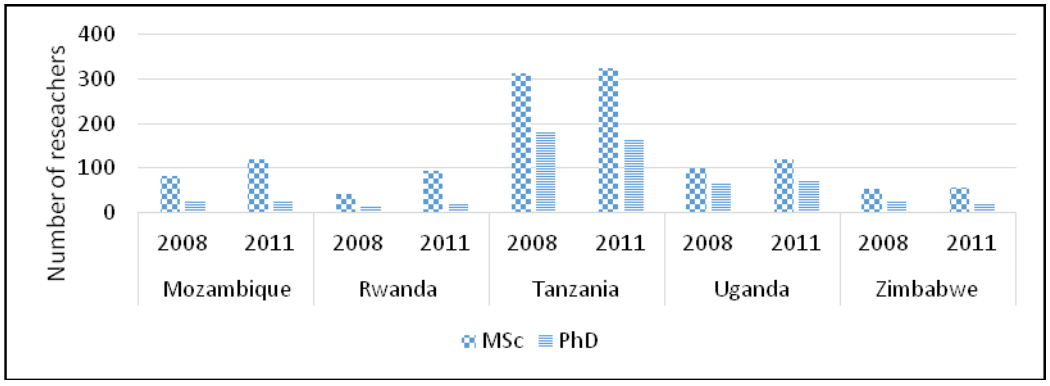
Financing Agricultural Research for Development (ARD)

Isaac J. Minde[1]

Conceptual Approach

Pouring millions of dollars in a research system does not necessarily guarantee good research and useful outputs and development. Many areas need to be considered and be in simultaneous, harmonious and coordinated motion to realise the research goal. First and foremost, we need qualified, competent and motivated researchers, with necessary incentives to ensure focus on the research instead of other things. In Tanzania, for example, the number of PhD holders was lower in 2011 compared with 2008 (Figure 1).

