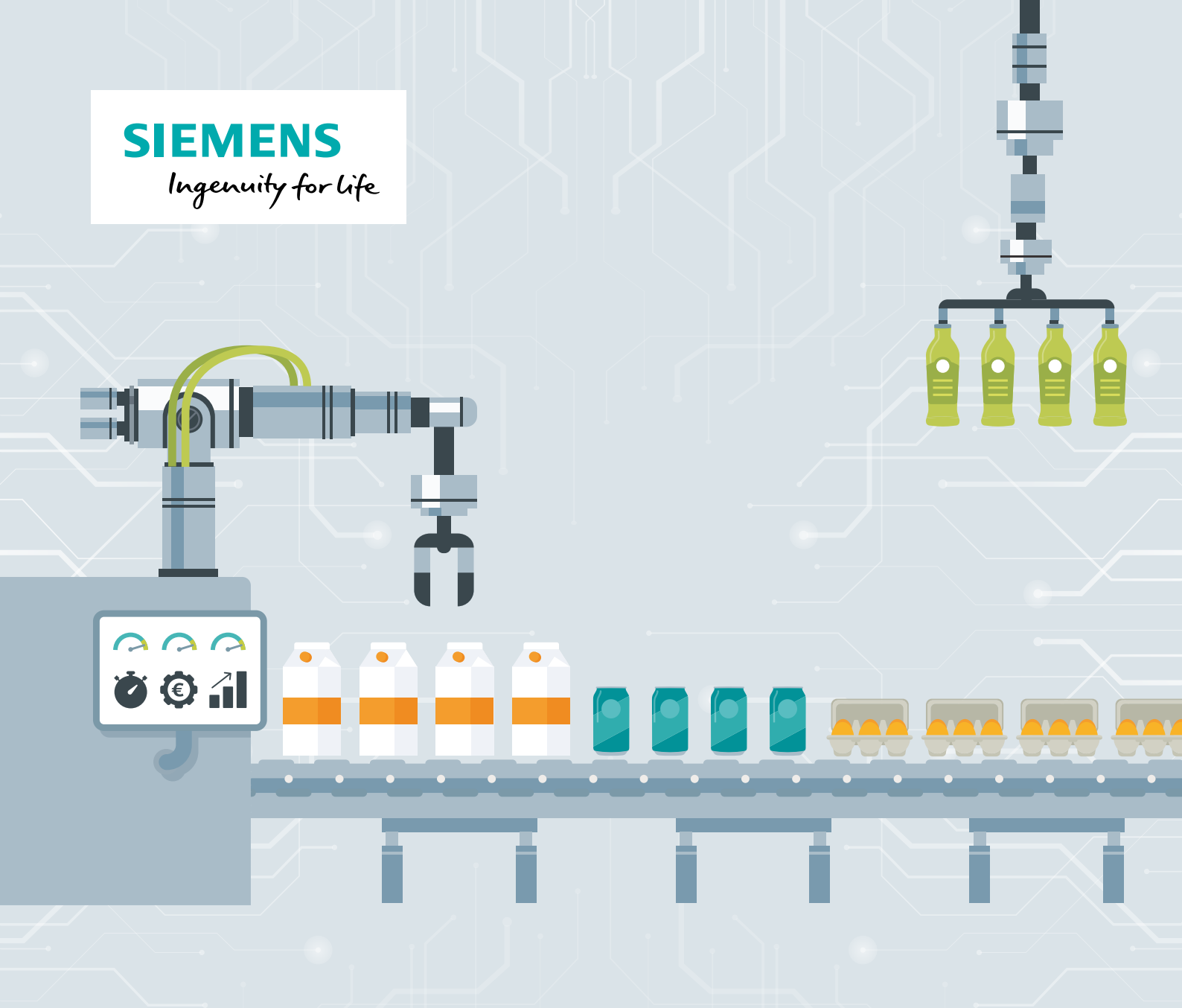


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Food and Beverage

Rising to the new challenge

The role of Smart Financing in helping
navigate the economic 'new normal'

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Contents

Management summary	3
1. The food and beverage industry – surviving and thriving in a time of crisis	4
2. The food and beverage industry in turbulent times – agility and resilience with technology	7
3. Smart financing enables continued investment	11
4. The cost of not investing	12
Financial gains from aspects of digital transformation	13
5. The size of the investment challenge	14
Business outcomes through smart finance	15
6. Smart finance for food and beverage manufacturers: enabling measurable business outcomes	17
Key references	19

Management summary



The economic impact of the COVID-19 pandemic is expected to be significant and prolonged. Businesses around the globe are having to cope with suppressed or changing demand. They are also coming to the realization that **supply patterns, ways of working and labor practices are likely to fundamentally change** as the crisis recedes and businesses and consumers embrace “the new normal.”



In many parts of the world, the food and beverage manufacturing industry has largely not been forced to temporarily shut down, except for breweries. This has been possible even though food supply chains have been disrupted, particularly in some countries such as India. However, the sector has had to **rapidly adapt to changing circumstances and patterns of consumption**. A potentially protracted period of lower economic growth will suppress consumer spending power and change spending habits. This will make it necessary for food manufacturers and packagers to adapt to new business patterns with astonishing speed.



Various key commentators, including the World Economic Forum, are suggesting that **companies who have invested in agile technologies and machinery are best placed to react to shifting market demands** with optimal flexibility. This applies both to SMEs – who make up most of the food and beverage sector – and multinationals alike.



Investment in new automation and digitalization technologies as well as retrofitting existing assets makes work more efficient and flexible – both now and in the future.



The food and beverage industry typically experiences strong margin pressure. This has an influence on investment psychology, especially in challenging times. There is therefore **a tension between the desire to modernize existing equipment and technology, and the focus on shorter-term returns**. Smart financing provides the bridge between these two factors and brings them into alignment across the food and beverage industry.



Historical studies have shown that **companies who continued to intelligently invest in technology during previous challenging economic times have survived, thrived and ultimately gained long-term competitive advantages**. Current commentators are now recommending that companies continue to invest in response to in the situation.



The pandemic and its economic aftermath make the **importance of investing in technology more, not less, urgent**. This is precisely to achieve levels of operational flexibility that can cope with uncertain and volatile markets – a flexibility that is becoming an increasingly important competitive advantage, which will be decisive both now and in the future.



