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Smart Greenhouse - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

https://marketpublishers.com/r/S5D298CFD015EN.html
Date: July 2024
Pages: 139
Price: US$ 4,750.00 (Single User License)
ID: S5D298CFD015EN

Abstracts

The Smart Greenhouse Market size is estimated at USD 2.05 billion in 2024, and is expected to reach USD 3.40 billion by 2029, growing at a CAGR of 10.59% during the forecast period (2024-2029).

Smart farming technology has advanced significantly. Technology has completely changed the farming sector, from introducing irrigation systems to developing tools for precision agriculture. These days, the emphasis is on incorporating the Internet of Things (IoT) and artificial intelligence (AI) into greenhouse operations. Greenhouse and controlled environment agriculture operations can boost crop yields, reduce waste, and enhance resource efficiency by utilizing AI and IoT.

Key Highlights

With the integration of AI technology, farmers or agriculturists can improve their workflows, boost productivity, optimize their supply chains, and boost profit margins while reducing waste and conserving resources. AI enables farmers to choose crops more easily and assess market demand, enabling them to determine which produce will yield the highest returns.

In smart irrigation, artificial intelligence (AI) is truly revolutionary because it transforms how farmers maintain lush landscapes and manage water resources. Artificial intelligence (AI)--based smart irrigation systems offer growers sustainable solutions to meet the growing demand for water conservation while yielding higher yields.

In April 2023, Housedigy Inc., a high-tech startup, unveiled GeoDrops, a cutting-edge intelligent irrigation control system, today. With the help of cutting-edge artificial

intelligence (AI) and industry-leading sensor arrays, GeoDrops can save up to 70% of water used for outdoor irrigation while also creating a garden that looks better.

The smart greenhouse design may provide many benefits to the cultivator, but the large investment required due to the deployment of pricey technology limits market expansion. There is a global expansion in vertical farming technology, an energy-intensive crop cultivation system combining several technologies, such as big data analysis, robotics, the IoT, and AI. Hence, the high initial investment and maintenance expenses are anticipated to hinder the growth of the smart greenhouse market.

However, the projected growth and the increasing demand for sustainable agricultural solutions present a promising business opportunity for entrepreneurs aiming to revolutionize the agriculture industry.

Due to the outbreak of COVID-19, the global supply chain and demand for multiple products have majorly been disrupted, due to which sensors, valves, HVDC systems, control systems, LED lights, and other smart greenhouse technologies halted for a short period of time. However, the growing demand for healthy food by consumers has significantly promoted market growth.

Smart Greenhouse Market Trends

HVAC Segment to Hold Significant Market Share

HVAC systems play an essential role in smart greenhouses by maintaining an ideal temperature needed for plant growth, minimizing the adverse impact of external temperature changes, and facilitating cultivation throughout the year. Currently, the HVAC industry is gradually shifting focus to energy efficiency. The urgency to tackle climate change and reduce greenhouse gas emissions has pressed governments, businesses, and individuals to actively pursue sustainable options in many areas, while greenhouses are among the most significant contributors to global energy usage.

The incorporation of AI in HVAC systems has been revolutionizing the overall concept of regularly measuring and adjusting the temperature, humidity, and CO2 levels as needed. This can be done through sensors and monitoring systems in smart greenhouses. Finally, advanced technologies, including machine learning and AI, can be used to optimize HVAC systems for vertical farming, and with developed software solutions, growers can analyze all available data, make a digital twin, perform predictive maintenance as well as performance management, and also apply hyperspectral image

recognition. These technologies can aid in automatically adjusting the growing environment to the requirements of the plants, which can lead to higher yields and efficient energy consumption.

Recently, in October 2023, Hikvision announced the creation of an innovative digital twin solution to align with the growing demand for intelligent and sustainable construction solutions. Hikvision has integrated a diverse range of AIoT technologies, and This convergence encompasses multiple subsystems, including lighting, energy management, environmental monitoring, HVAC, and more. Operators can view heat maps in the digital twin to understand peak times and occupancy rates for key areas of the site, and with AIoT devices observing the requirement, lighting and HVAC systems can be controlled.

With IoT presenting huge penetration rates in agriculture, AI has also been paving its way towards the respective sector. Automation systems play a crucial role in intelligent greenhouses, enabling precise control and management of environmental conditions. By leveraging actuators and control algorithms, these systems regulate factors like ventilation, shading, irrigation, and fertilization.

Currently, the latest versions of AI-based smart greenhouses facilitate a vast plethora of features that allow farmers to grow crops and maximize the total amount of produce efficiently. In the coming year, AI is expected to take over the farming process of the smart greenhouse and the entire farm as a separate entity that can make calculated decisions by itself. This will help farmers separate themselves from the daily farm management processes and use their time better, focusing on expanding their business rather than sacrificing 40-50% for management. As per Microsoft, used for environmental applications, AI is expected to reduce GHGs in North America by 6.1% by 2030 compared to a business-as-usual scenario.

Asia-Pacific to Register Major Growth

In India, increasing consumer awareness and demand for safe, high-quality food products is driving the adoption of smart greenhouses. India’s rapid technological advancements and digitalization efforts are driving the adoption of smart agricultural solutions, including smart greenhouses. Growers are increasingly adopting technology-enabled farming practices to enhance productivity, reduce production costs, and improve livelihood. Smart greenhouses offer innovative solutions that leverage sensors

and automation to optimize crop production.

The unexpected emergence of the COVID-19 pandemic highlighted the growing trend of greenhouse farming in China. The disruptions to traditional farming methods resulting from the pandemic have prompted various regions in China to adopt more advanced agricultural practices to enhance food security and maintain standards of safety and quality.

Japan is increasingly utilizing smart agriculture, raising expectations that artificial intelligence (AI) will be able to take on more labor-sensitive tasks to help alleviate the country's severe shortage of manpower. Growers who operate large-scale smart greenhouses are at the forefront of using AI-equipped robots developed by Japanese start-up companies. The AI-equipped robots have the potential to significantly impact the future of farming by improving the process of growing and harvesting agricultural products.

Smart greenhouses support the cultivation of a wide range of crops, including vegetables, fruits, flowers, and herbs. Malaysian growers differentiate the produce by adopting smart greenhouses and offering premium and high-value products to consumers.

Smart Greenhouse Industry Overview

The smart greenhouse market is highly fragmented due to the presence of both global players and small and medium-sized enterprises. Some of the major players in the market are Heliospectra AB, Prospiant Inc., Cultivar Greenhouse Ltd, Kubo Greenhouse Projects BV, and Certhon Group. Players in the market are adopting strategies such as acquisitions and partnerships to enhance their product offerings and gain sustainable competitive advantage.

March 2024 - Heliospectra AB, a provider of smart lighting technology for greenhouse and controlled plant growth environments, has received a substantial order from a greenhouse grower in Ontario, Canada. The order,r worth SEK 8.3 million, consists of the Mitra X LED grow light and HelioCORE control system, which will improve sustainability and productivity in cultivation.

March 2024 - KUBO Greenhouse Projects announced the completion of a new 24-acre

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greenhouse facility for WINDSET FARMS, located in Delta, BC, Canada. The greenhouse is the largest facility in BC. Utilizing sustainable initiatives, including renewable hydroelectric power and biomass boilers, Windset Farms will produce high-quality tomatoes and cucumbers year-round for Western Canada, the US, and Asian markets.

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Contents

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7 COMPETITIVE LANDSCAPE

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8 MARKET OPPORTUNITIES AND FUTURE TRENDS

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