SIEMENS

Collaborating to create the **future factory** for food and beverage manufacturers

Helping manufacturers and their innovation partners succeed
siemens.co.uk/food-beverage

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| **Introduction**

Brexit, the climate crisis, a national skills shortage, a global pandemic: any one of these factors in isolation is enough to disrupt the UK's food and beverage manufacturing industry. In 2020, all of these factors coalesced to create unprecedented levels of pressure. Both manufacturers and machine builders adapted quickly to try and protect staff while minimising supply chain issues. But they're also hard at work considering how best to move forward in the long term.

Most understand that accelerating digital transformation and maximising the value of data will be central to tackling these challenges. As new research from Siemens reveals, manufacturers know that operations need to become more resilient and agile, with minimal machine downtime and the ability to pivot production at speed. Productivity and efficiency need to go up – while costs need to go down. There's a demand for more proactive planning, more preventative actions, and more recommendations. And all of this needs to be achieved with sustainability targets in mind.

The race to transform successfully is on. Some are already out of the starting blocks, embracing digitalisation and automation to drive outcomes. Machine builders, of course, have a pivotal role to play in this shift – supporting end users with greater machine performance and roadmaps for the future. In fact, there's a growing awareness that since manufacturers and machine builders can bring different things to the table, organisations can't solve these problems on their own.
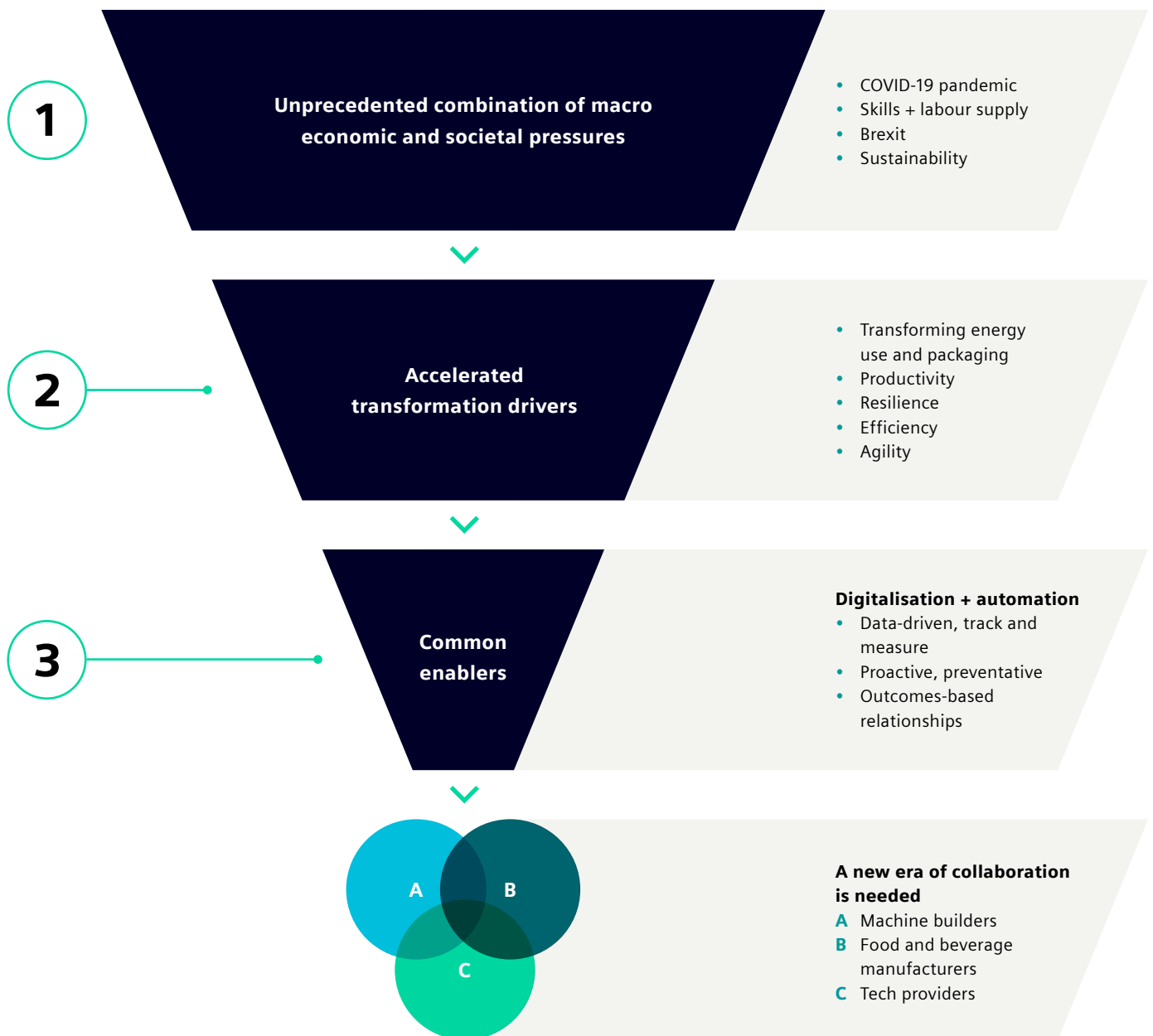
Methodology
Siemens surveyed and interviewed more than 25 of the UK's leading food and beverage manufacturers, along with the machine builders who provide them with the machines for production and packaging. Through analysis of this quantitative and qualitative research, we've established what manufacturers are seeking, how machine builders are hoping to support them – and what additional support is needed for the two groups to innovate together successfully.