Figure 1: The number of MSc and PhD researchers in 2008 and 2011



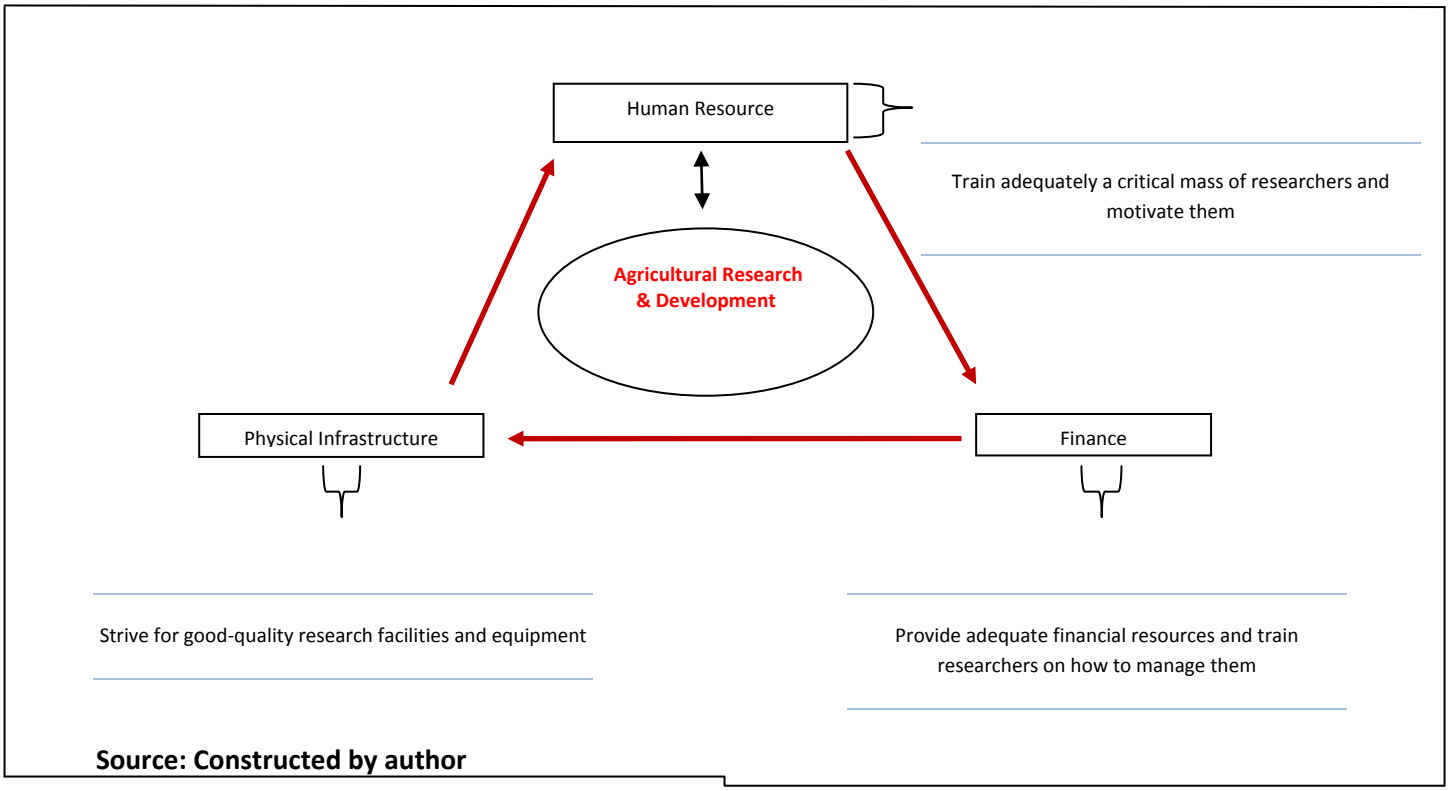
Source: Constructed from ASTI 2014 data

This decline, gives cause for concern, especially given the importance of the agricultural sector and the value of research in addressing present and future challenges. Were funding levels to increase, then there would be insufficient researchers to meet demands in the short term. Adequate physical infrastructure is also necessary to accommodate planned agricultural research activities. Financing planning is also needed for implementing the proposed research agenda. Effective financial

[1] Deputy Project Director, Innovative Agricultural Research Initiative (iAGRI) and Professor of International Development, Department of Agricultural, Food and Resource Economics, Michigan State University, based at Sokoine University of Agriculture, P. O. Box 3114, Morogoro, Tanzania. Email: minde@iagri.org

management of research funds is important to ensure research of good quality is done on time and meets the set goals (Figure 2).

Figure 2: For the system to work well, the various system components have to be financed too.



Source: Constructed by author

Sources of Research Funds

Government: The most important source is public funding, because agricultural research that responds to national needs is by definition a public good. It adheres to the non-excludability and non-rivalry principles (Byerlee and Echeverria, 2002). We cannot exclude non-payers in the utilisation of research outputs. The seed released as a product of research is to be sold and used by all farmers. Many governments in Africa are putting insufficient funds into agricultural research even to honour their commitments as made in pan-territorial and regional forums, such as those organized by the New Partnership for Africa's Development (NEPAD). African countries committed themselves to allocate at least 1% of agricultural gross domestic product to research. Data from ten countries selected from the ASTI (Agricultural Science and Technology Indicators) database (ASTI (2014)) show that this not the case for some countries (Table 1).

Table 1: Percentage of agricultural GDP spent on Agriculture Research and Development from 2003 to 2011 (2011 GDP in billions of US$)

Source: Adapted from ASTI 2014

Country	Ag-GDP	2003	2008	2011
Ethiopia	44.60	0.3	0.24	0.19
Kenya	20.40	1.32	1.35	1.21
Madagascar	5.63	0.23	0.25	0.16
Malawi	5.10	0.89	0.58	1.03
Mozambique	7.64	0.55	0.4	0.36
Rwanda	4.44	0.63	0.62	0.69
Swaziland	0.48		1.84	1.43
Tanzania	17.65	0.45	0.58	0.54
Uganda	10.67	0.76	1.29	1.22
Zimbabwe	0.88	0.39	0.37	0.79

There is also much year-to-year volatility, as seen in Madagascar (Table 2). Such inconsistency is potentially destructive, because planned research may cease if funding is rapidly and excessively reduced.

