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Global Food & Beverage Industry Trends Report

Assessing the growing impact of digital technologies as new priorities take center stage for the global food & beverage industry

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There are serious considerations to be weighed when making the decision to invest in technologies.

Introduction

This report offers a snapshot of how the food and beverage industry is using digital technologies across the supply chain to address business challenges, and identifies key trends the sector will face over the next two-to-five years.

Advances in technologies, from data analytics and increasing integration to robotics and artificial intelligence, are changing the way companies operate and are making significant innovations possible in how food is produced and delivered to the consumer.

The Covid-19 pandemic has highlighted a range of vulnerabilities in the supply chain and has accelerated the adoption of technology in many parts of the food and beverage industry. Without a doubt, it has boosted the growth in ecommerce, increased demand for locally grown fresh produce, and heightened concerns about the environment and sustainability. It has also spurred more businesses to look to digital technologies to help improve efficiencies and, looking to the future, reduce waste.

There are serious considerations to be weighed when making the decision to invest in technologies. The business costs and challenges are different depending on where you sit within the food supply chain, the size of the company and the volatility levels of the niche sector. The question of return on investment is a crucial one, as is cashflow and whether to bring in outside investors.

In order to find out how the industry is rising to these challenges, we surveyed over 300 executives, both industry influencers and food and beverage companies, and asked them a range of questions to establish where digital technologies are becoming more prevalent across the sector and how this is likely to look in the next few years.

We also asked for contributions from three key players in the food and beverage industry who each bring their own perspective from different parts of the sector. They are TVN Reddy, Chief Executive Officer of Aptean, a global provider of industry-specific enterprise software whose clients include meat processors, fresh produce producers, bakeries, dairies and food manufacturers. Vonnie Estes, who is Vice President, Technology, of the Produce Marketing Association, a global trade body with 2,200 members across the food supply chain. And Seana Day, a Partner at Better Food Ventures, whose investments in food and agriculture technologies span the value chain.

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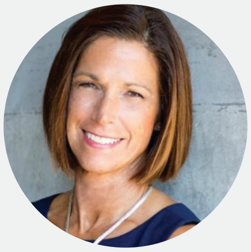

VONNIE ESTES
Vice President of Technology
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About Aptean

Aptean is one of the world's leading providers of industry-specific software. Our enterprise resource planning and supply chain solutions are uniquely designed to meet the needs of specialized manufacturers and distributors in over 20 industries, including food & beverage.

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Most companies on the food industry supply chain are somewhere on the continuum of digital adoption. The core system of the supply chain is digital and all operations are becoming digital. It is an essential part of the market now.

TVN Reddy, **Aptean**

The state of digital transformation in the food and beverage industry

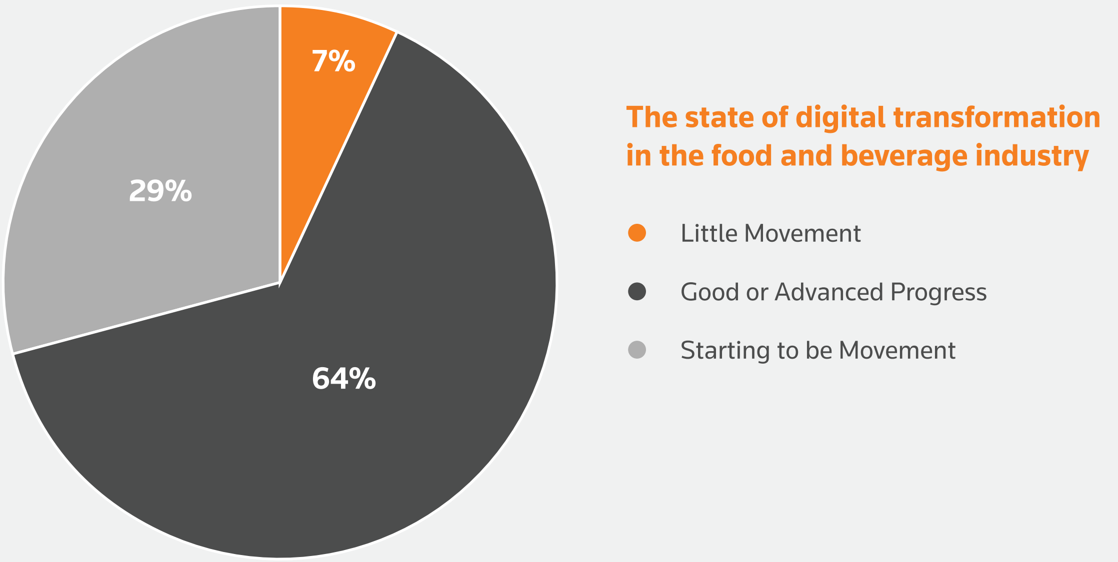
The food and beverage industry is embracing technology but it is not a uniform picture. Our survey of 300 executives found that 64% are seeing good or advanced progress in the move to digital and another 29% indicated that they were just starting on the journey to digital or saw some positive movements towards adoption across the sector. On average, only 7% of respondents indicated they had no plans to move to digital or see little movement towards digital in the industry.

