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Agriculture Autonomous Robots Market - A Global and Regional Analysis: Focus on Product, Application, Supply Chain Analysis, and Country Analysis - Analysis and Forecast, 2023-2028

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Abstracts

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Introduction to Agriculture Autonomous Robots Market

The global agriculture autonomous robots market was valued at $828.4 million in 2022, and it is expected to grow with a CAGR of 25.12% during the forecast period to reach $3,136.7 million by 2028. The growth in the global agriculture autonomous robots market is expected to be driven by the increasing need for efficient and sustainable agriculture practices.

The agriculture autonomous robots are advanced systems designed for farming without constant human intervention. Equipped with sensors and artificial intelligence, they perform tasks such as planting, weeding, harvesting, and monitoring crops. These robots navigate fields, make real-time decisions, and enhance agricultural productivity by reducing manual labor. These include crop harvesting robots, weeding robots, milking robots, and monitoring robots, among others. These technologies optimize yield, cut labor dependency, conserve resources, and improve product quality, revolutionizing farming practices.

The global agriculture sector faces a labor crisis, with Canada's farming industry expecting a shortage of 114,000 workers by 2025 due to immigration shifts. Agriculture robots offer hope, set to revolutionize the field, according to the National Institute of Food and Agriculture (NIFA). Autonomous robots enhance sustainability, efficiency, and

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crop yields, helping farmers overcome labor shortages while reducing costs. These robots are key to future food security, enabling increased crop production with less effort and environmental impact. Automation, including autonomous robots, streamlines farming tasks such as harvesting and land preparation, offering opportunities for women and youth. Initiatives such as Africa's Pitch AgriHack introduce new technologies, supporting agricultural transformation.

The agriculture autonomous robots market is expected to develop rapidly during the forecast period, owing to rising technological improvements in the worldwide agriculture business. Factors influencing market expansion are escalating worldwide demand for food, diminishing accessibility of water resources and arable land, scarcity of the agricultural workforce, and an upward trend in agricultural input costs. The collective influence of these factors is expected to drive the widespread adoption of agricultural autonomous robots in the agricultural sector and dairy farm management. Handling of autonomous robots provides farmers with the tools to optimize resource allocation, enhance crop management practices, elevate overall agricultural productivity, and enhance livestock production.

Market Segmentation:

Segmentation 1: by Application

Crop Monitoring

Livestock Monitoring and Management

Harvesting and Picking

Weeding

Others

Harvesting and Picking to Dominate the Global Agriculture Autonomous Robots Market (by Application)

During the forecast period (2023-2028), the harvesting and picking segment is expected to occupy a significant market share in the global agriculture autonomous robots market. Regions such as North America, the U.K., Europe, and China are anticipated to

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experience substantial growth in harvesting and picking, which can be attributed to the increasing adoption of precision agriculture practices, rising demand for sustainable farming solutions, and the need to optimize resource utilization for enhanced crop management.

In the rapidly evolving landscape of agriculture, autonomous robots are playing a pivotal role in harvesting and picking applications, revolutionizing the way crops are gathered. These robots are equipped with advanced sensors, computer vision, and machine learning algorithms, enabling them to identify ripe fruits and vegetables with remarkable precision. In the agriculture autonomous robots market, harvesting robots are adept at tasks such as picking fruits, pruning vines, and even sorting produce. Their efficiency is unmatched; they work tirelessly without fatigue, ensuring timely harvests and reducing wastage.

Moreover, these robots address the persistent challenge of labor shortages in the agriculture sector. As the workforce becomes scarcer, the demand for these automated solutions rises. Farmers are increasingly turning to autonomous harvesting robots to optimize their operations, improve productivity, and minimize dependency on manual labor. These technologies not only streamline the harvesting process but also enhance the overall quality of the produce by minimizing damage during picking.

Additionally, autonomous robots are adaptable to various terrains and crop types, making them versatile solutions for different agricultural practices worldwide. As the agriculture industry embraces innovation, the market for autonomous harvesting and picking robots continues to grow, promising a more sustainable and efficient future for farming practices.

Segmentation 2: by Product

- Crop Harvesting and Picking Robot
- Weeding Robot
- Milking Robot
- Crop and Livestock Monitoring Robot
- Others

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Crop Harvesting and Picking to Dominate the Global Agriculture Autonomous Robots Market (by Product)

During the forecasted period, the crop harvesting and picking robot segment is expected to hold a significant market share in the global agriculture autonomous robots market. Regions such as North America, the U.K., Europe, and China are expected to experience notable growth in this segment. These regions, characterized by vast geographical areas and diverse terrains, face challenges in achieving efficient logistics and delivery operations.

Crop harvesting and picking robots are pivotal components of the agriculture autonomous robots market, addressing the industry's pressing labor shortage challenges. These robots, equipped with advanced sensors and artificial intelligence, revolutionize the harvesting process. They can identify ripe crops, pick them delicately, and sort them based on quality, all with remarkable precision. This automation not only mitigates labor shortages but also significantly reduces the time and resources required for harvesting, leading to higher efficiency and productivity.