Table 2: Total public agricultural research spending and its percentage increase (in millions of constant 2005 dollar prices)

Country	2000	% change	2008	% change	2011
Ethiopia	47.8	35	64.5	8	69.6
Kenya	151.7	12	169.8	11	188.1
Madagascar	8.5	23	10.4	-27	7.7
Malawi	23.8	-32	16.3	110	34.3
Mozambique	17.5	4	18.1	14	20.7
Rwanda	16.6	9	20.2	35	27.2
Swaziland			6	-22	4.7
Tanzania	40.6	92	77.9	5	81.4
Uganda	39.1	138	93.1	15	106.8
Zimbabwe	3.6	-22	2.8	105	5.7

Source: ASTI 2014.

Similarly, when research funds are rapidly increased, as in Malawi between 2008 and 2011, the system may be unprepared to absorb this positive shock (Table 2). Expenditure per researcher in Africa has also

remained very low and a large proportion of the research budget goes to paying salaries. This is a fixed cost, as salaries must be paid first, no matter how low the allocated budget is. Expenditure per researcher for 2011 was as low as $43 k for Madagascar and as high as $365 k in Uganda (Table 3).

Table 3: Number of MSc and PhD researchers and expenditure per researcher in 2011 (in 000$)

Country	MSc	PhD	Expenditure per researcher
Madagascar	102	78	42.78
Zimbabwe	55	22	74.12
Ethiopia	747	168	76.02
Mozambique	118	26	143.15
Tanzania	324	165	166.67
Kenya	553	368	204.12
Swaziland	10	12	209.82
Rwanda	94	22	234.89
Malawi	71	32	332.36
Uganda	183	110	365.00

Source: Adapted from ASTI, 2014.

In 2011, Africa invested 0.51% of the value of the agricultural output in agricultural research, far below the African Union's target of 1% or more (Beintema and Stads, 2013).

Donors: Several donors fund research in Africa, in some isolated cases providing above 50% of funding (Spielman et al., 2011). This funding is mostly directed to national governments, universities (especially of agriculture) and non-government organisations (NGOs). Donors become handy in situations where governments are constrained by fiscal crises or civil strife. When these situations happen, the government research system becomes partially or completely dysfunctional and donor funding is diverted to NGOs to manage the research. This happened in Mozambique, Rwanda, Burundi and the Democratic Republic of Congo. NGOs can provide a breathing space as the country waits for the situation to normalise. However, many NGOs are not necessarily trained to conduct top-of-the-range scientific research and in some countries they have faced acute technological and scientific challenges. NGOs can also be donors, depending on their organisational setup, especially international NGOs such as Oxfam (www.oxfam.org), TechnoServe (www.technoserve.org), CNFA (www.cnfa.org), etc.

Private sector: Funding of agricultural research by the private sector in Africa is still very underdeveloped. Private sector is 'for profit' and so in whatever they invest in, they must remain convinced that it represents good value for money. The private sector is more likely to work with universities than ministries to avoid bureaucratic 'red tape'. It is not impossible to work with

governments, but their organisational rigidities mean the private sector finds it easier to partner with universities in doing research.

Commodity Research and Development Funds: Typically in Africa, research for cash, export-based commodities such as tobacco, coffee, sisal, tea, cashew, cotton has had its own funds and employs its own scientists, in what were very prestigious roles for graduates. Funds came from a levy imposed per kg of the commodity sold or exported — whichever would be found most convenient, with deductions made by a cooperative society handling that commodity. Today, many commodity-based organisations are unable to contribute to research, because of administrative, market and political challenges which have reduced their vigour in revenue collection and in making good use of this money for research.

