IoT in Building Management: Elevating Efficiency, Reducing Operational Costs

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Reading time 16 mins

Key Points

- 80% of a building's lifecycle cost comes from operational and maintenance expenses.
- IoT in building management solutions significantly reduces utility costs, optimises asset management (e.g. space, equipment), enables remote monitoring and predictive maintenance, and supports occupants' health and well-being, thus boosting productivity, increasing efficiency, maximising profitability, and supporting sustainability.
- The global smart building market size was valued at USD 75.89 billion in 2022 and is expected to reach an estimated market value of USD 570.20 billion by 2030.
- Market growth is driven by increasing adoption of IoT-based business management systems (BMS), a rising preference towards working from home and growing popularity for home automation solutions, increasing demand for commercial buildings with smart features, government investment and green initiatives, and a growing demand for technologies to reduce and recycle through waste management systems.
- While industry giants such as Siemens, Schneider Electric, and Honeywell are at the forefront of BMS development, startups innovating new technologies (e.g. smart flooring, self-healing concrete, and SmartSkin for buildings) contribute to market growth.
- BMS trends in 2024 include the integration of IoT with AI and self-learning technologies, advanced security systems, smart building as a service (SBaas) and digital twin modelling to reduce waste and support sustainability.

- Challenges include data security concerns, interoperability issues, the complexity of integrating diverse building systems and the expertise needed to manage them.
- Addressing these challenges creates opportunities for innovation, improved collaboration among industry stakeholders, and the creation of standardised frameworks for seamless integration.

Increase your building's operational efficiency by up to 30% and boost productivity. Call us for a quote!

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In the rapidly evolving landscape of building management, integrating the Internet of Things (IoT) technologies has become a cornerstone for driving efficiency and minimising operational costs. From cloud-based building management systems (BMS) to self-healing concrete and AI-enabled responsive buildings, what once seemed a futuristic concept not too long ago is now a present-day reality. Driven by technological advancements and changing societal needs, IoT in building management is

revolutionising and optimising how commercial and residential spaces are used and viewed.

At Ignitec, we take pride and inspiration from being at the forefront of IoT innovation. Our work is a testament to that: most of the products we've built and solutions we helped innovate have an IoT component. If you want to incorporate IoT into building management, call us for a free and confidential consultation. We will provide you with a quality-assured and strategically driven approach that not only provides you with an end-to-end solution but also helps you deliver results fast!

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How does IoT improve building management?

A building management system (BMS) consists of software, a server with a database, and smart sensors connected to an Internet-enabled network. It serves as a centralised control system that configures, monitors and manages the mechanical, electrical, and electromechanical services in a facility (e.g. power, ventilation, security, elevators):

- Smart sensors around the building gather data and send it to the BMS, which stores it in a database.
- The BMS triggers an alarm if a sensor reports data that falls outside predefined conditions (e.g., temperature spike).
- BMS software can be installed as a standalone application or integrated with other/existing monitoring systems.
- BMS systems can also control external factors entering a building (e.g. door controls),

provide natural disaster response protocols, and provide data-driven insights on optimising operational systems.

By [leveraging IoT devices](#) (e.g. motion detectors, occupancy sensors, lighting controls, smart thermostats), BMS boosts efficiency and productivity, enables faster decision-making, and improves resilience.

1. **Remote Connectivity:** Systems can be configured to take action automatically whilst simultaneously alerting an operator of an incident. This increases property and occupant safety and leads to efficient response times.
2. **Space Optimisation:** BMS provides an improved understanding of how space can be used – reducing costs and improving efficiency. By understanding which areas are in use, how often and for how long, building managers can create a more efficient building maintenance procedure and even repurpose spaces to make them more profitable (e.g. sub-lease).
3. **Asset Management:** Allows managers to track and monitor assets and their condition in real-time, adjust schedules to reduce downtime and reduce manual labour or the need for human intervention.
4. **Predictive Maintenance:** Signals issues that could result in equipment failures or performance inefficiencies. Targeted maintenance reduces unnecessary inspection, early maintenance results in a longer equipment lifespan, and scheduled maintenance reduces unplanned and costly downtime.
5. **Energy and Water Optimisation:** Accurately monitoring and controlling energy and resource utilisation contributes to sustainability and minimises a business's carbon footprint. Smart lighting, heating and cooling devices can reduce energy consumption by [13-66%](#). In addition, water flow monitoring devices [reduce](#) water consumption by up to 10%.
6. **Improve Occupants' Well-being:** Monitoring and controlling air quality, lighting, temperature and other environmental factors in real-time increases productivity and reduces absenteeism caused by '[sick building syndrome](#)' (e.g. headaches, coughs, or difficulty concentrating caused by bad air quality and poor ventilation).