Taking a look behind those figures reveals striking differences in the approach to digital adoption across the different segments of the food chain from producer to consumer. Seana Day, Partner at Better Food Ventures, has found from her own research that, over the course of the past five years or so, investment and adoption has largely been focused on the farm technology side and improving the consumer experience.

"Billions and billions of dollars have flowed into these areas but there has been significantly less investment in the 'messy middle' of food and agriculture, that is the farm gate to backdoor — production, distribution, logistics and demand side."

This is against a backdrop of what TVN Reddy, Chief Executive Officer of Aptean, describes as "the inevitable transformation of the food industry". "Most companies on the food industry supply chain are somewhere on the continuum of digital adoption", he says. "About two-thirds are on the right of that continuum, better than 50%. The core system of the supply chain is digital and all operations are becoming digital. It is an essential part of the market now."

The size of the company also plays a part in how much money companies are setting aside to invest in technology. "Companies with revenues of less than $5 million have more of a focus on building that revenue and customer base than investing in technology," says Reddy.



Vonnie Estes' perspective comes from her role as Vice President of Technology at the Produce Marketing Association. "On the farm there is not as fast adoption as you would think, although the pandemic means that this is now changing across the supply chain."

The first stage of the food supply chain, from farm gate to first hand-off is also where Day has observed a lack of technological innovation, whereas at the other end of the chain "there is tremendous innovation".

Aptean Food & Beverage

Aptean customers include meat processors, fresh produce producers, bakeries, dairies and food manufacturers, and understand that each industry deals with specific challenges that require specific food and beverage software solutions. At Aptean, we know food.

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> **There is a significant opportunity we are seeing in the volume of companies focusing on digitalizing logistics to the next generation of supply networks.**
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> *Seana Day,*
> **Better Food Ventures**

"On the demand side there are more big retailers and food service providers dabbling in technology adoption but in the areas of production, processing, distribution and logistics these are dominated by incumbent providers where digital adoption is not new, it is incremental, it is enterprise software," says Day.

This is confirmed by the findings of our survey of food and beverage industry executives, which noted encouraging responses from food and beverage companies, with 58% saying that they are either seeing good progress or are already advanced in their digital capabilities.

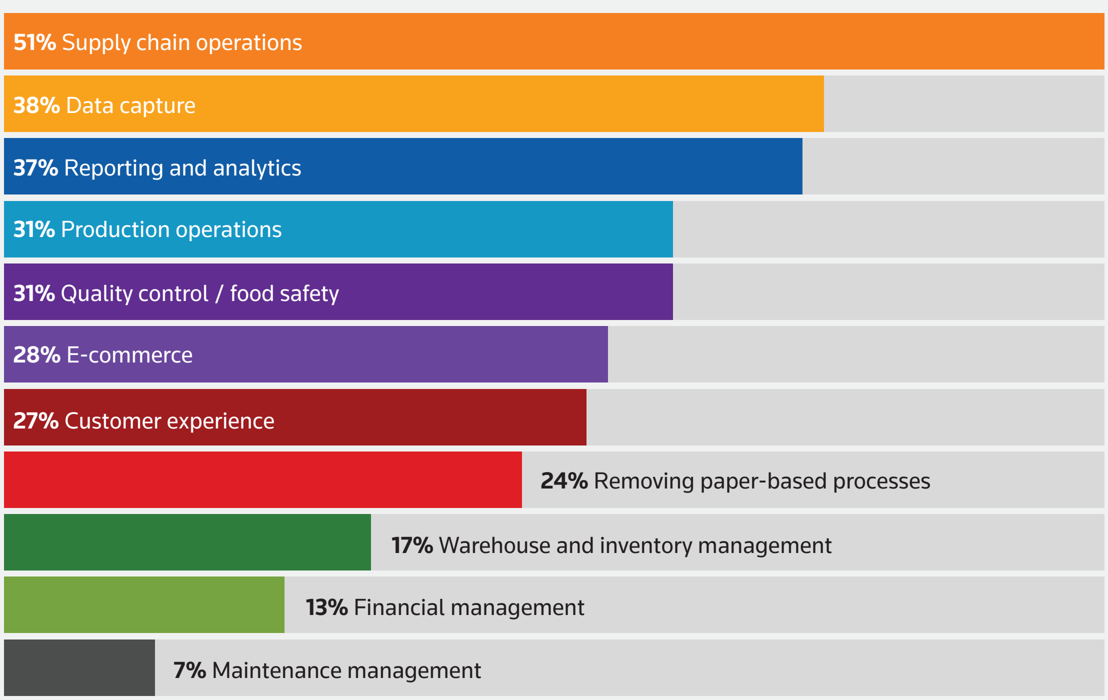
According to Reddy: "Whether you are a manufacturer, fresh food company, seafood processor, a grower, or a retailer, all companies will have similar needs in terms of digital technology, to help them gain insights into their own business and the market."

