

Agriculture Robots Market Assessment, By Type [Unmanned Aerial Vehicles (UAVs)/Drones, Milking Robots, Driverless Tractors, Automated Harvesting Systems, Others], By Component [Hardware, Software], By Farming Environment [Outdoor, Indoor], By Application [Field Farming, Dairy Management, Soil Management, Crop Management, Precision Agriculture, Others], By Region, Opportunities and Forecast, 2017-2031F

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Report description:

Global agriculture robots market is projected to witness a CAGR of 21.20% during the forecast period 2024-2031, growing from USD 14.08 billion in 2023 to USD 65.54 billion in 2031. The market is expanding rapidly, driven by automation, AI, and precision agricultural technology developments. These machines are changing conventional farming techniques by automating different processes such as planting, harvesting, weeding, and monitoring crops. As a result, they have become more efficient, lowering the need for human labor. The market continues to be segmented into various categories, including unmanned aerial vehicles (UAVs)/drones, milking robots, driverless tractors, and automated harvesting systems, designed to solve unique agricultural tasks. The leading reasons contributing to the development of the market consist of the increasing need for food as a result of a growing population, the demand for sustainable agriculture, and the lack of labor in agricultural areas. Technological developments such as artificial intelligence, machine learning, and the Internet of Things have enabled robots to accomplish complicated duties more accurately and reliably. Due to strong governmental support, technological development, and farmers' awareness, North America, Europe, and Asia-Pacific are the leading regions in adopting agricultural robots.

Leading companies such as Deere & Company, Trimble Inc., and SZ DJI Technology Co., Ltd. heavily invest in R&D to develop innovative solutions catering to diverse farming needs. The adoption of agricultural robots will be further supported by the

increasing trend towards smart farming and precision agriculture, which will likely enhance global agricultural productivity and sustainability. The market is set for tremendous growth as it continues transforming the agricultural scenario through more efficient, accurate, and sustainable forms of farming.

In April 2024, SZ DJI Technology Co., Ltd. introduced the Agras T50 and T25 drones overseas, extending the reach of their popular Agras series. While the T50 is made for large-scale farming efficiency, the T25 is portable and ideal for smaller businesses. Both models operate seamlessly with the upgraded SmartFarm software, which improves the management of aerial crop treatments. In March 2024, France based SIZA Robotics introduced a pre-series of autonomous robots for use in vegetable farming commercially. The product is aimed at reducing and controlling the costs of operation to develop a more sustainable and effective agricultural system.

Increasing Labor Costs Spur the Adoption of Agriculture Robots

Global adoption of agricultural robots has been prompted by rising labor expenses. The cost of hiring and meeting the demands of such personnel has increased greatly due to more established areas encountering scarcity in regard to the number of workers needed. Another factor that contributes to this aspect is the increasing average age of farmers and the lack of interest among new generations, prompting farmers to look for cheaper management options.

For some tasks, agricultural robots are better replacements as their performance is faster and uniform in areas such as planting, harvesting, weeding, and monitoring. To automate repetitive tasks which consume a lot of time, robots reduce the cost of production while at the same time reducing human errors, leading to more efficient and profitable farm produce. In August 2024, with the goal of harvesting at the same pace and quality as human pickers, Fieldwork Robotics Ltd introduced an autonomous robot model, Fieldworker 1, expected to harvest without sacrificing quality as it is outfitted with spectral frequency, which eliminates human bias from the assessment of berry maturity.

In addition, recent advancements made in robotics and AI have lowered the costs, making them more available to farmers, thus hastening their uptake. Hence, increasing labor costs have significantly contributed to the worldwide movement towards mechanization and employment of robots in agriculture.

Rise of Indoor and Vertical Farming Practices Fuel the Market Growth

Adoption of agricultural robots is being propelled significantly due to the rising popularity of indoor and vertical farming. This modern form of agriculture demands the growth of plants in controlled places such as greenhouses or vertical stacks where the water, nutrients, and light need to be managed precisely. Agricultural robots are especially appropriate for such settings, where space utilization and resource efficiency remain important factors to be considered.

Highly sophisticated robots are fitted with sensitive sensors as well as AI capacities, which enable them to do various functions such as sowing and putting seeds into the ground while observing the wellbeing of crops throughout their growth before finally collecting them in an extremely precise manner. Such automation increases production rates, cutting down on labor expenses, and guarantee uniformity of crop standards.

