

AI in Agriculture Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Technology (Machine Learning, Predictive Analytics and Computer Vision), By Offering (Hardware, Software and AI-As-A-Service), By Application (Precision Farming, Livestock Monitoring, Agriculture Robots, Drone and Others), By Region and Competition, 2019-2029F

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Abstracts

Global AI in Agriculture Market was valued at USD 1.15 Billion in 2023 and is anticipated to project impressive growth in the forecast period with a CAGR of 22.54% through 2029. AI in agriculture refers to the application of artificial intelligence (AI) and advanced data analytics to revolutionize conventional farming practices. It entails utilizing technology to gather, process, and analyze extensive data from diverse sources, including sensors, satellites, and drones, to make informed decisions in agricultural operations. AI in agriculture offers numerous advantages, such as optimizing crop management, forecasting and mitigating disease outbreaks, and enhancing resource allocation. Machine learning (ML) algorithms enable farmers to make precise determinations regarding planting, irrigation, and harvesting, resulting in increased crop yields and resource efficiency. In addition, AI-powered solutions can augment livestock management and streamline supply chain logistics, fostering sustainability and minimizing waste.

Key Market Drivers

Increased Demand for Agricultural Production with Growing Population

As the world's population continues to grow, the demand for agricultural production is expected to rise concurrently. This surge in demand presents a significant challenge, given the finite resources at disposal. It is in this context that Artificial Intelligence (AI) is predicted to play a pivotal role in revolutionizing the global agricultural sector. AI technologies, such as machine learning and predictive analytics, can enhance crop yields and resource usage efficiency. They can perform tasks like predicting weather patterns, monitoring crop health, and automating irrigation systems, thereby reducing wastage and optimizing production. AI can assist in managing pests and diseases, a major hindrance to agricultural yield. Moving towards a future where the demand for food outstrips production capabilities, the role of AI in agriculture assumes greater importance. By leveraging AI, one can not only sustain but potentially increase agricultural production to meet the escalating global demand. Thus, it is anticipated that the rising necessity for agricultural output in line with the growing population will substantially drive the global demand for AI in agriculture.

Maximizing Profits in Farm Operations

Maximizing profits in agricultural operations is a key driver behind the growth of the artificial intelligence market in agriculture. To increase profitability, it is crucial to maximize crop and animal yields. Incorporating AI technology in the form of robots, drones, crop management systems, and herd management tools allows farms to remotely monitor and regulate operations, providing valuable data for analysis. Smart or precision agriculture is rapidly emerging as a technology that enhances agricultural deliverables. With the rise of AI technologies, farmers can control and monitor equipment, crops, and livestock through their smartphones, receiving statistical predictions for crops and livestock. Smart sensors, satellite imagery, and other cloud-based technologies are highly beneficial for observing and recording data during crop planting and harvesting, thereby optimizing production output and minimizing resource wastage. In animal husbandry, advanced AI technologies, including sensors and visual imaging, can quickly analyze the health and well-being of individual animals, flagging any deviations that may indicate disease or illness. This proactive monitoring allows for timely treatment, preventing the spread of infection to other animals. Such timely monitoring also saves money by detecting abnormal animal health before symptoms arise and enabling minor precautionary steps to promote recovery in affected animals.

Advancements in AI technology Machine Learning

Advancements in Artificial Intelligence (AI) and Machine Learning (ML) are set to

revolutionize the agricultural sector on a global scale, significantly increasing the demand for these technologies. These advances provide an array of tools for farmers to optimize their yields and increase efficiency. For instance, AI-powered predictive models can anticipate climate patterns and suggest ideal planting schedules, helping farmers to mitigate the risks of unpredictable weather conditions. Machine learning algorithms can analyze soil data, aiding farmers in determining the optimal blend of nutrients and water for their crops. Likewise, AI can automate labor-intensive tasks, such as harvesting and weeding, reducing the need for manual labor and enhancing productivity. On a larger scale, AI and ML can contribute to addressing global food security issues by improving the overall efficiency of food production and distribution. In addition, with the increasing environmental concerns, these technologies can aid in implementing more sustainable farming practices. As such, the integration of AI and ML in agriculture is not merely a trend, but rather an impending necessity, thus driving up global demand.

