# Technological Transformation in Agriculture

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Technological transformation in agriculture sector shows much positive impact in terms of productivity, security and supply chain. The most effective way to improve the lives of millions in poverty is to support agriculture in developing countries. Most of the world's poor are farmers, and those who are not spend much of their income on food. Transforming a country's agriculture sector can create jobs, raise incomes, reduce malnutrition, and kick-start the economy on a path to middle-income growth. In fact, almost every industrialized nation began its economic ascent with an agricultural transformation. Recent examples include Brazil, China, and Vietnam, each of which at least doubled the value of its agriculture sector within 20 years of starting its transformation. There is drastic transformation of Agriculture over the past 40 years. The practices are evolving to enter into new era of technology. Agricultural sector is the backbone of every economy in the world. There is high demand of food and this is a challenge because there are constraints in supply due to climate change and high labor cost. Every decade, there is a continuous revolution of technology in agricultural industry.

Modern agricultural technology increases employment, efficiency in production of food, saving on time and reduction in cost. Farmers gain significant benefits from high innovation of technology. Farming is part of entrepreneurship and a business that fully dependents on the nature. The drivers of agricultural transformation are multidimensional, interrelated, and change over time, but they can be organized into categories to provide a better opportunity for pragmatic diagnostics and decision making on national priorities. However, agriculture is not all about success, farmers are also faced by challenges that are unavoidable. These problems are caused by enormous changes in climate because of increase in greenhouse emissions that lead to global warming, use of fossils fuel, deforestation and other factors.

Technological transformation refers to the application of modern agricultural technology to increase productivity. Agriculture production can be supported by the adoption of modern farming technologies such as agriculture equipment, better-quality seed varieties, and fertilizers based on the inorganic compounds. Once the farmer gain complete knowledge related to the latest technology as well as its potential, latest agricultural technology interventions convert long-term steadiness. Adaptation of modern technology in agriculture sector changes the way of farming in different ways such as a farmer can govern his irrigation systems as well equipment related to irrigation from his phone as well as from computer also instead of monitor each field by driving and Crop sensors utilizes its capability in order to maximize the productivity by applying the fertilizers in effective fashion. There are many augmenting factors or drivers to lead the agriculture in front way for enhancing the yield as well as quality by adopting the following tactics or strategies.

**Change agents identified and mobilized**

The success of any agricultural transformation relies on how well millions of smallholders and small- and medium-size enterprises can be helped to change farming practices as quickly and effectively as possible. The critical enabler, without which an agricultural transformation is likely to fail, is a frontline "change agent" that helps farmers modify their practices. Change agents are people who farmers trust and interact with regularly.

There are major technological innovations that include: Global Positioning System (GPS) and Geographical Information System (GIS) in precision Agriculture. Modern technology has been made easy by the contribution of the two technologies GIS and GPS. These two keeps the records of data for reference. It has allowed precise agriculture for data collection, farm planning, field and yield mapping and also used to give direction to automation in the field. GPS aid in spatial variability of soil and save on fertilizer. It's also

important in monitoring the farm when there is a heavy rain or fog.

**Water and Soil Sensor**

The modern farmers are equipped with smart crop sensors that help them in read and detect the health of crops, nitrogen level, soil PH, and moisture content in soil. It aids the farmers with information in order to determine the amount of water, pesticides and fertilizers needed by the crops. It makes use of available resources and hence minimizes the cost and wastage. Furthermore, it remains a very great challenge in farming to ascertain the type of fertilizer that work best in different soil, quantity and when to apply the fertilizer. The sensor is designed as that it can prescribe the quantity of fertilizer, pesticides and water that the crops needed.

**Farm Machinery**

Farmers have been facing high cost of labor, which demand for better methods to minimize the cost of labor. The innovation of machinery such as combine harvesters and planters simplifies the task and reduces the cost of labor. The automation of autopilot sprayers and tractors boost efficiency of the farm production.

**Farm Automation**

Farm automation also known as 'intelligent agriculture' is a technological form which improves farm productivity by automating crop production and cattle production cycles. Agricultural automation addresses important issues including population growth, labor shortages on plantations, and changing consumer tastes. The advantages of automating conventional farming processes are enormous, as they address concerns such as consumer desires, labor shortages, and farming's environmental footprint.