Who Does Agricultural Research and Why?

Ministries of Agriculture Research Departments: Traditionally, this has been the home for agricultural research in Africa. But because many governments find it difficult to adequately finance agricultural research, there is a dire need to diversify implementation of agricultural research.

Universities of Agriculture: In many countries, these are home to the largest concentration of qualified agricultural researchers with Masters and PhD degrees. In addition to research done by university staff, there are research projects to be undertaken by graduate students as requirements for their degrees. Coordination problems mean many studies do not go beyond enabling the student to graduate, nor meet national needs, as the opportunity to make effective use of them is often missed. In a six-year USAID-Feed the Future project called Innovative Agricultural Research Initiative, based at Sokoine University of Agriculture, Tanzania, of which long-term post-graduate degree training is a part, the research component must be done in Tanzania. When the project ends in 2017, 135 students would have received training and completed research projects. Since these topics are chosen from priority research themes identified by the key stakeholders of the project, i.e. the university, the ministry and selected private sector firms in the food system, the research is a highly relevant contribution to the country's research system.

iAGRI students

In 2013, Neema Shosho, a student sponsored by iAGRI, USAID Feed the Future Tanzania returned home (Tanzania) from Tuskegee University, USA to implement her master's research, which investigated the effectiveness of an alternative education regime in providing mothers in rural areas with the knowledge they need to administer nutritious complementary feeding practices to their young babies. Meanwhile, Chacha Nyangi investigated the effectiveness of a specially engineered grain storage bag in preventing the accumulation of potentially harmful mycotoxins as well as the bag's resistance to pest infestation in stocks of post-harvest maize and beans (iAGRI, 2014). One may question the sustainability of such exciting projects and programmes. Typically, the world over, a significant portion of research at universities is funded by donors and some by governments. At Sokoine University of Agriculture for example, there are several donors (DANIDA (www.um.dk/en/danida-en), EU (www. europa.eu), JICA (www.jica.go.jp), NORAD (www.norad.no), USAID (www.usaid.gov) who have different research funding

cycles. Usually, there are peaks and troughs but in general, research funds do not completely dry up, especially if the researchers establish a good reputation.

Commodity Focused Organisations and the Private Sector: Typically, commodity-focused organizations and private firms conduct their own research. In doing so, they often collaborate with the ministries of agriculture and or universities.

Financing Agricultural Research and Kinds of Research

Glenn Johnson (1986) identifies three kinds of research – basic or disciplinary, subject-matter and problem-solving. The first is meant to improve a discipline and it may be of known or unknown relevance, and thus it may be very difficult to attract funding from governments with constrained budgets. Subject-matter research is about generating knowledge that can later be applied in problem-solving research, for example the research on methods and tools to be used in coping with climate change. The results are useful but may not be of immediate application – hence also limiting funding. The third is research directed to solving a particular problem facing society and which may be rather acute, for example, research on maize lethal necrosis disease. For many Sub-Saharan African countries with low research funds, the third kind is most popular followed by the second and then the first. However, a country needs to invest in all three kinds of research as they have a specific role to play in national social and economic development.

Some Concluding Thoughts on Future ARD Financing

The following summarises what may be necessary to improve and attract more investments in Africa's research systems:

- Clear articulation of the research agenda – ownership by key stakeholders is paramount.
- Participatory and inclusive research agenda formulation processes is key.
- Responsiveness to national, regional and international concerns. There is need to think globally but act locally.
- Research networking with national, regional and international efforts is critical: This will help in building capacity of young and inexperienced staff, avoiding false starts and achieving economies of scale.
- Increasing the role of the private sector in funding research is absolutely critical. This should be engineered by the ministries of agriculture as well as universities of agriculture. The USAID Feed the Future project, iAGRI at Sokoine University of Agriculture has started facilitating commercial orientation of research proposals of staff and graduate students in order to attract the private sector. This is paying dividends and helps make the research relevant to the business communities and also tests for its national relevance.

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