Growth in the Adoption of Drones Automated Tractors

The agricultural industry is witnessing a surge in the adoption of technology, particularly with the advent of drones and automated tractors, which is expected to fuel the global demand for Artificial Intelligence (AI). The utilization of drones and automated tractors provides farmers with accurate and real-time data about their crops. This technology facilitates the efficient monitoring of crop health, pest detection, and precision farming. These sophisticated machines do not merely automate manual tasks, but they leverage AI to make more informed decisions, thereby improving crop yield and reducing waste.

AI advancements in the form of Machine Learning algorithms and predictive analytics enable drones and tractors to learn from the data they collect, predicting future trends and making proactive decisions. These technological leaps are expected to increase productivity, profitability, and sustainability in the agricultural sector on a global scale. The potential of AI in agriculture goes beyond mere automation; it represents a paradigm shift in managing and operating farms. As the benefits become more evident, the growth in adoption of drones and automated tractors is only set to increase, thereby driving an unprecedented demand for AI in the field of agriculture worldwide.

Key Market Challenges

Technical Difficulties in Developing AI Technologies

Technical challenges in the development of AI technologies pose a significant obstacle

to the growth of the artificial intelligence market in agriculture. AI-based technologies, such as deep learning, rely on extensive data to make real-time decisions. However, acquiring this data can be a complex and ethically sensitive process. Besides, smaller AI-focused start-ups may possess superior technical expertise compared to large multinational companies like Google or Microsoft but face financial constraints in collecting the required data.

Currently, AI systems excel in executing and adapting to specific pre-programmed functions, but multitasking remains a challenge due to limitations in neural network systems. Therefore, further innovation is necessary to enhance their capabilities. Promising projects involving progressive neural networks are underway, aiming to establish connections and communication between multiple deep learning systems. This advancement will enable the transmission of new information and eliminate the need for re-programming.

Lack Of Robust Technology Infrastructure

The global demand for AI in agriculture is projected to witness a decrease due to the lack of robust technology infrastructure. A significant portion of the world's agricultural sector, particularly in developing and underdeveloped countries, lacks comprehensive technology infrastructure to support the integration of AI systems. This includes insufficient network coverage, limited access to high-speed internet, and a dearth of tech-savvy personnel trained in AI applications. Secondly, the high cost of AI technology, along with the expenses associated with upgrading existing infrastructure to accommodate these advanced systems, poses a significant barrier for widespread adoption, especially for small-scale farmers. On top of that, the lack of standardization in data collection methods can lead to ineffective AI models, thus reducing their reliability and usability in agricultural settings. The paucity of efficient data storage solutions also impedes the adoption of AI, as these technologies often require substantial data storage capabilities for optimal functioning. Overall, these challenges contribute to the expected decrease in demand for AI in agriculture on a global scale.

Key Market Trends

Precision Farming Practices Gaining Popularity

Precision agriculture, also known as precision farming, is experiencing a surge in popularity worldwide, and this trend is set to drive the demand for Artificial Intelligence (AI) in the agricultural sector. The growing adoption of precision farming practices can

be attributed to the increasing need for optimized crop yields and efficiency in farming operations. These practices, which involve the use of advanced technology and data-driven decision-making, are paving the way for AI to revolutionize the agricultural industry. AI algorithms, for instance, can analyze a vast amount of data from satellite imagery and field sensors to provide farmers with actionable insights on crop health, soil conditions, and weather patterns. This enables more accurate predictions and better decision-making, leading to increased crop yields and reduced environmental impact. AI-driven solutions, such as automated irrigation systems, robotic harvesters, and drone-based crop monitoring systems, further optimize farming operations by reducing labor costs and increasing precision in tasks. As such, the rise of precision farming practices is not only reshaping the agricultural landscape but also propelling the global demand for AI in agriculture. With the world population projected to reach 9.7 billion by 2050, the role of AI in ensuring food security and sustainable farming practices cannot be overstated.

