its successful research results and potential contributions to targeted beneficiaries, including local industries, local government authorities, and agricultural private service providers (for example, input suppliers). The goal would be to build confidence among potential clients, thereby creating both demand and support for research.

**Development Partnerships and Networks.** As previously discussed, DRD has established linkages with regional and international stakeholders, and established mechanisms to channel funding to agricultural research institutes, as well as individual collaborating scientists. In the long term, it would be important for TARDI to foster existing linkages and develop new ones. In order to be successful in this regard, given the competitive nature of such collaboration, TARDI would need to build sufficient research capacity, including the ability to develop high-quality proposals.

**Voluntary Contributions from Stakeholders.** TARDI would foster linkages with various stakeholders to solicit voluntary financial contributions to demand-driven research.

**Revenue Retention Scheme.** In 1995, the Ministry of Finance granted approval for agricultural research institutes to retain and use revenues generated from activities and services, such as conducting consultancies, providing advisory services, selling seed and farm produce, charging institutional fees for research projects, publications (for example, selling newsletters) and renting out agricultural plant and machinery. In the long term, TARDI would continue to generate its own income through such arrangements, and these funds would complement the cost of operating the institute.

**Revenues from Royalties.** It is expected that in the short term the proposed TARDI would develop an efficient intellectual property management capacity to ensure that it would benefit from royalties on developed technologies.

## 7. CONCLUSION

DRD has traditionally been highly dependent on contributions from donors and development banks, notably the World Bank. When World Bank funding plummeted during 2004/05, the Tanzanian government was forced to raise its funding levels. Government funding to DRD more than doubled during 2004–09. Nonetheless, substantial discrepancies have been reported in the amounts originally allocated to DRD at the beginning of the financial year and those actually disbursed. In 2010/11, for example, DRD received just a quarter of originally allocated government funding. Currently, the Tanzanian government is funding DRD largely through ASDP, a multi-donor basket fund. However, DRD's overall budget is closely tied to staffing costs, which account for a large share of DRD's total budget allocations. Large salary increases, in efforts to restore some measure of competitiveness with other agencies, consequently consume the vast majority of DRD's operating budget, leaving little room for much-needed capital investments.

Agricultural R&D funding in Tanzania is expected to remain the predominant responsibility of the national government. The current weakness of DRD stems from its low funding levels. In 2010/11 the government committed to raising the budget for research in all sectors to 1 percent of GDP (compared with just 0.5 percent). However, it remains to be seen if TARDI, the soon to be established national agricultural research institute, can expect increased funding. In 2008, the country as a whole spent just 0.5 percent of agricultural GDP on agricultural R&D, below the African average of 0.6 percent and the 1.0 investment target set by the Tanzania government.

Contract research has proved to be a good source of funding for research conducted by national agricultural research systems in developed countries, but it has not been well tapped by DRD. In order to attract industry, institutes need to create awareness of the services they can provide and the inherent benefits of these services. One strategy would be for the proposed TARDI to widely publicize its successful research results and potential contributions to targeted beneficiaries, including local industries, local government authorities, and agricultural private service providers (for example, input suppliers). The goal would be to build confidence among potential clients, thereby creating both demand and support for research.

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## APPENDIX A. SUPPLEMENTARY TABLES

**Appendix Table A1. The Division of Research and Development's budget compared with disbursed funding, 2005/06 to 2010/11**

Year	Budget category	Required funding (Billion Tshs.)	Approved funding (Billion Tshs.)	Disbursed funding (Billion Tshs.)	Share of total disbursed to total approved funding (%)	Share of total approved to required funding (%)
2005/06	Recurrent budget	9.2	7.7	3.1	40	84
	Development budget	5.0	0.6	0.6	100	12
2006/07	Recurrent budget	11.0	7.6	4.5	60	69
	Development budget	7.3	7.3	0.8	11	100
2007/08	Recurrent budget	12.1	6.9	2.6	38	57
	Development budget	6.5	4.6	4.6	99	71
2008/09	Recurrent budget	13.3	7.2	5.6	78	54
	Development budget	6.0	4.5	4.5	100	75
2009/10	Recurrent budget	14.6	8.6	0.6	7	59
	Development budget	14.5	13.1	4.8	37	91
2010/11	Recurrent budget	15.2	1.8	0.6	34	–
	Development budget	11.4	11.4	6.2	54	100

Source: DRD progress reports

Note: Recurrent budget excludes salaries.

