



FROM INSIGHT TO ACTION: HOW DATA ANALYTICS IS CHANGING MANUFACTURING

Abstract

Data analytics has emerged as a game-changer in the rapidly evolving world of manufacturing. The ability to harness and analyse massive amounts of data has paved the way for unprecedented insights and efficiencies. From optimising production processes to enhancing quality control and streamlining supply chains, data analytics is transforming the manufacturing industry.

In this PoV, we will delve into the remarkable impact of data analytics on manufacturing and explore its role in improving efficiency, enhancing quality control, optimising supply chain management, fostering innovation, and addressing challenges.

The significance of data analytics in manufacturing^[1]

The manufacturing industry thrives on innovation, and within this dynamic industry, data analytics emerges as a powerful catalyst for driving advancements, efficiencies and progress. Manufacturers can get key insights into customer preferences, market trends, and competitors through analysis. Data analytics enables producers to respond quickly to market trends, tailor products, and provide greater user experiences by enabling agile decision-making.

Manufacturers, for example, might predict new trends and preferences by evaluating customer data, allowing them to build goods that meet market demands. Manufacturers can also conduct virtual simulations using data analytics, which reduces the time and expense of physical prototypes. This accelerates the product development cycle and allows for faster iterations and improvements.

Moreover, data analytics facilitates the integration of customer feedback into the product development process. By studying customer sentiment, reviews, and usage data, manufacturers can gain actionable insights, enabling them to enhance product features, address pain points, and ensure customer satisfaction. Data analytics also empowers manufacturers to implement intelligent automation and robotics, further boosting efficiency and reducing the risk of human error. By investigating sensor data and data from other connected devices, manufacturers can automate repetitive tasks, enhance production speed, and ensure consistent quality control.



How data analytics is driving innovation in manufacturing^{[1][2]}

Data analytics is revolutionising the manufacturing industry by providing manufacturers with unprecedented insights and opportunities for improvement. Some of the ways in which data analytics is driving innovation in manufacturing are:

- **Predictive analytics and maintenance:** Data analytics enables manufacturers to predict equipment failures, optimise maintenance schedules, and minimise costly downtime. Manufacturers can identify patterns that indicate potential equipment failures by analysing sensor data and historical maintenance records. Predictive analytics facilitates proactive maintenance, reducing unplanned downtime and optimising the utilisation of resources.
- **Real-time monitoring and control:** Real-time monitoring of manufacturing processes is

crucial for maintaining quality and efficiency. Data analytics allows manufacturers to collect, analyse, and visualise real-time data from sensors, machines, and production lines. Real-time monitoring of key performance indicators (KPIs) can help manufacturers recognise deviations, optimise processes, and take immediate corrective actions to maintain product quality and maximise productivity.

- **Demand forecasting and inventory optimisation:** To meet customer demands and minimise costs, manufacturers must accurately forecast the demands and optimise the inventory. Data analytics allows manufacturers to predict demand by analysing market trends, historical sales data, and external influences
- **Enhanced decision-making and business intelligence:** Data analytics provides manufacturers with

powerful decision-making tools and business intelligence. Manufacturers can gain holistic insights into their operations, performance, and customer behaviour by consolidating and analysing data from various sources. These insights enable informed decision-making, driving operational excellence and supporting strategic initiatives

- **Continuous improvement and lean manufacturing:** Data analytics facilitates continuous improvement efforts and lean manufacturing practices. Production data analysis allows manufacturers to identify inefficiencies in the processes, points of wastage, and areas for improvement. This data-driven strategy enables businesses to employ lean practices, enhance operations, and boost efficiency across the production process.



Overcoming challenges in manufacturing^[3]

In this section, let us look at some challenges in manufacturing and how data analytics can solve them.

- **Quality control and defect**

detection: Maintaining high-quality standards and detecting defects is a persistent challenge in manufacturing. Traditional quality control methods are often manual, time-consuming and tedious, leading to delays and errors. Data analytics, on the other hand, offers a solution by allowing for real-time monitoring and analysis of production data. Anomalies, trends, and correlations that indicate quality flaws can be identified by manufacturers, allowing them to take rapid remedial action.

- **Operational efficiency and**

productivity: Manufacturers strive to optimise their operations and enhance productivity. Nevertheless, inefficiencies and bottlenecks

often pose hurdles, impeding manufacturers from operating at their optimum capacities and hindering their progress.

Manufacturers can derive actionable insights by analysing historical and real-time data. These key insights empower them to make data-driven decisions aimed at enhancing efficiency, minimising downtime, and maximising productivity.

- **Supply chain management:**

Managing a complex supply chain poses significant challenges for manufacturers. Variability in demand, lead times, and supplier performance can disrupt operations and impact customer satisfaction. Data analytics is essential in supply chain management because it provides accurate demand forecasting, optimises inventory levels, and improves logistical operations.

Manufacturers may use data analytics to get visibility into their supply chain, detect possible bottlenecks, and make proactive decisions to maintain smooth operations and timely delivery.

