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Thoughts on Governance and Future Orientation of Agricultural Research in Ethiopia

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አጎፅሮተ-ጥናት

የሀገሪቱ የግብርና ልማት በአካባቢ ላይ አሉታዊ ተፅዕኖ ሳያስከትል በቂ የምግብና እንስሳት መኖ አቅርቦትን ማረጋገጥ ይቻል ዘንድ ቀልጣፋና ውጤታማ መሆን ያለበት ሲሆን በዚህ ረገድ የግብርና ምርምር ሰፋፊ የልማት ግቦችን ያለመ የምርምር አጀንዳ በመቅረፅ የነላ አስተዋፆዖ ሊያደርግ ይችላል፡፡ የሀገሪቱ የግብርና ምርምር ይህንን ሚና ይጫወት ዘንድ መሰረታዊ ለውጥ ማድረግን የሚፈልግ ሲሆን ይህም እንከን የለሽ የቅንጅት ስርዓት መፍጠር፣ በቂ የሰው ሃይል አቅም መገንባት እና የቁሳዊና ፋይናንስ አቅምን ማጎልበትን ያካትታል፡፡ በአሁኑ ወቅት ሀገሪቱ የፌዴራል ስርዓት የምትከተል በመሆኑና ተለያይነት ያለው ስነ-ምህዳር፣ ማህበራዊና ኢኮኖሚያዊ ሆኔታ ያላት እንደመሆኑ ያልተማከለ የምርምር ስርዓት መከተል አማራጭ የሌለው ሆኖ ይገኛል፡፡ ይሁን እንጅ ስርዓቱ ጠንካራ የቅንጅት ስርዓት ከሌለው ምርምሩ የተበጣጠሰና ተፅዕኖ የማያመጣ መሆኑ አይቀርም፡፡በዚህ ረገድ ብሄራዊ የግብርና ምርምር ካውንስል የብሄራዊ የግብርና ምርምር ስርዓቱን አካላት በውል መለዬትና የእያንዳንዳቸውን ሚና ለይቶ የልህቀት ማዕከላትን በመመስረት ውጤታማ የማስተባበር ስርዓት መፍጠሩን ማረጋገጥ ይኖርበታል፡፡ በሌላ በኩል የሀገሪቱ የምርምር ስርዓት በቀጣይ ቴክኖሎጂ ከማላመድ ጎን ለጎን ዘመናዊ የሳይንስ ምርምር ዘዴዎችን በግብዓትነት ተጠቅሞ በራስ አቅም ቴክኖሎጂ በማመንጨት የግብርና ቴክኖሎጂ ዋስትናን የሚያረጋገጥ፣ ብሎም ቴክኖሎጂን ኤክስፖርት እስከማድረግ ድረስ ኢላማ የሚያደርግ ሊሆን ይገባል፡፡ በፋይናንስ አቅም ግንባታ ረገድም የአገሪቱ የግብርና ምርምር ከፌዴራል መንግስት የታወቀ የበጀት ምደባ ሊደረግለት የሚገባ ሲሆን በውድድር አግባብ የሚሰጥ የምርምር ፋይናንስ ስርዓት መከተልም ጠቃሚ ይሆናል፡፡ በሌላ በኩል የምርምር የሰው ሃይል አቅም ከማጎልበት አኳያ በእቅድ ላይ የተመሰረተ የሰብዓዊ ሀብት ልማት እና የመተካካት ስርዓት መፍጠር ወሳኝ ነው፡፡ ከዚህ ባሻገር ልምድ ያላቸውን ተመራማሪዎች እንደገና መቅጠር፣ ወጣት ተመራማሪዎችን በሳልና ልምድ ካላቸው ተመራማሪዎች ጋር ማስተሳሰር እንዲሁም የማበረታቻ ስርዓት መፍጠር ጠቃሚ ይሆናል፡፡ በአጠቃላይ የግብርናውን ከፍለ ኢኮኖሚ ምርታማነት፣ የምግብ ዋስትና፣ ተወዳዳሪነትና ትርፋማነት በዘላቂነት ለማረጋገጥ የሀገሪቱን የግብርና ምርምር ስርዓት ማጠናከር እጅግ ወሳኝ ጉዳይ ነው፡፡