The challenges inhibiting investment are, however, considerable. This latest study from SFS – the first in a series – **estimates that over the next five years \$567 billion in investment funds are needed for digital transformation** alone in the global food and beverage industry¹. This estimate excludes other investments in automation and retrofit projects that will also help manufacturers cope with the crisis and ultimately emerge stronger.



The urgent challenges of the COVID-19 pandemic and its long-term effect on manufacturing **may now compress the timeline for investment into a shorter period**.



To provide food and beverage manufacturers – large and small – with a **financially sustainable path through the current challenging environment** to become ready for the future and resilient, smart financing models are emerging, mainly from manufacturing-specialist financiers.



Based on historical evidence from past economic crises, **expert commentators are recommending that companies diversify their funding sources beyond existing credit relationships** to alternatives such as smart financing, in order to weather the economic storm and even strategically reconsider their cash flow structures.



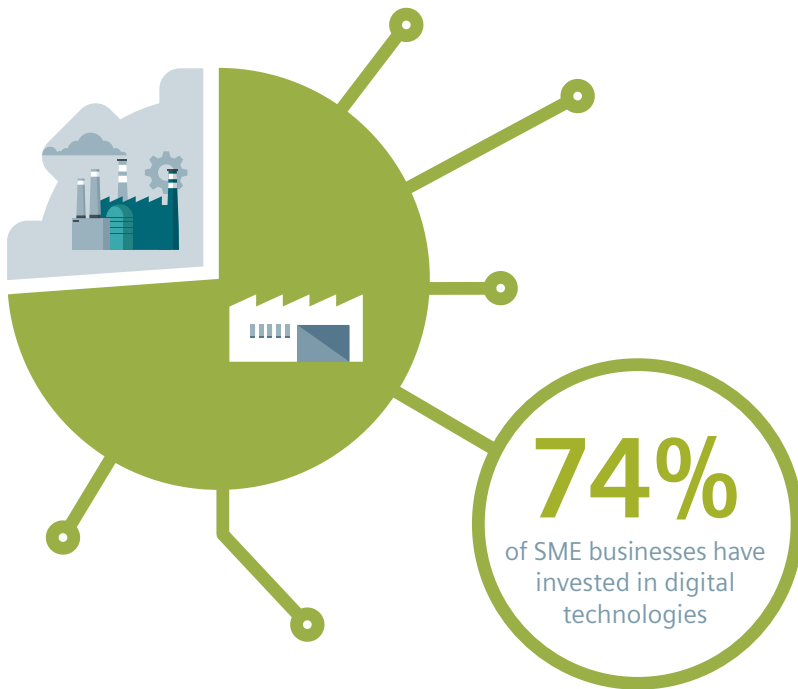
Increasingly these financing techniques are aligned to the expected outcomes associated with the investment. **They match financing arrangements closely with the expected rate of return-on-investment** delivered by the benefits of technology and equipment.

1. The food and beverage industry – surviving and thriving in a time of crisis

There can be little doubt that the economic aftershock of the COVID-19 pandemic will be felt for some time. The food and beverage industry, not including breweries, may largely have escaped the threat of temporary shutdown, yet a mid-term economic slowdown will affect consumption.

In countries such as India, food supply chains have been greatly disrupted². Patterns of supply and demand everywhere are certainly being affected in the short term, and some of these may turn out to be permanent. The industry will be reshaped in the medium- to long-term. Commentators are calling these permanent changes the “new normal” – a phrase coined after the 2008 financial crisis and revived in the current situation³. This means food and beverage businesses will still have to seek enhanced operating agility, flexibility and efficiency. No matter whether it’s through replacement or retrofit, expert commentators say automation, digitalization and a variety of other technology and machinery investments enable these qualities⁴. In an industry where SMEs are in the vast majority and provide two-thirds of jobs in the sector⁵, 74% have already invested in improving production processes through digital technologies⁶.

Pandemic-related challenges specifically faced by the food and beverage industry result from tensions in the supply chain, radically altered patterns of consumption and other factors. Where demand has suddenly plummeted, food is being destroyed at point of production⁷. Problems are also being encountered where there is a lack of cold storage for perishables – such as for the stocks of salmon intended for export to China⁸. Supply chain disruptions are also demanding agile adaptation of warehousing and storage⁹ and many manufacturers and suppliers are making a reduction in food product ranges in order to meet the spike in retail demand¹⁰. The balance of goods purchased has also changed – possibly long term. For instance, there has been a rise in demand for vitamin C-rich¹¹ and organic foods¹². All this is putting huge strain on food packaging. The challenges for relabeling and repackaging is immense, since wholesale packaging sizes and presentation is quite unsuitable for retail¹³. Manufacturers are introducing automated packing lines, which can react with agility to ensure the safety of food handling¹⁴. The global packaging supply chain is itself affected, with disruption in paper production in India¹⁵ and even fears of shortages of ink ingredients¹⁶ resulting from excessive demand for hand sanitizer.



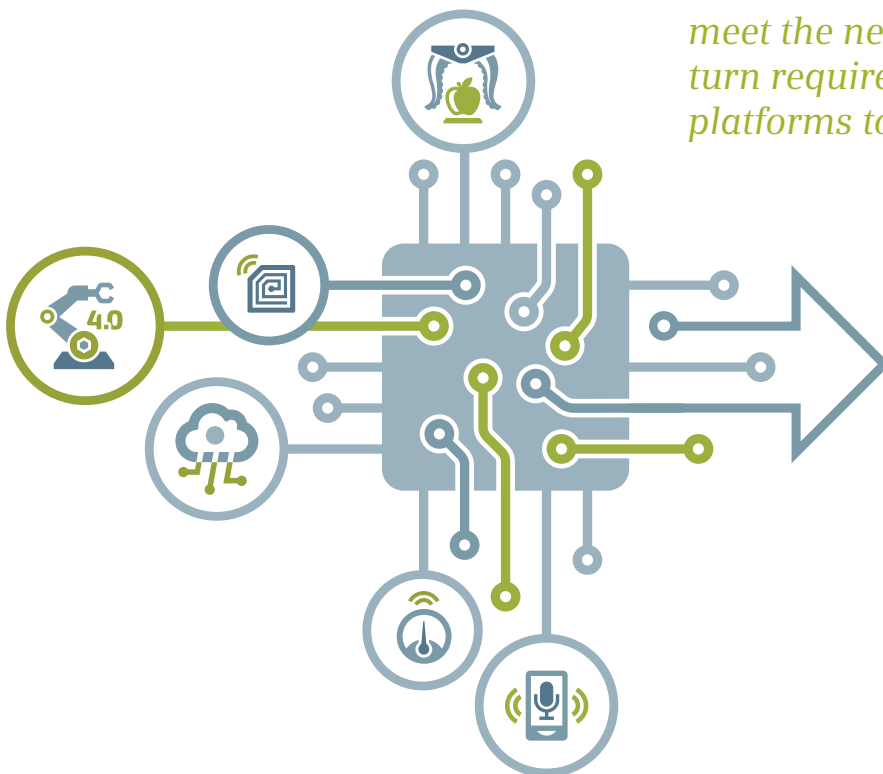
In an industry where SMEs are in the vast majority and provide two-thirds of jobs in the sector, 74% have already invested in improving production processes through digital technologies.

