BUSA8000 Techniques in Business Analytics Report

IoT in Manufacturing

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Introduction

In this report, Impacts of IoT in Manufacturing is discussed. IoT for manufacturing can use machine and equipment data to transform the systems and processes of the contemporary factory setting. In the last century, technological developments and innovation have gained an incredible momentum. To compete in the business world, it is very critical today to follow the current technology. Especially in recent years, many companies have gained an advantage against their competitors by investing IoT implications to reduce their costs and increase product quality.

The document is structured to discuss the importance and implementation of IoT in six cases of Manufacturing.

- Supply Chain Management
- Remote Monitoring
- KPI Compilation
- Automation
- Quality Control
- Worker Safety

Supply Chain Management

The global supply chain has been through drastic changes in the last decade. Using IoT devices in the supply chain began to receive immense attention around 1990s when IBM created the computerized inventory management and forecasting system. This started to streamline logistics, resulted in better warehouse storage, and better inventory management (blumeglobal, 2022). Supply chain management has unquestionably evolved as a result explosion of manufacturing in Japan, Korea, and China. Also, machine learning and AI were combined with prescriptive and predictive analytics (blumeglobal, 2022).

Suppliers can now more easily keep track of where goods are, where they are being stored, and when they can be expected at a particular location. Product locations can be monitored using GPS and sensors. This informs the customers the predicted delivery time quite accurately (Hussain et al., 2021). The RFID chips, for instance, are used in supply chain management to count, and track goods throughout the supply chain. This begins in the factory, where items are tagged at the source, and continues to the distribution centre, where orders are sorted before being distributed to stores (Swamy, 2020).

Remote Monitoring

IoT remote monitoring applications provides the tools businesses need to understand the state of critical assets or processes and continuously improve them. IoT remote monitoring applications provide the tools for businesses to know the state of critical processes. Companies can continuously collect the information needed to analyse performance on a micro or macro level by attaching IoT sensors to specific pieces of components to transmit data to a cloud based IoT monitoring system. (Kychkin, 2016). In the context of manufacturing predictive maintenance, IoT remote monitoring automates the evaluation of equipment health and the generation of service requests. Plants must rely on staff to

manually collect, process, and analyse the data before issuing actionable next steps for diagnostics or maintenance in the absence of IoT remote monitoring (Huang, 2020).

KPI Compilation

Key performance indicators (KPIs) in production are widely used techniques for evaluating the cost, flexibility, delivery time, and quality of manufacturing systems on a regular basis. Modelling the operational information flow, defining optimal-state values, and identifying key performance indicators provide businesses with a baseline against which to measure future performance. When the data from the actual details flow is compared to its digital twin at any time, it generates the insights necessary to determine the efficiency of assets within the context of the operational process as desired (Houyou, 2012).

With the new IoT technologies, tracking KPIs is more than visualising information to help make insightful decisions. Manufacturing machinery is becoming increasingly automated, reducing the number of decisions that must be made electronically by an operator. KPIs generated by IoT systems enable these operators to track the effectiveness of the machinery in real-time and intervene (increasingly) when something unusual occurs (Hement et al., 2016).

One of the most obvious examples of IoT and KPI is prescriptive analytics. Studies have revealed that in the future, companies will be able to look at the data behind their KPIs so that they can create company goals in surprising directions.

Automation

Failures and downtime occur every day in every manufacturing environment. When dealing with equipment that performs a repetitive task, this is simply a fact of life. Manufacturing in today's markets necessitates efficiency and quality production. Unplanned downtime even in a single machine in the "just-in-time" manufacturing environment can result in unhappy

customers, potentially loss of customers to a competitor, and a direct hit to a company's bottom line (Varga, 2017). An example of IoT, in this case, is Maintenance prediction and shop floor operations. Predictive maintenance is a method of anticipating maintenance needs in factory-floor machines. Patterns emerge from analysing operational data from the machines, allowing operators to understand the failure modes and estimate the time mainly when the maintenance will be required, especially to schedule them in less costly times. As such, industrial equipment and machines can help to analyse operational conditions, and credit goes to IoT. Singh (2019) has stated that this will allow for real-time monitoring of both equipment and production maintenance without any human intervention. One example is the IO-Link communication. This is a popular technology that allows for time-savings and cost savings in quality control applications in the manufacturing sector. Bassett (2021) has further added that this device facilitates bi-directional data exchange among the sensors that support IO-Link while being linked to the master. Furthermore, the sensor data can be accessed not only in real-time, but it can also be logged for long-term analysis. This enables real-time monitoring and optimization of quality control processes based on stored data. The impact of using this kind of communicative device enhances efficiency; therefore, reducing production costs.

Worker Safety

Wearable devices are increasingly being combined with IoT technology to improve safety in industries. Recently, Vandrico Solutions, a wearable/IoT company based in Vancouver, Canada, has created a "connected worker" software platform. This system monitors data such as individual miners' CO2 or sulphur dioxide exposure to make sure that workers working in the manufacturing facility are exposed to safe limits (Vandrico, 2022).

The company has also made a smart tagboard. This device makes use of digital

technology to know who is "tagged in" underground at any time. This makes sure that no one is left underground in an emergency. Vandrico has been working on a solution called "the tagged mine" with the Deloitte consulting firm and Cortex Designs of Toronto. This model includes a "smart helmet," which allows companies to pinpoint the exact location of miners and dispatch assistance in an emergency (Miningmagazine, 2022)

Conclusion

IoT is widely regarded as a novel paradigm capable of radically transforming the manufacturing industry. It allows for the seamless integration of various manufacturing devices with sensing, processing, communication, actuation, and networking capabilities. Industrial IoT systems can be adopted by businesses to increase productivity by guaranteeing production uptime, cutting costs, and eliminating waste. By utilizing IoT data, manufacturers may gain a better understanding of their production and supply chain operations, improve demand forecasting, shorten their time to market, and enhance customer experience. Based on such a highly integrated smart cyber-physical space, it allows for the creation of entirely new business and market opportunities for manufacturing. The adoption of these technologies is continuing despite the complexity and high investment costs of IoT systems. Manufacturers who do not adopt these technologies will not have a chance of surviving in the future.

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