MANUFACTURING AND THE SEARCH FOR MORE INTELLIGENCE

Analytics are improving processes and supply chains

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In a German factory, a bottle of liquid soap is essentially manufacturing itself. The bottle is giving orders to automated machines about the fragrance, color, labeling and other details it needs. After that job is finished, the next bottle spits out its instructions for how it should be composed.

This pilot program is on the forefront of Germany's Industry 4.0 Initiative, which is using advanced analytics and sensor data to usher in the next wave of manufacturing—known as the "fourth industrial revolution."

In this case, the smart factory reduces labor costs while speeding production by allowing machines to "talk" and quickly exchange the data necessary for manufacturing tasks. It's a remarkable use of big data, but that shouldn't be surprising: More than any other industry, executives in manufacturing put a high priority on drawing intelligence from their big-data stores, according to a new survey of 171 manufacturing executives worldwide, conducted by Oracle in partnership with WSJ. Custom Studios and IPSOS North America Market Research.

"Manufacturing has a long history of using data to improve performance," says Robert Morison, a management consultant and co-author of *Analytics at Work: Smarter Decisions, Better Results.* "And unless a manufacturer is selling direct to the consumer, it's a more straightforward proposition to use data because manufacturers can focus on production data and not worry about things like consumer sentiment data, which are more difficult to use."

IMPROVING YIELD
Big data and analytics are being applied to a host of manufacturing areas. For example, operations managers can use advanced analytics to take a deep dive into historical process data, identifying patterns and relationships among discrete process steps and inputs. This allows manufacturers to optimize the factors that prove to have the greatest effect on yield.

Morison points to one pharmaceutical company that makes large batches of chemical compounds. The manufacturing process can be affected by many factors, like the quality of the materials. For this reason, the pharmaceutical company is constantly tinkering with its processes to improve the yield. "The company has always used analytics to compare the various batches, but it was able to evaluate only a limited number of batches because the information was too vast for traditional business-intelligence systems," Morison says.

However, new big data tools—like Hadoop—allow manufacturers to crunch their massive treasure troves of information that go back for many years. In the case of the pharmaceutical manufacturer, big-data technology allowed it to analyze five years of production and batch data, gaining a better view of what changes would improve the yield. Considering that a 1% improvement in yield translates into millions of dollars, the ability to quickly analyze large amounts of data is a tremendous competitive advantage.

Morison says one benefit that manufacturers sometimes don't appreciate is that big data can enable ongoing improvement processes by embedding R&D directly into production processes. "Each new production batch adds to the knowledge base," he says. "You can constantly grow intelligence on which variables create the greatest yield, so it can make smart adjustments."

COORDINATING SUPPLY CHAINS
Bart Baesens, professor of big data and analytics at KU Leuven in Belgium and author of *Analytics in a Big Data World,* says manufacturers should access data from their downstream supply-chain partners to better forecast demand deeper

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within the chain. According to the survey, supply-chain data is growing much faster for manufacturing than for any other industry.

A product like an automobile can have thousands of parts, from engines to tires, sourced from different parts of the world. Being able to remotely monitor activity by telemetry and monitor performance allows manufacturers to predict demand and put the correct vehicles with the right features that are desired in different geographic areas.

"The bullwhip effect [larger and larger swings in inventory because of changing customer demand] can be mitigated, hereby significantly reducing costs across the entire supply chain, which can then be further translated into a more consumer-friendly end price," Baesens says. "Even a marginal improvement in terms of forecasting performance can yield huge cost savings. Hence, big data represents a key asset and vast resource in spearheading competitive pricing."

NEW WAYS TO DIFFERENTIATE

Making better use of data allows manufacturers to understand and address the cross-functional drivers of cost, such as warehouses being incentivized to keep stockouts down while production lines are incentivized to reduce costs. Using data more effectively can identify instances where companies are working at cross purposes.

"There are big optimization opportunities in transportation and logistics," Morison says. "By optimizing delivery routes, companies can save millions of miles of truck fuel and wear and tear. One of the big benefits of this is that companies don't have to reengineer the entire process—they just have to use data better."

The savvy use of data is allowing manufacturers to differentiate themselves. A Spanish maker of heating control systems analyzes customers' heating history and future needs to recommend new technologies that will save them money. Because of its sophisticated use of data, the manufacturer is able to surprise customers by giving them proposals they didn't—and wouldn't event think to—ask for.

For all the emphasis on big data and analytics, the study reveals that manufacturers still have areas in which they need to improve. Manufacturing executives admit they're hampered by inefficient data-gathering techniques. Consequently, manufacturers are looking to improve these abilities and expand analyst teams to leverage the power of analytics across their operations. They realize that the competitive terrain demands it.

"Although many companies start to successfully leverage big data and analytics for competitive advantage, others are completely missing out on it and may find themselves out of the game in the near future," Baesens says. "Manufacturers should embrace it and put into place the necessary logistics and infrastructure to fully exploit its potential, because its presence is ubiquitous and its impact continues to explode."

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