Labor shortages resulting from self-isolation, lockdowns or worker distancing requirements are affecting the industry's ability to maintain production capacity – favoring producers who have automated and digitalized their production units¹⁷. Similarly, the logistics industry has seen a reduction in capacity – especially for road and air freight¹⁸. Moreover, shortage of capacity and freedom of movement has increased logistics costs, meaning that the industry has had to reexamine its pricing models¹⁹. Looking at the long-term impact of these logistical issues, there is some consensus that nearshoring is likely to increase²⁰ in a bid to reduce risks in global supply chains. Without adoption of automation other digital technologies nearshoring will be neither affordable nor competitive. Ways of working for employees will have to change to accommodate new safety concerns, inevitably introducing greater levels of digitalization to enable remote working. Sales and marketing methods will need to change where face-to-face activities and larger events are no longer acceptable. Finally, the crisis has revealed that lack of digital connectivity has stood in the way of agile adaptation for some industry players. They were left without the software and data to simulate coronavirus impact scenarios through a “digital twin” to help them react quickly and effectively to the volatile situation.

Agility, flexibility and increasing digital methods and connections will help to meet the new challenges, and all in turn require updated technology and platforms to be workable. In some cases, technology needs to be replaced, in others existing platforms can be upgraded through a retrofit. It is not surprising, then, that key commentators on the current situation are highlighting the importance of maintaining the momentum of investment in technology and machinery. The Economist has noted that “in the long run the firms that survive will have to master a new environment as the crisis and the response to it accelerate... energizing adoption of new technologies... Firms will seek bigger safety buffers and a critical mass of production closer to home using highly automated factories²¹.” This is corroborated by studies from other expert commentators²². Moreover, an important European study notes that for the majority of food and beverage SME companies – who make up 99% of the market – key capabilities need to include “networking with new enabling functions of digital methods and collaborative tools [as well as] improving technology transfer²³.”

This short research paper explores the potential gains from technology investment in the food and beverage industry. It also offers historical proof that firms that continue to invest in the right strategic priorities are likely to be best placed to manage a period of uncertainty, cope with mid-term challenges and ultimately surge ahead during the recovery period. Finally, it outlines how this crisis is likely to make many companies rethink their cash positioning as they use smart finance to continue their investment program despite challenging markets.

Agility, flexibility and increasing digital methods and connections will help to meet the new challenges, and all in turn require updated technology and platforms to be workable



2. The food and beverage industry in turbulent times – agility and resilience with technology

In contrast to many other sectors, the food and beverage business is non-cyclical, which reduces the impact of the extreme effects of economic crises but also suppresses returns in booming markets. In the pre-pandemic world, the food processing market was expected to reach an estimated \$4.1 trillion in revenues by 2024 with a Compound Annual Growth Rate (CAGR) of 4.3%.

These projections may be somewhat affected by the duration of the current economic uncertainty as well as the nature and shape of the recovery period. Growth was particularly expected in the beverage, dairy, meat and poultry, convenience food and snacks, fruits and vegetables, and seafood sectors. The major drivers for these markets are increases in disposable income and demand for ready-to-eat food products as well as changes in lifestyles and family dynamics²⁴. Mature markets are also seeing growth in demand for vitamin C-rich²⁵ and organic foods²⁶.

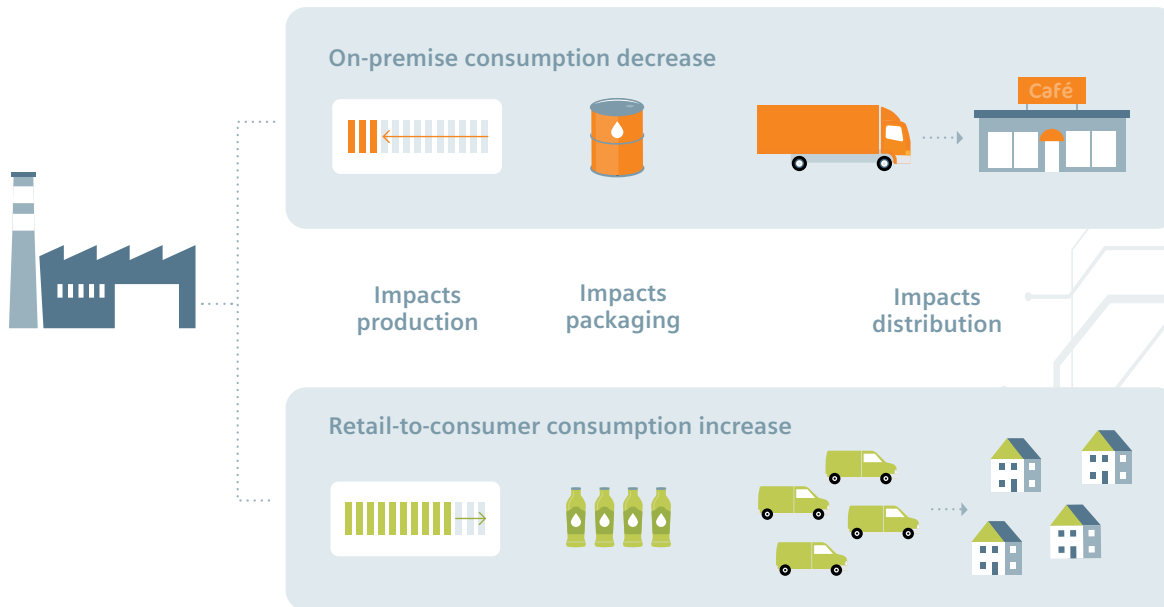
For each food and beverage manufacturer as well as in the packaging supply chain, achieving business results in line with the market – or indeed ahead of it – is a basic ambition. However, these markets are not only highly competitive, they have also been disrupted by recent events. In the good times, companies sought ways of sustaining or improving competitive pricing while maintaining, or even growing, profit margins. Now in more uncertain times, food and beverage companies need the means to adapt quickly to the challenges the markets throw at them.

