A comment on the need to develop institutional capacity for improved performance in agricultural research systems

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Presented at the Cornell University Conference New Directions in the Fight against Hunger and Malnutrition, held in honor of Professor Per Pinstrup-Andersen. Ithaca, NY, December 2013. Ruben G. Echeverría is the Director General of the International Center for Tropical Agriculture (CIAT), A.A. 6713, Cali, Colombia. Office Phone: +57.445.0000. Email: ruben.echeverria@cgiar.org

Summary

Very original and successful research conducted more than 30 years ago (Hayami and Ruttan) showed that the rate and direction of technological change is determined by shifts in relative resource endowments and by institutional innovations. This has been a significant if not prevalent framework for hundreds of international agricultural development professionals in recent history. Subsequent decades of well-documented research (Pardey et al.) have further underlined a general consensus in the global agricultural development community that investing in agricultural research gives very high economic payoffs.

With a few notable exceptions, however, this historic consensus on how innovations are induced by technical and institutional change has usually translated only into relative increases in short- and medium-term funding for public national and international agricultural research programs. Relevant investment in much-needed capacity to conduct research has remained weak. That is, institutional change – including the development of capacities to improve the effectiveness and efficiency of research policies, research organizations, and the management of agricultural research itself – has received only limited attention, particularly in the last 2 decades.

Since the late 1980s, a plethora of excellent proposals have been put forward to enhance the effectiveness of agricultural research institutions: including decentralization; separation of funding from execution with greater openness and competitiveness; greater private sector investment; the privatization of extension; a new role for universities; a shift from the public institute model towards knowledge and information systems, innovation systems, and multi-stakeholder platforms; regional and subregional centers of excellence plus many other appealing concepts. However, for one reason or another, few of these rigorous proposals have led (so far) to significant institutional change. Apparently, we have been much more productive in proposing research-for-development paradigms than in actually developing research capacities.

In this brief overview, I argue that there appears to be a major imbalance in the priorities for funding public research. I further question whether the current public institutional arrangement of agricultural research for development in low- and middle-income developing countries can respond adequately to the colossal food security challenges of the future without increased investment in social science research and institutional innovation capacity.

Strategic initiatives in international public research – such as the CGIAR – have rightly assigned high priority to partnerships with national research systems, with the aim of achieving research-for-development outcomes. However, with the exception of about a dozen relatively strong agricultural...
research systems in developing countries, national partners will be hard pressed to respond without significantly increased investment in capacity development.

Introduction

Improving institutional capacity to conduct agricultural research and extension in developing countries has contributed importantly to their agricultural and economic growth. Food policy research has played a particularly key role in strengthening capacity for agricultural policy analysis, and as a consequence, its impacts on poverty reduction are evident. Time and again, developing the capacity of researchers, policymakers, administrators, extension workers, and others has proved critical for addressing crucial policy issues through research, institutional change, and organizational management. Institutional capacity would, therefore, seem to be an “old” issue, which has been addressed by the significant expansion of public agricultural research systems in developing countries over the past 50 years or so.

Moreover, during the last 2 decades, it has been assumed that the private sector, producers associations, and other civil society organizations would fill any remaining major gaps in developing country capacity to develop relevant agricultural technologies. And if there were any gaps remaining then public private research partnerships would take care of them!

Research spillovers from country to country plus regional and sub-regional cooperative research were also expected to “take care” of filling gaps in public research capacity, particularly to address the issue of small size research systems. The recent return of agriculture to development agendas has further reinforced the assumption that developing countries will follow the many recommendations to increase their public research investments. In fact, many countries have done so. But despite growing global investment in public agricultural research, many developing countries still do not have sufficient institutional capacity to manage priority research investments or even to “absorb” technological spillovers from other countries. Without at least a basic level of local research capacity, the additional investment in new technologies (funded by local governments and/or by donors) may have even lower than expected returns.

Institutional capacity to conduct effective research could be considered as a key element of R&D policy, and within these broad topic and focusing on public sector research three main subjects should be consider: financing (who should pay for what), organizing (institutional arrangements) and managing research (how much to spend, where and how). In a groundbreaking work on the subject, Alston and Pardey (1996) discuss how to make these 3 themes more efficient, but the overall research policy literature has devoted little effort to the critical issues of financing, organizing and managing agricultural research.

