FROST & SULLIVAN

2024 TECHNOLOGY INNOVATION LEADER

IN THE ISRAELI IRRIGATION MANAGEMENT INDUSTRY

treetoscope

FROST & SULLIVAN

2024 BEST PRACTICES AWARD

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each Award category before determining the final Award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Treetoscope excels in many of the criteria in the irrigation management space.

Industry Challenges

According to the Center for Strategic and International Studies, agriculture accounts for about 72% of the global freshwater consumption and projects that agricultural production will have to grow by 50% to meet the rising food demands by 2050.[1] This growing food demand requires a 30% projected increase in global water withdrawal.[2] As such, accurate water consumption through irrigation management is crucial, as optimizing water use is key for the future of agriculture.

Traditionally, soil sensors and dendrometers are the two primary technologies in the irrigation management industry. Soil sensors have been available since the 1960s and provide data regarding what is occurring inside the soil. These solutions require extensive maintenance, only showcase the information in a small area around the sensor and have no direct representation of what is occurring inside the plant. Dendrometers have been available since the 18th century to measure the shrinkage and expansion of a tree trunk's diameter. Since a trunk's diameter can be impacted by various factors, such as stress, nutrients, sunlight, or water consumption, the dendrometer's accuracy for irrigation management is often limited. Moreover, dendrometer's calibers have moving parts, making them expensive and requiring extensive maintenance. As a result, many farmers simply do not trust dendrometers to provide accurate irrigation management.

[1] https://www.csis.org/analysis/water-and-food-how-when-and-why-water-imperils-global-food-security

[2] ibid

Many competitors within the irrigation management industry are realizing the benefits of Internet of Things (IoT) enabled sensors that enhance data-gathering and analysis across complete plots of land. As such, IoT sensors with enhanced technology capabilities can provide more accurate monitoring of the plant's water consumption. Despite this, many competitors within the industry are gathering sensor webs quickly, integrating multiple sensors to provide extensive datasets that are often unnecessary. Frost & Sullivan notes that these large sensor networks complicate many of these IoT offerings, requiring technicians for installation and ongoing maintenance. Oftentimes these offerings are still ineffective and inaccessible for small farmers due to the large upfront and maintenance costs and the complicated nature of the data analysis.

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- Jacinth Matthew
Senior Research Analyst--TechVision

Headquartered in Israel, Treetoscope was founded in 2020 by various experts from food technology, agricultural, and academic agricultural industries with the mission of disrupting a very conservative industry with low adoption rates and to develop a solution that farmers around the world can leverage. Currently, only premium growers can access technology to optimize water consumption, serving a small portion of the market. Frost & Sullivan appreciates how Treetoscope's platform provides a unique value proposition: offering simple, highly accurate sensors to monitor the water update of plants at a low-cost. The company's sensors are sold at local dealerships or farming shops and installable by the farmer, making the technology accessible and usable by farmers of all size - without requiring sizeable upfront installation or maintenance costs.

Treetoscope's Low-cost and Highly Scalable Platform Empowering Unmatched Value

Treetoscope recognizes the shortcomings of existing and competitor irrigation management solutions and sets out to provide a highly scalable, affordable, and low-maintenance solution for farmers and farms of any size. The company's platform uses simple, small, single-probe sensors that can be installed and connected to the internet by the farmer, eliminating installation costs. The sensors measure the trunk's temperature to determine the energy rate required to reach the target set-point. The set-point is then used to calculate heat transfer and derive the sap flux, thereby determining the tree's specific water consumption. Direct water sensing data is sent to Treetoscope's software-as-a-service (SaaS) irrigation management platform and translated to the block level. The SaaS integrates soil data, meteorological information (from companies like IBM or Microsoft), and satellite imagery with direct plant-sensing information. The company's sophisticated algorithm uses artificial intelligence and machine learning to create accurate irrigation recommendations immediately. Insights are improved with ongoing data integration, providing meaningful results after two weeks of monitoring.

Frost & Sullivan points out that Treetoscope is the only irrigation management platform that directly monitors a plant's water consumption, thereby providing unmatched accuracy in irrigation recommendations based on the actual amount of water consumption and not on other external factors.

Treetoscope's platform is plug-and-play and highly scalable, allowing farmers to use as many or as few sensors for their specific farm to gain actionable insights - without requiring a significant financial investment. The company recommends installing at least three devices per irrigation plot to gain a more accurate representation of water consumption across the plot. Furthermore, Treetoscope recognizes the technology-literacy limitations of many farmers, as they do not use extensive technology capabilities. Therefore, the company's platform displays data and actionable recommendations in real-time through an easy-to-use smartphone application. Moreover, the platform displays recommendations tailored to farmers' irrigation needs, whether per metric cube or hour, ensuring that farmers receive actionable recommendations without requiring them to conduct any analysis or data interpretation. Treetoscope's complete SaaS platform provides actionable insights, including irrigation recommendations, stress level management, weather history and forecasts, plot-level insights, and 24/7 notifications, giving farmers all the data they need to manage farms properly.