Where digital technology is having the biggest impact

Supply chain operations are reaping the greatest rewards from the growing application of digital technologies in the food chain, according to our survey. Fifty-one percent of respondents cited this part of their business as benefiting from technology, with data capture (38%) and reporting and business analytics (37%) also being significant.

This focus on the supply chain operations chimes with Day's observations of where the biggest impacts are being made and where the opportunities lie. "There is a significant opportunity we are seeing in the volume of companies focusing on digitalizing logistics to the next generation of supply networks. We have trucks going across the US empty or with partial loads and we are seeing the benefits of transport management systems that provide visibility and insight into the logistics of the market."

The primary benefits of digital technology



Innovation is also having a significant impact on cold chain and cold chain monitoring, an essential development if the huge levels of food waste are to be addressed. "Getting into this big picture of waste, we are all focused on the 40% of calories produced globally that are wasted. Much of this happens between the farm gate and the retailer as a result of finite shelf life and wild fluctuations in temperature. Historically this

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On the farm, data from sensors and artificial intelligence offer much better insights than what you can see with your eyes and growers can really see the difference.

Vonnie Estes,
Produce Marketing Association

has not been well tracked and managed, but there is an abundance of technology available and now we are starting to see the adoption of the technology, particularly in fresh and perishable items," says Day. This feeds into the concern with food quality and safety that 39% of the industry respondents highlighted as being helped as a result of the use of digital technology.

Logistics is an area also highlighted by Estes, who has also seen the benefits that can be enjoyed through innovations in the use of data capture. "On the farm, data from sensors and artificial intelligence offer much better insights than what you can see with your eyes and growers can really see the difference. For example, there can be efficiencies in using less labor, particularly at a time when labor shortages are an issue. One company I have worked with has sensors that can track how much workers are doing and when they are taking breaks."

The technology that is enabling a rapidly rising number of consumers to purchase food online is also having a tremendous impact, and Estes sees this only continuing to grow. Ecommerce was identified as a significant area of impact by 30% of our survey respondents.

In response to this demand, Aptean has just launched two new solutions, Aptean Pay and Aptean Ecommerce, for its clients. "This, plus our data analytics tools that monitor and optimize the business and decision making, are all focused on how we can, through technology, enable competitive advantage in the marketplace," says Reddy.

What is inhibiting more adoption of digital technology?

There is common ground in the top three barriers inhibiting adoption of digital technology cited by the survey respondents. Food and beverage companies and industry influencers agree that knowing how to use/integrate solutions (51%); lack of budget/investment (50%); and lack of time/resource (34%) are the principal factors that are restricting more adoption across the industry.

With a lack of knowledge of how to use and integrate solutions being highlighted as one of the biggest factors inhibiting more adoption, it is incumbent on technology providers to ensure they are prioritizing easy integration with their solutions and to educate the industry further on the benefits technology can provide across business lines.

The issue of integration is also underlined by Estes, Reddy and Day. For Estes the problem has been one of the biggest barriers to more adoption but she says this is changing: "People come along and say 'I have an app for your phone' and suddenly the farmer has 20 dashboards — nutrition, water, temperature and more — and they don't talk to each other. The issue is of interoperability. All of this data but it doesn't mesh. Now this is starting to change. Companies are coming along and saying, let me gather all that stuff for you and I'll give you one graph on a dashboard. It's part of the evolution of technology."

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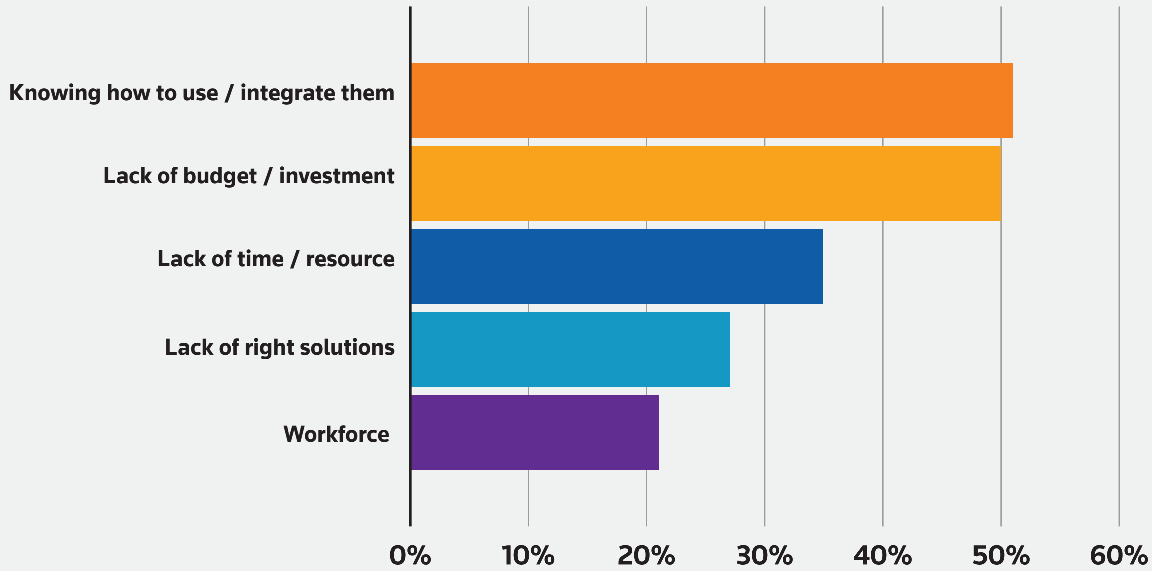
TVN Reddy, **Aptean**

