Achieving Excellence in Agricultural Education: Mobilizing Experience from Around the World

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Why Focus on Agricultural Education?

In the 1960s through assistance provided by the United States Agency for International Development (USAID), the Rockefeller and Ford Foundations and the World Bank India established a premier agricultural research and education system[1]. By 1975, in a decade since the balance of payments and a food crisis of the mid 1960s, the Indian agricultural educational system, patterned after the US Land Grant Universities had contributed handsomely to agricultural science capacity ushering in the Green Revolution (Lele and Goldsmith 1989). External assistance combined with India's strong political commitment to build a world class system of education and research, which was then driven by a desire to achieve food self-sufficiency and reduce dependence on external food and financial aid, dramatically turned a country of recurrent droughts and famines into a food surplus country. Indo-US relations deteriorated in the 1970s leading to the end of links to US agricultural university collaborations[2]. While interactions were restored later as relations between the two countries improved over time, research, scientific and educational collaborations between the two countries never again reached the previous zenith. In contrast Brazil maintained a steady collaboration with the US land grant universities for training and research. China invested a great deal in university education domestically and abroad after it opened itself to the world in the late 1970s. Today the US land grant system and USDA contain outstanding scientists and administrators of Indian origin, presenting an unexploited opportunity for scientific and educational collaborations, although the collaboration need not necessarily be confined to them.

It is now widely recognized, however, that while the post Green Revolution agricultural challenges have increased and become more complex, India's agricultural education has

[1] The first Joint Indo-American Team (1955) and H.W. Hannah's blueprint for Agricultural universities in 1956, were followed by the Higher Education Commission (1964-66), headed by Professor D.S. Kothari, the then Chairman of UGC. The Commission recommended the establishment of at least one agricultural university in each state leading to integration of research, teaching and extension.

[2] The deterioration was accelerating, a result of the Bangladesh war in 1971 which India supported following the influx of 10 million+ refugees from the then East Pakistan, leading the US to dispatch the 7th fleet to the Bay of Bengal, causing rising tensions, reinforced by the differences between the two countries on the Viet Nam War.

suffered from prolonged neglect, isolation and inbreeding (Tamboli and Nene 2011). The end of training abroad of Indian scientists contributed to the erosion of the norms and standards for the conduct of research and education which the freshly minted returning graduates had brought to the newly established Indian Agricultural Universities in the 1970s. The decline in the Indian agricultural educational system is in sharp contrast to other emerging countries such as Brazil and China as we will see from their presentations in this congress. Such reforms in the Indian agricultural educational system that took place have been piece meal, rather than being part of an overall agricultural educational strategy, addressing some of the fundamental challenges facing the system. Agricultural research and extension have received relatively more attention, for example, in the case of research, through the Committees headed by Dr. M.S. Swaminathan and Dr. Mashelkar. In the case of agricultural extension too there has been experimentation through the introduction of the Training and Visit system, followed by the establishment of Agricultural Technology Management Agency (ATMA) and the Krishi Vigyan Kendras (KVKs). Even though the reforms adopted in research and extension have not been as far reaching as those recommended by the various committees, and implementation of adopted reforms has been half- hearted, both research and extension have benefitted from identification of the changes needed, by some of India's best minds.

Why Include Research and Extension in a Congress meant to focus on Reshaping Agricultural Education?

Reasons for their inclusion are obvious, but they are worth stressing at the outset. Agricultural research, extension and value chains define the demand side of the agricultural education system. Their contemporary requirements need to be clearly understood in order to produce human capital that is attuned to the rapidly changed needs of the agricultural sector. Moreover in a well working agricultural educational system strong interactions exist among agricultural research, extension and education routinely to ensure effective services to farming communities and other clients.

Importance of Agriculture and Agricultural Education:

Indian agriculture contains 48 of the total population making all or part of its living from agriculture, and yet contributes only 17 percent of GDP. The disparity between the shares is the single most important indicator of the extent of underdevelopment and rural poverty. Agriculture not only contains the bulk of the poverty with the largest number of the poor and under-nourished in the world in a single country but also contains higher rates of underweight, wasted and stunted children than neighboring countries or countries at similar levels of per

capita income. Yet urban populations are growing rapidly too. Agriculture must meet their needs for food, fiber, and water.