Silos of innovation and best practice need to be bridged, with manufacturers and machine builders finding the sweet spot for collaboration. But as our research indicates, it's not always clear what role different parties need to play. For businesses that have historically worked on a transactional basis only, working together is easier said than done.

To achieve this, manufacturers and machine builders need clear oversight of what their respective strengths are, as well as what the other is expecting and can feasibly deliver. New partnerships and forums for innovation need to be developed - and as our research suggests, external technology providers may have a role to play in facilitating the shift.

Overall drivers and connections between machine builders, manufacturers and digital technology providers

1

Unprecedented combination of macro economic and societal pressures

- COVID-19 pandemic
- Skills + labour supply
- Brexit
- Sustainability

2

Accelerated transformation drivers

- Transforming energy use and packaging
- Productivity
- Resilience
- Efficiency
- Agility

3

Common enablers

Digitalisation + automation
- Data-driven, track and measure
- Proactive, preventative
- Outcomes-based relationships

A
B
C

A new era of collaboration is needed
A Machine builders
B Food and beverage manufacturers
C Tech providers

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Our highly competitive market means we often don't share best practice very well – it would be great for machine builders and technology providers to help with that.

International snacks producer

CHAPTER 1

The motivation for innovation in food and beverage manufacturing

Even before external factors like Brexit and the COVID-19 pandemic cast a shadow over the industry, food and beverage manufacturers were already under pressure from issues like aging infrastructure and rising costs.

Now – with technical, economic, political and workforce challenges in the mix – the manufacturers we spoke to collectively recognise that innovation and greater machine performance will be critical to their future success.
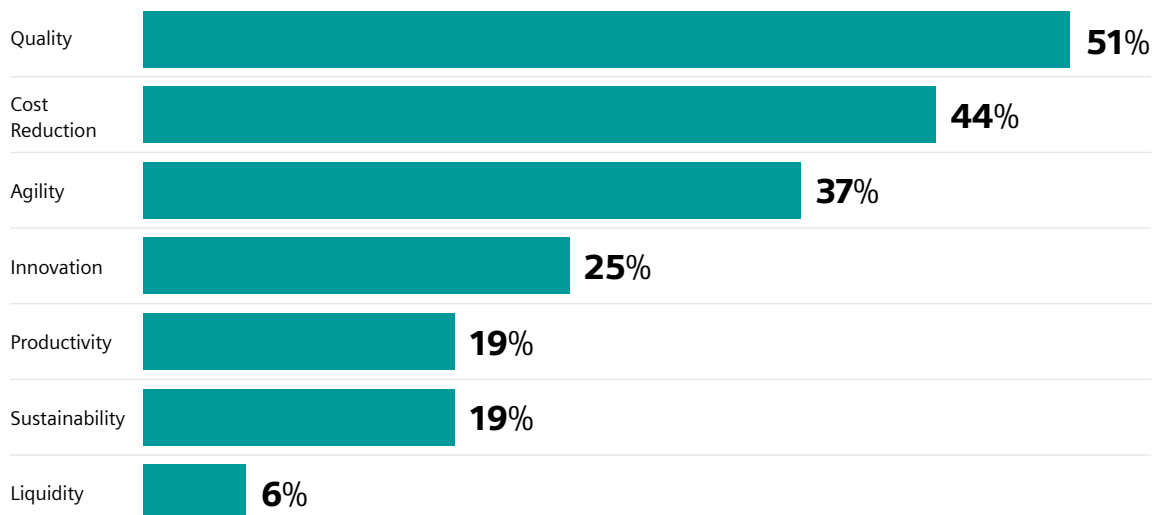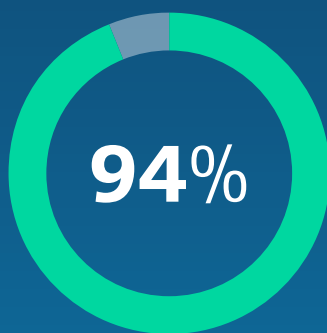
Strategic motivations