Moreover, funding volatility often triggers the restructuring of national research systems, but there has been very little attention to the link between effective financing of research, the structure of research systems and the organization of research activities (Elliott 1988). Indeed, structures suited to secure
funding may not be the best ones for executing research so sustainability of funding may be compromised.

When policymakers think about strengthening research capacity, the obvious options are building research laboratories and enhancing human capital by sending staff abroad to earn PhDs. But the capacity to conduct effective and efficient agricultural research also involves institutional “space” where innovative solutions to agriculture development problems can be created. It is essential, for instance, to learn from the knowledge and farming practices created by past generations and to adjust the priorities of applied research, so that it can cope with major new challenges. Yet, we have seen a steep decline in funding for this type of innovation as well as for many other useful public research interventions that are not provided by markets.

Mbabu and Hall (2012) in one of the most recent proposals to rethink a capacity building agenda in agricultural research describe four historical phases, from building national research institutes (NARIs) to national research and extension systems (NAREs) to agricultural knowledge and information systems (AKIS) to agricultural innovation systems (AIS). They propose to place capacity building in a systems framework with all its (production, social, organizational, functional) complexities. Hopefully, future emphasis on institutional development and capacity building will consider capacity development as a dynamic process, where there is more facilitation rather than stand alone training and much more focus on learning and performance management of research institutions.

Given the plurality of agricultural research systems and the multiple sources of innovation, it is essential to build national research capacity to link technological advances with the institutional innovations needed to pave the way for development impact. The expanding pipeline of new biotechnologies will further increase the need for capacity to ensure that researchers, regulators, producers, and consumers make informed decisions about the development, release, and regulation of appropriate technologies in a cost-effective way for the benefit of society (Pardey et al. 2007).

While there is a clear need to continue promoting the privatization of agricultural research where markets work, there are limits to the expansion of this research, especially in developing countries. Public financing and to a lesser extent public execution of research must remain central, especially where non-commercial agriculture is important and research institutions are weak (Byerlee and Echeverría 2002).

Despite weaknesses in the public research organizations of many countries, they also possess a wealth of experience with institutional innovations in the financing and execution of research, which have, in many cases, reinvigorated agricultural research systems. Often, these innovations involve increased collaboration between the public and private sectors, including farmers, leading to enhanced efficiency and effectiveness in public organizations. The increasing tendency to view agricultural research in the wider context of science and development is also creating new opportunities to integrate public funding and research into a wider innovation system (Byerlee, 1998; Echeverria, 1998).
The current capacity development challenge

As a result of rising concern about food security and climate change, agriculture development is gradually being restored to its rightful place in national and international development agendas. This increased attention includes the need to strengthen capacity to conduct effective and efficient agricultural research for development. Farmers and scientists, working within the larger framework of agricultural research institutions, need to build new capacities, so they can create, adapt, and adopt technologies and knowledge more effectively through collaborative work and learning.

However, the research capacities of emerging and developing countries around the world present an inconsistent picture. In many developing countries, conditions for capacity strengthening are not favorable, with researchers concentrated mainly in universities and the government and only limited private sector involvement in research and development.

Yet, at the end of last decade, developing countries’ overall investment in public research for development reached a similar level to that of developed countries (ASTI 2012). This overall picture masks a growing divide between the small number of countries that have performed well and the large majority that are falling behind. Some countries’ scientific capacity is actually weaker than it was a couple of decades ago.

According to ASTI (2012), public spending on R&D, after rapidly increasing in the 1960s and 1970s, slowed in most regions during the 1980s. Although there have been increased investment in the past two decades, the overall funding situation show a growing divide between lower and higher income countries and in the developing world between a handful of stronger systems (e.g., in Brazil, China, and India) and most of the others. An important lesson from the experience of these stronger systems is that to build the institutional capacity to develop and transfer local technologies to farmers can take at least 2 decades.

Capacity development is slowly returning to international research-for-development agendas. A recent ASTI/FARA conference on key challenges for Africa’s agricultural R&D (Lynam et al. 2012) emphasized the need to strengthen institutional capacity and highlighted key actions needed to achieve this end. The UK government’s Department for International Development, for instance has funded a pilot project on this subject in Africa (through FARA, the Forum for Agricultural Research in Africa). And the US Agency for International Development (2013) has recently convened an expert roundtable to determine a way forward for capacity building.