What are the financial benefits of smart

buildings?

As detailed above, the financial benefits of implementing IoT in building management are substantial as it helps to reduce the cost of buildings beyond the construction phase. Given that as much as 80% of a building's lifecycle cost comes from operational and maintenance expenses, IoT solutions significantly alleviate costs and optimise performance.

By optimising energy, water, space and asset utilisation through intelligent systems, organisations can significantly reduce utility costs, increase productivity, and improve well-being. Predictive maintenance minimises downtime and extends the lifespan of equipment, leading to substantial savings on repairs and replacements. Additionally, streamlined operations contribute to overall cost efficiency, making the initial investment in IoT technologies a financially sound decision.

What is the market size for IoT in building operations?

The market size for IoT in building operations has experienced substantial growth, fueled by an increasing awareness of the potential benefits. According to a recent Grand View Research, Inc. report, the global smart building market size was valued at USD 75.89 billion in 2022 and is expected to grow at a compound annual growth rate (CAGR) of 26.5% from 2023 to 2030 and reaching an estimated market value of USD 570.20 billion. This growth is being driven by:

- Increasing adoption of business information modelling, AI, IoT, cloud computing, data analytics and virtual reality.
- Growing popularity of home automation solutions and rising preference towards working from home.
- Increasing demand for commercial buildings with smart features (e.g. intelligent glass, smart thermostats and smart elevators).
- Governments are making significant investments in innovative building initiatives. For example, India's Energy Conservation Building Code (ECBC) sets minimal standards for new commercial buildings, and the European Commission's Smart Readiness Indicator (SRI) rates the readiness of buildings to use smart technologies.
- Growing use of, and demand for, technologies to reduce and recycle through waste management systems.

Underpinning the market's growth is the need to develop and promote sustainable solutions that use natural resources intelligently and are designed to last. The future of intelligent buildings is here – call us to help you develop solutions to concretise your market positioning in it!

Growth trend of IoT in building management: Expanding or just emerging?

IoT in building management is not merely emerging; it is experiencing a rapid expansion. The growing realisation of the tangible benefits associated with IoT, such as energy savings, predictive maintenance, and enhanced occupant comfort, is driving widespread adoption. As more businesses and organisations recognise the potential of IoT solutions, the market continues to mature and expand.

Who are the top IoT providers and major players in smart building management?

Effective building management systems equipped with modern technology tools brought together on a single platform and networked through a seamless communication system that's safe, secure, and highly efficient, is no simple feat. It's no wonder that industry giants such as Siemens, Schneider Electric, Honeywell, and IBM are leading the charge in IoT for building management.

Siemens' Desigo CC platform seamlessly integrates building systems, offering comprehensive control and optimisation. Siemens has a complete portfolio of smart building technologies, applications and services, which starts with harnessing the correct data from the building, its occupants and their surroundings to deliver an intelligent building that is comfortable and safe, energy and asset-efficient, space and user-efficient, and energy intelligent and resilient.

Schneider Electric's EcoStruxure Building Advisor provides advanced analytics and insights for enhanced efficiency. The platform securely connects hardware, software and services over an Ethernet IP backbone to help users maximise building efficiency, optimise comfort and productivity and increase building value.

IBM's Watson IoT for Buildings leverages artificial intelligence to optimise operations and energy usage. Its advanced analytics capabilities enable predictive maintenance, proactive fault detection, and personalised occupant experiences. With a focus on scalability and interoperability, IBM Watson seamlessly integrates with existing building systems, providing actionable insights for improved efficiency and sustainability.

Honeywell's strength in IoT for building management lies in its comprehensive solutions tailored to optimise operational efficiency and occupant comfort. Leveraging advanced analytics and real-time data insights, their Building Energy Management System (MEMS) enables predictive maintenance, energy optimisation, and streamlined facility management.

Smart buildings, smarter startups: Top 5 innovators for IoT in Building Management

Industry giants aside, the IoT in building management landscape is by no means a saturated one. New technology development is being influenced by rapid urbanisation and digitisation, climate change and environmental sustainability concerns, and a growing post-pandemic awareness of how one's surroundings and environment impact health and productivity. Smart building startups worldwide are rising to meet demand and offering a fresh perspective on how buildings can be made even smarter.