Abstract

Agriculture needs to be more efficient and productive to provide more food and feed with less environmental damage to which agricultural research has a lot to offer by designing a broader research agenda. This calls for overhauling the research system towards creating a seamless coordination mechanism, assigning adequate work force, and improving physical and financial capacities. As a federated country and for its diverse agro-ecologies and socio-economic settings, decentralized research system is feasible option for Ethiopia. This, however, needs a strong coordination mechanism, lest the research institutions tend to fragment into a number of isolated entities. To this end, the National Agricultural Research Council needs to re-define NARS entities, differentiate their roles, and ensure effective coordination through creating avant-garde Centers of Excellences. The country's future research needs to embrace modern biosciences, and alongside of technology adaptation it should generate technologies and ensure technology security, and subsequently technology export. In terms of funding, research in its own right should receive a core budgetary allocation from the federal parliamentary appropriation while competitive funding scheme is

also important. A well-planned staff development and succession plan is essential to strengthen the research work force. Besides, re-hiring out-gone researchers, and seconding researchers to veteran scientists at national and international research excellence centers would be helpful. Staff motivation and commitment is also vital. Staff recruitment modality needs to change as well. All in all, the country's agricultural research system needs to be reinforced to help sustaining productivity, food security, competitiveness and profitability of the agricultural sector.

Introduction

Providing adequate food, feed, fibre and fuel for the growing population without further endangering ecosystem services would without doubt appear the greatest challenge of the 21st century. It is axiomatic to note that, the demands on agriculture to become more efficient and productive is greater than ever. In the midst of these complex challenges, agricultural research stands at crossroads. New and speedy change and shorter reaction time to stand against expectations demands a much wider and deeper research agenda that would thrive well beyond the traditional philosophies and agricultural principles and disciplines.

To date the fundamental contexts for justifying the colossal role of agricultural research for development include reducing poverty; modulating hunger; improving food security; minimizing "hidden hunger"; efficient and sustainable management of natural resources; sustainable energy production; mitigating the effects of climate change, effective and broadly functioning land administration and use stand out boldly.

Scientific knowledge is now well recognized as the key production factor for successful economies. In this regard, agricultural research has a lot to offer by way of generating and sharing scientific and development-centered knowledge for general and specific solutions to problems of universal nature.

In the rapidly changing climate and globalizing world, Ethiopian agriculture is confronted with diverse set of constraints and challenges. This calls for overhauling the research system to keep on continually improve its impactful performance and become more sensitive to farmers' livelihood security, productivity, the quality of natural resources, captivating the integrity of climate in agriculture, and aligning the country's global roles and obligations.

Within the broader National System of Innovation (NSI), it has become essential to develop a strong National Agricultural Research System (NARS) and coordination mechanisms, assigning adequate work force, improving physical and financial capacities, and proper reorientation towards Agricultural Research for Development (R4D) approach. With this acquaintance of prerequisites, the country has established a new national coordination organ, the Ethiopian Agricultural Research Council (EARC) as of August 2013, to provide a national research coordination role as well as guide the

research direction of the country. This coordination body is supposed to operate under the decentralized governance structure setting of the country's research system, which its effectiveness and evolvement is yet to be seen.

This article intends to provide input into the headway of the EARC and future orientation of agricultural research in the country.

Organizational Models of Agricultural Research Governance

From NARS perspective governance is about guiding, actuating and steering research functions towards growth and improved performance, the latter depending upon an enabling environment to perform both internal processes i.e., rules and procedures and generation of S&T goods and services having relevance, and usefulness to external processes i.e. all NARS-stakeholders' interface (NAAS 2002).

Globally, there are some commonly known organizational models for governance of agricultural research (FAO 1997). These include Agricultural Research Council (ARC) model, National Research Institute (NRI) model, University model, and Ministry of Agriculture, Department of Agriculture model. The best example for ARC model is perhaps the Indian Council of Agricultural Research (ICAR), which its management at the Council level include a General Body, Governing Body, and Finance and Regional Committees. The National Institute of Agriculture (INTA) of Argentina best represents the NRI model with a governance structure including Governing Committee, National Directorate, Directorate of Research and Directorate of Extension. The USA Land Grant University best represents the University model of agricultural research and is governed by a board with greater autonomy.