Technologies, including automation and digital transformation, are one major factor in ensuring and enhancing agility, resilience, efficiency, productivity and competitive advantages for food and beverage manufacturers. For instance: connected temperature and condition monitoring automates regulatory compliance and reporting²⁷; digital twins speed up process design and testing²⁸ as well as scenario modelling for changing supply chain structures; and waste management and demand prediction can be radically advanced through improving information flows up and down the supply chain²⁹.

In the current challenging environment, there has been pressure to rapidly adapt production and packaging lines to accommodate fast-changing distribution patterns. Demand from “on-premise” consumption establishments has fallen away, while retail-to-consumer has soared. Manufacturers with more automated and digitalized platforms have found it easiest to adapt their production environment, and to cope with other disruptions such as labor shortages.

Not only is this automated technology removing concerns over workforce disruption, but it is also making it easy to change space allocation, stacking and retrieval at a moment’s notice. Automation in the warehouse has proved a boon for many food and drink manufacturers who are finding demand is often out of alignment with the volumes they are producing³⁰, as it allows them to change their storage needs week by week. Similarly, rapid rebalancing of storage management in the inbound supply chain – especially between local raw materials and imported goods – is also made easier with automation³¹. Simple robotics are increasing in popularity, not only in the West but also in Asian manufacturing operations³² – automating tasks such as washing, peeling, sorting, weighing, tray filling – eliminating human error or variability.

Adapting to changing circumstances and patterns of consumption

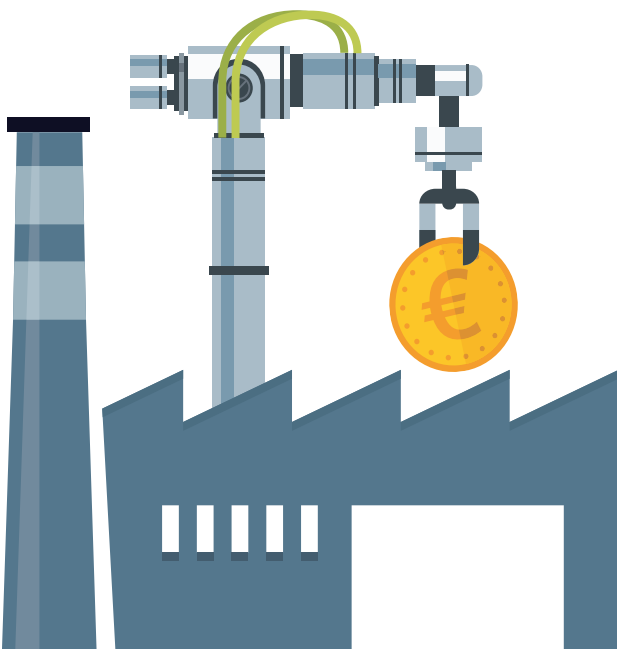


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Looking to future competitiveness and resilience in the “new normal,” technology is also enabling mass customization through packaging personalization. Labels can be personalized to offer a dialogue-like experience for customers³³ – with various iconic drinks brands using this capability both for promotional campaigns and as premium products³⁴. Further up the supply chain, sensor technology and machine learning are being used by the brewing industry to predict when beer moves from fermentation to the free rise phase – effectively “teaching” technology to predict when it is ready for the next stage of production³⁵. Similarly, artificial intelligence (AI) has been employed to identify hazards in milk or detect machinery faults before they occur³⁶. All of these applications help to minimize downtime, prevent spoiled batches and increase the operational efficiency of the production line.

Cautious food and beverage companies might be tempted to defer investment given the economic outlook and wait and see how much advantage early adopters gain from technology and equipment investment. Failing to invest early, however, may well be a strategic mistake. Firstly, greater agility is needed to cope with the current market disruptions. Second, a [previous global study](#) from Siemens Financial Services has shown that the window of opportunity to gain competitive advantage through digitalization investments is narrowing, with a “tipping point” of 5-7 years, after which manufacturers will be playing catch-up³⁷. With the competitive arena becoming tougher, both in the short-term due to the health crisis and in the medium-term due to a stalling economic environment, the pressure to invest to realize alternative solutions to production and distribution challenges is mounting. Investing in technology delivers agility, resilience and critical future competitive advantages, whether replacing whole production lines or selected machines, or upgrading existing platforms by retrofitting automation, digitalization or other important productivity enhancements.

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Agile technologies are now enabling mass customization in the shape of packaging personalization. Labels can be personalized to offer a dialogue-like experience for customers – with various iconic drinks brands using this capability both for promotional campaigns and as a premium product.

Many manufacturers have already deferred technology investment decisions, waiting for a more positive economic outlook³⁸. The economic aftershocks of the pandemic have only served to increase investment caution. Global analysts and experts, however, recommend that the momentum of investment be maintained – even during uncertain times³⁹. Studies have shown that companies that invest – even in a downturn – gain a long-term competitive advantage that their rivals struggle to match. One such study finds that “digital technology can help cut costs... [and] make companies more agile and therefore better able to handle... uncertainty and rapid change⁴⁰.” Conversely, failing to invest in technology is likely to create a disadvantage that will be difficult or impossible to overcome in the future. The same study notes that “companies that have neglected digital transformation may find that the next recession makes those gaps insurmountable⁴¹.”