Barriers to adoption of digital technologies



In Reddy's experience, these barriers are particularly prevalent for mid-market companies. "For smaller companies in particular there is a real concern about integration and whether the technologies they are interested in adopting will work together. Big companies in contrast have big IT departments that can handle all of these issues. For smaller companies it is a matter of education to explain to them what technology can do for their business. A lot of these companies have grown from family-owned enterprises and so there is a lack of awareness about technology. There is also the issue of being just too busy."

Day describes the barrier to more adoption of digital technology in one word "culture". "Change is difficult," she says. "Particularly in that first mile between harvest and packer, shipper and processor there has not been a high degree of comfort with technology. But now we are seeing more and more interest in it, particularly among the larger vertically integrated food or agri-production companies. They are starting to say that they are ready to adopt off-the-shelf technology after several years of trying to develop their own. They have found that hard to do and difficult to maintain."

Being able to demonstrate a good return on investment is important, particularly for smaller companies. "For them it is always the case that money is tight," adds Day.

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The pandemic has highlighted major vulnerabilities in the food supply chain.

The impact of the pandemic on the adoption of technology across the food chain

On January 30, 2020 the World Health Organization declared the Covid-19 outbreak a global emergency. As of early November more than 46 million cases have been reported worldwide and 1.2 million deaths.

At the same time, the pandemic has highlighted major vulnerabilities in the food supply chain. "In our industry there is a big difference between food that goes to the grocery store and food that goes to restaurants and hotels," says Estes. "No one realized what a potential issue that was. So when all the restaurants closed down, there was all this supply and no one could figure out where it could go. Valuable lessons have been learned about the supply chain and the resilience there."

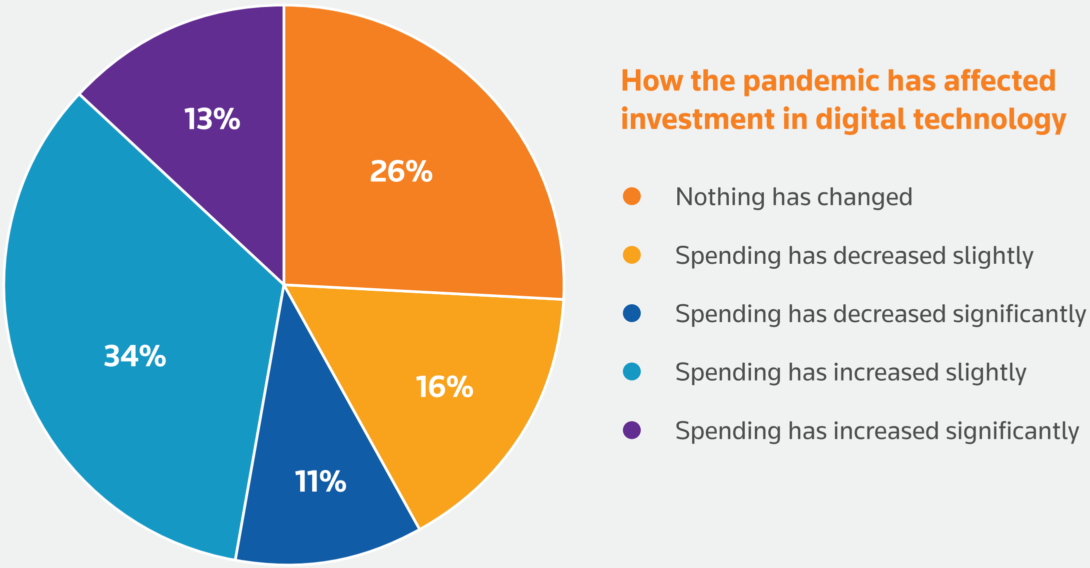
Reddy believes that in the longer term this will translate into an acceleration of the adoption of technology across the food chain, although in the very short term "companies are often too busy coping with demand".