1. PHYSEE is a Dutch startup producing SmartSkin, a solution that transforms buildings into sustainable ecosystems using solar power. The SmartSkin technology combines sensors, solar cells, and battery systems integrated into the window frames. This technology analyses data, such as temperature, light, and air quality, using a self-learning algorithm that independently controls the building's climate installations (such as sun blinds, lighting, ventilation, and air conditioning).

2. US startup Scanalytics developed smart flooring technology designed to cover entire floors, capture up to 100% of the foot traffic in an office or residential space, integrate occupancy and usage data with the BMS, and optimise the building for efficiency and comfort.

3. UK-based startup Ventive introduced an innovative ventilation solution that uses nature-close passive ventilation with heat recovery (PVHR). The technology moves energy flows from exhaust air to fresh incoming air. Simultaneously, it adjusts to the building's needs by enabling performance monitoring for proactive repairs.

4. Greenbeat is a Swedish startup providing green roofing and urban agriculture solutions based on the continuous real-time monitoring and management of vegetation. The startup combines IoT-based plant sensors, open weather data, actuators, predictive analytics, and simulation models.

5. US startup Cityzenith created the Smart World Pro platform to provide a comprehensive digital twin solution in the lifecycle management of intelligent buildings. The product features natural language search, multi-layer data operation, AI-driven cost analysis, and an all-in-one 3D information dashboard.

Modern building management trends for 2024 and beyond

Current trends in IoT for modern building management include the integration of edge computing, enabling real-time data processing at the source. Smart lighting and climate control systems that adjust based on occupancy and environmental conditions are also gaining traction. Additionally, the rise of IoT-driven space utilisation analytics helps to optimise building layouts for efficiency and productivity.

In 2024 and beyond, we can also expect to see more:

- Integration of IoT and AI to create more intelligent and responsive buildings. For example, personalised settings for lighting and temperature are automatically adjusted as the system learns from occupants' preferences, enhancing comfort and efficiency.
- Advanced security systems include applications such as keyless entry using facial recognition or integrated systems that guide occupants to exits during emergencies and coordinate with first responders.
- Smart Building as a Service (SBaaS) allows building owners to access cutting-edge technology and expertise on a subscription basis. This reduces the need for high initial investments whilst ensuring buildings remain technologically advanced and operationally efficient.
- Digital twin modelling to reduce waste and support sustainability. In addition, this technology can [increase operational efficiency](#) by up to 30%, reduce energy by up to 20%, and increase property value by a further 20%.
- Self-healing concrete (also known as [bio concrete or biocement](#)) is an innovative technique adopted to remediate cracks and fissures in concrete to extend the lifespan of concrete structures, making them more sustainable, affordable and versatile.

What are the challenges and opportunities in IoT for building management?

While IoT presents numerous opportunities for building management, challenges persist. Data security concerns, interoperability issues, the complexity of integrating diverse building systems and the expertise needed to manage them are common hurdles.

However, addressing these challenges opens doors to opportunities for innovation, improved

collaboration among industry stakeholders, and the creation of standardised frameworks for seamless integration.

In conclusion...

IoT is reshaping the landscape of building management by elevating efficiency and reducing operational costs. With top providers and innovative startups leading the way, a growing market size, expanding trends, and a multitude of financial benefits, embracing IoT solutions is no longer a luxury but a strategic necessity for organisations seeking to maximise efficiency and sustainability in their building operations.

As challenges are addressed and opportunities seized, the future promises smarter, more efficient, and cost-effective buildings powered by the transformative potential of IoT.

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FAQ's

Why is IoT important in building management?

IoT enhances building management by enabling real-time monitoring and control of various heating, ventilation, and lighting systems. It optimises energy consumption, reduces operational costs, and improves occupant comfort and safety through data-driven insights and automation.

How does IoT benefit building management?

IoT empowers building managers to monitor and manage various systems remotely, enhancing operational efficiency and reducing maintenance costs. It facilitates predictive maintenance by collecting data on equipment performance, enabling timely interventions to prevent costly breakdowns.

What are the advantages of using IoT in building management?

IoT enables proactive monitoring and management of building systems, leading to energy savings, improved operational efficiency, and enhanced occupant comfort. Additionally, it provides valuable insights through data analytics, facilitating informed decision-making for better resource allocation and maintenance planning.