Manufacturers are looking to radically improve machine performance across a range of areas. Quality of output remains a key concern, but as our research reveals, manufacturers also need to be able to withstand disruption, adapt faster to change, and hit growing sustainability targets.

Resilience and agility

Improving business resilience, machine performance and production agility is a growing concern for food and beverage manufacturers facing supply chain risk, demand fluctuation, and production challenges. Even brief downtime can have serious and wide-reaching effects, meaning there's strong industry appetite both for improved diagnostics, but also for proactive, preventative maintenance of machinery – an approach which can limit unpleasant surprises by identifying potential machine failures and resolving issues before they occur.

Highest current strategic priorities (ranked 1 or 2 from list)

Priority	Percentage
Quality	51%
Cost Reduction	44%
Agility	37%
Innovation	25%
Productivity	19%
Sustainability	19%
Liquidity	6%

94%

of the food and beverage manufacturers we spoke to say resilience is discussed more frequently in leadership meetings and planning than it was five years ago.

Threats to the supply chain at home and abroad are driving a need for better scenario planning, with manufacturers seeking the ability to change production levels quickly as needed. Accordingly, 75% are exploring greater flexibility for production times – and 75% are seeking ways to scale up and down faster to meet demand closer to real time.

Efficiency and productivity

The demand for greater productivity has always been present in manufacturing. However, growing pressures – like labour shortages and a need to facilitate remote working, for example – mean manufacturers are facing spiraling workforce productivity challenges. Bots and automation provide the opportunity to reduce spreadsheet work and repetitive tasks, but skills gaps mean innovation can't always be taken advantage of. Manufacturers ultimately need support, not only with machinery and software that facilitates automation, but with people and process training.

At the same time, manufacturers are striving to create efficiencies wherever they can, minimising costs while maintaining quality. One way of doing this is to improve machine resilience and extend equipment life cycles; many of the manufacturers we spoke to are looking to sweat their assets more effectively to avoid the need for costly new kit.