- **Innovation and product**

development: Innovation is essential for manufacturers to stay competitive and meet evolving customer demands. However, creating new products needs a thorough understanding of market trends, client choices, and competition activity. Manufacturers may use data analytics to examine large amounts of data from many sources, such as social media platforms, market research data, and consumer feedback, to gain significant insights. Data analytics applications and use cases in manufacturing^{[2][4]}

Supply chain management:

Data analytics has become a critical enabler for optimising supply chain management in manufacturing. The power of data can offer manufacturers improvements in various aspects of the supply chain, including:

- **Demand forecasting:** Data analytics allows manufacturers to study various aspects of the supply chain and optimise production levels, plan inventory, and meet customer demands while minimising the risk of overstocking or stockouts.
- **Order management:** Data analytics allows manufacturers to optimise order management processes by identifying patterns and trends in customer orders. This enables efficient order fulfilment, reduces lead times, and improves customer satisfaction.

- **Inventory optimisation:** By analysing inventory data, manufacturers can optimise inventory levels to strike a balance between meeting customer demand and minimising carrying costs. Data analytics helps identify slow-moving or obsolete inventory, reduce excess stock, and improve inventory turnover.

- **Supplier performance:** Data analytics provides manufacturers with insights into supplier performance, including delivery times, quality metrics, and cost-effectiveness. Analysis of supplier data provides manufacturers with data that can drive business decisions like selecting, evaluating, and managing suppliers, ensuring a reliable supply chain.

- **Transportation analytics:**

Data analytics helps streamline transportation operations by analysing route efficiency, transportation costs, and carrier performance. Manufacturers can identify opportunities for consolidation, improve delivery schedules, and reduce transportation expenses.

- **Early warning systems:** Data analytics can create early warning systems that proactively identify potential disruptions in the supply chain. By examining various data sources and applying predictive analytics, manufacturers can anticipate risks, such as supplier delays, and take preventive measures to mitigate their impact.



Product quality:

Data analytics is crucial in ensuring product quality during the manufacturing stages. Key applications include:

- **Real-time quality monitoring:** Data analytics allows manufacturers to monitor manufacturing processes in real time, allowing them to detect quality concerns as they arise. By analysing sensor data, manufacturers can detect anomalies, deviations, and variations, enabling prompt intervention to maintain product quality.
- **Root cause analysis:** When quality issues arise, data analytics can help manufacturers identify the root causes behind defects or deviations. Manufacturers can identify patterns, correlations, and potential causes by analyzing historical data, enabling them to address underlying issues and prevent reoccurrence.
- **Reliability analysis:** Data analytics facilitates reliability analysis by analysing data from sensors, equipment, and maintenance records. Manufacturers can identify equipment failure patterns, assess component reliability, and develop proactive maintenance strategies to reduce downtime and improve overall reliability.
- **Warranty analysis:** By analysing warranty data, manufacturers can gain insights into product performance, identify recurring issues, and improve product design and manufacturing processes. Data analytics helps manufacturers understand warranty costs, identify high-risk products or components, and make informed decisions to enhance customer satisfaction.

Field service and support:

Data analytics can significantly enhance field service and support operations for manufacturers. Common applications include:

- **Inventory management:** Data analytics enables manufacturers to optimise field service inventory by analysing historical data, service demands, and part failure rates. This helps ensure the availability of necessary spare parts while reducing inventory costs.
- **Supplier performance:** Data analytics allows manufacturers to assess supplier performance in the context of field service and support. Manufacturers can make data-driven decisions when selecting and managing suppliers by analysing metrics such as lead times, quality, and responsiveness.
- **Creating an efficient factory:** Data analytics helps manufacturers identify inefficiencies and bottlenecks within their factories, leading to streamlined operations and improved productivity. Manufacturers can improve workflows, allocate resources effectively, and minimise waste by analysing production data

Equipment and process monitoring:

Data analytics enables real-time monitoring of equipment and processes, the resulting data has the potential to augment prudent and informed decisions and optimise operations. Key benefits include:

- **Process capability:** By analysing real-time data from sensors and production processes, manufacturers can assess process capability, identify variations,

and take corrective actions to improve process performance and consistency.

- **Optimise maintenance:** Data analytics allows manufacturers to implement predictive and preventive maintenance strategies. Manufacturers can predict equipment failures by analysing equipment sensor data, historical maintenance records, and performance metrics, optimise maintenance schedules, and minimise unplanned downtime.

- **Overall equipment efficiency (OEE):**

Data analytics enables manufacturers to measure and analyse OEE, which represents the effectiveness of equipment utilisation in a manufacturing facility. By identifying OEE improvement opportunities, manufacturers can optimise equipment utilisation, reduce idle time, and increase overall factory productivity.

Conclusion

In conclusion, data analytics is transforming manufacturing by addressing challenges, driving innovation, and optimising operations. It gives businesses a means to increase quality control, improve

supply chain management, and stimulate innovation. Manufacturers can make informed decisions, increase efficiency, and stay competitive in a rapidly evolving industry by leveraging data-driven insights.

Data analytics is an essential tool for manufacturers looking to maximise the value of their operations to ensure long-term success.

* For organizations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed on organizational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like a living organism, will be imperative for business excellence going forward. A comprehensive, yet modular suite of services is doing exactly that. Equipping **organizations with intuitive decision-making** automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, [Live Enterprise](#) is building connected organizations that are innovating collaboratively for the future.

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