Therefore, the strategic advantage of maintaining the momentum of investment today is likely to define commercial success in the future. Commentary by expert consultancies on the pandemic’s economic impact offer the following guidance: “Don’t stand still – have a plan; and invest in core customer segments⁴².” Serving those core customers better inevitably means investing in agile, flexible capabilities that help deliver added value.

The main question is how investment can be maintained, even in a slowed economic period and an impending “new normal.” This is exacerbated by calls from commentators for companies to rethink their cash positioning and hold greater reserves or access to lines of credit⁴³. Increasing use of smart financing to access digital transformation is likely to be a hallmark of this revised attitude toward cash flow as it allows companies to retain reserves from revenue to increase resilience, rather than tying up those precious funds in outright technology and equipment purchases.

3. Smart financing enables continued investment

Expert commentators are advising companies to diversify their financing sources⁴⁴, nurturing existing lines of credit, but also harnessing alternative options which do not eat into these existing lines of credit.

A good example is smart financing. These solutions are designed by specialist providers specifically to enable investment in technology, equipment, retrofits and digital transformation. This provides a financially sustainable journey through a low economic period, along with the agility and resilience to navigate the medium-term difficulties, so that manufacturers can ultimately emerge ready for growth as the markets recover. Those organizations that continue to invest tend to be more successful. A historical study from McKinsey on the 2008 financial markets crisis found that “companies that emerged in the top quartile spent 15 percent more on capital expenditures⁴⁵.” The same study also notes that these companies invested in initiatives to reduce debt and improve cash flow. For the majority of SME players in the industry, a key European study notes that, “while bank financing will continue to be crucial for the SME sector, there is a broad concern that credit constraints will simply become ‘the new normal’ for SMEs and entrepreneurs. It is therefore necessary to broaden the range of financing instruments available to SMEs⁴⁶.”

The important role played by smart financing can be evidenced by the growing number of technology and machinery solution providers that now offer integrated financing options as part of their overall customer value proposition. This makes it possible for their manufacturing clients to access a wider range of possible technology options, because they can also use financing methods that make the investment affordable and financially sustainable. Effectively, the manufacturer’s investment in technological solutions is enabled through financing which takes the expected commercial benefits of the investment into account.

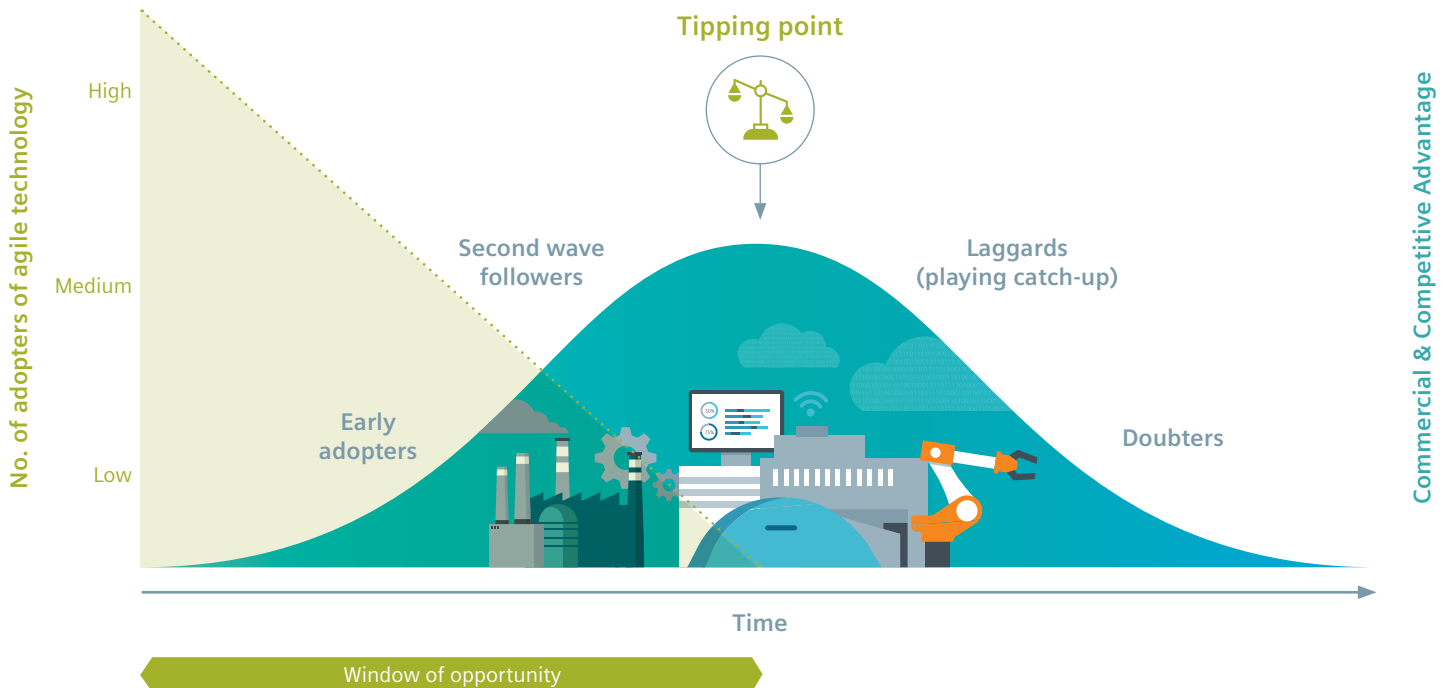
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4. The cost of not investing

What, then, is the scale of investment required to resiliently cope with the current challenges and emerge fitter and more competitive as markets recover?