Doing this successfully requires better maintenance and understanding of asset health – which in turn demands not only better HMIs and dashboards with smarter integrations and greater visibility of machine data, but also the skills and experience to understand and respond to that data at speed.
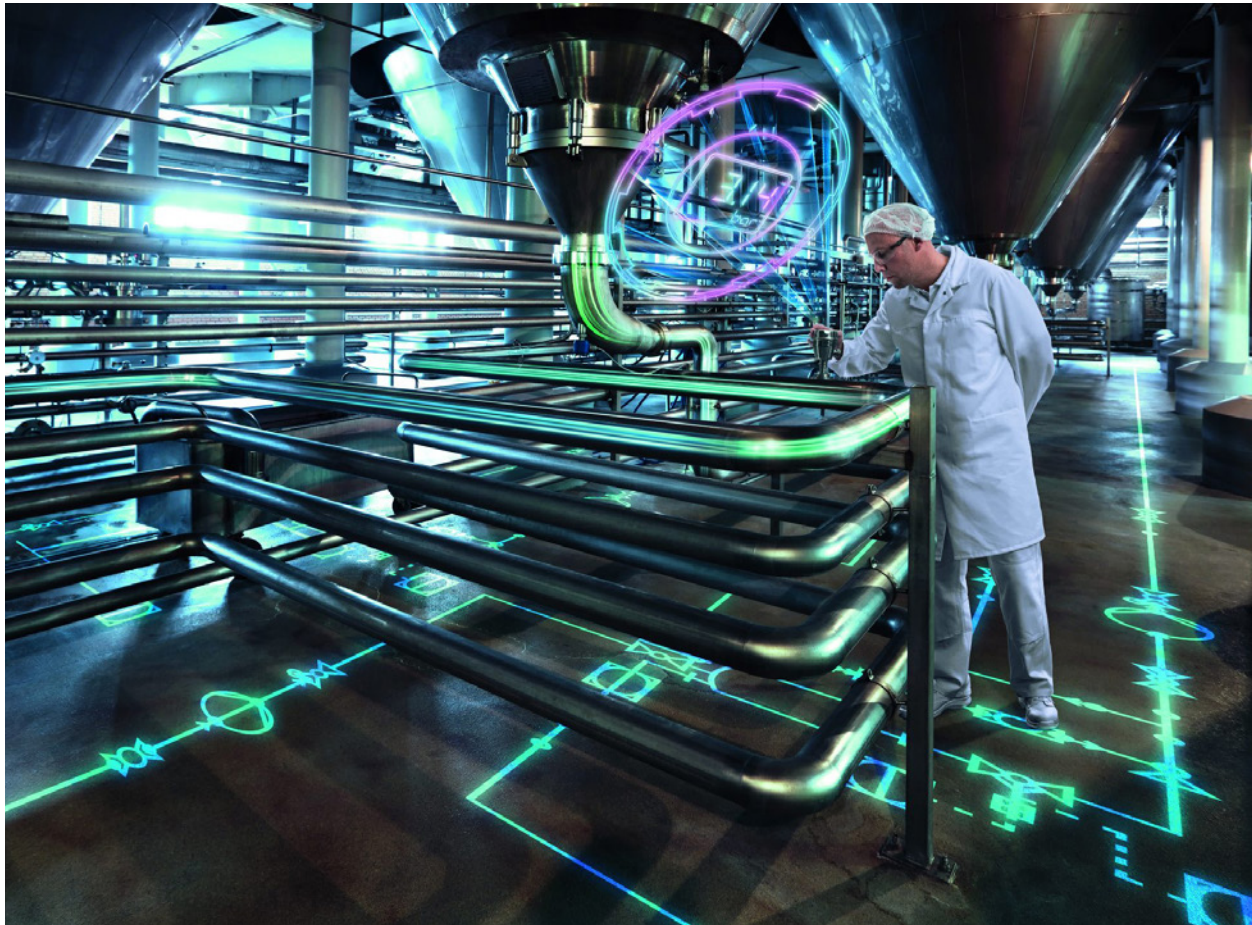
Sustainability

From environmental legislation to investor and consumer pressure, sustainability is high on the agenda. Having the ability to transform energy use and packaging is rapidly evolving into a central issue for suppliers and consumer food and beverage brands alike, with three quarters (81%) strongly agreeing with the statement:

"Sustainability in energy efficiency, packaging and recycling in our business will receive much more focus in our business in the coming years."

To achieve this goal, manufacturers must be able to track, measure and mitigate their environmental impact. But as it stands, many lack the ability to accurately understand their energy usage or the carbon footprint of their production and operations environment. As one manufacturer put it:

"We're pulling together a carbon zero plan now but there are still some big unknowns at the infrastructure level."
National baker

Some are more mature than others, but all are reaching the end of the road with conventional efficiencies for energy and downgauging for packaging. Having done all they can, the onus is increasingly on machine builders and other technology providers to help manufacturers reach the next stage of sustainable productions.

For all of these strategic priorities, digital transformation – and in particular, better access to and ability to use data – can deliver powerful results.

Data can improve resilience, providing a real-time view of machinery health to enable proactive maintenance and faster repairs. It can boost efficiency and productivity, if used to power automation and free up staff to focus on other tasks. And with better visibility through data, manufacturers can make strides towards sustainability goals, whether that's greener packaging, minimising waste or using energy more efficiently.

But as it stands, food and beverage manufacturers face serious challenges in gathering, analysing and reacting to data effectively. For the industry to progress, these roadblocks must be overcome.

CHAPTER 2

Data and **digitalisation**

Production line environments are rich with data. And as Siemens research shows, manufacturers are keen to both utilise it effectively, and embrace digitalisation more widely.

- **75%** are discussing digitalisation more than they were two years ago

- **81%** are exploring ways of capturing more production line data

- **81%** are exploring ways of managing and analysing production line data

Yet data maturity is low. Almost half (50%) of the manufacturers we spoke to are in the early stages, with an additional 38% only somewhat mature. Some have limited data visibility, with interfaces that make data gathering difficult to manage, while others have an abundance of data but no real sense of what to do with it.

