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Vertical Farming Market Report by Component (Irrigation Component, Lighting, Sensor, Climate Control, Building Material, and Others), Structure (Building-based Vertical Farms, Container-based Vertical Farms), Growth Mechanism (Hydroponics, Aeroponics, Aquaponics), Application (Indoor, Outdoor), and Region 2024-2032

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Abstracts

The global vertical farming market size reached US$ 5.6 Billion in 2023. Looking forward, IMARC Group expects the market to reach US$ 33.3 Billion by 2032, exhibiting a growth rate (CAGR) of 21.41% during 2024-2032. The increasing demand for sustainable farming, rising scarcity of arable land, rapid technological advancements, growing expenditure capacities of consumers, and the implementation of various government initiatives are some of the major factors propelling the market.

Vertical farming is a method of cultivating plants in vertically stacked layers or structures. It employs various methods, such as hydroponics, aeroponics, and aquaponics, to artificially control temperature, light, and humidity and produce the perfect micro-climate for farming. It is widely used to grow crops, such as lettuce, kale, spinach, basil, mint, parsley, cilantro, cucumbers, peppers, and micro radish around the year. Vertical farming is an eco-friendly farming technique that saves space, lowers energy consumption, minimizes water usage, mitigates transportation costs, and reduces manual labor. As compared to traditional framing techniques, vertical farming produces higher yields, eliminates dependence on seasonal changes, and reduces the need for pesticides and herbicides.

The increasing demand for sustainable farming to grow organic and nutritious food

crops is one of the key factors contributing to the market growth. Vertical farming helps to conserve water through efficient recycling systems, promotes sustainability by minimizing resource consumption, and reduces the need for land. In line with this, the widespread cultivation adoption in urban areas to allow the cultivation of fresh produce in close proximity and reduce the need for long-distance transportation is acting as another growth-inducing factor. Additionally, the rising scarcity of arable land, coupled with escalating requirements for stabilized crop production to meet the increasing food demands, is propelling the market growth. Apart from this, rapid technological advancements, such as the utilization of automation and robotic systems that are employed for tasks such as planting, harvesting, and monitoring plant health, are providing an impetus to the market growth. Other factors, including the rising environmental concerns associated with traditional farming practices, the implementation of favorable government policies, and increasing expenditure capacities of consumers, are anticipated to drive the market toward growth.

Vertical Farming Market Trends/Drivers:
The increasing need for sustainable farming

The rising demand for more environmentally friendly and sustainable agriculture practices is supporting the market growth. Vertical farming systems employ various techniques, such as recirculating water systems, hydroponics, and aeroponics, to minimize water usage. In line with this, vertical farming helps preserve soil quality and allows for the conversion of non-arable or degraded land into productive farming spaces, which is favoring the market growth. Moreover, the increasing use of energy-efficient technologies, renewable energy sources, and reduced reliance on long-distance transportation help in lowering greenhouse gas emissions, which in turn is positively influencing the market growth. Besides this, vertical farming reduces or eliminates the use of chemical pesticides and herbicides due to a controlled indoor environment resulting in sustainable and environmentally friendly farming.

The rising scarcity of arable land

The growing population and rapid urbanization are key factors reducing the availability of arable land for traditional farming. Furthermore, arable land is being degraded due to factors such as soil erosion, pollution, and overuse of fertilizers which in turn is favoring the vertical farming market. Additionally, changing climatic conditions, including extreme weather events, droughts, and changing precipitation patterns, are propelling the market growth. In addition to this, the increasing adoption of vertical farming, as it provides a controlled environment where temperature, humidity, and light can be precisely

regulated, mitigating the impact of climate change on crop production, is providing a considerable boost to the market growth. Besides this, vertical farming allows for the efficient use of space by growing crops in stacked layers, using artificial lighting and controlled environments to optimize plant growth, reducing the need for arable land.

Rapid technological advancements

Extensive research and development (R&D) activities are taking place in the field of vertical farming to enhance its efficiency, productivity, and sustainability. Additionally, the utilization of light-emitting diodes (LEDs) in vertical farming to provide energy-efficient and customizable lighting solutions is favoring the market growth. Moreover, the integration of artificial intelligence (AI) and data analytics to make real-time adjustments and analyze data on environmental conditions, plant health, and nutrient requirements is supporting the market growth. Besides this, the utilization of renewable energy sources such as solar panels and wind turbines to power operation, reduce reliance on the grid and contribute to a more sustainable and environmentally friendly farming model.

Vertical Farming Industry Segmentation:
IMARC Group provides an analysis of the key trends in each segment of the global vertical farming market report, along with forecasts at the global, regional, and country levels from 2024-2032. Our report has categorized the market based on component, structure, growth mechanism, and application.

Breakup by Component:

Irrigation Component
Lighting
Sensor
Climate Control
Building Material
Glass Greenhouse
Plastic Greenhouse
Others

Lighting dominates the vertical farming market

The report has provided a detailed breakup and analysis of the vertical farming market based on the component. This includes irrigation component, lighting, sensors, climate

control, building material (glass greenhouse and plastic greenhouse), and others. According to the report, lighting represented the largest market segment.

Lighting is the primary component used in vertical farming as it increases the nutritional parameters of horticultural plants. Light-emitting diodes (LEDs) are widely used as they are highly energy-efficient compared to other lighting options and help to convert a higher percentage of electrical energy into usable light, minimizing energy wastage. Moreover, lighting is essential in vertical farming as it can be dimmed or brightened as needed, allowing growers to provide the appropriate light intensity at various growth stages. Apart from this, the introduction of various advanced lighting solutions that can be customized to provide specific wavelengths of light that are optimal for plant growth, resulting in healthier and more productive crops, is contributing to the market growth.