**Appendix Table A2. Approved budget for the Division of Research and Development, 2005/06 to 2010/11**

Category	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
	(Billion Tshs.)					
Infrastructure	0.6	0.8	0.3	1.0	0.5	0.5
Equipment	–	1.8	0.5	0.5	0.3	0.3
Research costs	–	2.3	2.0	1.8	1.9	1.9
Training	–	0.6	0.2	0.2	0.3	0.4
Recurrent costs (administrative costs)	–	1.8	1.6	1.1	1.2	0.9

Source: Ministry of Agriculture budget documents

**Appendix Table A3. Actual research expenditures for the Division of Research and Development, 2005/06 to 2010/11**

Category	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
	(Billion Tshs.)					
Infrastructure	0.6	–	0.3	0.5	0.5	0.5
Equipment	–	–	0.5	0.2	0.3	0.3
Research costs	–	–	2.0	1.0	1.9	1.4
Training	–	–	0.2	0.3	0.3	1.4
Recurrent costs (administrative costs)	–	0.2	1.6	1.2	1.1	0.9

Source: DRD progress reports

**Appendix Table A4. Division of Research and Development salaries expenditures compared with total government budget**

Year	Salaries (Billion Tshs.)	Total allocation (Billion Tshs.)	Salary share of the total budget (%)
1997/98	0.93	1.62	58
1998/99	1.30	1.43	91
1999/2000	1.6	1.67	96
2000/01	1.80	1.82	173
2001/02	1.67	2.07	81
2002/03	1.67	3.79	44
2003/04	1.78	3.79	47
2004/05	1.98	3.98	50
2005/06	2.71	5.10	53
2006/07	2.53	13.01	19
2007/08	3,32	13.38	25
2008/09	5.96	14.35	42
2009/10	5.60	14.68	38
2010/11	5.59	12.39	45
2011/12	9.23	15.76	59

Source: Ministry of Agriculture budget documents.

Note: Data for 2011/12 are estimated; the total budget excludes the development budget.

**Appendix Table A5. Disparity in salary levels between Division of Research and Development researchers and those employed at other semiautonomous institutions in Tanzania**

S/NO	Researchers employed at the Division of Research and Development			Researchers employed at other semiautonomous institutions in Tanzania		
	Title	Grade	Salary range (Tshs. per year)	Title	Grade	Salary range (Tshs. per year)
1				Assistant research officer	PRSS 8-9	630,000–753,680
2	Researcher officer II	TGS. D	308,840–384,850	Research officer II	PRSS 10-11	773,830–959,180
3	Researcher officer I	TGS. E	391,300–483,700	Research officer I	PRSS 12-13	998,400–1,260,230
4				Senior research officer II	PRSS 14-15	1,318,530–1,623,750
5	Senior researcher officer	TGS. F	504,660–625,550	Senior research officer I	PRSS 16-17	1,682,520–2,203,470
6	Principal researcher officer II	TGS. G	658,400–818,560	Principal research officer II	PRSS 18-19	2,249,550–2,548,670
7	Principal researcher officer I	TGS. H	860,340–1,173,730	Principal research officer I	PRSS 20-fized	2,668,680
8	–	–	–	Chief research officer	PRSS 21-fized	2,927,300

Source: DRD annual reports.

Note: Grade is a salary category, for example, TSG is a starting salary scale for a graduate: Tanzania General Scale (TGS) level D.





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The Agricultural Science and Technology Indicators (ASTI) initiative compiles, analyzes, and publishes data on levels and trends in agricultural R&D investments, capacities, and institutional arrangements in developing countries. ASTI is managed by the International Food Policy Research Institute (IFPRI) and involves collaborative alliances with many national and regional R&D agencies.

Jointly convened by ASTI/IFPRI and the Forum for Agricultural Research in Africa (FARA), the conference, "Agricultural R&D -- Investing in Africa's Future: Analyzing Trends, Challenges, and Opportunities," brought together experts and stakeholders from the region to contribute their expertise for the purpose of distilling new insights and creating synergies to expand the current knowledge base. The themes under focus were (1) Why African governments under invest in agricultural R&D; (2) How human resource capacity in agricultural R&D can be developed and sustained; (3) How institutional structures can be aligned and rationalized to support agricultural R&D; and (4) How the effectiveness of agricultural R&D systems can be measured and improved.

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