In developing countries there is heterogeneity of NARS governance ranging from typical bureaucratic control under the ministerial departments to relating autonomous structure; and from practically with no coordination to well-orchestrated coordination. In most African countries, research organizations have been following the agricultural research pattern of the respective colonial power. To date, there are three typical governance models existing in Africa: a semi-autonomous research council, semi-autonomous research institute, and advisory and coordinating council models.

Agricultural Research Governance in Ethiopia

Although certain basic characteristics existed as far back as 1930's, organized agricultural research in Ethiopia started with the creation of Institute of Agricultural Research (IAR) in 1966 and the national agricultural research system has been built up since then.

In the evolution of organizational setting and governance of the national agricultural research system of Ethiopia the following four governance models can be identified

- the University model in the early 1950s;
- Ministry of Agriculture, Department of Agriculture model in late 1950s;
- the National Research Institute (NRI) model between 1966 and 1993; and
- the seemingly ARC model 1993 to date

A publicly funded organized agricultural research is traced back to the establishment of agricultural education institutions; Ambo Agricultural School (1947), the Jimma Agricultural and Technical School (1952) and the then Alemaya College of Agriculture (1953) (Tsedeke Abate et al. 2004) designed in USA Land Grant University archetype. In 1958, agricultural research was for a short period institutionalized under the Department of Agriculture Studies and Research in the Ministry of Agriculture marking a shift from a University model to Agriculture Department model. Then a shift from Agriculture Department to NRI model happened when IAR was established in 1966 and continued until 1993.

Following the decentralized political system in the early 1990s the Ethiopian NARS underwent a significant structural reform that led to the creation of federal and regional research institutions. IAR was renamed to EARO in 1997 to undertake national agricultural research through its federal research centers while simultaneously assuming a coordination role to the national agricultural research system, and rechristened to today's EIAR in the year 2006. During these times the NARS was directed by a governing or advisory board.

Nevertheless, national research governance remained indistinct for the lack of clear division of tasks and enforcement capabilities to hold the integrity of NARS entities. Such loose coordination has in effect resulted in research redundancies and ineffective use of the resources. Consequently, it is difficult to categorically devise the national research system governance in any of the governance models discussed above. However, the steps taken to establish the Ethiopian Agricultural Research Council (EARC) recently seems the future of the country's research will perhaps take the ARC or closer to this model.

NARS concept is a soft system, which is essentially a loose conglomerate of agencies or actors involved in conducting national agricultural research (Chema et al. 2003). Accordingly, the Ethiopian NARS today is customarily identified to constitute federal research/represented by EIARand universities with agricultural faculties/ and regional research. In fact, there are institutions that conduct research like sugar corporation and Forestry and Environment Research Institute and few private organizations as well as International Agricultural Research Centers/IARs/CGIARs, which in principle should form part of NARS in broader sense.

The present day NARS is characterized by possessing quite a good number of member institutions and more than 65 research centers in various agro-ecologies. However, NARS is not in a position to have clearly defined institutional tasks and kind of research carried out by its entities; ultimately, this obstacles the efficiency of the organization of the system. Consequently, flow of research materials, reporting, accountability, and coordination remain major problem in the country's agricultural research system.

Agricultural research decentralization

In its most basic definition, decentralization is the transfer of part of the powers of the central government to regional or local authorities. It is done in response to demands for diversity (Decentralization Thematic Team 2014). In agricultural research, one of the advantages of decentralization is to give a fair chance to ultimate beneficiaries of useable innovations to influence the research agendas, participate in applied research, and evaluate the results of research programs. Devolution offers the possibility that research agendas would reflect local needs providing few influential people do not capture the agenda to meet their specific needs to the neglect of the wider farming community. Therefore, decentralization of agricultural research makes agricultural research more outward looking, client oriented, and impact driven by bringing agricultural researchers closer to their clients-the farmers.

