

SIEMENS

Ingenuity for life



The Digitalization Productivity Bonus

What value does digitalization
offer the Food & Beverage industry?

[siemens.com/industryfinance](https://www.siemens.com/industryfinance)

Contents

1. The value of digitalization: Dimensions and perspectives	3
2. Putting a financial value on digitalization: The <i>Digitalization Productivity Bonus</i>	4
3. Sector focus: Food & Beverage	5

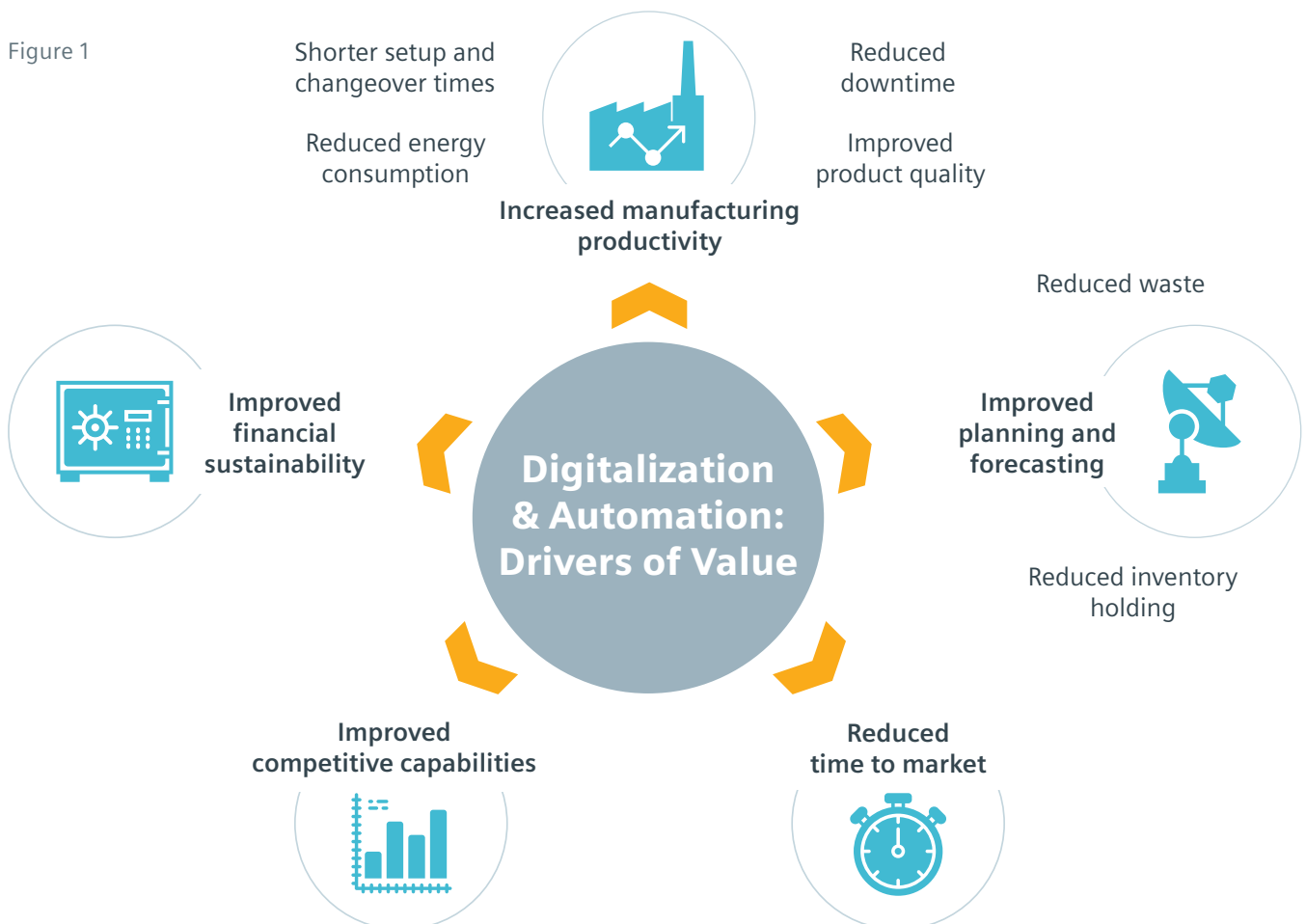
The value of digitalization: Dimensions and perspectives