The pandemic has also exposed the vulnerabilities in technology itself, which in turn has led to more work for Aptean. "During the pandemic food companies have not just had to deal with IT staff becoming ill but some have also been hit by cyber security issues, in particular ransomware [a type of malware that freezes files and demands money to reopen access]. As a result, there has been increased demand for our solutions. People want to move to the cloud, to have back-ups. If you don't have the right IT person on the floor then things can go down," says Reddy.

The hackers have tended to go after smaller companies, Reddy adds. "We have been active in providing all our offerings, allowing companies to ease into the cloud economically. We are trying to partner with them through tough times."

The pandemic has increased the numbers of employees working from home and this is also driving cloud adoption, according to Reddy.

Estes has seen the adoption of technology accelerate at the farm end of the food chain as a result of the coronavirus. "People can't just go out and look at their produce, you have to be careful where people are and that they are not too close together. Producers are starting to depend on digital tools."



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> **The technology itself is maturing and Covid has accelerated its adoption, particularly among larger agri-businesses.**
>
> *Seana Day,*
> **Better Food Ventures**

Traceability from Aptean

Account for raw materials and finished goods through the production process, and isolate defective products at the batch level in the event of a recall. At Aptean, we know food.

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She gives the example of apple growers who used to have to work out all their problems in person. "Now there is technology that can trace, check storage temperature, ethylene content and so on. The data is analyzed and passed through the chain. If there is a problem it shows in the data."

Day believes that the Covid pandemic will lead to "a real push to modernize and automate and be a lot smarter about data collection in the production part of the food supply chain. This is where the choke points have been during the pandemic. It's manufacturing technology, it's not sexy but it's essential," she says. "The technology itself is maturing and Covid has accelerated its adoption, particularly among larger agri-businesses", she adds.

Both Estes and Day also point to the growing numbers of consumers now shopping online during the pandemic and the implications for technology adoption. "Covid has accelerated our digital grocery shopping. There is a need for more and more data and for the kind of technology that can manage shelf life and decrease waste," says Day.

Interestingly, as you can see in the pie chart on the previous page, our survey of 300 food industry executives showed that that roughly three-quarters of companies have maintained or increased their investments in digital technologies during the pandemic (73%).

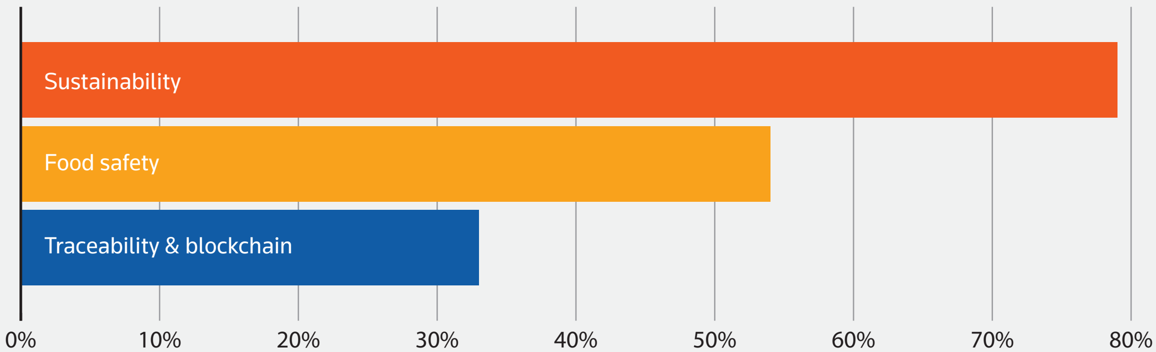
And while there was consensus on this across the two groups, there was significantly more optimism from industry influencers than food and beverage companies. Influencers believe that 59% of the industry companies are actively increasing their spend on digital technologies and processes, while only 36% of food companies indicate that they are actively increasing their budgets in this area.

Instead, 37% of food and beverage companies are saying that nothing has changed, where this option was only checked by 15% of industry influencers. So, while the survey indicates the pandemic does not appear to be having a negative impact on spending, this should perhaps be taken with a small note of caution.

The biggest food and beverage trends rising up the agenda over the next two years

The move to sustainability and an increasing focus on food safety and traceability are core trends that are gaining traction across the food and beverage industry. In the survey of food industry executives, 79% of food and beverage companies responded that they were prioritizing action on sustainability, with 54% indicating that they were taking action on food safety and 33% on traceability.

Priority focuses for food companies



When asked what three things are going to impact the food industry over the next two years, there were three issues that clearly stood out: changes in consumer demands and preferences (64%); sustainability and environmental stewardship (62%); increased traceability demands and requirements (45%). These choices were made in the same order by both industry influencers and food and beverage companies.