Decentralization of agricultural research can have the following features

- deconcentration or geographic decentralization of agricultural research capacity from headquarters to sub-national centers;
- decentralization of decision-making within agricultural research organizations based on the principle of subsidiarity i.e., decisions should be taken at the lowest level possible in the organization;
- delegation of at least some of the responsibility for agricultural research funding to specific client groups, i.e., encouraging stronger stakeholder participation and private funding; and
- devolution of the responsibility for agricultural research to lower levels of government.

The last type of decentralization is usually the result of a more generic decentralization policy, which several developing countries including Ethiopia have adopted (Chema, et al. 2003).

Is research decentralization a feasible option to Ethiopia?

In Ethiopian case the needs of decentralized agricultural research emanates from different grounds. First, Ethiopia is a federated country where each region is given a greater autonomy of self-administration, and agricultural development is highly decentralized to a grass root level. Hence, the stimulus for decentralization is more political, being driven by a desire to establish a federal system of government. Ethiopia is a big country with diverse Agro-ecological zone and socio-economic settings, varied potential, varied farming portfolio, varied needs, etc. requiring varied research services

and solutions through a more attuned locally relevant research agenda. On the other hand, the research direction the country accorded high precedence is adaptive research that needs a fast track approach of technology adaptation, testing, and transfer for which existence of lower level research institutions with great autonomy is crucial. Therefore, devolving research responsibility to regional/ local level is a feasible option for Ethiopia if a critical mass of human and physical capacity is built at regional level.

Organizational Set up of EARC

First, what should not be in doubt is that the establishment of coordination mechanisms should be in compliance with the federal governance structure of the country and in tandem with the national policy setting environment of the nation. It is common to see a decentralized research system in other federating countries like India and yet to have a strong national research coordination mechanism. A strong coordination body is a prerequisite for successful decentralization, lest our research institutions tend to fragment into a number of isolated entities. This means that in Ethiopia the EARC should be able to play a strong coordination role in the decentralized research political setting of the country.

Nonetheless, building a centralized coordination mechanism in a decentralized setting would not be an easy task. The primary problem is the major NARS entities fall under different government levels and organs. Regional centers are accountable to their respective regional governments. On the federal side, universities are accountable to the Ministry of Education and EIAR to the Ministry of Agriculture. How would then it is possible to create a strong central coordinating body with rational authority under such setting and hold each NARS member accountable and responsible? is a daunting challenge that need to be solicitously answered. The way it is organized now with a Council its members drawn from federal and regional authorities and a Secretariat office with a lean organizational structure running the Council's routine activities seems perhaps the only conceivable solution in the short term. EARC is assumed the national apex body for coordinating and guiding research in agriculture and allied sectors resulting in building of agricultural science, knowledge, and technology capital. As such, it should be an entity composed of high-level federal and regional bodies with defined authorities and roles. Such a governance regime in agricultural research should allow for accountability, responsibility, efficiency, and research decentralization. The council should also promote objectivity and independence in the coordination of the national agricultural research system. It should be unbiased in its execution of its tasks; develop, nurture and retain first-rate researchers and seek to promote excellence in agricultural research.

What should be the role of EARC?

Common functions of most research governing bodies include developing national research strategies and plans, linking research to broader agricultural policy discussions, channeling funds to priority research areas, thus, coordinate research across institutions,

promoting collaboration and exchanges among the various parts of the national agricultural research system, and coordinating external links.

Likewise, some of the roles of EARC include (adapted from Rajalahti, R. undated)

- coordinating the development of a strategic vision for the national agricultural research system;
- formulating agricultural research roadmap;
- designing agricultural research priorities and agendas;
- identifying focus of research and divisions of labor among the NARS entities;
- identifying centers of excellences and capacitate them;
- facilitating NARS capacities in terms of human resources, physical and financial capacities;
- assisting flow of funds to priority research areas;
- establishing strong monitoring and evaluation mechanisms for research programs and their impact; and
- promoting collaboration and exchanges among the NARS entities including external linkages, linking agricultural research to broader agricultural policy and science-innovation programs

EARC should also act as a clearinghouse of research and general information in its areas of competence through its publications and information system.