Industry 4.0, the Fourth Industrial Revolution, is inexorably gathering strength. Industry 4.0 introduces the digitalization of processes, the Internet of Things, the installation of widespread sensors in the physical environment and the ability to rapidly enhance production economics through real-time performance-data analysis. The new generation of digitalized, automated technology now available is enabling manufacturers around the world to improve overall performance and reduce time to market through virtualized product and process development, improved productivity, increased manufacturing plant and equipment uptime through remote monitoring and predictive maintenance as well as improved competitive

capabilities through mass customization, where tailored products are offered with much the same economies formerly associated with mass production.¹

Industry 4.0 represents a significant opportunity for manufacturers to offer their customers enhanced product ranges and quality in tandem with more competitive pricing. Drawing on original research and a variety of published sources, this paper summarizes the key points of value that digitalization and automation have been delivering to those pioneering companies that have already started to invest in the new wave of digitalized technology. These key points of value are summarized in the diagram below (figure 1).

Figure 1



Putting a financial value on digitalization: The *Digitalization Productivity Bonus*

The various categories of value derived from digitalization that were highlighted in the previous section are compelling and have already been realized by a range of pioneering manufacturers. Some elements, however, are challenging to translate into a precise financial amount. Competitive advantage from greater turnaround agility or mass customization capabilities are clearly of value; yet these are more difficult to precisely quantify. One exception is increased manufacturing productivity, where the ability to either produce the same number of products for less or more products for the same cost, has a clear and calculable positive effect on costs (and, accordingly, on margins).

This paper will refer to amounts that can be released through **increased manufacturing productivity** as the *Digitalization Productivity Bonus*.

This research report consulted over 60 international industrial companies, expert management consultancies and academic specialists based in 11 countries around the globe. Each gave his or her expert estimate of the potential financial benefit that conversion to digitalized technology could deliver to manufacturing organizations, specifically in terms of **increased manufacturing productivity**.

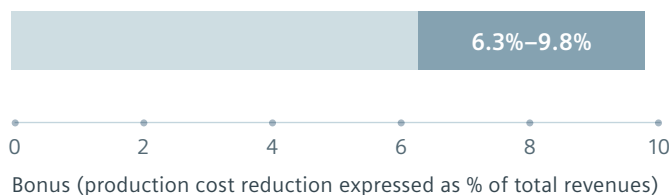
Production productivity is defined as a reduction in the cost of production – or, conversely, an increase in margins. Respondents assessed this reduction in production costs – the *Digitalization Productivity Bonus* – and expressed this as a proportion of total revenue.

The estimated global average percentage of financial gains is shown in figure 2.

To express the *Digitalization Productivity Bonus* as a financial amount, the average “bonus” percentage range was applied to the total annual revenue of different industries around the world (revenue data sourced from third-party research, trade associations, government statistics, etc., as appropriate). The subsequent total represents an estimate of the potential financial gain across an entire industry resulting from digital transformation and consequent improvements in manufacturing productivity.

Global Digitalization Productivity Bonus:
reduced production costs resulting from
conversion to digitalized technology

Figure 2



In the global plastic-products and packaging manufacturing industry, it is estimated that conversion to digitalized technology could deliver a Digitalization Productivity Bonus of between \$34 billion and \$53 billion.

Sector focus: Food & Beverage

The value of digitalization really comes alive when described in terms of a specific industry and its challenges, processes, and opportunities. In this section, our report examines some of the ways Industry 4.0 is being applied in the Food & Beverage industry, a sector that is economically significant across the world.

