Agricultural Industry and Technology

Agricultural Industry

Agriculture is the science, art, and practice of cultivating the soil, producing crops, raising livestock, and preparing and marketing the resulting products.

Digital Agriculture, focusing on its concept, is creating value from data, which means going beyond the existence and availability of data and creating actionable intelligence and meaningful added value from such data. It is the application of precision farming, internal and external networking of the farm, and Web-based data platforms.

Precision Farming is a technology-enabled approach to farming management that monitors, measures, and analyzes the needs of individual fields and crops to optimize agricultural production processes.

Technically, both precision farming and digital agriculture use advanced technology to integrate agricultural production from farms to consumers. The technology in agriculture provides the industry with tools and information to make more informed decisions and improve productivity in terms of agricultural production.

Impacts of Technology in Agriculture

Modern agricultural operations work far differently than the conventional way of farming, mainly because of the advancement in technology. Today's agriculture regularly uses sophisticated technologies such as robots, temperature and moisture sensors, aerial images, and GPS technology. These advanced devices, precision farming, and robotic systems allow businesses to be more efficient, profitable, safer, and environment-friendly.

Below are some impacts of technology in the agricultural industry:

- With the aid of precision farming, farmers no longer have to apply water, fertilizers, and pesticides across an entire field. They can now use minimum quantities required and target specific areas, or even treat individual plants differently, which results in higher crop productivity and less use of chemicals.

- Robotic technologies enable more reliable monitoring and management of natural resources, such as air and water quality. It also gives produces greater control over plant and animal production, processing, distribution, and storage, which results in greater efficiencies, lower prices, and safer products.

- Mobile applications specifically developed for the agricultural industry can also support farmers in reducing costs and increasing their profit. Applications in mobile devices enable farmers to perform critical tasks wherever and whenever they need it. From scouting fields, managing data, and flying drones to creating farm maps, there is numerous work that a farming application can perform.

- An ERP system implemented in agricultural business can facilitate the corporate finances, optimize the tracking of resources, enhance business compliance, and provide real-time reports for farmers. When correctly applied, ERP systems for the agricultural industry can bring several qualitative changes in the industry.

- Re-engineering the conventional way of farming and pursuing the development of the agricultural industry can ensure food security and reduce a country's dependence on import and shift towards an innovative and knowledge-based economy.

Applications of Technology in Agriculture

Software for harvesting
Precision-farming engineer Manuela Zude-Sasse of the Leibniz Institute for Agricultural Engineering and Bioeconomy in Germany developed sensors connected with a smartphone application to know if the fruit is ready for harvest. The sensors are attached to the fruits to detect their size, color, and level of water content. The data are fed into an algorithm to calculate the developmental stage. When the fruit is ripe for the picking, growers are alerted through their smartphones. Zude-Sasse is also developing a mobile application for cherry growers, which uses photographs of cherries taken by growers to calculate growth rate and quality score.

Drones with precision sprayers
Agriboticx, an agriculture data-analysis company in Colorado, supplies drones and software that use near-infrared images to map patches of unhealthy vegetation in large fields. Images can reveal potential causes, such as pests or problems with irrigation. Machine learning is also used in training the system to differentiate crops from wild plants. Modern technology that can autonomously eliminate pests and target agrichemical better will reduce damage to wildlife, lower resistance, and cut costs.

Animal trackers
In Scotland, breeders are utilizing smart collars for animals. Smart collar is a wearable device for animals which monitors fertility by tracking the animals' activity (e.g., cows tend to move more when they are fertile). It sends message alert or notification to the breeder's device. It can also detect early signs of illness by monitoring the average time each cow spends eating and ruminating.

Researchers in Belgium was also successful in developing a camera system to monitor broiler chickens in sheds. The system is composed of three (3) cameras continually tracking the movements of thousands of birds to spot problems quickly. This behavior-monitoring system is being sold by Fancom, a livestock firm in the Netherlands.

Robot as surveyors
Bonirob, a car-sized robot initially developed by a team in Germany, can measure some indicators of soil quality using various sensors and modules, including a moisture sensor and a penetrometer, which is used to assess soil compaction. The development of this kind of robot rooted from the fact that numerous harvesters damage soil through the overuse of agricultural chemicals, such as nitrogen fertilizer.

Possible ERP Modules for Agricultural Industry

Agricultural business is a dynamic business for any country. It helps a country to be a self-sustaining country in terms of food. Agricultural industries across the globe are continuously capitalizing on the latest technology which specializes in quality, advanced productivity, and reduction in prices by expanding all operations. For processes like procurement, production, and distribution, agricultural firms would like a strong, scalable ERP system. Aside from the basic ERP modules previously discussed, here are some possible ERP modules for agriculture:

- **Human Resource Management Module** – Agricultural industry revolves around seasonal works. In this event, an ERP for agricultural industry with an integrated human resource management module is a great help. This module can track the seasonal workers and look after their payments, taxes, and other costs efficiently.

- **Compliance Module** – Customer satisfaction is the highest and pivotal factor for an agricultural business' success. To withstand in the market, the farmers and breeders have to ensure that the products they produce are clean and safe to consume. All the tracking, quality control management,

and timely delivery are integrated into this module, which provides traceability to most aspects of the agricultural business.

- **Livestock Tracking Module** – An ERP for agriculture industry helps breeders in tracking different growth cycle of an animal. This module facilitates the monitoring of animal life stages, which includes birth, parental lineage, amount of food intake, increase or decrease in weight, veterinary services, and other events affecting animal growth.

- **Field Mapping Module** – This module can help farmers identify the field areas where fewer or more fertilizers must be applied based on soil quality that was tracked by the system. This can also help farmers in yielding a balanced crop.

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