

MODERN TECHNOLOGY: THE KEY TO AGRICULTURAL DEVELOPMENT IN INDIA

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Abstract- This paper acknowledged the important role of modern technology in the agriculture sector in developing countries such as India for overall economic growth. Technological change has been the major driving force for increasing agricultural productivity and promoting agriculture development in all developing countries. In the past, the choice of technologies and their adoption was to increase production, productivity and farm incomes. Over many decades, policies for agriculture, trade, research and development, education, training and advice have been strong influences on the choice of technology, the level of agricultural production and farm practices. It is an understood fact that the improved inputs and modern machinery are important determinants of agricultural output, yet it is important to quantify the relationship. Study also concludes that improved seeds, water availability, number of tube-wells and labor employed in the agriculture sector are positively related to agricultural output. The paper also recommends the provision of credit facilities to farmers, extension services, price stabilization and making agriculture a priority etc. to ensure that the sector takes its rightful place in our economy.

Keywords: Modern technology, agricultural development, agricultural mechanization agricultural output, machinery, fertilizer, seeds

1. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17 per cent of world population from 2.3 per cent of world geographical area and 4.2 per cent of world's water resources. In India over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. It fulfills the basic need of human beings and animals. It is an important source of raw material for many agro based industries. India's geographical condition is unique for agriculture because it provides many favorable conditions. There are plain areas, fertile soil, wide variation in climatic condition and long growing season etc. Apart from unique geographical conditions, India has been consistently making innovative efforts by using science and technology to increase production.

India has an affluent and vast natural resource base, covering various environmental and climatic zones. Hence, the country has great potential for producing all types of agricultural commodities. In India, agriculture sector has always played an important role in generating the economic growth. The importance of agriculture to the economy of any nation can be seen in three ways: first, it provides food to consumers and inhabitants of the country; second, it is a source of foreign exchange earnings; and third, it provides a market for industrial goods.

Mainly, there are two challenges related to agriculture in developing countries, especially in India. The first is the need to increase food productivity and production. To achieve this, a number of problems need to be addressed: research and development for seeds and inputs, irrigation, fertilizer, agricultural extension, credit, rural infrastructure, storage, and connection to markets. The second problem is the volatility of food prices, often because of events outside the control of poor countries. Agricultural R&D and its capacity to produce more productive technologies are at the heart of long-run agricultural growth.

The environment in which farmers operate today is changing and requires new ways to provide extension services. Information and Communication Technologies (ICTs) can deliver information that is important for the development of rural areas in the long term (such as education) and in the short run (such as market information). ICT can also provide information on weather, prices, and profitable income diversification possibilities. An important technology is cell phones, which can improve both private as well as public information in agricultural sector.

2. OVERVIEW OF INDIAN AGRICULTURE SECTOR

Agrarian sector in India is given vital importance and accorded priority being the largest source of employment for millions of people. The agriculture sector of India has occupied almost 43 percent of India's geographical area. Agriculture is still the only largest contributor to India's GDP even after a decline in the same in the agriculture share of India. Agriculture also plays a significant role in the growth of socio-economic sector in India. As per estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) was 16.1 per cent of the Gross Value Added (GVA) during 2014-15 at 2011-12 prices.

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India is the largest producer, consumer and exporter of spices and spice products. It ranks third in farm and agriculture outputs. Agricultural export constitutes 10 per cent of the country's exports and is the fourth-largest principal commodity. The agro industry in India is divided into several subsegments such as canned, dairy, processed, frozen food to fisheries, meat, poultry and food grains.

In the earlier times, India was largely dependent upon food imports but the successive stories of the agriculture sector of Indian economy have made it self-sufficing in grain production. The country also has substantial reserves for the same. India depends heavily on the agriculture sector, especially on the food production unit after the 1960 crisis in food sector. Since then, India has put a lot of effort to be self-sufficient in the food production and this endeavor of India has led to the Green Revolution. The Green Revolution came into existence with the aim to improve the agriculture in India. As a result of the replication of Green Revolution in Asia, India went from eleven metric tonnes of wheat production in 1960 to twenty-four million tonnes in 1970, thirty-six million tonnes in 1980, and fifty-five millions in 1990.