To provide an idea of the scale of benefit Industry 4.0 can provide the Food & Beverage industry, this paper has applied its *Digitalization Productivity Bonus* model to the industry in 11 countries around the world. The average bonus percentage range was applied to total annual revenue around the world (revenue data derived from official third-party sources). The resulting financial totals in figure 4 estimate how much the Food & Beverage industry could gain from improvements in manufacturing productivity as a direct result of digital transformation.

The *Digitalization Productivity Bonus* is, however, only one aspect of value that digitalization delivers to the Food & Beverage industry. Research conducted for this report reveals that there are a number of key focus areas where digitalization and automation create value in the sector. A selection of these is described below.

Reaching down the food-supply chain, we see that agricultural production benefits from digital data. In the food-processing industry, information on the expected quality of an ingredient might be available even before harvest (e.g., on the basis of data on weather conditions). This information will be relevant for adapting manufacturing processes or sourcing other ingredients.

Another area where Industry 4.0 can help is with food quality. Shelf life is undeniably a real issue for many food manufacturers; and for businesses that make fresh products the same day they are shipped, it is important to not overproduce. Digital information flowing up and down the distribution and supply chains improves coordination of supply and demand (which may fluctuate as frequently as each day) to guard against overordering and overproducing. Electronic traceability allows producers to track items from delivery to the supermarket shelf. This is about connecting engineering to production to IT in order to support joint systems and more efficient demand and production planning.

In the global food & beverage manufacturing industry, it is estimated that conversion to digitalized technology could deliver a Digitalization Productivity Bonus of between \$290 billion and \$450 billion.

Estimated *Digitalization Productivity Bonus*: reduced production costs resulting from conversion to digitalized technology in the Food & Beverage industry