Fundamentally, all the data in the world means nothing if it's not possible to analyse and respond to it in a timely manner. It should be noted, however, that this is as much a point around people and processes as it is technology. As automation and data gathering increases, the demands on people change. There's anxiety about what growing automation means for certain roles. And while the value of greater data usage and digitalisation is obvious, the absence of relevant skills in the workforce means it's difficult to realise value.

Approach to digital and data-driven strategy for production line assets' performance and maintenance
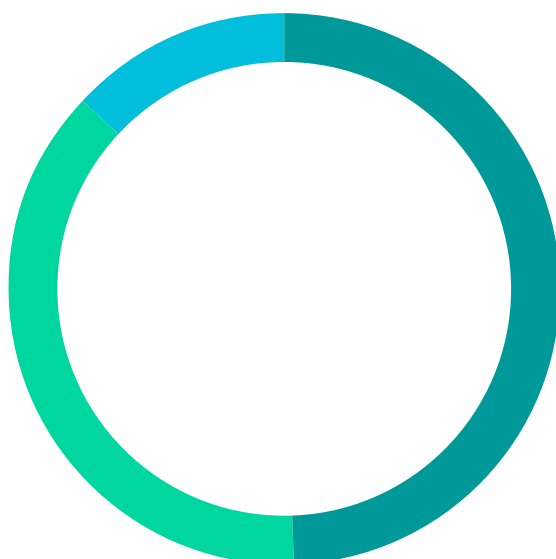
50%
Early stages currently limited data visibility across assets

38%
Somewhat mature some data helps asset visability but aware there is more to do

13%
Leading compared to peers at the cutting edge of new capabilities

As a result, some of the businesses we spoke with are cautious about a tech-led agenda which neglects to facilitate people and process change sensitively. Even as tech evolves and digital transformation accelerates outcomes, it can create serious problems with those working on site – particularly for those whose roles have historically involved monitoring and measuring machine performances across a range of screens.

Increasingly, with this information accessible on a single screen, employees are being asked to shift to more analytical, problem solving roles. And that means major cultural and skills evolution is required, whether that's reframing objectives, retraining those whose jobs have been impacted by automation, or bringing in external support to upskill existing workforces to be able to interpret data effectively. Ultimately, those working in the industry need thoughtful support and considered training to move in step with transformation – or the advantages of new technology could be outweighed by the strains placed on the people involved.

Supporting change

With so much complexity to wade through – and with technology, people and process challenges to untangle – food and beverage manufacturers need support if they're going to succeed. Machine builders and other industry tech providers have an important role to play – and as both our survey and interviews made clear, manufacturers are looking to these organisations to assist.

When we asked manufacturers what support they would most value from machine builders in order to address challenges, responses included:

- More guidance and visibility of their digital strategy for assets

- Service support and training

- More collaboration on product development and roadmaps

- Guarantees that assets with be kept up to date with digital factory norms and connectivity over their lifecycle

- Guarantees on KPIs

Firstly, there's an emerging sense that manufacturers want to evolve how they buy machinery. Their desire for assurances around KPIs, and SLAs, suggests that a shift to a service servitization model could be beneficial, rather than simply buying machinery and taking it from there.

Beyond this, they want to work with external partners to evolve, adapt, learn and grow. With internal skill sets often lacking, manufacturers are seeking expert voices that can guide them on resilience, agility and predictive capabilities. And they don't just want access to more data – they need help turning this into useful, actionable information.