Environmental challenges are also mounting. Well over 85 percent of the water in India is reported currently to be used in the agricultural sector, compared to 65 percent in China (Lele 2013). Efficient use of water in agriculture is essential to supply water to a growing urbanizing and industrializing country. Climate change is changing hydrological cycles in unpredictable and at times catastrophic ways, their incidence being higher in Asia than in other regions.

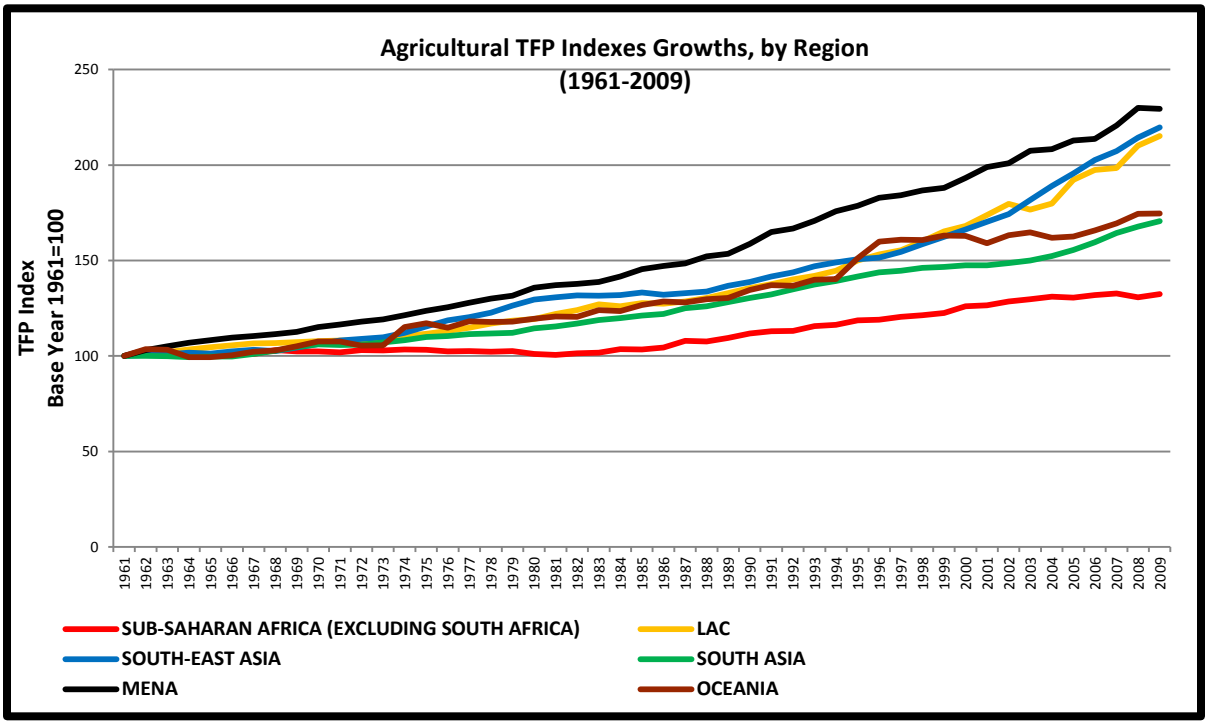
It is obvious then that a productive, diversified, socially inclusive and environmentally resilient agriculture is critical to achieving overall economic growth, reducing poverty and achieving sustainability of natural resources upon which the current and future food security critically depends.

Agriculture has often been perceived by policymakers as a declining sector. They assume that it can meet the societal needs without continuous nurturing. Decline in the real food prices for nearly three decades, contributed to a sense of complacency, not just in India but globally. The sharp rise in the food prices and increased volatility since 2007 have been wakeup calls to policy makers that agriculture needs more attention.