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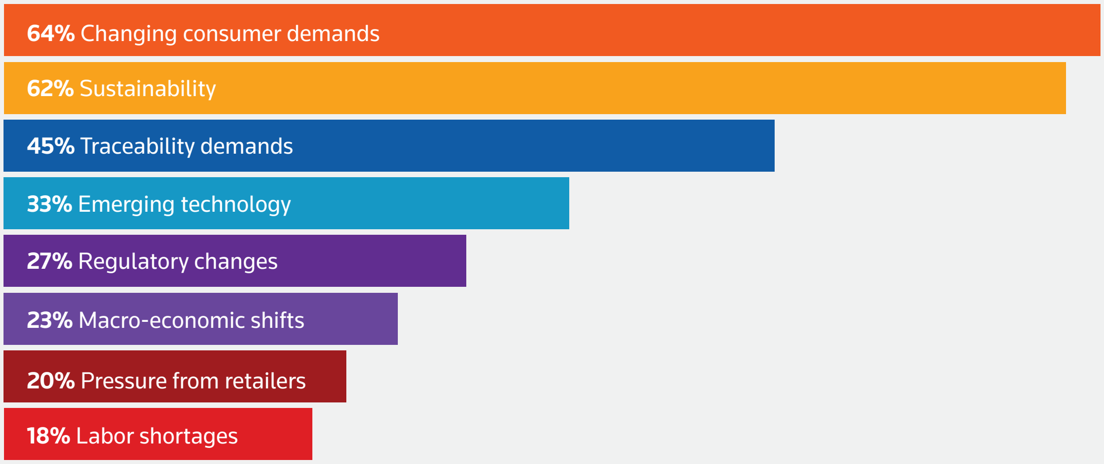
> **Consumer choice is reverberating down the chain. Growers are now looking to grow in a more sustainable way**
>
> *Vonnie Estes,*
> **Produce Marketing Association**

Digital technologies can have a significant impact in both capturing and providing this data so this looks like an area of significant growth over the coming years. Reddy agrees: "From Aptean's perspective we are thinking about how we can partner with our customers, who include meat processors, fresh produce producers, bakeries, dairies and food manufacturers, to help them navigate these issues and have a competitive advantage, to see shifts in their customer base and be agile."

Top of that list is changes in consumer demand and that is also driving concerns on sustainability and the environment. Estes sees this playing out on the ground. "It used to be in our industry the attitude, 'I grow avocados and that's all I grow'. Push it out to the marketplace, put it on a truck and it disappears. Now consumers want avocados that keep longer, have more flavor and nutrients, or they want to make sure the avocados are from a grower where the workers are treated well and the land is treated well. So that consumer choice is reverberating down the chain. Growers are now looking to grow in a more sustainable way and to use less plastics."

What's going to impact the industry most in the next 5 years?



Estes also sees a lot of money being invested in indoor vertical farming and says this is a trend that is going to continue. "The costs of vertical farming are coming down and the technology involved, the data analysis, has become far more sophisticated and would not have been possible without developments in machine learning. Robots are taking the place of human labor. Billions of dollars are being invested but it is still in its early stages. Most big companies do not have more than one or two vertical farms at the moment."

That big investment in fresh produce and perishables is a trend that Day has also observed. "There is an abundance of technology available and we are starting to see its adoption, particularly in these items." She is also seeing how that trend in adoption differs between the developed and the developing world. "We are seeing an explosion in technology adoption particularly in India and China and to a certain extent Brazil. Whether in dairy or produce we are seeing very efficient technology emerging that connects the farmer directly to the consumer/store with the technology companies handling all the logistics between."

When it comes to the growing adoption of sensors, sophisticated irrigation management and automated equipment "we are seeing a much faster adoption curve in developed countries where the farms are bigger and so are the balance sheets".

There is an issue however that Day believes could put the brakes on the adoption trend and that is who pays.

"Who pays for technology adoption is really a choke point. If you are asking a food processor, packer or farmer to add additional steps in their workflow to capture and record information you have got to be willing to share the risk and reward. Innovation is happening closer to the consumer but it really is flowing upstream back to the farmer."