The expectation from manufacturers is clear – and according to the providers we spoke with, most machine builders recognise and understand the need that food and beverage manufacturers have. However, our research also indicated that there's more work to be done before they can fully support.
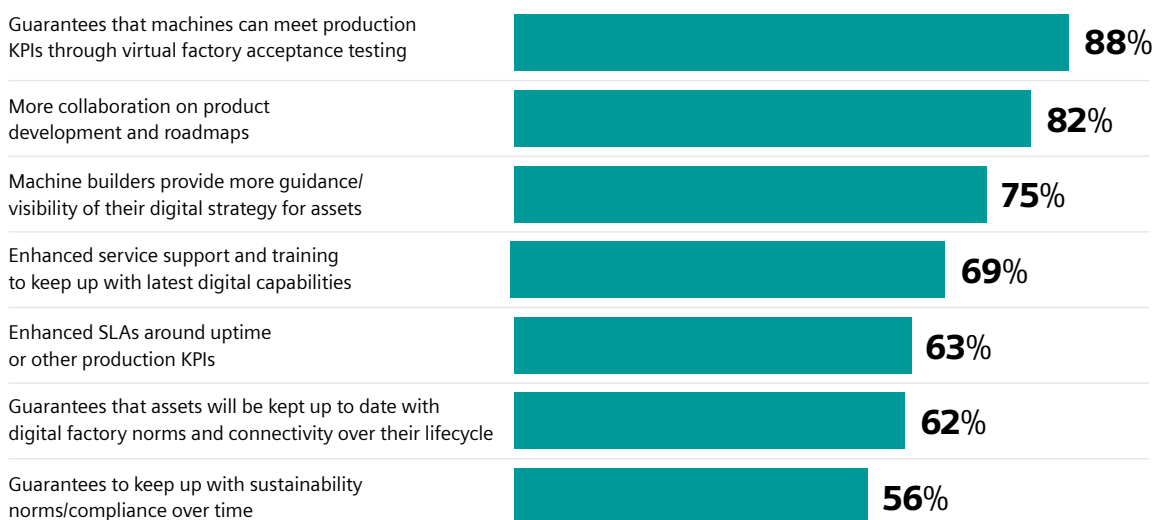
"We want actionable insight and useful dashboards – please don't just throw data at us. There's a lot of high concept discussion of digital transformation but this clashes with the lack of evidence-based results and tangible impacts. Many pilots haven't been game-changing."
International flavourings manufacturer

"We also expect machine builders and technology providers to share best practices and use cases that are applicable to us – and offer more guidance on frameworks and relevant outcomes. The culture and integration gap between OT and IT is an issue in terms of data but also resilience and cyber security, for example – help us bridge it."
International flavourings manufacturer

Support most valued from machine builders to address current challenges around digitising production assets and taking action on data they provide: ranked 4 or 5 on scale of 1 (no value) - 5 (extreme value)

Support	%
Guarantees that machines can meet production KPIs through virtual factory acceptance testing	88%
More collaboration on product development and roadmaps	82%
Machine builders provide more guidance/ visibility of their digital strategy for assets	75%
Enhanced service support and training to keep up with latest digital capabilities	69%
Enhanced SLAs around uptime or other production KPIs	63%
Guarantees that assets will be kept up to date with digital factory norms and connectivity over their lifecycle	62%
Guarantees to keep up with sustainability norms/compliance over time	56%

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We increasingly expect proactive, predictive and preventative relationships with machine builders. We're realistic about what kind of SLAs are possible – but we'd like advice on best practice and expected performance on longevity and maintenance cycles.

National baker

CHAPTER 3

Stepping up to support:
Machine builder ambitions

At present, machine builders are some way off being able to collaborate with manufacturers on all of their strategic goals. Their capacity for innovation is significant, and many are collaborating with manufacturers successfully on specific briefs and problem solving – such as making specific machines more agile.

Broadly, the providers we spoke with feel they can offer guidance and visibility of digital strategy for assets, and assurance that assets will be kept up to date with factory norms and connectivity over their lifecycle.

Yet as the industry gets to grips with ambitions around the data-driven factory of the future, a general shortage of data and analytics experts in the industry means machine builders aren't yet in a position to help to full effect.

However, they have ambitious plans for the future.

This includes:
- Collaborating on product development and roadmaps

- Expanding their capabilities for capturing and analysing data

- Offering enhanced SLAs around uptime or production KPIs

- Giving assurance around sustainability norms and legislation

Innovation in action

Facilitating agility

Machine builders are exploring how they can help manufacturers pivot at speed – a capability that has proved crucial during the Covid-19 pandemic. Some manufacturers have needed to adapt packaging, repackaging products previously sent to hospitality businesses for a direct-to-consumer model. Others had to change the size of packaging; it's just one example, but with many spending Christmas in lockdown, demand for large turkeys decreased, meaning there was a greater need to package crowns and legs.

Machine agility is fundamental to achieving this. It can also contribute to sustainability goals, as green packaging alternatives emerge and manufactures have to adapt. And it may even support manufacturers looking to decentralise sourcing and rely on food grown locally – meaning the goods requiring packaging change with the seasons.

One machine builder we spoke with is exploring delivering smaller units with more flexibility, and configuring units to be easier to switch in the future. Another is looking to create a more flexible, modular approach, with assets that are easier to deploy and upscale.

Meanwhile, several of the machine builders we spoke with are providing more freedom by offering more flexible terms.