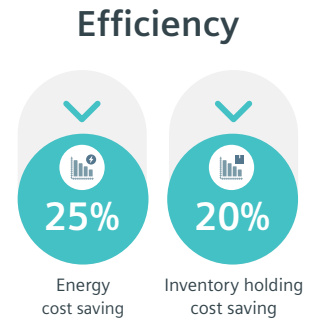
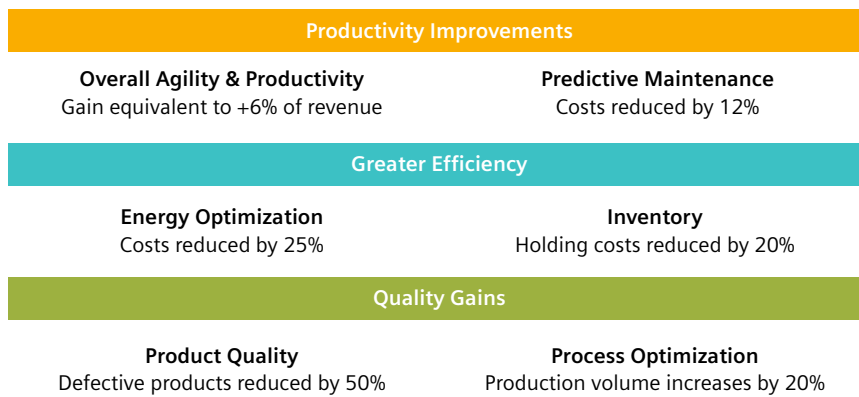
A study by McKinsey notes, for instance, that companies expect to replace around 50% of the installed base of manufacturing equipment in the course of converting to Industry 4.0⁴⁷. This replacement – a significant part of the technology investment challenge – remains an urgent matter, to achieve agility and sustainability in the current volatile markets. Only earlier movers gain the full competitive advantage from digital transformation – investing before their competitors can catch up. There is a window of opportunity to be in the first half of the market to achieve digital transformation. Previous research from Siemens Financial Services has shown that this window of opportunity to get ahead of the competition has a “tipping point” of 5-7 years⁴⁸.

Commercial benefit of Industry 4.0 adoption



Financial gains from aspects of digital transformation

Moreover, the cost of failing to invest in Industry 4.0 can be quantified financially, according a variety of studies summarized in the diagram below.



“Industry 4.0 transforms how factories operate by creating a conducive environment for Just-In-Time (JIT) practices for production, order management, and shipment. It not only interconnects disparate sub-systems of a shop floor, but also establishes digital links between the assembly line or processing unit, and the product design office, logistics services, supply chain, and stakeholders.”

The World Economic Forum, 2019

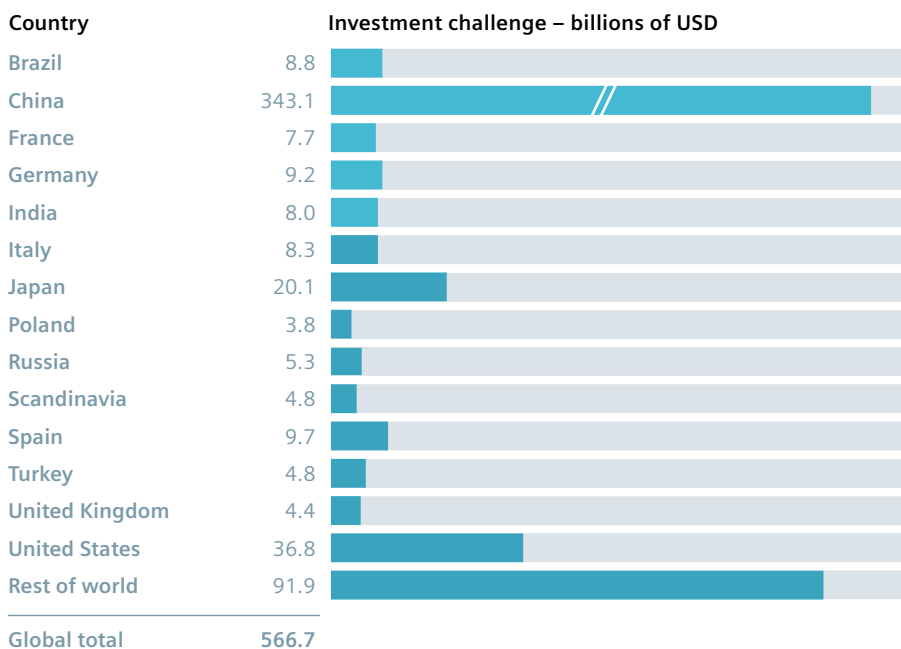
5. The size of the investment challenge

We have noted that one key element of the challenges impeding investment is the cost of digital transformation – a pressing situation for food and drink manufacturers large and small, East and West.

SFS has developed a model that conservatively estimates the size of the investment challenge faced by the global food and beverage manufacturing industry as it seeks to digitally transform – even through the current economic difficulties⁵⁵. The model takes a variety of predictions from analysts on the value of the global food and beverage industry's investment in digital transformation for the five-year period 2020-2024 inclusive. The resulting figure is then adjusted by the proportion of digital transformation solutions that the global food and beverage industry is already acquiring through smart finance. Additionally, the estimate is reduced to just half of the "available market," to give a highly conservative view of the sheer scale of investment required even to reach 50% market penetration⁵⁶.

These modelled estimates will be of interest to technology solution vendors who sell to the global food and beverage market, as they represent a large proportion of the market over the next five years, after the recovery period. Smart finance, embedded as part of the overall value proposition, will be a key enabler for solutions providers across the entire technology and machinery supply chain. Smart vendor finance makes digital transformation more financially sustainable for food and beverage manufacturers – removing their obstacles to investment.

The investment challenge for digital transformation in the food and beverage industry 2020-2024



The Siemens Financial Services model estimates that digital transformation alone in the global food and beverage industry will require \$567 billion of investment during the five-year period 2020-2024⁵⁷

Business outcomes through smart finance – wrapping up success



An innovative company has developed a revolutionary packaging system that is reducing the consumption of energy and material by food producers. With its cold wrapping technology, TrakRap has not only taken heat and waste out of the packaging line; it is working with Siemens to provide its customers with all the benefits of manufacturing digitalization.

After a physical machine is installed on a customer site, it is permanently paired with its digital twin. Existing applications feed real-time operational data to MindSphere, the cloud based, open IoT (Internet of Things) operating system from Siemens, for comparison with data generated simultaneously by the digital twin. With 24/7 microscopic management of each machine, potential issues can easily be anticipated and downtime avoided.

Digitalization is changing everything about TrakRap, transforming the way it provides and monitors machinery and the way in which it supports customers. The company works with Siemens Financial Services so that it can provide customers with a service based on output and measured in terms of “pay-per-wrap.”

The collaboration with SFS enabled TrakRap to offer this innovative solution without capital investment from its own customers and offers added value because of the significant reduction in the amount of energy and packing material consumed.