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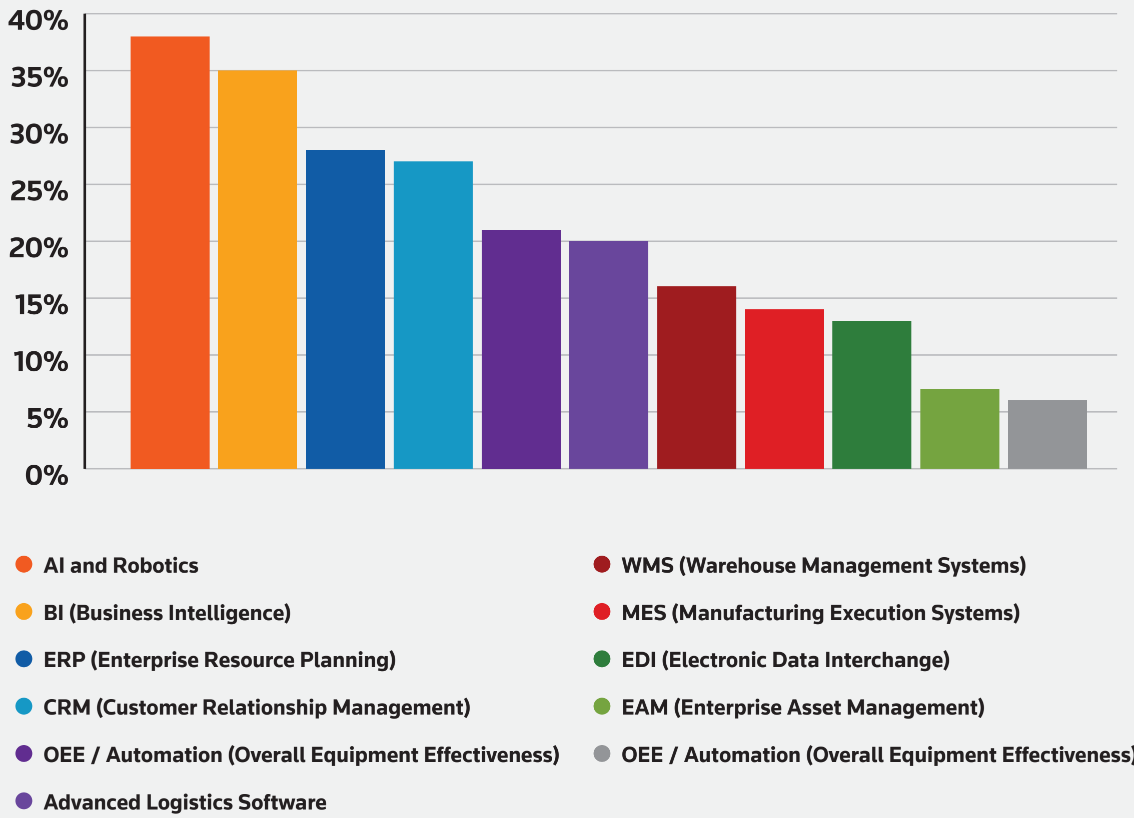
From the investors' perspective, Day says that some have become more risk averse when it comes to putting money into food sector innovation. "But that said, during the course of 2020 the number of domain specific vertical food and agriculture technology investors continues to increase, signaling a willingness to focus on the sector. So, I am optimistic, but we still have a ways to go."

From the food and beverage companies' perspective, there are a number of areas that over a fifth indicated that they would be looking to invest in over the next two years: enterprise resource planning (26%); business intelligence (26%); customer relationship management (25%); and artificial intelligence and robotics (21%).

Likely technology investments in the next 2 years



These findings are largely supported by the data from industry influencers, although there is a bigger emphasis from them on the potential of AI and robotics. With over 56% of them suggesting that they see big potential in these areas, there appears to be a bit of a disconnect between this perspective and what only 21% of food and beverage companies say their looking to invest in as shown above.

When asked which food category would see the strongest growth over the next five years, food and beverage companies were clear that moves to healthier alternatives would pick up pace. From the list of 10 categories given, the top three picked by the food companies surveyed were fresh produce (27%); health foods (25%); and meat and seafood (15%).

Interestingly, vegetarian/plant-based meat replacement foods were the next in line but only secured 10% of the vote despite much talk about the projected growth of this category in recent times.

