
Subject III

Innovations, Access to Technology and Competitiveness of Markets

Rapporteur: **Ranjit Kumar***

BACKGROUND

Ensuring sustainable food production systems that not only increase productivity, but progressively improve/maintain land, soil, and water quality, and simultaneously increases farmers' income, require new technologies and innovations. Innovations in agriculture may be either technological (product or process) or non-technological (organizational, marketing and policy level). These innovations influence diversification and competitiveness of agricultural markets as well. Many technologies, particularly biological and chemical, are delivered through various types of inputs. Innovation in agriculture has spatial dimensions due to site-specific nature of the technology and the biological nature of the production process. Technological and institutional innovations are essential interventions to meet the triple bottom lines of raising income of smallholder farmers, strengthening the competitiveness of Indian agriculture, and keeping the entire ecosystem sustainable. In other allied sectors, like agroforestry, aquatic sector, etc., there might be several technological developments including traditional knowledge centric innovations which remained away from the limelight of attention, need to be brought for wider discussion. On the other hand, the innovations are also leading to paradigm shift in the agricultural sector in variety of ways. The food system is shifting away from calorie-dominated crops to millets, high value crops, livestock, poultry and fisheries. The advances in machineries have expanded the scale, speed, and productivity of crops and livestock sector equally. Vertical integration of services near villages through aggregation and collectivization are taking place in subtle way. Digital technologies have already made inroads in some regions and are expected to disrupt the agricultural value chain significantly through application of artificial intelligence (AI), internet of things (IoT), remote sensing, data analytics, drone services, and robotics.

Considering the growing importance of innovations in all spheres of agriculture sector, the 82nd Annual Conference of the Indian Society of Agricultural Economics had one of the technical sessions on 'Innovations, Access to Technology and Competitiveness of Markets' for deliberations. Under this theme,

* Head, Agribusiness Management Division, ICAR- National Academy of Agricultural Research Management (ICAR-NAARM), Rajendranagar, Hyderabad- 500 030, Telangana, INDIA.

total 26 papers were received, out of which 13 papers were presented and discussed during three-day conference. These papers mainly covered issues related to innovations tackling the major problems in agriculture and allied sectors; role of public research in innovation cycle of Discovery, Development and Delivery; constraints in scaling up and scaling out of successful innovations; disparity in innovations across regions and farm-sizes; and adequacy of public policy in faster innovations.

Following recommendations emerged from extensive discussions on various papers presented:

- New technologies like slag-based gypsum needs long-term trials before wider level dissemination at farmers' level to examine the net effect on different crops under different agro-climatic conditions and the residual effect in the field. The comparative economics of the production and marketing also need to be studied to ascertain the economic viability of the business to convert slag into gypsum.
- Polyhouse technologies are well proven to enhance the crop productivity and farmers' income. Some of the state governments are promoting the technologies by providing subsidies in establishing the polyhouses. However, due to lack of appropriate training of the target farmers before setting up the infrastructure resulted into poor adoption of management practices. This has finally resulted into high variability in crop yield and profitability, hence demotivating farmers to continue. Therefore, it is recommended that the government schemes promoting investment-heavy technologies should focus more on right targeting of the beneficiaries and they should also be provided adequate training to get maximum benefits from such technologies.
- Nutrient supplements in case of organic farming is very important to reduce the conversion period during which crop yield reduces drastically. The appropriate technologies developed may be encouraged through field demonstrations. *Krishi Vigyan Kendras* (KVKs) may be roped in for validating and demonstrating the results of such technologies.
- Fisheries sector has huge potential for income and employment generation for large section of the workforce. Since the export of fisheries products is highly competitive sector, ecosystem needs to be developed to promote higher level of value addition before exports. Improvement in production and value addition with favourable institutional and policy support is essentially needed.
- Collectivization model like FPOs must be supported by the state government to provide appropriate market linkage to smallholders. Innovative service models like ICT-enablement or value chain upgradation, negotiable warehouse receipts, etc. need to be taken to remote villages.

- North-east regions with some of its unique agricultural products in terms of quality, nutrient content, taste, etc. have huge market potential. Therefore, entrepreneurial ecosystem for secondary agriculture should be developed to create better value from agriculture and allied sector. Diversification of existing cropping system with suitable high value crops may increase the farmers' income significantly.
- India is highly competitive in international market for different spices. However, every spice has its own nuances in the international market, which should be further examined.
- Policy hesitancy creates ambiguity in R&D environment in multi-stakeholders sector like agriculture. Therefore, policy advocacy needs to be strengthened in NARS. High potential technologies need to be identified and enabling ecosystem to be developed to promote the development and delivery of such technologies-based products.
- Availability of quality data on real-time basis or with minimum lag at granular level is needed for research purposes. Further, systematic research is needed to generate field-level evidences for innovation and adoption of modern technologies. Benefits from adoption of such technologies like application of drone services, artificial intelligence based advisory services, other innovations by agri-tech startups, etc. should be studied at different levels.
- Research scholars in social science at most of the agricultural universities have serious problem of funding support for their research work, particularly in the field-based study. For other stream scholars, universities are providing laboratory facilities including consumables and needs at experimental fields. While social science research scholars find difficulty in getting any budgetary support to conduct the field survey. Therefore, all the universities may be sensitized towards making need-based budgetary provision to conduct research in social sciences.