Business outcomes through smart finance – achieving a finer brew

A good example of an industry player achieving business outcomes with smart finance is a brewery company in Russia. The brewery was founded in the early 21st century and was eager to launch into new product lines without becoming financially overburdened.

Because SFS had a deep understanding of the industry, the market and the underlying technology, a tailored financing agreement could be offered. No other financier was prepared to match the offer and the technology vendors involved were keen that finance should be provided by a financier with a long track record supporting the industry and an international footprint.

The arrangement was comprised of low starting payments that rise over time; an extended financing period to reduce monthly payments overall; and no charge until new production lines had been tested and were fully operational.

The expected business outcome made possible by this special financing arrangement is 80% revenue growth from new lines of business by 2024, with the creation of almost 100 new jobs.



6. Smart finance for food and beverage manufacturers: enabling measurable business outcomes

Smart finance for digital transformation in manufacturing tends to come from integrated specialist financiers, where the funder understands the technology, the sector, the applications and the operating pressures.

Using this knowledge, they can create and align financing structures that are focused on achieving recognizable and clearly identified desired business outcomes for the manufacturer, through access to the right technology, services and advice. Aligning payments to commercial outcomes is particularly important during an economic period where all expenditure **has** to deliver an exceptionally clear and tangible link to business benefits.

Specifically, in the food and beverage industry outcomes range across: adapting production and logistics to changing patterns of consumption and distribution; product condition and quality monitoring; product prototyping and speed to market; predictive maintenance; mass customization; and supply chain efficiency and demand prediction. All areas that ensure resiliency, ability to recover and ultimately growth. So, in the current challenging climate, how is smart finance enabling such business outcomes without any loss of flexibility, agility or commercial sustainability?

What does smart financing do?



Aligns payments with rate of benefit received from the technology investment.



Encompasses equipment, software, maintenance, service and even labor costs if required to deliver a complete solution.



Intelligently flexes financing periods to fit each organization's cash flow needs and profile.



Can be linked to business outcomes, such as productivity increases, energy reduction, optimized uptime, etc.



Provides guaranteed payment level for the whole term – no possibility of variable rates.



Extends available financing arrangements beyond relationship credit ceilings – additional to core bank credit limits.

Business outcomes enabled by smart finance



1. Digitalization upgrade

Acquire Industry 4.0 technology as needed, but spread payments to align with the expected rate at which benefits will be gained.



2. Retrofit

Retrofit current hardware with digital capabilities – with upgrade options built into the financing period.



3. Transition management

Acquire new technology solutions, often in stages, with payments scheduled for when the solution is up and running.



4. Energy efficiency

Use expected future energy savings to in effect pay for energy efficient technology upgrades and alternatives.



5. Outcomes finance

A range of packages where payments can be aligned to expected business outcomes such as productivity improvements, availability or other production KPIs.



6. Sustainable growth

Financing that helps manage cash flow and liquidity at times of rapid growth with increased production capacity and productivity.



7. OEM and vendor sales enablement

Specialist financing for technology solutions that systems integrators, OEMs and distributors can offer end customers, making those solutions more affordable and increasing the likelihood of adoption.

For further information, check out

[siemens.com/industry-finance](https://www.siemens.com/industry-finance)

Key references

- ¹ Refer to graph on p. 14 of this paper for investment challenge data by country
- ² Wall Street Journal, India's Food Supply Chain Frays as People Stay at Home, 8 Apr 2020
- ³ See, for example: McKinsey, The New Normal, Mar 2009; BBC News, Coronavirus: Spain plans return to 'new normal', 28 Apr 2020
- ⁴ For instance: World Economic Forum, How companies and employees can make their best coronavirus comeback, 28 Apr 2020; World Economic Forum, Who will be the winners in a post pandemic economy? 20 Apr 2020; McKinsey, Coronavirus: Industrial IoT in challenging times, 2 Apr 2020; Harvard Business Review, How Chinese Companies Have Responded to Coronavirus, 10 Mar 2020
- ⁵ Food Navigator, Turnover, technology and trade, 2 Dec 2019
- ⁶ Food Drink Europe, Data & Trends 2019
- ⁷ New York Times, Dumped Milk, Smashed Eggs, Plowed Vegetables, 11 Apr 2020
- ⁸ Food Management Today, CCF details impact of coronavirus on cold chain businesses, 8 Apr 2020
- ⁹ Beverage Daily, Food & manufacturing companies in Europe face many challenges from the impacts of the coronavirus, 20 Mar 2020
- ¹⁰ Financial Times, UK food suppliers battle to fill the empty shelves. 19 Mar 2020
- ¹¹ CNN, Orange juice sales are soaring during the pandemic, 9 Apr 2020
- ¹² BFMTV, Pourquoi les Français achètent encore plus de produits biologiques, 12 Apr 2020
- ¹³ Financial Times, Food industry fears waste explosion as coronavirus strains supply chain, 31 Mar 2020
- ¹⁴ See, for instance: Food Navigator Asia, Safety vs sustainability: Single-use food packaging use rises, 7 Apr 2020; Federal Drug Administration, Food Safety and the Coronavirus Disease, 3 Jun 2020
- ¹⁵ Heidelberg, Print Media Industry Climate Report, 20 Apr 2020
- ¹⁶ Packaging Europe, Trade bodies warn of shortage of ink ingredients due to increased hand sanitizer production, 24 Mar 2020
- ¹⁷ Economic Times of India, Labour shortage may break supply chain in Coronavirus lockdown extension, 10 Apr 2020
- ¹⁸ Trucking capacity to ship goods from factories to ports in China is at about 60-80% of normal; McKinsey, Coronavirus' business impact: Evolving perspective, 13 Apr 2020
- ¹⁹ Food Manufacture, Fears over food impact of coronavirus, 24 Mar 2020
- ²⁰ For instance: Global Trade, How coronavirus impacts ecommerce and beyond, 13 Mar 2020; Horton International, Will logistics companies restructure? 20 Apr 2020; The Manufacturer, Coronavirus: black swan events and how to avoid them, 2 Mar 2020; Supply Chain Dive, From section 301 to COVID-19: How a volatile China changed, 31 Mar 2020
- ²¹ The Economist, The business of survival, 11 Apr 2020
- ²² For instance, Boston Consulting Group Global Manufacturing Cost Competitiveness Index, 2019
- ²³ Food Drink Europe, Making Research and Innovation Work for SMEs in the Food & Drink Sector, 2018
- ²⁴ Research and Markets, Global Food Processing Industry Market Report, 2019
- ²⁵ CNN, Orange juice sales are soaring during the pandemic, 9 Apr 2020
- ²⁶ BFMTV, Pourquoi les Français achètent encore plus de produits biologiques, 12 Apr 2020
- ²⁷ CTS Magazine, Digitalisation in the food & beverage industry, 16 Jan 2019
- ²⁸ Process Industry Informer, How digitalisation is shaping the future of the food and beverage sector, 21 Jan 2019
- ²⁹ Asia Pacific Food Industry, Unlocking the benefits of digitisation in the food and beverage industry, 8 Oct 2018
- ³⁰ New Food, How is Canada's food industry coping with COVID-19? 30 Apr 2020
- ³¹ The Hindu Business Line, FMCG, packaged goods companies scramble for local permissions for units, materials and transportation, 25 Mar 2020
- ³² Robotics Tomorrow, COVID-19 impact on food automation and robotics market, 5 May 2020
- ³³ Packaging Europe, Industry 4.0 – Are we there yet?, 24 Sep 2019