In addition to solving labor-related issues, crop harvesting and picking robots offer several other advantages. They minimize crop damage, enhance the quality of harvested produce, and allow for timely harvesting, which is crucial for certain crops with short harvesting windows. Furthermore, these robots operate tirelessly, day and night, in various weather conditions, ensuring continuous productivity.

The agriculture autonomous robots market's growth in this sector is propelled by the increasing adoption of these robots by farmers worldwide. As technology advances, these robots are becoming more sophisticated and capable of handling various crops and terrains. This trend not only transforms the agricultural landscape but also plays a pivotal role in ensuring a stable and efficient food supply chain for the growing global population.

Segmentation 3: by Region

North America - U.S., Canada, Mexico

Europe - Germany, France, Italy, Greece, Ukraine, Netherlands, Belgium, Switzerland, and Rest-of-Europe

China

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U.K.

Asia-Pacific - Japan, South Korea, Australia, and Rest-of-Asia-Pacific

South America - Argentina, Brazil, and Rest-of-South America

Middle East and Africa - Israel, South Africa, Turkey, and Rest-of-Middle East and Africa

During the forecast period, Europe, North America, and Asia-Pacific are projected to witness substantial demand for agriculture autonomous robots. The consolidation of small farms and the consequent expansion of average field sizes is expected to create favorable conditions for the adoption of agriculture autonomous robots.

The utilization of agriculture autonomous robots market is witnessing a notable expansion in Europe, North America, Asia-Pacific, and the Middle East and Africa. This growth can be attributed to heightened research and development activities, alongside experimental field studies conducted by institutions and government entities aimed at assessing the economic advantages associated with the agriculture autonomous robots market. In South America, China, and the U.K., the rapid proliferation of startup ventures, coupled with the demand for efficient input utilization in food production to minimize costs, is expected to increase the adoption of the agriculture autonomous robots market, consequently stimulating market growth.

Recent Developments in the Global Agriculture Autonomous Robots Market

In June 2023, Lely announced that Lely Exos, a system for the fully autonomous harvesting and feeding of fresh grass, will be commercially available from mid-2024. With Lely Exos, dairy farmers can use a large part of their grassland production as fresh feed.

In March 2023, GEA Group Aktiengesellschaft's new generation of the DairyRobot R9500 achieved significantly improved economics in automatic milking. Compared to the previous model, the individual box of the DairyRobot R9500 consumes up to 37% less electricity, power consumption was also reduced by 35% in standby mode, and water consumption was reduced by around 13%.

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In January 2023, Deere & Company launched ExactShot. ExactShot empowers farmers to significantly decrease the required starter fertilizer quantity during planting, reducing it by over 60%. This innovative technology utilizes sensors and robotics to accurately apply starter fertilizer directly onto seeds as they are planted in the soil instead of applying a continuous stream of fertilizer across the entire row of seeds.

Demand – Drivers, Limitations, and Opportunities

Market Drivers: Need for Organic Food Production

Autonomous robots are transforming organic food production by enhancing efficiency and sustainability. They precisely plant, weed, and harvest crops, reducing synthetic pesticide use and cutting labor costs. These robots monitor fields, conduct soil analysis without chemicals, and assess plant health, saving crops from diseases. Demand for organic foods rises due to health consciousness. Robots such as Agrobot E-series and Octinion's Rubicon revolutionize planting and harvesting, while autonomous greenhouse management boosts crop yields by 30%. These innovations reduce chemical dependency, optimize resources, and promote eco-friendly agriculture.

Agricultural labor shortages, stemming from factors such as migration and an aging farm workforce, threaten productivity and inflate production costs. Autonomous robots, developed by companies such as Agrobot and Octinion, perform delicate tasks such as fruit harvesting, bridging the skill gap caused by an aging workforce. These robots enhance efficiency, cut labor costs, and boost productivity. As they become more advanced and accessible, they play a crucial role in sustaining agriculture amid demographic challenges.

Market Challenges: High Initial Investment and Cost

The adoption of agricultural autonomous robots faces hurdles due to high initial investment and ongoing maintenance costs. A study in 'Applied Engineering in Agriculture' revealed that 40% of surveyed farmers cited the primary challenge as the steep initial capital cost. Ongoing expenses for maintenance and software updates further strain budgets. Collaboration between manufacturers and policymakers is essential to create financing plans, subsidies, and incentives, ensuring broader accessibility and driving growth in the autonomous agriculture sector.

Small-scale farmers encounter barriers to adopting autonomous robots due to limited awareness, technical expertise, and internet connectivity. Financial constraints and

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diverse farming practices further impede adoption, with concerns about job displacement adding to the challenge. Initiatives such as subsidies in India, low-cost designs from the U.S. universities, and leasing programs in the Netherlands aim to make these robots accessible. As affordability and user-friendliness improve, wider adoption among small-scale farmers is anticipated in the coming years.