Throughout the 1970s and 1980s, when CGIAR centers had substantial core funding for training as well as research, many centers built strong training units. Training was among the activities that suffered most from reductions in CGIAR core funding, beginning in the 1990s. During this period, training was increasingly incorporated into research programs. A major shift in the amount and type of donor funding to CGIAR had a large impact on how training was organized, funded, and implemented across the system. The decline of core funding prompted most Centers to reduce training as a stand-alone
activity. The Centers came to rely on the ability of their scientists to attract funding for training within research projects. The responsibility for training itself was often passed on to national or regional partners, with mixed results. On the positive side, this decentralization connected the Centers more directly with field activities, better enabling them to engage with extension services, farmer groups, and market actors (Staiger-Rivas et al. 2013).

A key challenge now for the international research community is how to integrate capacity development into global agricultural research-for-development programs, with the aim of widening the impact pathways that lead from research products to intermediate development outcomes and system-level outcomes. The clear outcome orientation of new CGIAR Research Programs requires greater efforts to strengthen the capacity of partners, who will be instrumental in scaling up/out research outputs (Staiger-Rivas et al. 2013).

Against this background, the perception of capacity development in CGIAR is changing from a focus on individual professional training to a concern with achieving outcomes from global research programs by strengthening partners’ institutional capacities while conducting collaborative research with them. CGIAR paid serious attention to strengthening research capacities at the national level during the 1980s and 1990s when an entire center (ISNAR, the International Service for National Agricultural Research) was devoted exclusively to this mission. Gradually, the need to build research capacity particularly in small and medium size research systems in developing countries is once again becoming evident.

The argument for strengthening research capacity has been well articulated in the past. Horton (1999), for instance, argued that capacity development should move to the center of the agendas of development organizations, since technologies and institutions are changing fast and overseas development assistance has declined since the early 1990s. Strengthening individuals and organizations is vital for ensuring that scarce research resources have maximum development impact. However, as noted by Horton (2003) and other experts, capacity development efforts have not been robust and have not been evaluated systematically.

ISNAR conducted evaluations of capacity development to draw lessons for the improvement of future programs. Mbabu and Hall (2012) describe ISNAR as a unique entity whose agenda dealt explicitly with capacity building rather than research per se. The authors note that, by virtue of the diverse composition of its staff (including economists, sociologists, human resource specialists, organizational development specialists, research management specialists, evaluators, and policy researchers), the Institute was able to draw on complementary professional perspectives outside of agricultural research. ISNAR also focused on retooling the professional skills of agricultural researchers and research managers to help them cope with the changing context of agricultural development.

More than a decade after ISNAR was closed, it’s important to understand the current status of research capacity in national research systems and to find a way forward. These two key tasks are the subject of the remainder of this comment. A key message of this brief comment is that we need to develop institutional research capacity at the national level with diverse actors rather than return to our previous
focus on “rebuilding” national research institutes and creating international centers devoted to this mission.

**Status of research capacity in national research systems**

In 2008, global public spending on agricultural research was close to $32 billion in inflation-adjusted, purchasing power parity (PPP) US dollars (ASTI, 2012). Expenditures were split evenly between more developed and less developed countries. Public research investments in China, India, and Brazil accounted for 25% of global spending and half of the combined spending of less developed countries. Sub-Saharan Africa, other Asia-Pacific countries (excluding China and India), other countries of Latin American and the Caribbean (excluding Brazil), West Asia and North Africa, and eastern Europe and the former Soviet States each accounted for only 3-6% of global public spending on agricultural research in 2008.

In the past decade, a number of medium-income developing countries (China, India, Argentina, Brazil, Mexico, Iran, South Africa, Nigeria, Uganda, Kenya, Thailand, Indonesia, Vietnam, and others) have significantly increased their public research investments. However, a large number of low-income developing countries have not been able to follow suit. So, the good news is that about a dozen developing countries are pursuing a virtuous path towards increased investment in infrastructure and salaries for public research. But what about the other hundred or so middle- and low-income developing countries whose average research intensity is only about 0.5% (research investments as a percentage of agricultural GDP)? And how much of the recent expansion in public budgets has gone to boost capacity in “soft” research areas?