- ³⁴ For instance: Beverage Daily, The path to true liquid personalisation, 27 Feb 2019; <https://www.coca-cola.co.uk/stories/share-a-coke>
- ³⁵ Osisoft, 'Deschutes: Better Data for Better Beer', 2017 and Fortune, 'Big data meets the beer industry', 29 Jan 2019.
- ³⁶ Prescouter, 'How Food and Beverage Companies Are Implementing AI for Supply Chain Management', July 2017
- ³⁷ Siemens Financial Services, Countdown to the Tipping Point for Industry 4.0, April 2019, Estimates the time period to the "tipping point" for investment – when 50% of the global manufacturing community will have substantially converted to Industry 4.0 platforms
- ³⁸ See, for example: KPMG, A Reality Check for Today's C-Suite on Industry 4.0, Nov 2018; Business Leader, What's keeping UK manufacturers awake at night? 4 Mar 2019; Mibiz, Manufacturers expect first pullback on capex since 2009, 5 Jan 2020; Institute for Industrial Organization, WHU—Otto Beisheim School of Management, M Prause, Challenges of Industry 4.0 Technology Adoption for SMEs, 26 Aug 2019; College of Business Administration & Information Science, Chubu University, T Hamada, 12 Apr 2019
- ³⁹ A new study from Bain & Co (Bain & Co., Beyond the Downturn: Recession Strategies to Take the Lead, 16 May 2019) has reemphasized a common truth learned from previous economic turbulence in the early 2000s and in the Great Recession of 2008-9 – namely, companies that wish to survive and thrive in and after a recession need to continue to invest. The study notes that "[our] research shows that well-prepared companies emerged as winners during and after past recessions. They managed a strong defense and offense in parallel, reining in costs while simultaneously reinvesting in growth."
- A Harvard Business Review (HBR) study from a decade ago (Harvard Business Review, Roaring Out of Recession, Mar 2010) also found that the companies who come out on top and flourish through, and after, a recession are those who "reduce costs selectively by focusing more on operational efficiency than their rivals do, even as they invest relatively comprehensively in the future by spending on marketing, R&D, and new assets." HBR cites research from McKinsey.
- ⁴⁰ Harvard Business Review, How to Survive a Recession and Thrive Afterward, May/June 2019
- ⁴¹ Ibid.
- ⁴² See, for instance, McKinsey, COVID-19 – Implications for business, April 2020
- ⁴³ See, for instance, Deloitte, COVID-19 – Managing cash flow in a period of crisis, 2020
- ⁴⁴ For example, Deloitte, CFO Insights, COVID-19 – Practical steps for the immediate, midterm and long-term, Apr 2020
- ⁴⁵ McKinsey, Preparing for the next downturn, April 2007
- ⁴⁶ Food Drink Europe, Making Research and Innovation Work for SMEs in the Food & Drink Sector, 2018
- ⁴⁷ McKinsey, Industry 4.0 – How to navigate digitization of the manufacturing sector, 2015
- ⁴⁸ Siemens Financial Services, Countdown to the Tipping Point for Industry 4.0, April 2019, Estimates the time period to the "tipping point" for investment – when 50% of the global manufacturing community will have substantially converted to Industry 4.0 platforms
- ⁴⁹ Sources: SFS, Digitalization Productivity Bonus, 2017; PwC, Financial Benefits of Industry 4.0, 2018
- ⁵⁰ Sources: PwC 2018; McKinsey, How to navigate digitization, 2015
- ⁵¹ Source: SFS/Siemens DES, Future savings – current gain, 2019
- ⁵² Sources: PwC, 2018; IIoT, Bosch, an example when Industry 4.0 makes a difference, 2017; McKinsey, 2015
- ⁵³ Sources: Deloitte Insights, 2017; McKinsey, 2015
- ⁵⁴ Sources: Deloitte Insights, The smart factory, 2017; McKinsey 2015; Flex/WSJ/Emerson, How manufacturers achieve top quartile performance, 2019; Accenture, Industrial smart manufacturing, 2015
- ⁵⁵ See specific table references
- ⁵⁶ Estimation models built by Siemens Financial Services seek to avoid any risk of an exaggerated view of the investment challenge that manufacturers face globally. By sizing just half the 'available market' for digital transformation, this model builds in a margin of error for factors such as: over-prediction of market growth by analysts; price competition among solutions providers; breakthrough technologies that reduce the cost of transformation; step change in consumption of manufactured product markets; and so on.
- ⁵⁷ Core sources for the digital transformation market include: HIS Martkit, 2019; Markets & Markets, Mar 2019; GM Insights, Jul 2019; Reports & Data, Jun 2019; FM Insights, Oct 2018; Grandview Research, Aug 2019); Deloitte, 2017.

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Siemens Financial Services
80200 Munich, Germany

For more information:

Phone: +49 89 636 40019

E-mail: communications.sfs@siemens.com

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