Market Opportunities: Rise of Small Farm Robots

Globally, 85% of farmers operate small land farms, making small farm robots a financially viable choice. They're affordable, allowing multiple purchases compared to a single large robot, fostering widespread adoption. These adaptable robots navigate complex terrain, perform tasks such as weeding and harvesting, and are eco-friendly due to local production, reducing transportation costs. Innovations such as Tertill and FarmBot Genesis exemplify this trend, transforming smaller-scale farming with automated solutions.

The surge in agricultural autonomous robots is driven by the need for sustainable farming, labor shortages, and rapid robotics advancements. Increased investments fuel the development of robots by both established manufacturers and startups, focusing on tasks such as weeding, planting, harvesting, and livestock management. Innovations such as LettuceBot, capable of harvesting lettuce heads without damage, and the Lely Astronaut A5, a robotic milking system, showcase the industry's progress. These robots enhance productivity, efficiency, and sustainability, indicating a promising future in agriculture.

How can this report add value to an organization?

Product/Innovation Strategy: The product segment helps the reader understand the different technologies used for agriculture autonomous robots and their potential globally. Moreover, the study gives the reader a detailed understanding of the different solutions provided by the agriculture autonomous robot equipment providers, such as imaging, AI, and analyzing. Compared to conventional agricultural methods, the agriculture autonomous robots market enables more exact targeting of planting, weeding, and harvesting, allowing farmers to save money by maximizing the use of their inputs.

Growth/Marketing Strategy: The global agriculture autonomous robots market has seen major development by key players operating in the market, such as business expansion, partnership, collaboration, and joint venture. The favored strategy for the

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companies has been partnership, collaboration, and joint venture activities to strengthen their position in the global agriculture autonomous robots market.

Competitive Strategy: Key players in the global agriculture autonomous robots market analyzed and profiled in the study, including their market segments covered by distinct products, applications served, and regional presence, as well as the influence of important market tactics. Moreover, a detailed competitive benchmarking of the players operating in the global agriculture autonomous robots market has been done to help the reader understand how players stack against each other, presenting a clear market landscape. Additionally, comprehensive competitive strategies such as partnerships, agreements, and collaborations will aid the reader in understanding the untapped revenue pockets in the market.

Methodology

Key Considerations and Assumptions in Market Engineering and Validation

The scope of this report has been focused on various types of agriculture autonomous robots market.

The market revenue has been calculated based on the global agriculture autonomous robots market.

The base currency considered for the market analysis is US$. Currencies other than the US$ have been converted to the US$ for all statistical calculations, considering the average conversion rate for that particular year.

The currency conversion rate has been taken from the historical exchange rate of the Oanda website.

Nearly all the recent developments from January 2019 to September 2023 have been considered in this research study.

The information rendered in the report is a result of in-depth primary interviews, surveys, and secondary analysis.

Where relevant information was not available, proxy indicators and extrapolation have been employed.

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Any future economic downturn has not been considered for the market estimation and forecast.

Technologies currently used are expected to persist through the forecast with no major technological breakthroughs.

Primary Research

The primary sources involve the agriculture autonomous robots industry experts and stakeholders such as data suppliers, platform developers, and service providers. Respondents such as vice presidents, CEOs, marketing directors, and technology and innovation directors have been interviewed to verify this research study's qualitative and quantitative aspects.

The key data points taken from primary sources include:

validation and triangulation of all the numbers and graphs

validation of reports segmentation and key qualitative findings

understanding the competitive landscape

validation of the numbers of various markets for market type

percentage split of individual markets for region-wise analysis

Secondary Research

This research study involves the usage of extensive secondary research, directories, company websites, and annual reports. It also makes use of databases, such as Hoovers, Bloomberg, Businessweek, and Factiva, to collect useful and effective information for an extensive, technical, market-oriented, and commercial study of the global market. In addition to the aforementioned data sources, the study has been undertaken with the help of other data sources and websites, such as www.agricultural-robotics.com/fira and www.ifr.org/worldrobotics

Secondary research was done to obtain crucial information about the industry’s value

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chain, revenue models, the market's monetary chain, the total pool of key players, and the current and potential use cases and applications.

Key Market Players and Competition Synopsis

The companies that are profiled have been selected based on inputs gathered from primary experts and analyzing company coverage, product portfolio, and market penetration.

Some Prominent Names Established in the Market are:

- GEA Group Aktiengesellschaft
- Deere & Company
- AGCO Corporation
- Bluewhite
- BouMatic
- DAIRYMASTER
- Lely
- Robert Bosch GmbH
- Trabotyx
- Saga Robotics AS
- FarmWise Labs, Inc.
- XMACHINES

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