Future Agricultural Research Approaches and Directions

Re-defining members of the NARS entities

At present, only the federal public research represented by EIAR, agricultural universities and RARIs constitute the NARS. Therefore, the Ethiopian NARS framework shall encompass public, private and international research organizations. For instance, in the public domain research institutions like sugar research, forestry research, animal health research, biodiversity research, health and nutrition research, etc. need to be part of the system.

Differentiating the roles of NARS entities in agricultural research

Normally, decentralization of agricultural research results in a tiered research system, with local research focusing on adaptive research and national research more on the more upstream research. Unfortunately, as it stands now there lacks a clear division of responsibilities and a further differentiation of the research focus among the regional, university and federal research entities in Ethiopian NARS. Of course, in terms of spatial/geographical coverage regions are mandated to research within their own regional territory. EIAR intends to cover issues spanning more than one region. Universities are mandated a triple role of education, research and community services.

Nonetheless, the research focus and type of research conducted in each entity is difficult to differentiate. Because of which reciprocal exchange of information and knowledge is weak and there is an enormous confusion of roles and activities resulting in enormous overlaps and redundancies.

Therefore, division of roles and responsibilities should be articulated with a research focus among the different entities of NARS. In principle, the federal research system should direct most of its efforts towards problems of national importance and focus more on the upstream applied, strategic, and basic research. While regional research should essentially focus on downstream, adaptive, applied and action research to address problems of regional and local relevance, and closely cooperate with the federal system to address problems of worth at national level. Nevertheless, at present the regional research system lacks adequate capacity to fully taking up adaptive research in respective mandate regions. On the other hand, the federal research system is not strong enough to undertake strategic and basic agricultural research at national level. What is more, the country's short-term research direction is towards technology adaptation for the betterment of the transforming agricultural development. From this perspective, the federal research system, while developing the necessary capacity on upstream research, it should be in a position to undertake adaptive research and complement regional research efforts.

The need for effective technical coordination

Apparently, EARC would provide overall coordination role for the agricultural research system. Nevertheless, EARC is not a replacement for the technical/research level national coordination that has to be effected among NARS partners themselves. Accordingly, this coordination, which has to start from proper identification of the national research coordination institution and center, should be implemented under decentralized research administration settings within the EARC coordination framework. For this, NARS partners shall enter into a legally binding agreement such as memoranda of understanding, memoranda of agreement, letters of agreement, material transfer agreements, and contract and collaborative research. The role of the EARS would then be to oversee such arrangements are enforced and smoothly running.

Experiences from Indian Council of Agricultural Research shows that to find effective solutions for the national problems of agricultural production, national projects need to be identified that make up an effective national framework of coordinated experiments. Perhaps, such projects are developed as multidisciplinary and problem-oriented approach with a major emphasis on multi-location testing of new technologies. Such approach provides opportunities for researchers working on similar problems but located differently to discuss and exchange ideas, information, and materials for mutual benefits.

Wide area versus specific adaptation technology release

As it stands now, technology development trend in the country is towards regional and specific than the broader agro-ecological and area-wide release. This has implications in terms of winning wider customers as economies of size and low effective demand would

not encourage private sector to enter into technology multiplication and marketing. A decentralized agricultural research system like ours would be better off adopting more on wider adaptation and countrywide technology development and supply approach than area specific and region and district boundaries for technologies of wider use, specific releases shall not be impeded though.

Pluralistic research

In many countries, the research capacity of alternative suppliers, such as universities, NGOs, and private companies, is growing faster than public organizations. In Ethiopia, public sector research is likely to play a dominant role in delivering research promises. With increasing commercialization, provision of regulatory framework and excludability mechanisms as intellectual property rights and plant breeders' right; however, the private sector research would gradually assume an increasing role in the provision of research (FAO 2001). In any ways, harnessing synergies of private sector in developing improved technologies, systems and information is crucial.

Need for systems linkage

In addition to creating a strong linkage and coordination within NARS, EARC should also ensure the formation of a strong linkage among research, extension, and farmers, building on ADPLAC—usually regarded as AKIS—, which combines agricultural research, extension, and education in one system. It should also be part and forge a strong link with the broader national system of innovation as university-research-industry linkage, as well as strong partnerships with the international agricultural research institutes, centers and universities, etc.