Yet after years of under-capitalization of the sector, neither global nor Indian efforts are commensurate with the challenges of agriculture in a highly changed context. The under capitalization is manifested in India's total agricultural factor productivity. TFP growth has been lagging behind other major developing countries.[3]

[3] TFP measures the portion of growth of output which is not explained by the growth in the amount of inputs used in product. It is a residual.

Figure 1: Agricultural Factor Productivity Growth is Critical for Overall Economic Growth but is lagging in South Asia and Sub-Saharan Africa



Source: Fuglie, Keith. 2012.

Brazil and China experiencing more rapid agricultural productivity growth than India have invested more in "technology capital", i.e., in agricultural research, education and extension, (Evenson and Fuglie, 2010). Besides, productivity growth entails much more than direct physical capital in agriculture. It calls for investments in primary and secondary education, roads, power, and community and market institutions. India has now fallen behind other major East and South East Asian countries by most measures of physical and social capital, including women's education, rural access to energy, transport, internet and markets leading to a lagging process structural transformation relative to countries such as China and Indonesia. And this is even though the China and Indonesia started with similar or worse initial conditions than India's in 1960 (Lele et al 2011).

What is Structural Transformation?

It has several distinct processes: (1) declining share of agriculture in GDP, (2) declining share of agriculture in employment, (3) rural-urban migration, (4) growth of the services and the manufacturing sectors and (5) a demographic transition with reduction in the population growth rates. The final outcome of transformation is a state in which differences in labor productivity between the agricultural and non -agricultural sectors narrows considerably whereas at early stages of development, there is often a huge and even a widening gap in labor productivities between agriculture and non-agricultural sectors. A turning point is reached when, the difference between the share of agriculture in employment and income begins to narrow. Analysts have considered agricultural productivity growth as being crucial to the transformation process over the long haul. Analysis of structural transformation focuses on changing labor productivity over time (Timmer 2009; and Lele et al 2011).

Dramatic Changes in the Global Environment:

The changes in the global environment add to the complexity of challenges facing Indian agriculture going forward. These changes include:

- The Accelerated Speed of Globalization leading to highly inter-connected markets at the global level ranging from agriculture and energy to financial and exchange rate markets. Together they influence international food and energy prices.

- Rapid Technological Change, e.g., in Information Technology, biotechnology in which others are surging ahead.

- Climate change is already projected to adversely affect the South Asian region severely.

- Population exceeding China's by 2023, will exert pressure on natural resources and increase risks and uncertainty.

The educational system must develop the human capital necessary to help Indian agriculture face these broad set of challenges tend typically not to be incorporated in agricultural strategies, while addressing issues of food security and increasing living standards of the masses.

To address such new challenges, the focus in the more progressive countries has shifted from top down, unidirectional research and education to flexible horizontal problem solving approaches involving multiple stakeholders and learning by doing. Universities and research systems are adapting to these changes as will become evident from the cases of Europe, the US and Japan.

Internal Changes in India for Better and Worse:

There have been changes in India too. Those for the better include: India's accelerated economic growth for nearly two decades, leading to growing self-confidence and more fiscal revenues. Yet the increased fiscal deficits since the global recession hit in 2008 are calling for retrenchment in government spending with the increased need to use resources already allocated to agricultural research, extension and education more efficiently.

India has more trained people now, a dynamic private sector including an impressive IT (Information Technology) industry which is insufficiently harnessed in the business of public sector management, a strong civil society, the rising middle class, an active media and judiciary, each demanding better socio-economic performance.

But some changes in India are more ominous. A large underclass of uneducated, unskilled and undernourished population threatens to turn the demographic dividend into a demographic liability. The pervasive decline in the overall quality of governance compounds the challenge of reshaping India's agricultural education for increased accountability, than when educational reforms are considered in isolation.