Industrial and service sectors have outpaced agriculture sector during the past two decades as evident from the average annual growth of agriculture sector (around 3%) of the overall average growth of the economy (6 - 7%). However, the proportion of workforce engaged in agriculture did not commensurate with the decline of its share in the gross domestic product.

Growth in Indian economy always gets affected by the monsoon as 55.7 percent of area sown in India is dependent on rainfall. If rainfall is normal, it results in good output of agriculture. In case of deficit rainfall, agriculture output is adversely affected that has its impact on growth of Indian economy. Despite shrinkage of cultivated area, extensive research and development has helped to increase farm production in India.

3. TECHNOLOGICAL DEVELOPMENT IN INDIA

Introduction of technology in agriculture is an important factor for the productivity growth. Hence technological change plays a vital role in the growth of the sector and the overall development of the economy. Technological change involves a shift in the production function which relates the quantity of output to the quantity of inputs enabling greater output quantity or quality or both to be produced with the same volume of land, labor and capital. Often these changes result from the variation in quality of inputs such as enhanced forms of machinery or more highly knowledgeable labor. Technological change is aimed at saving the relatively limited or more costly resources. Technological advancement began in the early times when our forefather thought of tilling the ground and establishing food crops and grain as a main source of food aside from animals. Agriculture does not only develop every place it has implanted but also give additional knowledge and provide a better technology. No one can deny its importance in our daily lives for it has transformed mankind continually from time to time.

From the earliest time, ancient people have already engaged in some form of agricultural technology used in planting, collecting or even gathering. But unfortunately such technological tools are inadequate to bring out the best in agricultural industries. The simple plowing tool that was the most important equipment a farmers had, rest to its usage and form until modern centuries had arrived. It was changed into a steel plow and later was developed into a gigantic plowing machine. Tractors were put into the field as a replacement on the old plowing devices. Another development in agriculture also occurred on this earlier times when the threshing machine was first invented. The once was manually being done, was now operated by machines. The burden and hard labor was now being lessened as man operated equipment rules the field.

With the use of modern technology, since 1948, agricultural production has doubled around the world, while total input use, including labor and land, has declined slightly. It implies that overall, agricultural productivity has increased. Hence, fast improvements of machinery have enabled fewer farmers to work with less land and obtain a greater output. Now a days, farmers produce higher valued products as a result of technological improvements in agricultural production.

4. TECHNOLOGICAL DEVELOPMENT STRATEGY

The Indian government has set up Ministry of Food Processing Industries to stimulate the agriculture sector of Indian economy and make it more lucrative. India's agriculture sector highly depends upon the monsoon season as heavy rainfall during the time leads to a rich harvest. But the entire year's agriculture cannot possibly depend upon only one season. Taking into account this fact, a second Green Revolution is likely to be formed to overcome such restrictions. An increase in the growth rate and irrigation area, improved water management, improving the soil quality, and diversifying into high value outputs, fruits, vegetables, herbs, flowers, medicinal plants, and bio-diesel are also on the list of the services to be taken by the Green Revolution to improve the agriculture in India.

In the field of agriculture, our scientific and technological researches have enabled us to be self-reliant and self-sufficient in food grains. Today, we can withstand droughts and natural calamities with much greater confidence than ever before. Now, we are in a position to export food grains, etc. and are on the threshold of white and blue

revolutions. Our agricultural scientists and farmers are always ready to imbibe new technologies. We have many varieties of hybrid seeds, crop-protection technologies, balanced farming practices and better water and irrigation management techniques. Similarly in the field of industrial research, we have achieved many milestones and India is emerging as a major industrial power of the world. The Council of Scientific and Industrial Research (CSIR), with its network of research laboratories and institutions, has been chiefly instrumental in our major achievements in scientific and industrial research. We have now joined the exclusive club of six advanced nations by developing our own super computer at the Centre for Development of Advance Computing at Pune.

