



Coping With New Policy Agendas for Agricultural Research: The Role of Institutional Innovations

Introduction

Over the last four decades the policy agenda of agricultural research has evolved significantly from an initial focus on increasing food production to concerns for the environment, poverty and stakeholder participation. Not only has the poverty focus become more explicit, but also the concept of poverty has expanded beyond earlier notions relating to supplies of food, to encompass wider livelihood concerns. (Carney, 1998). As a result, both national and international agricultural research systems around the world are finding their output and contribution to welfare under increasing scrutiny. All too frequently agricultural research systems are struggling to accomplish new and complex tasks within the confines of institutional structures and mandates designed decades previously for a much simpler agenda. India is no exception to this global trend.

To understand the challenges that this presents, it is useful to reflect on the way these agendas and institutional set ups have emerged and evolved. The global perspective provides useful lessons for India's agricultural research system. Of particular importance are new policy analysis approaches that recognise that institutional innovations are not only central to the development of more efficient research systems, but also that such developments underpin the wider process of technical and economic change.

Origin and purpose of agricultural research systems

During the 1950's and 60's national and international concerns over food shortages, particularly in Asia, led to large investments in public agricultural research organisations. The unambiguous agenda was to raise agricultural productivity as a means of increasing the aggregate food supply. This was seen as a way of reducing hunger and the poverty associated with it.

With this agenda in mind, centralised public sector scientific research institutes were created to solve the generic problem of increasing the biological potential of important food crops. The institutional set up contained international agricultural research centres and, at the national level, sets of commodity and or disciplinary based research institutes. The task of transferring technology packages to farmers was given to the institutionally separate extension system. The task to be achieved was conceptually quite simple and all the actors in the system held this same clarity of purpose. This approach resulted in the development and spread of input responsive, high yielding cereal varieties and the consequent "green revolution" phenomenon.

The new agendas

Poverty. The green revolution, despite its success in increasing food production, demonstrated the difficulty of using advances in agricultural productivity to address complex social phenomena such as poverty. It brought to attention the fact that the poor did not always have the resources to benefit directly from new productivity enhancing technology. Moreover when the poor had land-based resources, research often had difficulty responding to their specific technological needs, usually in the less favourable production environments. For the landless and urban poor the need for better entitlements to food (through employment for example) restrained the benefits that would have otherwise arisen through cheaper and more abundant food (Lipton and Longhurst, 1989).

Environment. Concerns were also emerging as to the environmental consequences of an intensive agricultural development strategy reliant on chemical inputs and heavy consumption of water. Wider environmental concerns were highlighted by a number of major international conferences and initiatives during the 1980's. As a consequence the environment is now a mainstream agenda for agriculture and development policy generally.

Stakeholder participation. There was also a growing realisation that the hierarchical institutional arrangements typical of most centralised, public agricultural research organisations make it difficult to achieve a client focus in research. Farmer participatory research arose as a way of addressing this issue. Sustained advocacy during the 1990's placed the participatory "paradigm" in the mainstream. Public research organisations in many countries have tried to accommodate this new agenda with varying levels of enthusiasm and success. However the institutional context of many public research organisations has restricted the development of truly participatory and client focussed working practices.

Public vs. Private. In the last decade economic liberalisation along with shifts in globally held perceptions concerning the role of the State in society have emerged as a major new policy agenda. This has made institutional concerns of fundamental importance, focusing attention on the efficiency and proper role of the public sector in areas such as agricultural research. Private sector agricultural research has also grown as a result of the opportunities that economic and trade liberalisation are now presenting for private investments in agro-industries such as seed production, horticultural exports and so forth. Private research has also been encouraged by improved

intellectual property protection regimes and technical advances associated with biotechnology.

Balancing agendas. The result of this ever expanding range of new policy agendas is that the "one size fits all" type of agricultural research organisation found in many countries no longer seems appropriate. Often these new agendas actually conflict with traditional internally driven policies and beliefs of the public research sector. Examples are the need to develop capacity in frontier areas of science, while also supporting adaptive research for traditional and subsistence sectors; the need to support, but not to compete with, the private sector; the need to support competitiveness in global markets such as export horticulture, but not to displace small-scale producers. All these need to be achieved without losing sight of either the old agendas of increasing food production nor the new agendas of poverty and sustainability.

The new agendas, along with the contraction of public sector funding for research in recent years, has focused attention on the need for reform of national agricultural research organisations around the world. The parallels with the Indian situation are clear.