India needs "Disruptive Innovations":

In a system riddled with vested interests the dramatically changed paradigms for agricultural education globally offer a new way to increasingly focus on innovation rather than technologies alone. Changed Paradigms for Agricultural Education and Research focusing on innovation include:

- Problem-Solving Inter-Disciplinary Education and Research (rather than Elitist, “Knowledge for its own sake”).

- Lifelong Learning (cradle to grave learning, including Internet-based education rather than just) classroom teaching which ends with formal degree education.

- Pluralistic Institutional Structures: i.e. not just public but private sector, farmers’ organizations, consumer and client focused organizations, processors and exporters all contributing to knowledge as well as learning.

- Strengthening of global and local collaborations in scientific and educational endeavors to accelerate learning.

- New Funding Mechanisms—which are often competitive rather than block funding based.

- New Sources of Funding beyond agriculture to include:

- Environment, Health to address the broader scope of challenges facing food and agriculture.

- Demand for Improved Accountability in Public Sector Management which include:

    - Evidence of Efficiency and Effectiveness of Public Institutions.

    - Accountability Mechanisms. Including Professional Peer Based Standards, Norms, Government Imposed Performance requirements, Client, Civil Society and Media Driven standards.

The global expertise mobilized at this Congress is intended to discuss how these various changes have been incorporated on multiple fronts by emerging and industrial countries. In addition experience of international organizations in supporting agricultural education, research and extension is being presented including from the World Bank, Food and Agriculture Organization of the United Nations (FAO), the Consultative Group on International Agricultural Research (CGIAR), and the Global Forum for Agricultural Research (GFAR) and the Gates Foundation.

Collectively the speakers will demonstrate how countries have moved ahead on policies and institutions which are pertinent to educational reforms not just in the tertiary sector, but including primary, secondary and women's education.

Their examples show that reforms and investments in the REE (Research, Extension and Evaluation) Systems are necessary but not sufficient. Also needed are investments in physical and social infrastructure. More difficult are changes in the mind sets which seek to perpetuate the status quo.

How can India use global knowledge to achieve "disruptive innovations" to dismantle the business as usual approach?

Disruptive innovation has now become the global norm through the contributions of the likes of Bill Gates, Steve Jobs and many others including an army of micro-innovators of "apps" that form the panoply of innovations. They have dramatically changed the way we do business, acquire information, communicate, learn and spend our leisure time listening to music or watch movies. They have democratized information and some have struck a major blow to the intellectual property regimes, thereby fundamentally changing our mindsets. Reshaping "agricultural" education needs to achieve such changes to make equitable and sustainable economic growth a reality. It means understanding how others are striving for—

- Cutting Edge but relevant research
- Training to produce high quality skilled staff
- Doing Performance assessments
- Pursuing Meritocracy
- Conducting Impact Assessments
- Introducing increased accountability and
- Entering into effective Public- Private –Civil Society Partnerships—including in managing such thorny issues as IPRs (Intellectual Property Rights),

These global innovation approaches must be seen in the context of India specific challenges in agricultural education. These include:

- **India's Complex Public Agricultural Education System** matched in complexity only by China's: 51 Universities including 44 state agricultural universities, 5 deemed-to-be universities[4] and 2 central agricultural universities[5].

- **Vast and Multi-Sectorial Scope of Agricultural Research, Education and the Extension System**, requiring cooperation among the Departments of Agriculture, Council of Scientific and Industrial Research (CSIR), departments of Science and Technology, Fertilizers and Chemicals, Commerce, 76 All India Coordinated Research Projects, in soils, water, crops, horticulture, livestock, fisheries, home science, agricultural engineering, education, etc.

- **Agriculture (like Water, Land and Forestry) being a "state subject"** constitutionally in India in contrast to China has led to a seemingly highly decentralized system of "state responsibility". It seems to have all the disadvantages of a large country (diseconomies of scale) without the advantages, described by some as 28 states acting as independent countries.

How do large countries such as China, Brazil, the US, Japan each with quite different political systems, reform and perform? How do they use Public Private Civil Society Partnerships to achieve constructive solutions to controversial issues?