Considering the quantum leap witnessed by the wheat and rice production unit of India's agriculture, a National Pulse Development Programme that covered almost 13 states, was set up in 1986 with the aim to introduce the improved technologies to the farmers. A Technology Mission was introduced in 1986 right after the success of National Pulse Development Programme to boost the oilseeds sector in Indian economy. Pulses too came under this programme. A new seed policy was planned to provide entree to superior quality seeds and plant material for fruits, vegetables, oilseeds, pulses, and flowers.

Agricultural mechanization should contribute to sustainable increase in yields and cropping intensity so that the planned growth rates in agricultural production are achieved. The benefits of agricultural mechanization should be extended to all categories of farmers with due consideration to small and marginal farmers and to all regions of the country especially the rainfed areas. Appropriate technologies for value addition, handling, packaging, storage, transportation and marketing of agricultural products should be developed for safe and quality food.

5. FACTORS AFFECTING TECHNOLOGICAL DEVELOPMENT IN INDIA

Factors hindering the adoption of appropriate technologies for sustainable agricultural system include:

- farmer's financial constraints and access to credit;
- economic profitability of the technology;
- farmer's familiarity with the technology, and his knowledge and education levels;
- uncertainty about agricultural support policies and world market prices;
- conservative attitudes of farmers and local authorities;
- local/ site-specific conditions;
- structural factors such as size of the farm — for example, precision farming is good for large farms, but expensive for small farms that could benefit from semi-precision farming instead;
- cost of new technology to farmer — new technologies are often expensive when they are first introduced, thus penalizing early adopters;
- scale of production for the technology — technologies produced in small quantities have difficulties to get market access.

CONCLUSION AND SUGGESTIONS

The country has made significant progress in the adoption of modern methods of cultivation and creating infrastructure for effectively and sustainably utilizing the national resources available at its command. Modern technology plays an important role in the growth of agriculture sector of India. Closing the current gap in agricultural productivity will require a significant increase in agricultural yields all over India. This will require improved seeds that enable crops to withstand environmental and biological stresses, crop protection solutions, modern irrigation practices, mobile technology, fertilizer, and mechanization. It is also a fact that fertilizer consumption is contributing insignificantly to agricultural output. The reason for insignificant impact of fertilizer consumption on agricultural output is the illiteracy of poor farmers. Farmers living in distant rural areas do not know the optimal usage and proper timing of fertilizers.

On the basis of the current study, the following suggestions are made:

- Number of tractors should be increased in the agriculture sector. Government should launch tractor subsidy schemes so that the number of tractors may be increased in the sector.
- Government should improve input use efficiency of seeds, chemicals and fertilizers and water through engineering interventions.
- Government should bring more area under efficient water application methods and harnessing available resources through watershed management, rainwater harvest and ground water recharge.
- Government should advise all commercial banks to issue long-term loans to farmers on low interest rates since many poor farmers are not able to manage to pay for mechanization necessary for cropping.
- Advertisement should be enhanced in order to bring awareness among people about the importance of improved machinery in agriculture sector.

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- Government should play an important role in educating the farmers. If the farmers are trained and educated, they can make use of the available technology.
- Government should establish more agricultural universities in order to enhance research and development in the sector.
- Empowerment of women by forming cooperatives and evolving woman friendly technologies.
- Through print and electronic media, government should brought awareness to the rural farmers about the proper usage of fertilizer, pesticides and other inputs.
- There is a need to generate more interaction among the farmers, R&D workers, departments of agriculture and industry.

Finally, agriculture will only be sustainable if it is capable of renewing itself by attracting younger farmers to take up a career in farming. This means not only adopting appropriate technologies for sustainable agricultural systems, but also appropriate incentives and an appropriate policy framework are essential to sustain an economically-viable agriculture and a vibrant rural economy.

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