**Modern Irrigation**

Farmers are moving towards new technology by use of modern irrigation techniques in their crops. By the use of developing boreholes and dams in dry regions, farmers are getting benefit of pumping water to irrigate the crops. This increase the production and supply of food throughout the year.

**Modern Greenhouse**

The heat from the sun is used by plants (solar radiation) to grow. The heat from sun is used to generate optimal temperature for the crop growth. Greenhouse farming generates favorable climate for production of horticulture, such as vegetables and flowers throughout the year. With automated irrigation systems and soil sensors is used to figure out the problems arising from green house. The increasing demand of food requires high growing of the crops. Greenhouse technology helps in availability of production of food and makes full use of the available resources.

**Indoor Vertical Farming**

Why indoor vertical farming? Since our population is growing rapidly and the demand of food is also increasing, there is need of high supply. To feed the billions of people, it requires more innovative ways of growing food. Vertical farming is one of the best innovations. Crops are grown vertically stacked layers, which allow preservation of space and high productivity. It is practiced in urban areas due to very limited space.

**Satellites, Drones and Aerial Imaging**

Satellites, Drones and Aerial imaging are becoming advanced in taking the farm to high quality images. This equipment's aid the farmers to analyze the crops while they are at the comfort of their home, as if they are actually in the farm. They access the crops' status from a distance. The drones can be used to spray the pesticides on the crops.

**Agricultural Robots**

In today's world, farmers are using robots in performing human-related tasks that are complex. The agricultural robots are highly tailor-made with sensors and affixation that perform particular task, such as planting and harvesting as well. Agriculture is quickly becoming an exciting high-tech industry, drawing new professionals, new companies and new investors. The technology is developing rapidly, not only advancing the production capabilities of farmers but also advancing robotics and automation technology.

At the heart of this phenomenon is the need for significantly increased production. As per the UN estimates, world population will rise from 7.3 billion today to 9.7 billion in 2050. The world will need a lot

more food, and farmers will face serious pressure to keep up with demand.

**Agricultural Robot Applications**

Agricultural robots automate slow, repetitive and dull tasks for farmers, allowing them to focus more on improving overall production yields. Some of the most common robots in agriculture are used for: harvesting and picking, weed control, autonomous mowing, pruning, seeding, spraying and thinning, phenotyping, sorting and packing, and in utility platforms, etc. Harvesting and picking is one of the most popular robotic applications in agriculture due to the accuracy and speed that robots can achieve to improve the size of yields and reduce waste from crops being left in the field.

**Block chain and Big Data**

We believe that the utilization of Block chain in agricultural sector will become increasingly popular as a way to improve transparency in supply chain, minimize the risk of shortage of foods, and encourage more productive transactions.

**Artificial Intelligence**

It helps in precision agriculture. Artificial Intelligence helps the farmers to detect diseases, controlling pests in crops and monitor soil PH. Like human intelligence, the machine can accomplish tasks that are complex. It has become so difficult for the farmers to predict the climate due to global warming. The farmers cannot determine the sowing period, but with the aid of Artificial Intelligence farmers can smile. They may get the firsthand information to know the weather changes by the use of weather forecast.

**Conclusion And Way Forward**

The evolving technology in agriculture is gaining substantial benefits in high productivity, less cost of production, increase in efficiency and increase in income. There is high demand of food due to the increasing population. The farmers face difficulties in climate change and high cost of production, but it will never stop them from producing. Successful agricultural transformations have focused on the farming household, providing opportunities for farmers to earn a better income. For some, that will mean raising farm productivity or shifting the mix of production to include higher-value crops and livestock. For others, the right choice will be to do less farming and take advantage of employment options off the farm.

The modern technology is important for the farmers to minimize the constraints. Farming is not only known about weather and high production but also involves data collection and embracing the modern technology. As technology continues advancing agriculture becomes progressively worthful. Modern agriculture will not only help the farmers to automate their activities but helping farmers to shift to precision agriculture. Therefore, agricultural transformation is essential to the future well-being of developing nations and also to a world with more equitable economic development.

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