What Type of Research is Needed?

- ### Ethiopia's research policy and direction

The research direction and focus of the country is clearly indicated both in the rural development and the national science, technology and innovation policies. Both policy documents clearly indicate that in the short term until adequate research capacities developed, the country's major research direction will be adaptation of improved technologies, domestic research and technology development are not precluded though.

Therefore, the country's short-term research agenda is to find suitable technologies from elsewhere in the globe, and adapt for immediate use. Initially, this direction has not been appealing to and has a buy in by many in the research system. In reality, since we are laggards we have no choice but to learn and adapt. Consequently, the direction set by the government appears a right one in the short term. After all, many of the technologies generated by our NARS are adapted ones. Eventually as no country can grow sustainably relying only on technology adaptation our domestic research has to build adequate capacities to domestically develop enough technologies and ensure technology security, and even in the long-term plan technology exports. We cannot be copycats forever and rely upon external source as a major supply of our scientific capital. Indeed a

country, which relies upon external sources for its scientific and technological knowledge, will be sluggish in its development and fragile in its competitive position.

- **The look of future research agenda**

Ethiopian agriculture has registered remarkable growth for the last several consecutive years now for most part due to increased use of improved technologies. In addition, the research system is highly credited for supplying most of these technologies. Nevertheless, our farm level productivity is yet very low by the global standard. Neither is the productivity level registered by the research system paralleling the global record. Therefore, the research system has yet to generate superior technologies than the present. Nevertheless, this may not be achieved with conventional research approach alone the way it is a common place now.

Frontier sciences have considerable potential to address many of the future challenges. Our research system should develop capacities and embrace the opportunities of productivity enhancing modern biosciences and tools synergies as biotechnology, molecular biology, nanotechnology, bioinformatics, etc. through increased integration and use of information communication technology and geo-spatial technology tools. These will enable us improving research efficiency, better targeting of technologies and also identifying production and marketing environments.

On the other hand, technology development target of the agricultural research system was for most part achieving food security. As has been remarked at the outset of this document, however, our globe is facing many daunting challenges as reducing poverty, improving food security, reducing hidden hunger, sustainable management of natural resources, sustainable energy production, and mitigating the effects of climate change for which agricultural research should properly respond to. For this to happen, agricultural research needs a much wider research agenda well beyond the traditional agricultural disciplines and targets.

Our NARS has been for a long time in the first generation of innovation: the push for technology, which is largely supply driven where researchers developing plant varieties and production techniques are disseminated to farmers as end users. Now it is time to transit into second and further generation of innovation such as push-pull technologies. Globalization is opening huge opportunities for food and processed commodities while at the same time throwing a challenge of global rival. Agricultural research should therefore play major role in supporting and maintaining the competitiveness of the country's agriculture in a global economy through the supply of competitive technologies. This means beyond technologies for food, agricultural research should provide technologies for addressing agro-industries needs and agri-business development by doing so contribute to import substitution. Processing, product development and value addition researches should receive greater attention. It should also raise the productivity and quality of commodities of domestic and export market.

Agricultural research should bring about technological innovations for food and nutrition security and safety. It should be able to develop innovations for broader issues of sustainable natural resources management, climate change adaptation, and mitigation, technologies for harnessing ecosystem services and biodiversity. The research system should embrace in its agenda the issue of job creation especially of youth and women. Policy research and recommendations should form a part in our future research.

To date, bio-risk is increasing with increased use of uniform varieties, overlapping production and continuity due to the expansion of irrigation culture, unregulated access to foreign material, weak quarantine, surveillance and early warning system, and of course a change in climate, which is impacting by way of increasing production cost, reducing food and farm income and damage to the environment. Therefore, NARS on its part has to build adequate capacities to develop effective management and bio-risk intelligent system as early warning systems that would enable bearing risk and overcoming the bio-risk warfare.