Breakup by Structure:

Building-based Vertical Farms
Container-based Vertical Farms

Container-based vertical farms represent the leading application in market

The report has provided a detailed breakup and analysis of the vertical farming market based on the structure. This includes building-based and container-based vertical farms. According to the report, container-based vertical farms represented the largest market segment.

Container-based structures are commonly used in vertical farming to create compact and modular growing environments. These containers provide a controlled environment for plant growth, allowing growers to optimize growing conditions. In addition to this, they can be stacked or arranged side by side to scale up the farming operation vertically or horizontally as needed. Moreover, container-based structures are prefabricated that offer quick setup and installation with minimal construction. These structures are equipped with built-in infrastructure such as electrical wiring, ventilation systems, and water supply, reducing the need for extensive on-site construction, which is positively influencing the market growth.

Breakup by Growth Mechanism:

Hydroponics
Aeroponics

Aquaponics

Hydroponics represents the leading segment

The report has provided a detailed breakup and analysis of the vertical farming market based on the growth mechanism. This includes hydroponics, aeroponics, and aquaponics. According to the report, hydroponics represented the largest market segment.

Hydroponics is a commonly used growth mechanism in vertical farming as it eliminates the need for traditional soil, reducing the risk of soil-borne diseases and enabling the reuse of water and nutrients, making it a highly water-efficient cultivation method. As compared to soil-based methods, hydroponics provides plants with direct access to nutrients and water, resulting in faster growth rates and increased crop yields. Furthermore, hydroponics also helps in sustainable agriculture practices and facilitate faster growth rates due to the direct availability of nutrients and optimal growing conditions.

Breakup by Application:

Indoor
Outdoor

The report has provided a detailed breakup and analysis of the vertical farming market based on the application. This includes indoor and outdoor.

Indoor vertical farming is widely preferred as it allows for year-round crop production and maximizes space utilization by growing plants in multiple layers or shelves. It further assists in providing precise control over environmental factors such as temperature, humidity, light, and air quality. Additionally, indoor farming practices reduce environmental impact by operating within a controlled environment and reducing the need for pesticides, herbicides, or fertilizers. Apart from this, the integration of LED lighting, climate control systems, nutrient delivery systems, and monitoring sensors for precise control, data-driven decision-making, and increased operational efficiency is providing a thrust to the market growth.

Breakup by Region:

North America

United States
Canada
Asia-Pacific
China
Japan
India
South Korea
Australia
Indonesia
Others
Europe
Germany
France
United Kingdom
Italy
Spain
Russia
Others
Latin America
Brazil
Mexico
Others
Middle East and Africa
Asia Pacific exhibits a clear dominance in the market, accounting for the largest vertical farming market share

The report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, Asia Pacific represented the largest market for vertical farming.

Asia Pacific is dominating the global vertical farming market due to the growing land scarcity, urbanization, climate variability, and sustainable food production. The widespread adoption of vertical farming practices in the region as it is highly urbanized, with densely populated cities and limited available land for traditional agriculture. Moreover, the Asia Pacific region experiences diverse climates, ranging from tropical to temperate, which is facilitating the demand for vertical farming that allows year-round

production irrespective of external weather conditions. Besides this, the implementation of various government initiatives to promote vertical farming by providing subsidies to farmers through the vertical garden scheme launched under various missions in the region.

Competitive Landscape:
Several key market players are significantly investing in research and development (R&D) projects to enhance efficiency, productivity, and sustainability in vertical farming. Moreover, researchers are focusing on nutrient dosages, composition, and timing to maximize plant growth and health. Furthermore, key players are optimizing the design and layout of vertical farming systems for improved space utilization, energy efficiency, and workflow management. Apart from this, the development of software platforms to manage and monitor vertical farming systems and integrate data from sensors, control systems, and environmental monitors, providing growers with real-time insights, analytics, and remote-control capabilities, is providing a considerable boost to the market growth.

The report has provided a comprehensive analysis of the competitive landscape in the global vertical farming market. Detailed profiles of all

AeroFarms
Agrilution Systems GmbH
AmHydro
Everlight Electronics Co. Ltd.
Freight Farms Inc.
Gr?nska Stadsodling
Heliospectra AB
Jones Food Company Limited
Koninklijke Philips N.V.
OSRAM GmbH (ams-OSRAM AG)
Signify N.V.
Urban Crop Solutions
Vertical Farm Systems Pty Ltd
Recent Developments:
In 2020, AeroFarms launched a new line of microgreens, including arugula, mustard greens, and wheatgrass, which are grown in their vertical farms. In 2019, the company announced a partnership with Dell Technologies to develop a machine learning platform that can optimize plant growth in vertical farms.
Freight Farms Inc. has continued to develop and improve their technology, including

updates to their software platform and hardware components. They have also introduced new products, such as the Greenery, a smaller version of the LGM designed for homes and small-scale farming.
Urban Crop Solutions focuses on the integration of artificial intelligence (AI) and machine learning (ML) algorithms to optimize crop growth. It also uses modular systems, which allows for easy scalability and customization of its vertical farms.

Key Questions Answered in This Report

1. What is the market value of vertical farming?
2. What is the expected growth rate of the global vertical farming market during 2024-2032?
3. How profitable is vertical farming?
4. What is the scope of vertical farming?
5. Which is the biggest vertical farming in the world?
6. What is the Business opportunity of vertical farming?
7. Why vertical farming is trending?
8. What has been the impact of COVID-19 on the global vertical farming market?
9. What are the key factors driving the global vertical farming market?
10. What is the breakup of the global vertical farming market based on the component?
11. What is the breakup of the global vertical farming market based on the structure?
12. What is the breakup of the global vertical farming market based on growth mechanism?
13. What are the key regions in the global vertical farming market?
14. Who are the key players/companies in the global vertical farming market?

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