

M2M/IoT Applications in the Agricultural Industry

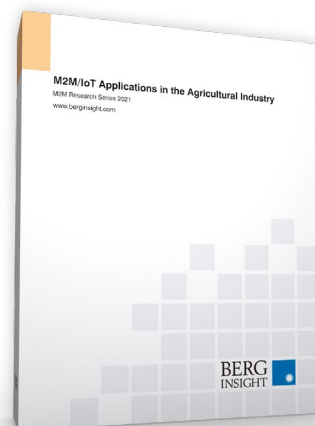


M2M/IoT Applications in the Agricultural Industry is the second consecutive strategy report from Berg Insight analysing the latest developments on the global smart farming market covering precision farming, in-field monitoring, herd management and farm management software.

This strategic research report from Berg Insight provides you with 180 pages of unique business intelligence, including 5-year industry forecasts, expert commentary and real-life case studies on which to base your business decisions.

Highlights from this report:

- **Insights** from 30 executive interviews with market leading companies.
- **Comprehensive** overview of the agricultural technology value chain and key applications.
- **In-depth** analysis of market trends and key developments in crop and livestock production.
- **Profiles** of 61 agricultural technology providers.
- **Detailed** reviews of the latest precision agriculture initiatives launched by industry players.
- **Summary** of OEM propositions from manufacturers of agricultural equipment.
- **Forecasts** by market segment, region and wireless technology lasting until 2025.



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What are the latest IoT developments in the agricultural sector?

Smart farming refers to the application of information and communications technology in agricultural production systems. The electrification of agricultural equipment has advanced over several decades but has accelerated in recent years due to improvements in computing power, data storage and wireless data transfer. Berg Insight's definition of smart farming solutions include systems installed in agricultural equipment, in the field or fitted to animals. Included are also agricultural software systems which ensure that agricultural production can be planned, scheduled and managed to achieve efficient operations.

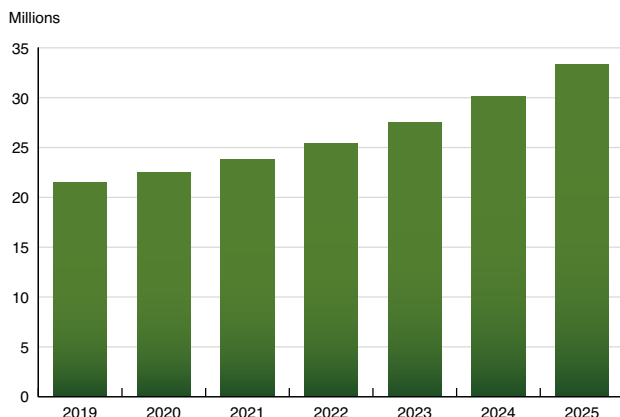
Precision agriculture is about managing variations in the field to increase crop yield, raise productivity and reduce consumption of agricultural inputs. While solutions such as auto-guidance and machine monitoring and control via on-board displays today are mainstream technologies in the agricultural industry, telematics and Variable Rate Technology (VRT) are still in the early days of adoption. Berg Insight estimates that the total market value for precision agriculture solutions was € 2.7 billion in 2020. Growing at a compound annual growth rate (CAGR) of 6.8 percent, the market value is expected to reach € 3.7 billion in 2025. Most major agricultural equipment manufacturers have initiatives related to precision agriculture although strategies vary markedly. Leading providers of precision agriculture solutions include Deere & Company, Trimble, Topcon Positioning Systems, Raven Industries and Hexagon. Other significant vendors are AGCO, Ag Leader Technology and DICKEY-john. Important players that provide data-oriented applications and agronomic services are Bayer's The Climate Corporation, Corteva Agriscience's Granular business, Syngenta, Farmers Business Network, Farmers Edge and BASF.

The market for in-field sensor systems can be divided into three segments: environmental monitoring, pest management and irrigation management. These solutions typically incorporate wireless connectivity, data logging, cameras and sensors that record measurements of environmental parameters to support decision making in agricultural production. Semios is the largest vendor in the space by far with an installed base of more than 300,000 sensor nodes, followed by Pessl Instruments and Davis instruments with installed bases of around 50,000 devices. Top specialised providers of integrated soil moisture monitoring solutions comprise Hortau, AquaSpy and CropX. Remote irrigation control solutions are ►

► offered by the largest OEMs of central pivot irrigation machines and drip irrigation systems including Valmont Industries with its Valley Irrigation brand, Lindsay Corporation with its Zimmatic brand, Netafim and Jain Irrigation Systems. Berg Insight estimates that the installed base of in-field sensor systems and remote control units amounted to 800,000 in 2020. Growing at a CAGR of 16.7 percent, the active installed base of in-field monitoring and control devices is expected to reach 1.7 million units in 2025.

Precision livestock farming technologies are mainly applied to the husbandry of dairy cattle, poultry and pigs. Consolidation and growth of dairy farms have resulted in larger herds per farmer, which makes manual observations challenging. Body-mounted sensor systems together with herd management software are used to achieve satisfactory herd health and timely insemination when a cow is in oestrus. A majority of the leading dairy equipment OEMs including GEA Group, Lely and BouMatic partner with specialised companies to provide advanced sensor technology for herd management. The world's largest dairy equipment manufacturer DeLaval offers its in-house developed activity monitoring system along with its milking and dairy farming infrastructure solutions. Important providers of sensor systems for herd management furthermore include Netherlands-based Nedap and the animal health company Merck. The latter provides ear tags and dairy monitoring technology following the acquisition of Anteliiq Group – owner of the brands Allflex and SCR. Other notable players include Fullwood Packo, Farmnote, Dairymaster and Afimilk.

Berg Insight's outlook for the smart farming solution market is positive as agricultural production remains greatly underpenetrated by IoT technologies. The number of installed wireless devices for applications in agricultural production is forecasted to grow at a CAGR of 8.1 percent from 22.5 million connections at the end of 2020 to 33.3 million connected devices by 2025. Cellular connections amounted to 1.1 million at the end of 2020 and are expected to reach 2.1 million in 2025. The main application areas for cellular communications comprise telematics and in-field sensor systems. LPWA technologies are expected to achieve the highest growth rate and realise a significant market position in the remote monitoring and control segment. 802.15.4-based standards comprise the most employed wireless technology due to its wide adoption in dairy cow monitoring applications.



Installed base of active wireless devices in agricultural production (World 2019–2025)

This report answers the following questions:

- What are the main applications for wireless IoT in agricultural production systems?
- Which are the leading providers of precision farming technologies and in-field sensor systems?
- What offerings are available from technology and service providers?
- How are the OEMs and agricultural input producers involved in the ecosystem?
- What are the main drivers and barriers for technology adoption in agricultural production?
- What are the precision livestock farming strategies of animal monitoring specialists and dairy equipment manufacturers?
- Which are the main application areas for cellular and LPWA connectivity?

Executive Summary

1 The agricultural sector

- 1.1 **Agricultural production**
 - 1.1.1 Agricultural land use
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Glossary

About the Author



Fredrik Stålbrand is a Senior Analyst with a Master's degree in Industrial Engineering and Management from Chalmers University of Technology. He joined Berg Insight in 2016 and his areas of expertise include cellular IoT hardware, IoT platforms and IoT/M2M applications in the industrial markets.

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