If the allocation of public sector research resources between the central and state units is any guide Brazil and China seem to undertake more research through centralized institutions to achieve national objectives. They appear to exercise more central direction and control to public sector agricultural research than does India. Their research systems also seem to enjoy more autonomy and less political interference. State level educational institutions in India on the other hand seem to receive a larger share of R and D budget than either in Brazil or China, according to ASTI (Agricultural Science and Technology Indicators) data, but seem to be conducting less research and more teaching. What limited research they undertake seems to come from central resources provided by the ICAR (Indian Council of Agricultural Research) and other grants. Whether these data are accurate or not, they call for the need to better understand the balance of research funding between the center and the states and between

[4] IARI--Indian Agricultural Research Institute, IVRI--Indian Veterinary Research Institute, NDRI--National Dairy Research Institute, CIFE--Central Institute of Fisheries Education and SHIATS--Sam Higginbottom Institute of Agriculture, Technology & Sciences.

[5] CAU--Central Agricultural University, and BHU-- Banaras Hindu University.

research and education, as well as the balance between spending and quality. This will require more thorough reporting, monitoring and analysis of quality and impacts.

Other challenges of the educational system which Tamboli and Nene and others note are worth emphasizing at the outset and will be discussed in the various sessions. They note that:

- " SAUs have deteriorated in the last two decades";
- "Indian Faculty finds little time for research";
- "Most expenditure goes on salaries with little left for operating expenses. (Typically a 60/40 split between salaries and operating expenses is considered desirable)";
- "Extension seems to be busy dispensing subsidized inputs rather than imparting advice".
- US Land Grants have evolved from agricultural into general universities with numerous complementary disciplines which many Indian SAUs lack, a problem compounded by the fragmentation of Indian SAUs into horticulture and livestock etc.
- US Land Grants Benefit from Multiple Sources of (Competitive) Funding.
- Primary and Secondary Agricultural Education is as important as Tertiary education according to the Japanese experience.
- European Universities are becoming "third generation" universities.

These random observations I have listed from their papers call for extracting lessons from the experience of others for the specific Indian circumstances.

We have several different tasks ahead:

1. First and foremost, it is to develop a precise consensus on India's current problems/challenges.
2. To examine if an adequate National Strategy for Reform of Agricultural Education exists—ranging from primary, secondary to tertiary and if not how to develop one.

3. To clearly establish the locus of leadership for the design and implementation of reforms.
   E.g. for Stronger Inter-Ministerial Cooperation (ICAR and NAAS [National Academy of Agricultural Sciences], Ministry of Education, Agriculture, DBT [Department of Biotechnology], Information and Communications, Environment and Forests?)

4. To explore how to establish active regular continuous Cooperation with External actors including the USDA, Brazil, China, Japan and Netherlands besides the CGIAR, FAO and GFAR.

5. To Establish "LABEX (Laboratory of Excellence) like" programs for Scientific Exchanges.

6. To seek support of International Agencies in a catalytic way? E.g. World Bank, FAO, Gates, IFPRI (International Food Policy Research Institute)?

7. To establish International Mentorship Programs for Training, Collaborative Research such as the one I have established with AAEA.

8. To identify needs for Curriculum Improvement and Its Implementation in a Multi-Stakeholder-Public Private Civil Society Mode.

9. To revamp and implement Performance Assessment Systems.

10. To devise improved Incentive systems for teachers and students.

11. To address Organizational issues on the appropriate roles of centralization agencies (establishment of standards and norms, accreditation, definition of responsibility and accountability for performance) and decentralization—including fiscal issues—operational budgets compared.

12. To find ways to introduce routine Independent M and E (Monitoring and Evaluation).

13. To establishing Centers of Excellence in SAU's on a Competitive Basis.

To devise a reform agenda based on the global experience, participants must engage actively in the sessions, form groups in the areas of greatest need for reforms, discuss and debate them, and convey "Out of the Box" ideas to organizers from the NAAS and ICAR so as to help create a Problem Solving Education System. I look forward to a stimulating Congress.

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