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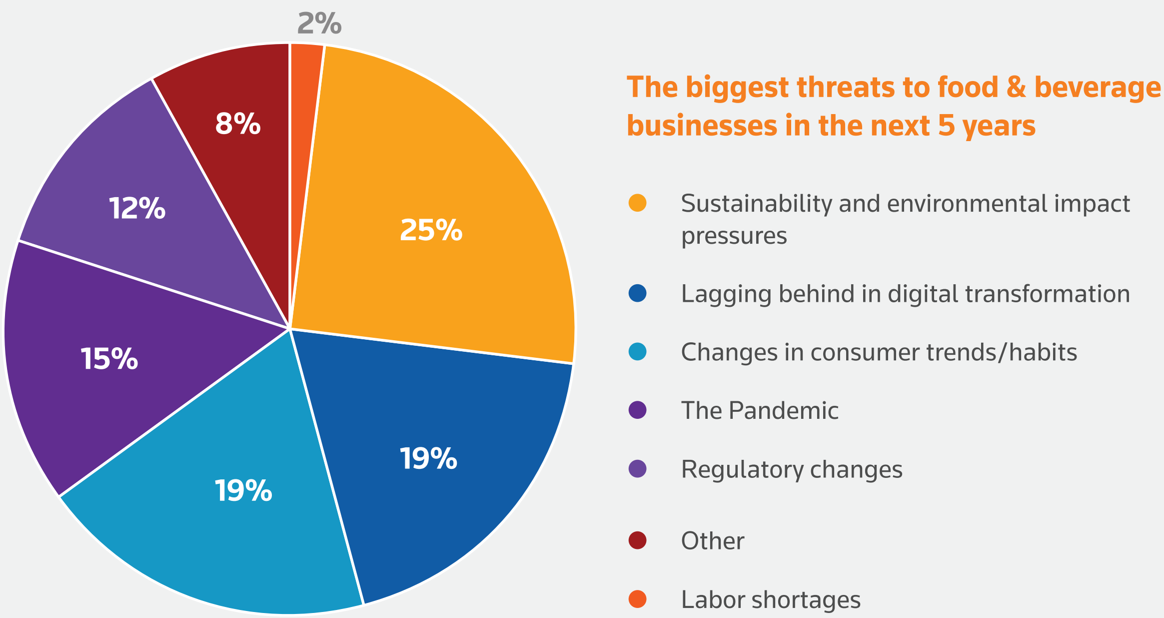
Integration and interoperability between systems and platforms must be prioritized to drive continued technology adoption and innovation across the sector.

In terms of threats to their business over the next five years, food companies suggested that the top areas of concern were sustainability and environmental impact pressures (25%), adapting to changes in consumer trends/habits (19%) and lagging behind in digital transformation (19%).



Conclusion & takeaways

Digital technology is becoming increasingly prevalent across the food and beverage industry with a significant ramp up over the past five years and this will continue as the technology matures and the costs come down.

One of the key takeaways of the report is that integration and interoperability between systems and platforms must be prioritized to drive continued technology adoption and innovation across the sector. Having sufficient IT resources and support from third party providers has never been more critical, particularly for small to mid-market food & beverage producers and manufacturers.

The drivers for continued growth in technology adoption are the need for greater business efficiencies, developments in machine learning and robotics and more awareness on producing food in a sustainable way with minimal impact on the environment.

A change in consumer attitudes has accelerated these changes and the move to more online shopping is increasing investment in technology at the retail end of the supply chain.

The Covid-19 pandemic has accelerated some of these changes while at the same time exposing the vulnerabilities in the food supply chain. Businesses have seen that they need to be more agile, to iron out the choke points in their supply chains and rely more on technology to do jobs that in a pandemic have become problematic.

The innovations that will make the most significant impact in the future are at different ends of the scale in terms of the investments required. The benefits of increasing the use of technology in logistics are more and more recognized. The savings to business would be significant and the reduction in food waste much needed. While at the other end of the spectrum, billions of dollars are being invested in building vertical farms near large urban populations to supply fresh food at the point of demand. The great strides that have been made in

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> **Food companies are showing an increased appetite for using digital technologies but are lacking some knowledge and understanding of the benefits they can bring.**

renewable energy supply, lighting technology, artificial intelligence and robotics are all coming together to make this development more financially viable.

On the ground, while farmers are starting to employ data capture and business analytics more, some industry observers still identify this end of the supply chain as having the furthest to go in terms of technological innovation. An important issue is who should pay for this technology. At the opposite end of the chain, the growth in ecommerce has heightened competition, raising the bar on food standards, traceability, sustainability, reducing plastic use and so on. These demands are flowing down the chain through the CPGs and onto the producers. That farmers should shoulder the burden of costs to introduce more technology to meet these higher standards is not seen as entirely fair.

There are also differences in the types of technology adoption in the food supply chain between the developing and the developed world. In India, China and Brazil technology is increasingly delivering systems that handle all the logistics between the producer and retailer. Innovation in this segment of the food chain is taking longer in the developed world because of older more embedded infrastructure.

Overall, as far as responses from food industry executives is concerned, the survey indicated that food companies are showing an increased appetite for using digital technologies but are lacking some knowledge and understanding of the benefits they can bring, and how to deploy them best.

The primary reasons for them looking to invest in technologies are to cater for a new wave of emerging consumer preferences and reduce negative environmental impacts, while continuing to expand their productivity and efficiencies in an increasingly crowded marketplace.

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About Aptean

Aptean is one of the world's leading providers of industry-specific software. Our enterprise resource planning and supply chain solutions are uniquely designed to meet the needs of specialized manufacturers and distributors in over 20 industries, while our compliance solutions serve specific markets such as finance and life sciences. In total, Aptean's solutions are used by over 6,000 customers around the world including many in the food & beverage industry.

With both cloud and on-premise deployment options, Aptean's products, services and unmatched expertise help businesses of all sizes to scale and succeed. Aptean is headquartered in Alpharetta, Georgia and has offices in North America, Europe and Asia-Pacific.

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