

WHITEPAPER

Industry 4.0

How the food industry must adapt to survive



EXECUTIVE SUMMARY

- Industry 4.0, the so-called Fourth Industrial Revolution, is about to shake up the food and beverage industries
- All stages of the food supply chain can benefit from the efficiencies that connectivity, digitization and data sharing offer
- Businesses will need to create a digital roadmap to plan for future technology, data, and employee training needs
- Industry 4.0 will create jobs, but it will be a transformed workforce with a new skill set
- Manufacturers that want to survive will have to recruit, upskill, and keep staff capable of maintaining these highly complicated business operations.
- Costs of production-line downtime will increase exponentially, and it will be imperative to have staff on hand who can instantly troubleshoot electrical faults and get machinery up and running quickly
- Skills training in electrical troubleshooting is a negligible cost compared to the astronomical price tag of production-line downtime.

Industry 4.0

Industry 4.0 is how analysts are referring to the digitization of manufacturing and the increasing digital connectivity of product, process, and factory. It marks the rise of smart factories in which new manufacturing technologies allow for greater communication between machines, and machine-level processing of data allows them to adapt instantly to new production requirements. It also refers to the connecting of information systems and sharing of data across the supply chain to improve efficiency.

It's *Industry 4.0* because it's being hailed as the Fourth Industrial Revolution, or the fourth major revolution in modern manufacturing. (The first three were the lean revolution of the 1970s, the outsourcing of the 1990s, and the rise of automation in the 2000s). It's a radical revolution that's being compared to the advent of steam power, electricity, and automation in terms of its impact on manufacturing.

Take the case of Ian Pigott's farm in Hertfordshire, UK. Picture a massive tractor roaring along in a rural field. From a distance, it looks like any other tractor. Up close, however, you see there's no one in the cab. This tractor is driving itself, guided by satellite, and equipped with multiple on-board computer monitors. It's spraying fertilizer, but it's also sending data on soil nutrients and harvesting history back to the computer in Mr. Pigott's office, via a wide-area network.

It's also just one link in the chain. This particular farmer is fully wired—he's receiving weather forecasts, pesticide use data, and plant tissue tests from other software, and watching his profits soar, all from the comfort of his chair. In similar operations, camera-bearing drones hover over fields relaying images; underground water sources are located via mapping software; cows' feed allotments are adjusted automatically according to their milk production; and cameras with infrared technology scan poultry flocks for chickens running a fever. Welcome to the Fourth Industrial Revolution.

While some manufacturers may be skeptical of the hype, according to McKinsey & Company this is a real and very powerful emerging trend that will fundamentally change the way modern factories work. They identify four factors that have made *Industry 4.0* possible:

- Computational power and wide-area networks have evolved to the point where they are fueling the rise in data volumes
- Analytics and business intelligence capabilities have evolved to the point where they can make use of this data
- New forms of human-machine interaction are now readily available (e.g., touch interfaces and augmented-reality systems)
- Technological advances are changing the ways we send digital messages to the physical world (e.g., robotics, 3-D printing)

It's the perfect storm that is sweeping away old thinking about manufacturing methods, and making way for the next wave.

Industry 4.0 and Food Industry

Farming is just the first link in the food supply chain that can benefit from *Industry 4.0*. In fact, the entire food supply chain, from farm to processor to distributor to consumer, can be integrated.

The interoperability of connecting the production facility with distributors means product gets to market more quickly. Shelf life has always been a critical area for food manufacturers. Freshness counts, so delivery time and the amount of time that product rests on shelves is paramount. Electronic tracing technology is helping manufacturers track product from delivery to supermarket shelf. This means they don't overproduce, so they waste less. The data lets them predict consumer demand and benefit from increased efficiencies.

According to McKinsey & Company, manufacturers should be interested in *Industry 4.0* because it offers opportunities for greater efficiencies in energy consumption, real-time

yield optimization, and other processes—opportunities all manufacturers can easily get behind—that are hiding in the heaps of data it generates.