Expanding Sensor Technology to Meet Various Application Uses

As the first and only technology that specifically monitors a plant's water consumption, Treetoscope's technology has expansive application diversity potential. Currently, the company's platform focuses on permanent plant groups, such as trees. It is also analyzing other plant's physiology to tailor the sensor's physics and algorithms, expanding its applicability to other markets, such as crops.

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>
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In addition to expanding the sensor's use for other plants, Treetoscope is analyzing other ways to expand its sensor capabilities, such as measuring nutrients inside the plant to make actionable recommendations regarding nutrients or plant yield predictions. These expanded capabilities have numerous applications. For example, with a growing focus on urban green environments, Treetoscope has formed partnerships with universities to leverage its advanced irrigation management platform to analyze how to decrease temperatures in city environments using trees.

Treetoscope also wants to expand its platform into the agro-photovalic (APV) market. Many farmers are turning to APV farming, which leverages their land for crop and energy production. However, as energy production is more profitable, governments are creating regulations requiring APV farmers to ensure they do not reduce their crop yields due to solar panel projects. Treetoscope's platform measures plant productivity through water consumption, with decreases in water consumption indicating trees are not as productive. As such, APV farmers can leverage the platform to track plant productivity and prove it is remaining compliant with government regulations. Treetoscope is currently working with energy companies such as Enlight and EDF, a large electric company in France, to showcase how its technology empowers APV farm monitoring.

Financial Performance Built on Large Margins

In 2023, Treetoscope had $0.8 million in gross sales and expects gross sales of over $2 million in 2024. The company recently partnered with a large distributor in North America, bolstering its growth trajectory with an extensive dealer network. Treetoscope recognizes the advantages of working with a large distributor, as it provides the company with better access to a broad region. The company is working to decrease the costs of manufacturing its sensors to deliver costs savings to customers and increase profits for itself and its distributor network. As a result of its cost reduction and its robust distributor partnerships, the company expects to experience rapid growth and expansion over the next five years.

Expansion Bolstered by its Technology's High Scalability

Treetoscope recognizes the challenges farmers face with technology, as many are older and not comfortable using highly advanced technologies. The company's phone application makes it easy for farmers to use and access data through their smartphone. Scalability is also one of the company's main concerns, as reaching small farms across various geographies is difficult without a key distributor. As a result, Treetoscope recently partnered with Netafim and The Toro Company, two of the largest irrigation companies in the world, for distribution channels in EMEA and North America It is focusing expansion on southern Europe (including Spain and Portugal) and North America (primarily Mexico and the United States) and expanding into Turkey.

Treetoscope has about 30 employees in its customers' primary regions, including Mexico, the United States, Spain, and Israel. Its field technicians support its sensors and software components, ensuring customers receive the best value possible from its advanced data analysis. Moreover, the company monitors customers' usability of the platform from its website and phone application, allowing Treetoscope to detect the most used features of the application, identify areas of improvement, and help users optimize operations leveraging the data recommendations provided via the platform. As a result, Frost & Sullivan is impressed with Treetoscope's strategic growth and believes it is poised for widespan impact in the irrigation management industry.

Conclusion

The agriculture industry accounts for over 70% of water consumption; with the increased food demand, water consumption optimization for agriculture is vital. Traditional irrigation management technologies are lacking, either providing inaccurate information or requiring large installation and maintenance costs, making them ineffective and inaccessible for small farmers.

Treetoscope is setting the new gold standard for irrigation management as the first direct plant monitoring platform, empowering unmatched data specificity to enhance irrigation recommendation accuracy. The company's software-as-a-solution platform leverages small, single-probe, Internet of Things (IoT) capable sensors installed directly into the plant's trunk, allowing for direct monitoring of its water consumption. The IoT data is combined with weather, soil, and plant stress data and analyzed using machine learning and artificial intelligence to create actionable irrigation recommendations in a farmer specified format. As a result, farmers more effectively optimize water irrigation strategies, reducing overall water usage while increasing or stabilizing plant productivity.

Treetoscope's innovative platform is highly scalable, easy to install, and accessible via a smartphone application, removing technology and cost barriers to provide access to farms of all sizes. The technology's wide application across various market segments and partnership with large distributors position Treetoscope for explosive growth, helping it set the new standard for irrigation management.

With its strong overall performance, Treetoscope earns the 2024 Frost & Sullivan Technology Innovation Leadership Award in the irrigation management industry.

What You Need to Know about the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Leadership Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

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The Growth Pipeline Engine™

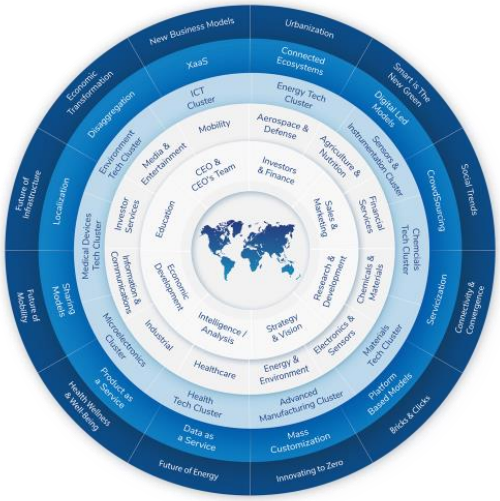
Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.



Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)