For instance, in sub-Saharan Africa there has been a research spending decline or stagnation in about half of the 30 countries with data during the 2000-2011 period. In 2011 DR Congo spent US$16 million or 0.17% of AgGDP on agricultural R&D and Ethiopia spent US$78 million or 0.22% of AgGDP on agricultural R&D (Beintema and Stads 2013). These seem to be extremely low levels considering that DR Congo and Ethiopia are the 2nd and 3rd most populated countries in SSA. Moreover, spending would need to increase six fold in DR Congo and fivefold in Ethiopia to reach the agreed UN/NEPAD 1% target. Furthermore, about half of the countries in SSA show more than 50% of PhD holders being 50 years of age or older, underscoring an urgent need to recruit and train a new generation of scientists.

We might assume that non-governmental and civil society organizations, universities, and the private sector are filling the major gap in developing country research investment. But apparently that is not the case. Moreover, despite welcome news about increasing support for CGIAR, its entire research budget of about $1 billion still represents just 1.5% of total public spending or 3% if high-income countries are excluded (ASTI, 2012).

So, there is still plenty of scope for countries to do more collectively in terms of public funding and execution of research at the subregional and regional levels and benefiting more from spillovers. But in order for these collective efforts to be effective, countries require some minimum level of local research
and institutional capacity. In addition, the approach on relying on regional and subregional research structures when in most cases they are only funded through donors may not be sustainable in the medium to long term.

Can the private sector fill the gap? According to ASTI (2012) private investment in research on agriculture and food processing increased from $12.9 billion in 1994 to $18.2 billion in 2008. Most of this research was conducted in high-income developed countries. Focusing only on agricultural research—and thus excluding food processing and product development—global R&D spending by the public and private sectors combined totaled $40.1 billion (PPP) in 2008, of which 79% was performed by the public sector and 21% by the private sector.

**Concluding thoughts**

Qualified scientists are an essential requirement for research organizations to perform and thrive. The institutional framework in which researchers operate – i.e., sound policies, efficient organization, and skillful management – is just as critical for research effectiveness and impact. So, capacity development must be a key element of impact pathways, not just a stand alone training component of research – making it possible to build research institutions that can deliver research impacts on a large scale.

Given recent substantial increases in public research investments, particularly in sub-Saharan Africa, it is important to find better ways to guarantee medium- to long-term government support for agricultural research (with less dependence on development assistance); adjust the fit between donor support and national priorities; promote regional and subregional cooperation; and facilitate private-sector participation (Lynam et al., 2012). To these important measures, we must add the crucial ingredient of capacity development if we expect to lessen funding volatility.

Why do we have underinvestment in capacity development for agricultural research? This is typically attributed to the long time required to achieve results as well as the externalities associated with spillovers and small-scale systems. In addition, I would argue that, in addition to those reasons, there has been pervasive neglect of the need to strengthen social sciences for institutional change in research systems.

The case is often made that investment in research is one of the major instruments for maintaining competitiveness, particularly in more open trade systems. But as expenditures increase, many public research organizations face severe institutional constraints, which hinder their effectiveness and ability to raise funds. Even if funding for research does increase, research systems may still be unprepared to absorb new funding in an effective or efficient manner, unless institutional research capacity is strengthened.

Two critical challenges facing many research organizations and governments, which were commonly cited in the literature of the 1990s (Echeverría 1998; Byerlee 1998), remain to be addressed. These are relatively obsolete institutional structures and the lack of stable funding for agricultural research.
Reduced research funding in the 1990s together with the declining capacity of public research organizations at that time, created an opportunity to rethink the institutional architecture and develop truly national agricultural innovation systems. Several elements emerged as key factors of this new paradigm: a pluralistic institutional structure, a growing role for the private sector, new mechanisms for research funding, improved efficiency and effectiveness of public research organizations, and strengthening of global scientific links.

Research capacity should be developed in a way that, from the beginning, encourages interaction between public, private, and civil society organizations; it should figure as a stand-alone item in the portfolio of funding priorities.

Increased investment in research should, therefore, include the development of research management and organizational capacities, which are critical parts of the institutional framework in which researchers operate. Moreover, developing research capacity, including a stronger ability to attract and keep researchers, requires a long-term commitment. Two examples of such commitment are the strong public research systems of Brazil and India.

If agricultural research organizations are to achieve greater success, they must become more interconnected and more responsive, increasing their capacity to learn and change. Training is necessary but not sufficient for capacity development, which we should view as a means to enable social learning and innovation and promote sustainable development as a collective achievement. Since there are different views and definitions of capacity development, a flexible approach is essential for finding the way forward.

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