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## multidisciplinary e-Newsletter

# Digitalization's Role in Agriculture

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During the past few decades, the agriculture industry in India has undergone a drastic change. With the advancement of smart farming, we have come a long way from traditional farming methods. As technology continues to develop advanced solutions to enhance productivity, rural agriculture's challenges are finally being overcome. In order to feed an ever-increasing population, farmers need to produce high-yield crops. Drones, moisture sensors, and other cool gadgets have helped achieve sustainable growth through technological advances combined with artificial intelligence. Robots used in agriculture are one example. An agricultural robot, also known as agribot or agbot, is an artificial intelligence source used in agriculture. In addition, they help farmers increase productivity and reduce their reliance on manual labor.



**Robot used in Agriculture**

Agri bots help to automate routine farming activities because of which repetitive tasks are completed in no time at all. These robots assist in performing several farm functions, some of which include:

- **Harvesting** – One of the most frequent tasks an Agribots performs is this one. These robots work more quickly and precisely to boost agricultural productivity and decrease wastage.

- **Weed Control** – Agri bots assist in distinguishing weeds from beneficial crops and removing them by artificially disturbing the soil using laser technologies.

- **Mowing** – Agri bots utilize sophisticated sensors to precisely measure plant density and trim agricultural land.

- **Seeding** – Agri bots can also be used as seed-planting attachments, properly predicting the soil's propensity and assisting in the placement of seeds.

- **Spraying** – Agri bots can recognize weeds and crops that need pesticides and fertilizer, reducing resource waste.

- **Sorting and Packaging** – Agri bots help with the locating, classifying, and packaging of agricultural products.

- **Livestock Monitoring** – Agri bots assist in locating cattle and guiding it across difficult terrain.

- **Irrigation** – Artificial intelligence facilitates water volume access and aids in farmers' controlled water use of only the plants that require it.



**Need of Robots in Agriculture**

Did you know that necessity is the mother of all inventions? In the case of agricultural robots, several factors contributed to their invention. Here are a few of them:

- An estimated 10 billion people will inhabit the planet by 2050, according to a United Nations report. The ever-increasing population makes it necessary to increase food production levels.

- Precision farming advancements, combined with a reduction in natural resource wastage, inspired the idea behind Agri bots.

- Land and water resources are utilized to their full potential with the help of agribots. Additionally, they help enhance the quality of farm yields through accurate crop and livestock analysis.

**Different Types of Agricultural Robots**

The three main categories of agricultural robots can be categorized based on their roles.

**Crop-Harvesting Robots**

Crop harvesting is a monotonous, repetitive and physically demanding job. Additionally, it requires a delicate touch and a certain level of skill. Robotic components used in crop harvesting allow them to operate in scorching temperatures and under less-than-ideal conditions. In addition to handling crops' delicate nature, these robots avoid unripe or diseased products using sophisticated computer vision and machine learning algorithms. Globally, Harvest Crop, Abundant Robotics and Harvest Automation are among the leading manufacturers of crop harvesting robots.

**Weeding Robots**

It is important and challenging to control weeds in agriculture. Farmers still rely on herbicides even when they practice crop rotation. The use of herbicides is hardly a solution now that more and more consumers are averse to chemically treated food. Robots that manage weeds are an attractive option for such situations. To distinguish crops from weeds, these robots use advanced artificial intelligence. Herbicide usage is decreased through the use of conventional blades and finger weeders that run along the base of the plant. Among the top producers of weeding robots worldwide are Nexus Robotics and Naio Technologies (both based in France) (Nova Scotia).

**Aerial Imagery Drones & Seed-Planting Drones**

When it comes to agricultural imagery and seed planting, something is in the air. By giving them a bird's eye perspective of their crops, aerial imaging saves farmers a lot of time. Farmers are able to swiftly evaluate the condition of the vegetation, bug problems, and weed growth in this method. Additionally, it enables them to calculate the precise quantities of seeds and fertilizer required in the fields.

Precision farming is rapidly embracing drone technology. These are high-tech, self-charging machines that collect and analyse information on agricultural stress using computer vision and data science. They also assist farmers in identifying areas where they can improve. Among the top producers of drones for aerial photography and seeding are American Robotics, UAV Systems International (US businesses), and Taranis (Israel).

**Overview, Leading Manufacturers and Prices in India**

In India, there is unquestionably a demand for agricultural robots. Farmers in India have access to a number of data-focused digital solutions, but the adoption of robots and automation-focused solutions is still in its infancy. Although more and more industries are observing a high success rate in popularizing the concept of these revolutionary solutions, robotics in agriculture is becoming increasingly popular. In India, agricultural robots are available for as little as Rs. 6,000. Binary Robotics, Robo Technos, NadafAgro Industries, Hari Agro Industries, and Shpine Technologies are a few of the top producers of agricultural robots in India.

**Advantages of using Agricultural Robots**

Farmers in India can benefit in a number of ways from using agricultural robots, including the following:

- **Decreased labour** – Agricultural robots can easily carry out all the main farming tasks, minimizing the need for human labour. As a result of no longer needing manual labour, farmers become more independent.

- **Increased profits** – It is generally a one-time investment, but it can be expensive. It is, however, a long-term investment with low operating costs and increased productivity.

- **Saving Precious Resources** – The use of Agbots ensures the optimum utilization of resources like water, chemicals, etc. Additionally, they prevent the waste of resources and preserve them for future generations.

- **Attracts Young Talent** – Artificial Intelligence and modern technology have fascinated young minds for many years. As a result of these advancements, an increasing number of young farmers practice agriculture for a living. In the future, this tendency might even encourage the urban population to work in agriculture.

- **Maximum productivity** – Farmers can save time and energy by using agricultural robots in almost every aspect. In addition, accurate soil reports allow farmers to maximize production while maintaining quality while understanding the suitability of crops.

**Drawbacks of Agricultural Robots**

However, some limitations of agricultural robots prevent their widespread use despite their many advantages. Some of the drawbacks are as listed below.

- **Costly** – Agri bots are expensive for small and marginal farmers since they demand a substantial financial investment.

- **Complex Operations** – Technology advances have made agbots more complex to use, as a result.

- **Requires Technical Expertise** – It is difficult for farmers to take care of their farms properly with the use of agricultural robots, since they must become skilled and proficient in handling modern technology.

- **Power Cuts** – Most rural areas of India suffer from frequent power outages. In addition to wasting time, it renders agricultural robots useless because they cannot function without electricity.

**Conclusion**

When choosing between working with a reputable systems integrator or handling robotic systems yourself, understanding the different types of robots available and their costs and advantages can be crucial. Hopefully this effort has helped you gain a better understanding of the role agricultural robots play in the farming sector.