But the food and packaging industry has been slow to fully utilize the data revolution. The automotive and banking sectors are already using this kind of data to help with customer retention, and are a good model for the food industry. For food manufacturers who don't know what to do with it themselves, consultants are available to monetize their data by mining for potential efficiencies.

The Digital Roadmap

The seismic technological shifts now shaking the food and beverage industries are being driven by market forces that some manufacturers may not survive. Those with vision will plan for the future and thrive. It's uncharted territory, but experts suggest creating a *digital roadmap* to plan for future data, technology, and employee training needs. Businesses need to think about what is going to add value and provide the best chance for remaining competitive, such as infrastructure needs for supporting emerging technology, and a long-term workforce recruitment strategy.

One major challenge will most certainly be recruiting, upskilling, and keeping staff capable of maintaining these highly complicated business operations.

Workforce Transformation: Investing in people

Surviving and thriving in the era of Industry 4.0 will entail more than just investing in technology. It will mean investing in people as well.

History has shown that these manufacturing revolutions don't reduce net jobs, but they do change them. Even as more processes become automated, more jobs are created, but they require a transformed workforce armed with new skills to perform them.

A recent example is the case of Germany, one of the most advanced manufacturers in the world. A study of

the way Industry 4.0 has been implemented in Germany has revealed that more jobs were gained than were lost, but the new jobs required different skills. Germany's example shows that to successfully implement Industry 4.0, companies need, among other things, to retrain their workforce. While the number of physically demanding jobs may decrease, they will be replaced with positions requiring flexible responses, problem-solving, and customization.

Industry 4.0 depends on the interconnectedness of sophisticated digital machines in a delicate chain. When one machine goes down, the whole chain is dysfunctional. Analysts have estimated the costs of production-line downtime, and the news is bleak. Depending on the sector, downtime can cost anywhere from \$7,000 to \$200,000 per hour (Table 1).

Table 1. Downtime Costs Estimates

Industry	Average Downtime Costs
Forest Industry	\$7,000/hour
Food Processing	\$30,000/hour
Petroleum/Chemical	\$87,000/hour
Metal Casting	\$100,000/hour
Automotive	\$200,000/hour

Source: Rutgers University Industrial Productivity Training Manual

Those are current costs. In the not-too-distant future, as more and more complex machines including robotics are integrated into the chain, two things will happen. First, manufacturing will speed up exponentially, meaning that every minute of production-line activity will become exponentially more valuable. Second, in an inversely proportional relationship, production line downtime will become exponentially more costly.

It will be an absolute imperative to repair this machinery, much of which will contain PLCs (programmable logic controllers), as quickly as possible. In order to survive financially, manufacturers will need a workforce in place

with the advanced skills necessary to troubleshoot electrical problems instantly and get production lines back up and running.

Our belief is that merely a passing familiarity with maintaining complex machines will not be enough. Manufacturers will need staff properly trained in safe, systematic, electrical troubleshooting that resolves problems swiftly, eliminates guesswork, and prevents further accidents. In order to compete, businesses are going to have to invest in their people, giving them the necessary skills to handle complex, data-rich, integrated systems; skills such as analyzing and interpreting data, and troubleshooting electrical problems.

Skills training has its costs, but for most industries, they are insignificant compared to the enormous price of even one hour of downtime.

Conclusion

Industry 4.0 will accelerate and streamline food manufacturing processes through advanced automation and data collection and analysis. It will create jobs, but it will also require a transformed workforce. In order to compete, manufacturers will have to retrain staff so they have the skills they need to keep these highly complicated business operations running.

Just as the profitability of production-line activity will increase exponentially as more processes become automated, the costs of production-line downtime will also increase exponentially. It will be more critical than ever that staff can instantly troubleshoot electrical faults and get machinery up and running quickly.

Skills training in electrical troubleshooting is a negligible cost compared to the astronomical price tag of production-line downtime.

Convincing people to change the way they've always worked is never easy, but if manufacturers want to stay ahead of the competition, they are going to have to engage in strategic workforce planning. The Fourth Industrial Revolution is upon us, and as with any emerging opportunity, early responders are going to reap the benefits first.

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