

A Review on Agricultural Education, Rural Development and Career Prospects in India

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Abstract

Agriculture continues to play a vital role in India's economic and rural development by providing employment, livelihoods and opportunities for entrepreneurship. Agricultural education has contributed significantly to the development of skilled human resources required to improve agricultural productivity, promote technological advancement and address emerging challenges in the sector. This paper examines the role of agricultural education in rural development and explores the career prospects available in agricultural science and technology. It highlights the contribution of agricultural universities, research institutions and extension services in developing knowledge, skills and scientific capabilities among students and farmers. The paper also discusses major challenges facing Indian agriculture, including low productivity, declining farm profitability, inadequate market linkages, limited mechanization, resource degradation, climate-related stresses and the shortage of trained manpower. At the same time, developments in agribusiness, food processing, agricultural technology, rural finance, marketing, research and entrepreneurship are creating diverse employment opportunities for agricultural graduates. Strengthening higher agricultural education, practical training, technological skills and entrepreneurial capabilities is therefore essential for sustainable rural development, improved food security and the transformation of Indian agriculture.

Keywords: Agriculture, Rural, Livelihood, Education, Marketing.

Introduction

India is a country whose economy rests largely on agriculture. Farming and its allied occupations serve as the principal means of subsistence for over 80% of the rural populace, generate employment and enterprise for nearly 52% of the workforce, and contribute roughly 14 to 15% of the Gross Domestic Product (GDP). When the country became independent, it was confronted with an acute shortage of food grains. From 1966 onwards, however, the agricultural sector recorded striking gains, and despite a steadily rising population India is today self-reliant in most food grains. National food output climbed from 51 million tonnes in 1950 to a record of about 273.38 million tonnes in 2016–17 — an advance that stands out in the history of world agriculture. Comparable progress has been registered in milk, fish, oilseeds, fruits and vegetables, giving rise to the green, white, blue and yellow revolutions respectively, each of which has improved the economic condition of farming families. Several elements underlie these gains, among them supportive governmental programmes and policies, the willingness of farmers to accept change, and the creation of institutions of higher agricultural learning.

If the potential of the agricultural sector is to be sustained, diversified and fully realised, the development of human resources skilled in ICTs becomes essential. Building agricultural manpower is an ongoing task carried out by agricultural universities and their associated research stations. These universities offer instruction across a wide range of disciplines — Agriculture, Agricultural Engineering, Forestry, Horticulture, Veterinary and Animal Husbandry, Dairy Science, Food Technology, Fisheries Science, Agricultural Information Technology, Agri-Business Management and others. Such education is available at diploma, bachelor's, master's and doctoral levels through the country's various agricultural universities and institutes.

Agricultural instruction in India has roots reaching back to the medieval era, when agriculture featured as a significant subject in the syllabi of the universities at Nalanda and Takshashila. Formal courses, nonetheless, appeared only at the opening of the twentieth century, when six agricultural colleges were founded under the general universities — at

Kanpur, Lyalpur (now in Pakistan), Coimbatore and Nagpur in 1905, at Pune in 1907 and at Sabour in 1908. Following independence, the Government of India embarked on a comprehensive planning exercise. To secure systematic expansion, the Indian Council of Agricultural Research (ICAR) — the apex organisation responsible for coordinating, guiding and administering agricultural research and education nationwide — took the initiative and framed the country's first Model Act for Agricultural Universities in 1966, promoting the creation of dedicated State Agricultural Universities to support research, extension and teaching. The nation's first agricultural university was founded in 1960 at Pantnagar (presently in Uttarakhand), and it opened the way for similar institutions elsewhere. The country now has 73 Agricultural Universities (AUs), a figure that includes five deemed-to-be universities, two Central Agricultural Universities and four Central Universities possessing agriculture faculties. Student intake, which stood below 5,000 in 1960, has since risen to 40,000. Through roughly 350 constituent colleges, these universities annually admit some 25,000 undergraduates and more than 15,000 candidates to master's and Ph.D. programmes. Numerous privately affiliated colleges enrol thousands more each year. Around 23,000 scientists are engaged in teaching, research and extension within the present ICAR–Agricultural University system. Degree programmes are offered in 11 undergraduate and 93 postgraduate disciplines, with learning strongly oriented towards hands-on practical sessions. Roughly 52% of those admitted come from rural backgrounds and 36% are girls.

Factors Affecting Rural Development

Rural development is bound up closely with progress in the agricultural sector, since agriculture furnishes livelihood and work to a substantial share of the rural population. Progress in rural areas rests on the effective coming together of human resources, agricultural knowledge and skills, capital, land and water resources, technology, infrastructure, markets and institutional backing. Entrepreneurs, cultivators, self-help groups, cooperatives and rural institutions each have a significant part to play in assembling these resources for productive and economically viable agricultural activity.