When should buildings implement IoT for management purposes?

Buildings should consider implementing IoT for management purposes as soon as possible to reap the benefits of improved efficiency, reduced costs, and enhanced sustainability. Early adoption allows for integrating IoT devices seamlessly into existing infrastructure, ensuring smoother transition and maximum impact.

Which building management systems can IoT integrate with?

IoT can integrate with various building management systems such as HVAC, lighting, security, and occupancy sensors. This integration allows for centralised monitoring and control, enabling seamless

coordination and optimisation of building operations for greater efficiency and performance.

How does IoT enhance energy efficiency in building management?

IoT enables precise monitoring and control of energy-consuming devices and systems, allowing for optimisation based on real-time data and predictive analytics. Through intelligent automation and adaptive algorithms, IoT minimises energy wastage and fosters a more sustainable approach to building management.

What role does data analytics play in IoT-enabled building management?

Data analytics in IoT-enabled building management processes vast amounts of data collected from sensors and devices to derive actionable insights. These insights inform decision-making, facilitate predictive maintenance, and enable continuous improvement in operational efficiency and occupant satisfaction.

Why is remote access important in IoT-driven building management?

Remote access enables building managers to monitor and control building systems from anywhere, facilitating timely interventions and reducing response times to maintenance issues. It enhances operational flexibility, especially in situations requiring immediate action or adjustments outside regular working hours.

How does IoT improve occupant comfort in buildings?

IoT enables personalised control of environmental parameters such as temperature, lighting, and air quality, catering to individual preferences and needs. By continuously monitoring and adjusting conditions based on occupancy patterns and feedback, IoT enhances comfort levels and overall satisfaction among building occupants.

What security measures are in place for IoT-enabled building management?

IoT-enabled building management systems implement robust security measures such as encryption, authentication protocols, and network segmentation to safeguard data and devices against cyber threats. Regular updates and patches further mitigate vulnerabilities, ensuring the integrity and confidentiality of sensitive information.

Why is scalability important in IoT solutions for building management?

Scalability allows IoT solutions for building management to accommodate the growing needs and complexities of diverse building environments without compromising performance or reliability. It facilitates seamless expansion and integration of additional devices and functionalities as requirements evolve over time.

How does IoT contribute to predictive maintenance in building management?

IoT sensors continuously collect data on equipment performance, enabling predictive maintenance algorithms to identify potential issues before they escalate into costly failures. By detecting anomalies and patterns indicative of impending problems, IoT helps building managers schedule maintenance proactively, minimising downtime and reducing repair costs.

What are the challenges of implementing IoT in building management?

Challenges of implementing IoT in building management include interoperability issues between different devices and systems, data privacy concerns, and the need for robust cybersecurity measures. Additionally, integrating legacy infrastructure with IoT solutions and ensuring sufficient network bandwidth can pose logistical hurdles.

Who benefits from the implementation of IoT in building management?

Various stakeholders benefit from implementing IoT in building management, including building owners, managers, occupants, and maintenance personnel. Owners enjoy reduced operational costs and increased property value, while occupants experience improved comfort and safety. Managers benefit from enhanced operational efficiency and better decision-making capabilities enabled by data-driven insights.

How does IoT facilitate regulatory compliance in building management?

IoT enables automated monitoring and reporting of environmental conditions, energy consumption, and safety protocols, streamlining compliance with regulatory standards and certifications. By providing real-time data and audit trails, IoT helps building managers demonstrate adherence to regulations and standards, avoiding penalties and ensuring occupant safety.

What are the long-term cost savings associated with IoT in building management?

IoT-driven building management leads to long-term cost savings through reduced energy consumption, lower maintenance costs due to predictive maintenance, and enhanced operational efficiency. Moreover, optimised resource allocation and improved occupant satisfaction contribute to increased asset value and sustained savings over time.

How can IoT improve sustainability in building management practices?

IoT enables precise monitoring and control of energy usage, water consumption, and waste management processes, facilitating sustainable practices and resource conservation. By identifying inefficiencies and promoting eco-friendly alternatives, IoT empowers building managers to minimise environmental impact and contribute to a greener future.

What are the potential risks of relying heavily on IoT in building management?

Risks of relying heavily on IoT in building management include cybersecurity threats, data privacy breaches, and operational disruptions due to system failures or compatibility issues. Additionally, overreliance on automation may lead to dependency issues and hinder human intervention when necessary, compromising overall resilience and adaptability.

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