Creating the conditions for resilience

With end user manufacturers seeking more assurance about performance and availability, machine builders are increasingly advising on predictive capabilities – along with proactive maintenance and preventative fixes – to ensure operations can continue without interruption.

Many machine builders agree they should act as the experts on how their equipment runs, how it can be maintained, and how assets can be sweated – although they're also aware that some use cases are very specific, making it hard to commit to contractual guarantees in a scalable way.

Our research also suggested that, while 91% of manufacturers are discussing resilience, not all of the machine builders we spoke with are having these discussions with end users – meaning there's a need for more conversation between the two groups.

Remote management

The Covid-19 pandemic has forced an acceleration for those exploring how the production line can be managed, maintained, altered or analysed remotely.

However, the constraints of lockdown aren't the only motivating factor here. With skills in such short supply, using augmented reality or remote management capabilities eases the burden on a limited pool of skilled individuals being physically in the room.

Data management

With manufacturers producing more and more data, machine builders are looking to support them with utilising this information effectively. What this looks like in reality varies – from dashboards that make data easier to understand, to integrations at the edge that ensure insight can be shared easily.

As with manufacturers, the overall conclusion is that machine builders are working hard to innovate and accelerate digital transformation – all while moving towards an operational model that enables everyone across the industry to collaborate for better outcomes.

However, the fact remains that there are still hurdles to be jumped on both sides – such as talent shortages, facilitating collaboration, and even financing the necessary transformation.

Rethinking finance

The need to invest in new technologies, new processes and training for employees is clear, both for machine builders and the manufacturers they serve. However, as many of the organisations we spoke to were well aware, it isn't as simple as identifying the need and responding to it.

Financing any new investment (and finding the time to plan and execute new tech or training) is a serious barrier. And while the demand for training is huge, there are a limited number of experts operating within the industry who can deliver this.

Collaboration
for the future factory

Although there's a clear sense of where innovation efforts should focus, there are undeniably, many challenges afoot for both food and beverage manufacturers and the machine builders hoping to support them.

There's uncertainty about finding or developing the right talent to lead on key projects. Since no single organisation alone has the time, talent and resource to solve all of the industry's problems, a big cultural shift is required to facilitate the collaboration that's needed. And with so much innovation required, organisations are also being placed under financial pressure, at a time when many are already feeling the pinch due to the broader economic situation.

But, more positively, there is an emerging sense of how to move forward.

As our research shows, manufacturers understand both the trends in the market, and what innovation should look like in order for the industry to thrive. From smarter data analytics to remote management and greater flexibility in the production line, these businesses can see a smarter, more resilient and more agile future for the factory floor – and they're keen to build on recent transformation changes and learnings.

Perhaps most importantly, there's a growing sense that businesses don't have to figure all of this out alone. Everyone involved sees the need for a more holistic approach to achieving all of these ambitions – with people, processes and technological innovation considered in tandem, rather than siloes.

There's an appetite for collaboration, understanding, and sharing of best practice across the industry. With skills in short supply, and pressures mounting, food and beverage manufacturers are keen to be supported and guided by those who provide their production line equipment. Machine builders, meanwhile, are also keen to share knowledge across the industry, while taking on more of a consultative role for manufacturers.

But since this level of collaboration is new ground for an industry that has traditionally worked in siloes, there's a need for external partners to step up and facilitate.

Where next: Five areas for collaboration Here are five areas we believe machine builders, technology providers and manufacturers should aspire to work together:

1 Data-driven innovation: ways of capturing information and using it to innovate production and processes - e.g. digital twins, simulations, scenario planning.