Policy Response

A common policy response to these new agendas has been the initiation of impact assessment and research priority setting exercises. This has often been used by both national and international agricultural research organisations to achieve efficient allocation of scarce funds and justify their position in terms of returns to investment. However these approaches fail to quantify impact in terms of, for instance, poverty. Furthermore such approaches have difficulty in accommodating analysis of the institutional context of research and the way this affects research outcomes.

Another response by national agricultural research organisations has been the introduction of organisational and management (O&M) reforms. This generally includes a package of measures addressing decentralisation, autonomy, accountability, cost-recovery, transparency, and efficiency (The success of these in the Indian context is discussed below).

Institutional Innovations

Although not necessarily an explicit policy response, new and often experimental institutional arrangements are emerging in many countries as a way of addressing changing agendas and responding to emerging opportunities. These types of institutional innovations are often linked to the need to access R&D and technology more effectively and in many instances have been the result of initiatives led by private organisations both the for profit and non-profit sectors. Innovations often blur traditional institutional distinctions between research and production, usually as a way of making R&D more client responsive. The specific features of these institutional innovations are often a response to the particular institutional set-up of a country and may therefore only be successful in this national context. Frequently these developments have significantly changed the institutional roles of different actors, with private organisations sometimes taking on roles previously performed by government (see box 1).

Box 1: Institutional Innovations

Contract farming: These usually involve a private organisation supplying the technology and sometimes credit for inputs to farmer to ensure a supply of quality produce. The private organisation usually sells this produce in high value domestic or export markets. A number of countries have developed strong horti-cultural export sectors using this approach, for example Zimbabwe (Porter and Phillips, 1996; Haque, 1999).

Growers associations: These bodies can provide organisational focus for articulating the technology demands of farmers. In Colombia, in the cut flowers, coffee and sugar sectors, the growers association provides a range of technological services at a level of quality that the corresponding public sector institutions cannot match. In India Mahagrapes has performed a similar task for grapes growers (Clark, 2001; Hall et al 1998)

Non-Governmental Organisations (NGOs): The capacity of national and international NGOs is growing beyond that of facilitation, and is increasingly emerging as a significant source of R&D capability, input supply and marketing services. Also partnerships between public research institutes and private organisations with a commitment to social welfare of the poor, can be an important way of focusing R&D and other services on the poor. Examples include research foundations such as BAIF in India and BRAC in Bangladesh (Alsop et al 2000)

Competitive research funds: A number of developing countries have established competitive research funds (CRF). This can improve accountability and research performance. By stipulating certain selection criteria, CRF can be used to encourage projects that: address the needs of certain social groups; encourage diversity of research partnerships; and respond to changing priorities and agendas.

Producers funded research organisations: For commodities where producers have a strong institutional base (growers associations, co-operatives, etc) this can be used as a way to mobilise resources for a dedicated research and training organisation. This is often a response to the need for location specific adaptive research and advisory services in high value crops. Examples include sugar research in Colombia and tea research in Kenya.

In countries where the value of these institutional innovations has been recognised, the policy response has been to seek opportunities for public/private sector partners in research and allied activities. A related approach has been to use competitive research funds to encourage a diversity of research partners from both public and private sectors. This has often been accompanied by the separation of responsibility in the national agricultural research organisation for agricultural research policy and research implementation.

Progress in India

Over the last five years the Indian Council of Agricultural Research (ICAR), being aware of the need to respond to both tightening finances, a changing research and policy environment, and a need to rationalise existing research infrastructure and human resources, implemented a series of O&M reforms. These have focused on improving efficiency and accountability; forging linkages with new partners; mobilising resources; and strengthening capacity in frontier areas of science. Priority setting exercises in

major agro-ecosystems, crops and commodities have also been initiated. Reforms have not yet been applied to the State Agricultural Universities, the other major component of Indian public sector agricultural research system.

Despite some imaginative initiatives, the impact of the reforms to date has been less than expected. While there may have been some impact on research practice, administrative and financial procedures have not witnessed any major change (Paroda and Mruthyunjaya, 2000). Policies now exist whereby ICAR can provide consultancy and contractual services. However the extent of public/private collaborative research programmes resulting from this has not been as extensive as the potential implied by the strength of ICAR's human and scientific capital (Mruthyunjaya and Pal, 1999). While there seems to be widespread agreement that there is a strong institutional dimension to this problem, the key challenge is to find ways to more effectively understand and address the issue. This is where contemporary policy analysis of the innovation process in other sectors has something to offer.