A number of elements shape rural development: the availability of farm inputs, irrigation infrastructure, access to credit, educational and extension services, uptake of improved technologies, marketing arrangements, transport, storage and processing facilities, healthcare, governance and social institutions. These elements are mutually dependent and act upon one another. Better education and extension services, for instance, can encourage the adoption of modern agricultural technology, while improved irrigation and marketing facilities can raise farm output and cultivators' earnings. No single factor, therefore, can by itself bring about rural development; lasting rural progress instead calls for the simultaneous and coordinated strengthening of agricultural, economic, social and institutional dimensions.

Education as a Component of Rural Development

Education occupies an important place in rural and agricultural advancement. Within a typical rural system, the various functional components are linked to one another through physical, social, economic and institutional infrastructure. Such components take in the supply of agricultural inputs, crop production, marketing, human resource development, education and extension, healthcare and governance. Agriculture forms a key connecting thread among them, since a shift in any one component influences the working of the others either directly or indirectly.

Within the agricultural setting, education equips cultivators with the knowledge, skills and scientific outlook required to raise farm output and income. Farmers who are educated tend to grasp and adopt improved practices more readily — high-yielding varieties, balanced use of fertilisers, integrated pest management, soil and water conservation, mechanisation, precision farming, post-harvest handling and climate-smart agriculture among them. Agricultural education and extension also assist farmers in making sense of government schemes, obtaining institutional credit, using inputs economically and securing better prices through suitable marketing channels.

Education consequently advances rural development by raising agricultural productivity, resource-use efficiency, employment prospects, farm earnings, entrepreneurship and the general standard of rural living. Any improvement in education can exert a favourable influence on production, marketing, health, governance and the remaining

components of the rural system. Education — and agricultural education and extension in particular — therefore constitutes an indispensable basis for sustainable rural development.

Emerging Challenges in the Agriculture Sector

The sector at present contends with numerous difficulties: (i) weak productivity, averaging about 60% of the global mean; (ii) shrinking profit margins in cultivation; (iii) mounting competition on quality under globalisation; (iv) inadequate linkage between farms and markets; (v) limited knowledge of input agriculture; (vi) a wide gulf between laboratory findings and field application; (vii) restricted mechanisation and value addition; (viii) shortcomings in supply chain management and product lifecycle management; (ix) an insufficient pool of trained personnel capable of tackling new and emerging problems and delivering results at the grassroots; (x) a growing threat to sustainability stemming from the deteriorating quality of natural resources, biotic and abiotic stresses and the wasteful use of agro-inputs; and (xi) a poorly coordinated system for managing natural disasters.

Meeting these difficulties adequately will demand skilled human resources in considerable numbers in the years immediately ahead. This in turn calls for a fresh emphasis on higher agricultural education, supported by stronger financial provision for the ICAR–AU system. Estimates indicated that by 2020 the country would need upwards of 16,000 scientific personnel to serve its R&D requirements in the sector. As matters stand, the shortfall between the demand for and supply of trained manpower in agriculture and allied sciences amounts to 50% or more. Projections placed the yearly output required at undergraduate level and above at roughly 54,000 by 2020, against a current annual output of about 40,000. Determined efforts are thus needed to draw larger numbers of students into higher agricultural education. Considerable scope exists for young graduates to take up agriculture as a career, one that contributes directly or indirectly to the nation's economic and social advancement.

The Indian Council of Agricultural Research (ICAR) has recently accorded professional-degree status to the B.Sc. (Agriculture) programme offered by the various State Agricultural Universities. Nine courses in all have received this recognition: Agriculture, Horticulture, Agricultural Engineering, Sericulture, Forestry, Food Technology, Biotechnology, Home or Community Science, and Food Nutrition and Dietetics. Now that these courses carry professional status, specialised instruction can be delivered — a timely development, since Indian agriculture increasingly demands attention at the micro level. The Fifth Deans' Committee report laid down terms of reference that took account of contemporary challenges to graduate employability and called for a holistic approach to quality assurance in agricultural education. The Committee reshaped course curricula and reoriented the system towards building the skills and entrepreneurial outlook that graduates need in order to enter self-employment, strengthen rural livelihoods and food security, sustain agriculture and act as a driving force for agricultural transformation.

Professional-degree status carries several advantages for students, including higher fellowship rates from the DBT and similar agencies. Larger numbers of students and their parents now favour the agricultural stream. The contemporary higher education landscape is shaped by globalising forces, by newly emerging specialisations such as intellectual property rights (IPRs) and areas connected with the World Trade Organization (WTO) and the General Agreement on Trade in Services (GATS), and by frontier technologies of considerable promise such as biotechnology and nanotechnology. Agricultural graduates must, on completing their studies, be conversant with all these new techniques and be capable of meeting the demands imposed by a globalised environment. Above all, agricultural education must answer the needs of its foremost stakeholder — the Indian farmer.