2 Combining people, process and data: frameworks for assessing the need, understanding impact and then managing change

3 Finance: budgeting and optimising the costs of innovation

4 Joint vision for sustainability: sharing best practice and innovation from across the industry and supply chains

5 Going beyond the food and beverage industry: sharing best practice from other heavy heat and energy users
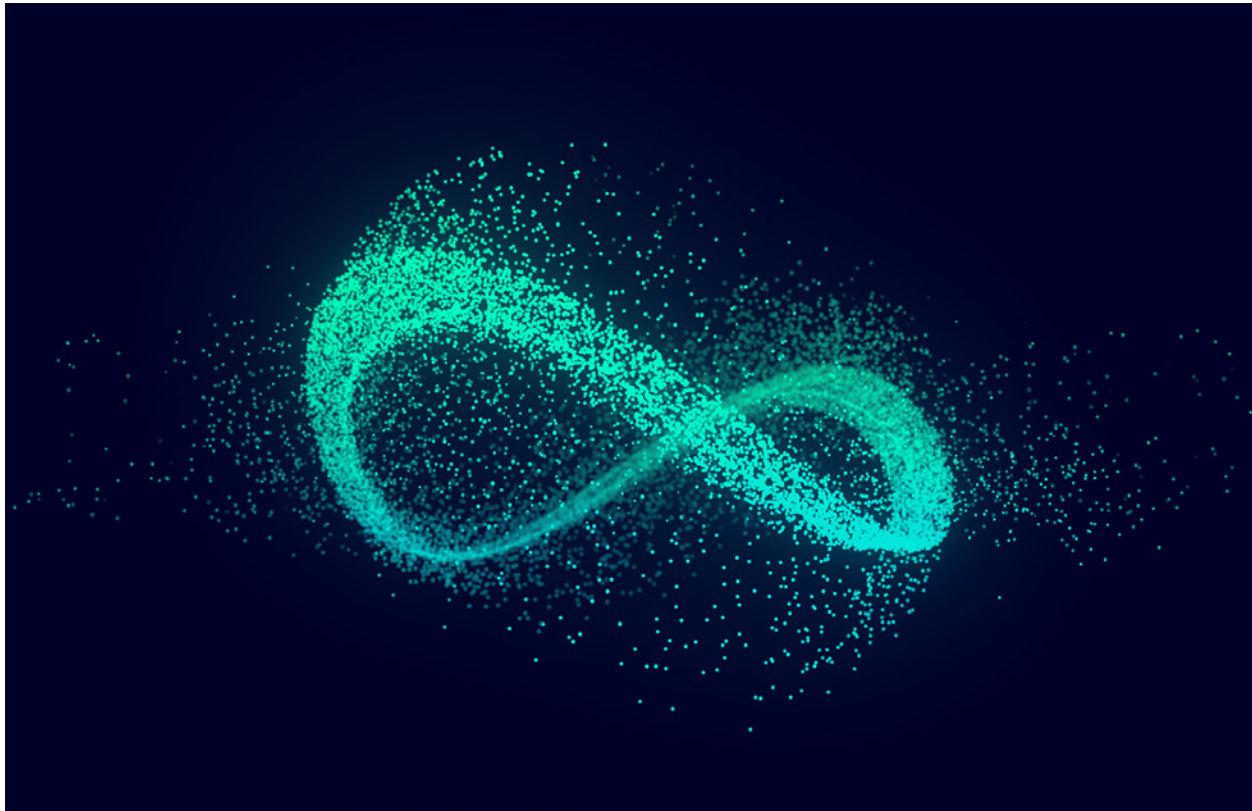
Experience in action: Siemens' expertise

Siemens' global scale and expertise means we've long been at the forefront of innovation in digitalisation and automation. We work closely with manufacturers, machine builders and other technology providers to continuously improve their operations for the digital future.

Ultimately, this means we have the ability to combine the theory of digital transformation across the industry – with real world experience and best practice for making it happen. We can offer expertise, planning and even the finance packages to support change.

TrakRap: A worked example

Siemens has worked with packaging solutions provider TrakRap to create a cheaper, more efficient and more sustainable alternative to traditional secondary wrapping processes. TrakRap's 'orbital wrapping' process uses the Siemens SIMATIC and SINAMICS platforms to continually control the tension, speed and angle at which wrapping has to be applied.

The process has been met with positive feedback from manufacturers – but as TrakRap discovered, certain items are more difficult to package than others, due to instability. Siemens supported TrakRap to develop a new machine that can counter this, through a collaborative project with several external partners.

This project has used Siemens technology to virtually develop, test and commission TrakRap's latest machine on a digital twin – a fully functioning 3D computer model of the machine. This positioned TrakRap to run simulations and design new solutions to problems that weren't immediately clear.

This isn't only a clear example of the tangible value possible from data; digital twins of this type are also a clear way of understanding a machine's 'business as usual' performance in detail over long periods of time.

As TrakRap CEO Martin Leeming says:

"We now think of our machine not so much as a physical entity but as a flexible software platform that can adapt to different types of environment, product and set up, enabling us to predict quality, throughput and timescales."

Learn more **here**

To find out more information visit our website: **www.siemens.co.uk/food-beverage**
or get in touch with our experts **here**