- **Governance of the Centers of Excellences**

Improving and sustaining agricultural productivity, food security, competitiveness and profitability in the agricultural sector requires an effective centers and networks of avant-garde institutions all dedicated to innovation and excellence in agricultural research. Therefore, institutional innovations should be made on selected centers to form centers and networks of excellence at national levels that provide for all research institutions (public and private) to participate on an equal footing and get best research services. Establishment of COEs enables to invest in agricultural research adequately, and to concentrate expertise, and scarce resources in a few well established COEs for agricultural research where research and capacity building, through training, can be efficiently conducted. By doing so COEs will then appear key to innovation and that major scientific and technological advance are made at such centers.

In line with this, attempt has been made to identify 32 Centers of Excellence (CoEs) catering for 49 national priority commodities. While most of these CoEs are managed by federal research (EIAR), regional research institutions and higher learning institutions also coordinate some. Nonetheless, when it comes to especially regional research centers the coordination and management of these centers remained in great complicatedness. As COEs cater national level issues for a certain commodity mandated for, they have to receive a federal funding from MoFED through EIAR and has to allocate it across collaborative research institutions across the country. Nonetheless, the accountability and answerability of a given regional excellence research center to a research center of another region is not well defined. Because of such complications, centers that were supposed to be COEs remain underdeveloped. Therefore, what should follow next is that COEs need to be properly identified or redefined based on clear and rational criteria and EARC should make a targeted investment out of the federal means to build the capacity of COEs. As to their mode of administration, the easiest and most effective way would be to put all COEs coordination under the federal research system; EIAR and Universities. I

do not see any problem with this arrangement since there are live experiences even today where while falling within the OARI mandate area and located in its Bako Research Center premises the National Maize Research is administered by EIAR but provides excellent coordination services to all research centers across the country. So long as the federal resources are allocated in that specific region and capacities are built the issue of governance and management should not appear much a problem. Alternatively, a hard to implement but with good working modality and appropriate legal framework put in place to hold each research center accountable and allowing cross region collaboration and answerability, administration of COEs can fall in a regional research institutions and they can provide coordination and networking role.

Funding Agricultural Research

To the extent agricultural research accorded high priority in Ethiopia it does not receive funding commensurate with the task it is required to do. Currently, agricultural research receives not more than 0.19% of the agricultural GDP (IFPRI/EIAR 2014). At present, three sources of funding can be identified for agricultural research in Ethiopia. The major funding comes from the government. Loans and grants from the World Bank, and contributions from donor agencies also play a major role though not on a sustained basis. A limited amount of funding also comes from other sources such as internally generated revenue from sale of research by-products. One of the major roles of EARC should be facilitating access to multiple financial resources: federal/regional, competitive funds for strategic research, contractual funding from private sector, cooperatives, etc. In future agricultural research different innovative funding mechanisms as core national funding, competitive funding, funding like from commercialization of research products, advisory, training and consultancy services, royalty fees, and contractual research need to be considered.

Apart from the budget that is allocated to each NARS entity through its own ministries, the NARS should be supported through a core budgetary allocation from the federal parliamentary budget appropriation to build adequate competencies (human and infrastructural) and undertake research on key national priorities. On the other hand, regional states beyond funding their own research institutions they need to be encouraged to contribute funding to the entire NARS.

NARS should have a competitive funding scheme to provide a nationally identified problem a solution based on competitive grants. Competitive funds improve identification and prioritization of agricultural research needs, improve formulation of research project proposals, more transparent selection of agricultural research projects, and improved monitoring and evaluation (M&E) of project implementation. Also competitive research funding can help closer alignment of research activities with regional and federal research priorities, increased effectiveness by directing resources by merit, increased efficiency by reducing costs and increasing accountability, facilitating cross-institutional or cross-national collaboration, and mobilizing underutilized capacity

(Chema, et al. 2003). Such a system is more common in NARS in Argentina, Brazil, Costa Rica, Colombia, and Chile. In general, in the long term the country should minimize relying outside sources and should be able to finance agricultural research out of its own means.