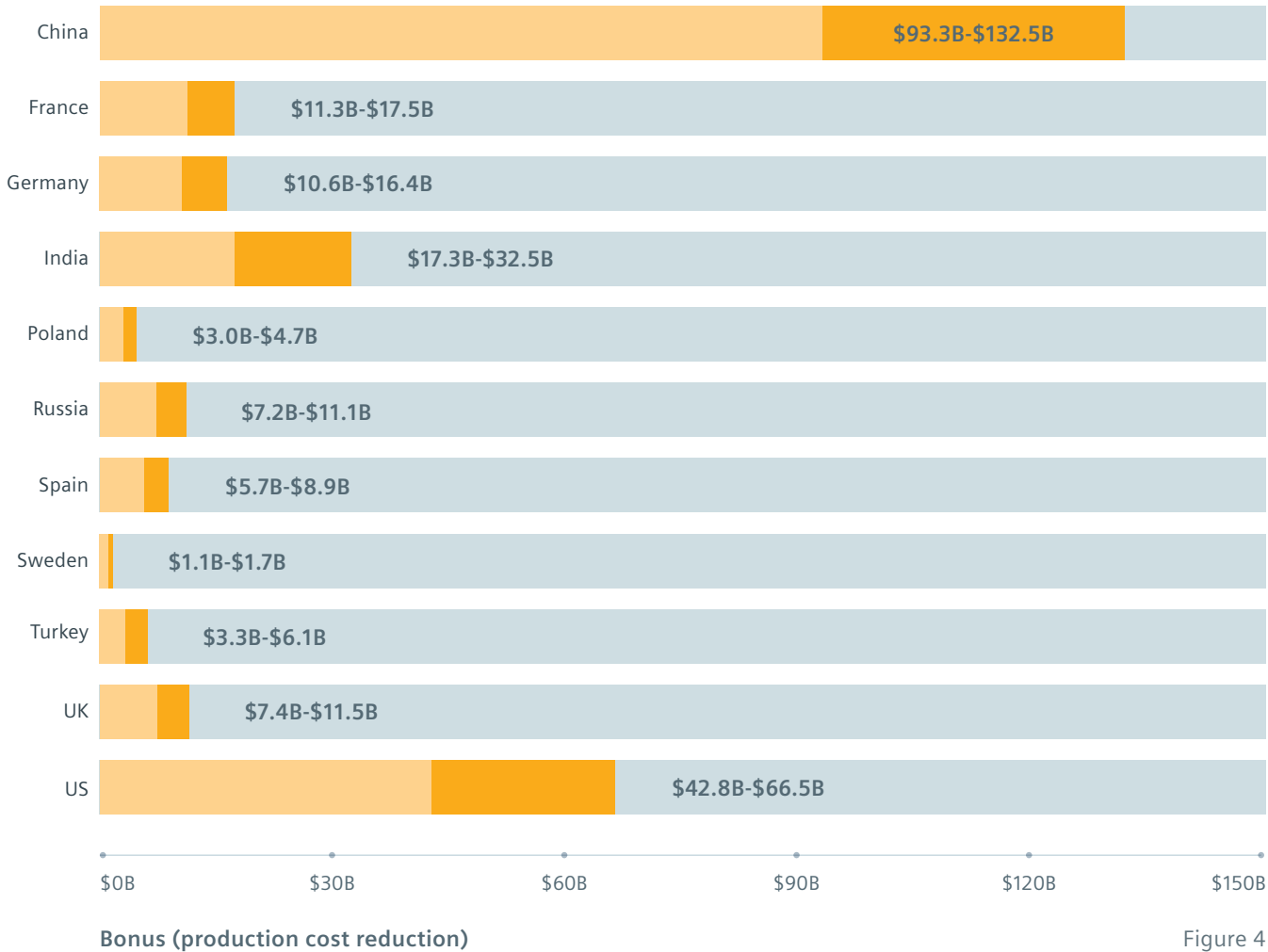


Figure 4

From field to factory



Other benefits from digital supply-chain integration include connecting communities and technology through a cloud-based platform. Food Industry 4.0 allows businesses to take a product to market more quickly by connecting the supply chain to the production facility through interoperability. Uncovering patterns in data also allows businesses to actually anticipate customer demand – enabling businesses to harness analytics and further refine their processing solutions.

One industry observer notes that Food Manufacturing 4.0 introduces highly flexible “lights-out” (totally automated) manufacturing that enables new economies of production. One example is a food company’s palletizing and depalletizing systems that run on a “lights-out” basis. A forklift automatically loads the system with individual cases and robots pick the cases, put them into place, and stack them onto pallets. These pallets are then stacked on top of one another in a dedicated area. Sensors detect when space is running out and only then is human intervention triggered.

The results include reduced personnel costs and optimized personnel deployment, reduced human error, higher process accuracy, automatic monitoring and audit information, and automated action triggers for optimized uptime.

Digitalization also permits the optimization of preventive maintenance programs so expensive and delay-inducing machine failures are all but designed out. A good example is industrial bakery ovens, which operate on very tight “fresh-bake” delivery schedules. Oven failure at times of peak production can be absolutely disastrous for customer relationships, so predictive preventative maintenance enabled through sensor-derived data analysis is a critical commercial risk-management benefit.

Connected and communicating production machinery reduces wastage. This enables more flexible production with shorter swap-over times, provides greater energy- and machinery-utilization transparency and improves overall equipment effectiveness (OEE) and other key performance factors.

One global confectionery manufacturer has been quick to leverage the benefits of additive manufacturing – 3D printing, a hallmark technology in the digital factory, employing it as part of their new product-development process. The company has been able to turn their ideas into 3D models and then into edible prototypes within a matter of days. Innovating the new product-development process in this way has allowed the company to create and test prototypes more rapidly and cheaply than any of their competitors and has positioned them as a leader in their field.

Packaging is another area to benefit from smart factory technology. Working with a crowdsourcing platform, a major global beverage company gathered data on customer product labeling ideas. Participating customers were then able to order the product in small quantities with their own label configuration. This “mass customization” was only possible and affordable using digitalized Industry 4.0 print and dispatch technology. Not only is this a good example of mass personalization, it also shows technology being used to build brand image and customer relationships.