Adoption of Cloud-Based Services in Agriculture

The rise in adoption of cloud-based services in the agricultural sector is predicted to significantly boost the global demand for artificial intelligence (AI) in agriculture. Cloud technology provides a platform for the storage and analysis of large volumes of data, a feature that is integral to AI applications. As more agricultural operations shift towards these digital services, the scope for AI to optimize various farming practices expands. AI-driven tools can analyze the data stored in the cloud to make accurate predictions about crop yields, monitor soil health, control irrigation, and detect potential diseases or pests. This can lead to enhanced productivity and more environmentally friendly farming. Besides, cloud technology enables real-time data sharing across different platforms, increasing accessibility and facilitating the deployment of AI solutions on a global scale. Consequently, as the digital transformation of agriculture continues, the integration of cloud services and AI is anticipated to become increasingly prevalent, driving a surge in demand worldwide. The promise of increased efficiency and sustainability in agricultural practices through the use of cloud-based AI solutions holds immense potential for the future of farming.

Segmental Insights

Offering Insights

Based on the offering, the software segment is projected to hold a significant market share among components. Key industry players like IBM, Microsoft, and Deere

Companies offer AI-based solutions for the agriculture sector. Leveraging prediction-based analytics and computer vision, AI-powered software enhances crop productivity and yield.

The growing adoption of predictive analytics-based software contributes to the expansion of the software segment. Prominent examples include IBM Corporation's Watson Decision Platform, Microsoft's AI Sowing App, and Deere Company's See and Spray pesticide and herbicide distribution systems. These artificial intelligence solutions assist farmers in determining optimal crop sowing dates, detecting crop diseases, monitoring crop yield, and managing resources such as land, fertilizers, water, and pesticides. The advantages of AI-enabled software in precision farming and drone analytics further fuel the growth of the software segment in the AI in agriculture market.

Application Insights

Based on the Application, the precision farming segment is projected to capture a significant market share over the forecast period. With the rapid growth of AI-enabled applications in agriculture, precision farming has emerged as one of the most promising areas. By leveraging artificial intelligence, precision farming empowers farmers to minimize costs and optimize resources in a highly effective manner. In precision farming, AI plays a crucial role in data collection, interpretation, and analysis. For example, combine harvesters equipped with GPS and artificial intelligence can track the harvest yield and analyse field variability. This includes factors such as differences in water levels, soil composition, or the presence of fungus. By generating georeferenced data, farmers gain valuable insights that enable them to customize the use of fertilizers or pesticides accordingly.

Likewise, the use of AI-powered agriculture robots has gained traction in recent years. These robots combine artificial intelligence, field sensors, and data analytics to perform a wide range of tasks. From efficient harvesting to weed control and hoeing, these robots offer a versatile solution for various agricultural applications. The increasing adoption of artificial intelligence in agriculture, coupled with ongoing developments in robotics, is driving the growth of the agriculture robot's segment. Overall, the integration of AI in precision farming and the advent of advanced robotics are revolutionizing the agricultural industry, enabling farmers to achieve higher productivity and sustainability.

Regional Insights

The North American market accounted for the largest share in 2023, driven by the

prominent industrial automation industry and widespread adoption of artificial intelligence solutions in the region. North America is characterized by a strong purchasing power, continuous investments in automation, significant investments in IoT, and growing government focus on domestic AI equipment production. Plus, the market benefits from the presence of numerous agricultural technology providers exploring artificial intelligence solutions, including IBM Corporation, Deere Company, Microsoft, Granular, Inc., and The Climate Corporation.

Key Market Players

IBM Corporation

Granular Inc.

Microsoft Corporation

Deere Company

Climate LLC

Agribotix LLC

Descartes Labs Inc.

Prospera Technologies

Report Scope:

In this report, the Global AI in Agriculture Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

AI in Agriculture Market,By Technology:

oMachine Learning

oPredictive Analytics

oComputer Vision

AI in Agriculture Market,By Offering:

- oHardware

- oSoftware

- oAI-As-A-Service

AI in Agriculture Market,By Application:

- oPrecision Farming

- oLivestock Monitoring

- oAgriculture Robots

- oDrone

- oOthers

AI in Agriculture Market, By Region:

- oNorth America

 - United States

 - Canada

 - Mexico

- oEurope

 - France

 - United Kingdom

 - Italy

Germany

Spain

oAsia-Pacific

China

India

Japan

Australia

South Korea

oSouth America

Brazil

Argentina

Colombia

oMiddle East Africa

South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global AI in

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Agriculture Market.

Available Customizations:

Global AI in Agriculture marketreport with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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