Human Resources Capacity Development

When it comes to work force development NARS should achieve building of competent human capital fulfilling three basic requirements: knowledge, skill and attitude. As it stands now, the research staff is low in level of knowledge and skill and is thin in number, and staff attrition level is very high resulting in lack of institutional memory of the new generation junior staff. In order to re-vitalize the human capital two approaches may need to be put in place. One is, to reinforce the research work force through re-hiring retired and or out-gone local and Diaspora Ethiopian and even non-Ethiopian researchers with a better capacity and placing them in the research system on short-term contract arrangements. The second and perhaps the most sustainable solution will be to establish training institutions within NARS for enhanced skilling up opportunities. Encouraging self-learning within the NARS itself through creating a scientific environment as seminars, lectures, panels, etc. would also offer great opportunity to learn. Another approach would be linking research system with and seconding researchers to experienced scientists at national and international scientific research excellence centers. Other options as joint appointments, recruiting affiliated scientists, and visiting scientists could also be considered. On the other hand, for upgrading knowledge of research staff there should be a well-planned continuous staff development and succession program resorting to domestic and foreign universities.

- **Staff motivation and commitment**

No matter how NARS is staffed with well skilled and high caliber scientists, we cannot achieve the desired outcome unless the staff is well motivated and develop the right attitudinal settings. In this respect, NARS has to have a sustainable competitive incentive and remuneration mechanisms put in place to retain and lure competent talent and bring a revival of the human capital. Furthermore, performance based output and rewarding systems can also do much in this regard.

Being in possession of the right attitude may be instinctive; but it could be influenced by consistently engaging and nurturing the new generation of NARS staff. Therefore, much work has to be done to shape the human capital the way it will have a shared nation and institution's vision, foster useful values, research ethics and principles and there by develop positive attitudes.

- **Staff recruitment and governance**

To provide flexibility of work force recruitment and management process agricultural research need to be granted a reasonable degree of administrative autonomy by freeing it from civil service regulations. This would ideally be realized through direct

empowerment of the research institutions. Under such a management setting, however, to bring the required commitment and accountability and build competent quality futuristic work force in the research system the recruitment modality needs to change to on a contractual basis and renewed based upon performance.

Conclusion

Should Ethiopia build a modern and transformed agriculture, research has to receive a higher profile platform with concrete support from all sorts of stakeholders. The NARS should re-orient and align its objectives with the transformative development agenda and develop capacity to better respond to development challenges and be more sensitive to the order of the day and beyond. EARC should be able to properly position itself for a benevolent provision of seamless coordination and good research leadership with clear roles and responsibilities of entities and develop appropriate research roadmap, and by doing so enable NARS to innovate and transform Ethiopian agriculture into a vibrant and competitive sector.

References

Chema. S, Gilbert,E., and Roseboom, J. 2003. A Review of Key Issues and Recent Experiences in Reforming Agricultural Research in Africa. ISNAR Research Report 24. The Hague: ISNAR.

Decentralization Thematic Team 2014. What is Decentralization? The Online Sourcebook on Decentralization and Local Development. Available at: http://www.ciesin.org/ decentralization/ English / General/Different_forms.html. Accessed on 22 November 2014.

FAO 1997. Management of agricultural research: A training manual. Module 1: Institutional agricultural research: Organization and management. FAO.

FAO 2001. Reform and Decentralization of Agricultural Services: A Policy Framework. FAO Agricultural Policy and Economic Development Series 7.

IFPRI/EIAR 2014. Agricultural R&D Indicators Factsheet, Ethiopia. Agricultural Science and Technology Indicators (ASTI).

NAAS 2002. Scientist's view of good governance in agricultural research organization. Policy paper 17

Rajalahti , R. undated. National Coordination and Governance of Agricultural Innovation. Thematic note. Available at: http://siteresources.worldbank.org/INTARD/Resources/335807-1330620492317/ 8478371-1330712114326/Module1-TN1.pdf. Accessed on: 20 October 2014

Tsedeke Abate, Abera Deressa and Amare Molla.2004.The Ethiopian NARs: Evolution, Challenges & Opportunities. Paper presented to the Meeting of ASARECA/NARS/World Bank. Retreat on Reform of Agricultural Research and Technology Dissemination Systems in Eastern Africa, 26¬28 February 2004, Addis Ababa, Ethiopia. ASARECA strategic planning paper no. 1