The chain of digitalization continues in the factory, where it’s imperative the cold or hot chain is not interrupted while the product is being processed otherwise whole batches of food could become unusable under certain conditions. IoT monitoring of fridges and other temperature-controlled environments is critical, with automated alerts and escalation routines making it possible to quickly identify and rectify irregularities.

In an industrial kitchen there are strict rules – for instance, the temperature of warm food may not fall below a very precise temperature so the danger of bacterial growth is eliminated. Smart transport containers in the delivery chain help monitor the food temperature and add heat when necessary.

Logistics and goods or materials handling are major areas that derive value from digitalization. Automatic guided vehicles (AGVs), once the domain of manufacturing operations like automotive plants, are making their way into the Food & Beverage industry and consumer packaging applications, replacing human-operated forklifts for moving raw materials and finished products around the food-processing plant and redeploying and reskilling staff. Although the fundamental purpose of automated vehicles is to more cost-effectively move materials in a plant, these vehicles offer other benefits as well, including reduced product damage, reduced inaccuracies, and reduced safety risks.

One industry observer described an even more futuristic vision about how Food Industry 4.0 factories will interact to create significant economic advantage. While today’s food-industry systems are centrally controlled, in the future machines and raw materials will use information and communication technologies to similarly communicate with a social network and independently organize production across company boundaries.



Key references

1. See, for instance: McKinsey, "Industry 4.0," (2015); Strategy&, "Industry 4.0" (2014); McKinsey, "Manufacturing's Next Act" (2015); PricewaterhouseCoopers, "Industry 4.0" (2014); Control Engineering Asia, "The dawn of the new industrial era with the Smart Factory" (January 2017); ABB, "The new age of industrial production" (2016); Assembly Magazine, "Industry 4.0" (2016); Accenture, "IIoT – a game changer" (2015); Roland Berger, "Industry 4.0" (2016); VDMA and McKinsey, "The future of German mechanical engineering" (2014); Oliver Wyman, "Digital industry" (2015); Manufacturing Technology Center, "Industry 4.0" (2016)
9. See note 1; N.B. exclusions: oil refining, smelting, heavy chemicals and other mega-energy industries.
10. Average Digitalization Productivity Bonus data derived from over 60 interviews in 11 countries with international manufacturers, international management consultancies and academic experts (expressed as a percentage of total revenues) were applied to the global turnover of the plastics products and packaging manufacturing industry. Source: IBISWorld, "Global plastic products and packaging manufacturing," (August 2016).
16. For methodology see note 10.
17. https://www.mckinsey.de/files/mck_industry_40_report.pdf
18. <http://www.foodmanufacture.co.uk/Manufacturing/Food-manufacturers-should-prepare-for-Industry-4.0>
19. <http://www.foodmanufacture.co.uk/Manufacturing/Food-manufacturers-should-prepare-for-Industry-4.0>
20. <http://www.foodmanufacture.co.uk/Manufacturing/Food-manufacturers-should-prepare-for-Industry-4.0>
21. <http://www.telegraph.co.uk/sponsored/business/business-reporter/11853908/new-food-manufacturing-technologies.html>
22. Source: original research, US.
23. Source: original research, France.
24. <http://www.fponthenet.net/article/124535/Industry-4-0-and-all-that-.aspx>
25. <http://www.freshminds.net/2014/01/five-large-food-beverage-brands-truly-innovating/>
26. Source: original research, UK.
27. Source: original research, China.
28. Source: original research, UK.
29. Source: original research, Germany.
30. <http://www.engineerlive.com/content/industry-40-food-and-beverage-industry>

Longitude Research

Lion Court
25 Procter Street
London WC1V 6NY
Tel +44 (0)203 841 4770

Siemens Industry, Inc.

5300 Triangle Parkway
Norcross, GA 30092

For more information, please contact
our Customer Support Center.
Phone: 1-800-241-4453
E-mail: info.us@siemens.com

Follow us!



linkedin.com/company/siemens-financial-services



twitter.com/siemens_sfs



fb.com/siemensfinancialservices



goo.gl/en9KMd