Career Scope in Agricultural Science and Technology

India ranks among the world's foremost agricultural nations, and a considerable portion of its economy is propelled by agriculture. More than 52% of rural households look to farming for their employment. The country is among the largest producers of vegetables, fruits and flowers globally; it leads the world in milk output, stands second in sugar, and ranks foremost in coconut and spices. India is also a major exporter of agricultural commodities including spices, flowers, mushrooms, oilseeds, milk, rice, food grains and assorted vegetables. Because society will always require food, agriculture remains a rewarding career choice. The government too has extended firm backing to the sector, as

the 2016–17 budget made evident, and the 2017–18 Union Budget was expected to press for further reform in agricultural marketing together with larger allocations for insurance and irrigation schemes. Agricultural credit has been lifted to an unprecedented Rs. 10 lakh crore. Alongside the government, private organisations and overseas investors have shown keen interest in Indian agriculture. Official figures from the Department of Industrial Policy and Promotion (DIPP) show that the sector drew Foreign Direct Investment (FDI) equity inflows of roughly USD 2.8 billion between April 2000 and March 2016 (Source: Government of India). The outlook for an agricultural career is therefore decidedly promising.

Agricultural science concerns itself with research and development relating to crop production, processing, productivity and the finished goods that reach consumers. Its principal concerns include raising the quality and volume of farm output, increasing crop yields, reducing labour requirements, conserving soil and water, and controlling pests. The sector is not confined to scientific research and development alone; it also offers openings to students with a background in business. Conventional avenues lie in government departments, research and teaching, nationalised banks, the agri-inputs industry, and government and policy-making agencies. Newer avenues include agribusiness, food processing, the financial sector, retailing, rural marketing, international trade, rural credit and insurance, warehousing and commodities, NGOs and KPOs. Nearly half of all professionals in the sector occupy business-related positions. An MBA in Agri-Business centres on agricultural marketing, agricultural pricing, agricultural law, agricultural trading and merchandising, agricultural economics, agricultural data analysis and farm management. Non-scientific roles encompass marketing, technical sales, merchandising, economics, accountancy, financial management, commodity trading, and communication and education within the social services.

Indian agriculture also faces serious difficulties — and these difficulties translate into abundant opportunity. A number of agri-tech social enterprises operating in India provide employment, among them DuPont India, Rallis India Ltd, Nuziveedu Seeds Ltd, Lemken India Agro Equipment Pvt Ltd, Advanta Ltd, Monsanto India, Poabs Organic Estates, National Agro Industry, Godrej Agrovvet Ltd and Rasi Seeds. Several start-ups and entrepreneurs have likewise emerged within the sector. Agri-tech start-ups concentrate on four broad areas: disease and pest control; timely irrigation and soil health; aerial surveying for the detection of anomalies; and packaging and transportation. For anyone from a scientific or business background who wishes to do something worthwhile for society and possesses an entrepreneurial streak, agriculture offers a fitting field.

Career Opportunities in Agricultural Fields

Openings in agriculture extend across agricultural research, agribusiness, agro-industry, agricultural education, agricultural journalism, agricultural services, banking, farming, conservation, agricultural engineering, management and sericulture. Students pursuing the B.Sc. (Ag.) or B.Tech. programme, postgraduate M.Sc. or M.Tech. degrees in disciplines such as agronomy, soil science, horticulture, plant physiology, agricultural economics, agriculture and dairying, plant genetics and breeding, animal genetics and breeding, farming system management and agricultural marketing management, or the B.E. in Agricultural Engineering, all enjoy favourable prospects within the sector. A candidate seeking a Ph.D. as a route to a good position in agriculture may study at the Indian Agricultural Research Institute (ICAR), New Delhi; the Indian Veterinary Research Institute, Izatnagar; the National Dairy Research Institute, Karnal; or the Central Institute of Fisheries Education, Mumbai. Each of these institutions holds its own annual entrance examination for doctoral study in the various branches of plant and veterinary science. Agriculture is not a production-centred field alone; it spans quality assurance, research science, sales representation and much besides, and the industry is regarded as more stable than many others while offering rewarding careers.

Reasons for Choosing Agriculture as a Profession

1. Start-up ventures stand to benefit both entrepreneurs and the rural poor.
2. Agriculture in the developing world has grown dynamic through effective innovation.
3. An increasing number of young people are turning to agriculture.

Agriculture offers a sound means of addressing youth unemployment, a problem found across the world, since the sector has demonstrated its readiness to accommodate youth entrepreneurship.

Conclusion

Agricultural education plays a vital role in the development of Indian agriculture and rural society. It provides the knowledge, technical skills and scientific outlook needed to improve agricultural productivity, promote efficient use of resources and address emerging challenges. Agricultural universities, research institutions and extension services have made an important contribution to developing skilled human resources for the sector.

India's agriculture sector faces challenges such as low productivity, declining farm profitability, inadequate market linkages, limited mechanisation, environmental stresses and a shortage of trained manpower. These challenges highlight the need to strengthen agricultural education through practical training, technological innovation, research and entrepreneurship. At the same time, the growing fields of agribusiness, food processing, agricultural technology, banking, marketing, research and extension are creating diverse career opportunities for agricultural graduates.

Thus, strengthening agricultural education can contribute not only to better career prospects for young people but also to employment generation, rural development, food security and sustainable agricultural growth. A skilled and innovative agricultural workforce will be essential for meeting the future needs of Indian agriculture and improving the livelihoods of rural communities.

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