There are cases of indoor and vertical farming whereby robots help to reduce carbon footprints in agriculture. Urbanization and the need for sustainable agricultural practices have led to a rise in indoor and vertical farms. With the constant demand for local fresh produce, the significance of incorporating agricultural robotics into vertical and indoor farms to offer efficient, eco-friendly, and expandable food production systems is increasing. In May 2023, the autonomous mobile robot, Watney, was launched by the Danish robotics company, Seasony, to address the unique problems associated with indoor and vertical farming. Watney's 80 cm width makes it possible to reach racks in confined passageways. The robot can safely move between humans and equipment in a very little space, using advanced LiDAR technology.

Driverless Tractors to Gain Momentum

Farmers are increasingly looking for solutions that enhance productivity efficiently and economically. Thus, there is a growing trend towards driverless tractors in agriculture. With advanced GPS, sensors, and AI, these autonomous machines can conduct various field operations such as plowing, planting, or harvesting with precision and less human supervision. The rising adoption of driverless tractors is propelled by the desire to address labor shortages, lower operating expenses, and maximize farming techniques.

Eliminating the human need for drivers, these tractors minimize labor costs and enable uninterrupted functioning amid tough weather conditions and at night. Besides, these driverless tractors reduce the chance of human error, improve fuel economy and

decrease soil compaction that leads to sustainable farming practices. Robotics and machine learning advancements have made such tractors versatile and dependable on various land surfaces and kinds of crops.

The agriculture sector is adopting technology to enhance its operations, thus making driverless tractors increasingly sought after in the market. In August 2023, New Holland Agriculture, owned by CNH Industrial N.V., launched T4 Electric Power, an all-electric utility tractor which has autonomous features. For a variety of uses, including mixed farms, hay and forage, dairy, livestock, municipalities, greenhouses, and specialty crops, the T4 Electric Power is an excellent option for field operations requiring less horsepower.

Asia-Pacific Market to Grow Rapidly

Agricultural robots are becoming more popular in Asia-Pacific due to profit and sustainability requirements. China, Japan, and India are among the leading economies attracting these investments due to escalating costs of labor accompanied with depletion of farmhands resulting from rural-urban migration; coupled with a rising demand for food occasioned by population growth. Consequently, governments have set out to establish precision agriculture and improve yields through encouraging farmers to use farming technologies by providing them with financial support or giving them favorable policies that will enable them to adopt innovative practices.

In addition, the region boasts of various agricultural activities spanning from paddy fields to big estates, thus catering need for different types of robots such as drones, driverless tractors, and machines for collecting fruits and vegetables. In June 2024, Tokyo-based GMO Internet Group, Inc. launched its new business to rent out AI-based robots to clients for personal use. The business is paying attention to the need for these robots in a variety of sectors, including agriculture. The business model is aimed at filling shortages in the workforce.

The agriculture robots market is anticipated to witness a fast growth trajectory in the Asia-Pacific countries as they keep pouring more resources into technological advancements and agricultural innovations that will revolutionize conventional farming methods while enhancing food security on a global scale.

Future Market Scenario (2024 [] 2031F)

With the increasing global population, food demand continues to rise, and the agricultural sector is under immense pressure to raise productivity levels to respond to skilled labor shortages while making the shift towards sustainable agricultural practices. Modern farming is expected to be revolutionized by agricultural robots using AI, machine learning, and IoT, resolving the current issues farmers face.

□ A variety of agricultural robots with a range of capabilities is expected to grow, including self-driving tractors and drones designed for taking pictures of crops from the top and machines made to weed, prune, and harvest crops.

By deliberately increasing investments in research and development by key market players and globally supportive government policies such as tax breaks, agricultural robots will be adopted much faster.

Key Players Landscape and Outlook

The landscape of the agricultural robots market is characterized by a mix of established industry leaders, innovative startups, and technology giants, competing to develop advanced solutions that enhance farming efficiency and productivity. These players are heavily investing in research and development to introduce cutting-edge technologies such as AI, machine learning, and IoT to create more sophisticated and capable robots. In November 2023, Naio Technologies launched Augmented Autonomy, an innovation that allows every robot in its fleet to function independently of a human operator. This leads to considerable time savings and enhanced productivity. Moreover, the market is seeing an influx of partnerships, mergers, and acquisitions as companies collaborate to combine expertise and expand their product portfolios.

Increasing demand for automation to address labor shortages, rising operational costs, and the need for sustainable farming practices are expected to drive the growth of the market. The market is expected to witness robust growth, particularly in regions such as North America, Europe, and Asia-Pacific, where technological adoption is high, and government support for digital agriculture is strong. As the industry moves forward, the key players are expected to focus on enhancing the precision, reliability, and cost-effectiveness of their robotic solutions, driving further innovation and adoption across various agricultural applications, including planting, harvesting, weeding, and crop monitoring.

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