The way forward - an agricultural innovation system?

One approach a number of countries and international organisations are adopting in science and technology policy analysis in other sectors is the National Systems of Innovation (NSI) framework (Freeman, 1987, Lundvall 1992). The NSI provided a conceptual framework to study innovation performance in systems terms, where flows of knowledge between actors and institutions in the process are critical to innovative performance (see box 2). The approach is useful to agricultural research policy at a time when changing agendas and an evolving research environment mean that while institutional change is inevitable, no consensus exists on the shape of the new system.

The contribution of NSI is that it provides a way of analysing institutional roles and relationships, and the way these change over time, and conceptualises this in terms of an **innovation system**. This type of analysis is more inclusive than the narrower notion of a **research system**. The distinction being that the latter is a system of predominantly public sector organisations engaged in producing technical innovations. In contrast an innovation system encompasses all the elements of the system or network of private and public sector institutions whose interactions produce, diffuse and use economically useful knowledge. In contrast to the research system, innovation systems are viewed as producing both technological and institutional innovations. The latter creating the evolutionary dynamics that often creates the new institutional forms that allow the creation and utilisation of new technology. This process of institutional learning is a central feature of successful innovation systems.

While the effectiveness of an innovation system usually requires strong horizontal linkages between institutional nodes, the political and social structures in many developing countries tend to encourage central control and top-down linkages, particularly in public sector organisations. The institutional innovations generated by private organisations (see box 1) are an implicit recognition of the shortcomings of these structures and of the benefits that can be derived from improving connectivity to other nodes and the need to change institutional capabilities to suit emerging circumstances.

Box 2: National Systems of Innovation

The National Systems of Innovation (NSI) approach recognises that technical and economic change are a product of, and are shaped by, the prevailing institutional context rather than just by levels of investment in R&D and that this context is likely to be specific to individual countries. This is based on the empirical observation that:

- in countries where there are effective networks linking different institutional nodes, economic performance has been high;
- the linkages can take the form of joint research, personal exchange, cross patenting, purchase of equipment and other channels;
- innovation as a social process involves learning and this concerns institutional innovations as much as it does technical ones;
- the actors or nodes in the innovation system can be private enterprises, universities and public research institutes.

Analysis based on this NSI framework stresses that it is the performance of the system as whole that is important. Success tending to be a function of the interaction and interactive relationships - often partnerships- that determine the effectiveness of knowledge flows between institutional nodes. Rather than presenting a blue print for institutional reform, NSI provides a set of analytical principles to help in the re-mapping of these linkages. These include:

- Assessing the extent of institutional interactions
- Assessing impediments to flows of knowledge between nodes
- Assessing the opportunities for and constraints to interactive learning and institutional linkages
- Assessing policy and practices that can give rise to failures of the component parts working as a system.

For policy makers, an understanding of the NSI system can help identify leverage points for enhancing innovative performance and overall competitiveness.

The Indian agricultural innovation system

Recent case studies in the Indian seed and horticultural sector suggest that patterns of partnerships are starting to emerge with many of the features that the NSI recognises as important in the creation of a successful innovation system (Hall et al, 1998, 2000). However much of the initiative that is stimulating these developments has come from private organisations. Currently there are limitations to the extent to which - despite policy changes - the public sector can operationally contribute technology and allied R&D capability to these emerging partnerships.

Partially this relates to the administrative delays involved in contracting public sector scientist and their institutions. It also reflects the narrow research focused professional mandate of the scientists and their lack of exposure to commercial applications. Introducing policies that permit these types of contract research arrangements needs to be supported by institutional changes that allow them to work efficiently in practice. Linkages are also weak between public sector institutes, with the result that mutually useful pieces of knowledge are often locked-up in different organisations.

While scientists are often interested in engaging in partnerships with the private sector, public sector institutional hierarchies tend to engender a professional approach whereby scientifically robust recommendations are devised that can then be transferred to others. Extension organisations' continued obsession with feedback, training and demonstration and its inability to perform more valuable roles such as facilitating linkages have been also restraining the performance of the innovation system. This tends to stand in the way of developing iterative working practice that would assist in developing client-focused research. There is wide recognition by many scientists of these types of institutional constraint. However mechanisms for institutional learning and the generation of institutional innovations to address these problems are not apparent.

Conclusions

In many countries institutional innovations have been an implicit and explicit response to the increasingly complex agendas of agricultural research. The NSI framework provides an approach that allows an analysis of these

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