Transforming food safety through digitalisation and AI

Whitepaper

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Introduction

The food sector is facing significant challenges – from increasingly complex supply chains and rising consumer expectations to stricter regulatory pressures. As a result, the call for digitalisation is becoming more urgent. However, while digitalisation offers the potential to improve transparency, reduce risk and increase efficiency, it is not a simple or quick fix. The shift towards digital tools requires careful planning, overcoming resistance to change and addressing the real-world obstacles businesses face in integrating these technologies effectively.

Like many others, the food sector is also exploring its readiness for Artificial Intelligence (AI) adoption. With emerging AI solutions promising to further optimise processes such as predictive risk management, product quality monitoring and even food safety compliance, the industry is evaluating how ready it is to implement such advanced technologies. Many organisations are still navigating the complexities of data collection, ensuring data accuracy and integrating new digital tools into existing systems without overwhelming operations or staff. For many businesses, the question is not just about digitalising, but about adopting AI effectively – can they trust these tools to provide the insights needed to improve their systems and mitigate risk?

Experts Kimberly Coffin, Global Technical Director of Supply Chain Assurance at LRQA, Bizhan Pourkomailian, Global Director of Food Safety, Restaurant and Distribution at McDonalds and Melody Ge, Senior Director of Food Safety and Quality Operations at Treehouse Foods, are leading the conversations around digital transformation in the food sector. Their insights highlight the growing recognition that digitalisation is key to enhancing risk mitigation, transparency and efficiency across the supply chain. However, this shift is far from seamless and requires overcoming significant challenges to achieve real-world impact.

This whitepaper delves into how the food industry, through the insights of leaders like Kimberly, Bizhan and Melody, is leveraging digital tools to drive food safety and supply chain risk management forward.

> The question is no longer “Why digitalise?” but rather, “Can you afford not to?”

Digitalisation in the food sector

Transparency and traceability

Digitalisation in the food sector is fundamentally about transparency – ensuring businesses have full visibility across their supply chains, from sourcing raw materials to delivering the final product to consumers. As Kimberly Coffin puts it, “One up, one down traceability is no longer acceptable. We need to go deeper, taking ownership of our products from sourcing through to the consumer; not just for food safety, but for a range of other critical reasons.”

This need for deep traceability is reshaping how companies approach supply chain oversight. The complexity of modern food systems means that paper-based tracking and spreadsheets are no longer viable. Digital tools such as Internet of Things (IoT) technology, distributed ledgers for secure record-keeping and cloud-based Enterprise Resource Planning (ERP) systems are revolutionising transparency efforts, enabling companies to track and verify materials throughout their journey.

In Europe, where 90% of food businesses are Small to Medium Enterprises (SMEs), many still lack the resources and digital expertise needed to transition fully to digital supply chain risk management systems. While 79% of these companies store data digitally, much of this is limited to basic spreadsheets rather than integrated systems (EITFOOD.EU). In fact, only 17–21% of small food businesses analyse most of their data (EITFOOD.EU) and 31% of companies that consider themselves ‘digitally transformed’ still rely on manual data collection (Food Industry Executive). This results in fragmented food safety and quality (FSQ) data, leaving many businesses with limited visibility into their suppliers, with over 40% unable to track their Tier 1 suppliers effectively (World Economic Forum).

As Kimberly emphasised,

“There’s no way we can achieve real transparency without a digital mechanism. Spreadsheets and paper-based records simply don’t provide the visibility we need to ensure compliance and manage food safety risks effectively.”

For digitalisation to truly enhance transparency and traceability, businesses must move beyond simply collecting digital data; they need to use it strategically to improve compliance, reduce food safety risks and build consumer trust. Without this shift, the industry risks ‘drowning in data without extracting meaningful insights’, as Bizhan Pourkomailian put it.

Regulatory alignment and consumer trust

The drive for greater traceability and transparency is heavily influenced by regulatory mandates. As Melody Ge pointed out, regulators such as the FDA and EFSA are increasingly advocating for a technology-enabled approach to food safety. The FDA's "New Era of Smarter Food Safety" emphasises a people-led, regulatory-driven and technology-enabled framework designed to enhance compliance and transparency. This shift reflects a broader global trend, with governments and regulatory bodies actively encouraging (and in some cases mandating) digital record-keeping and real-time data sharing to strengthen risk management and food safety oversight.

As Melody described,

"The smarter food safety era is not just about technology; it's about leveraging technology in a way that improves efficiency, ensures compliance and ultimately strengthens consumer trust."

Digitalisation enables real-time monitoring and rapid response, allowing food businesses to act faster and more precisely when food safety risks emerge.

One of the key technological enablers in this space is IoT-based real-time monitoring, which allows companies to track food safety conditions instantly, from refrigeration temperatures in transport to contamination risks in production. The adoption of cloud-based ERP systems has also surged, with more than half of food industry CIOs considering cloud ERP essential for operational compliance.

These tools enable rapid response to food safety incidents, ensuring that contaminated products can be traced and removed from the market before reaching consumers.

While regulatory pressures are a key driver of traceability and transparency, consumer expectations are just as influential. Today's consumers demand greater visibility into the origins and journey of their food, driven by growing concerns over provenance, responsible sourcing and sustainability. Digital transparency is no longer just a compliance requirement, it's a trust-building necessity, giving consumers confidence in the safety, authenticity and ethical sourcing of the products they buy. Digital tools that provide verifiable traceability data help companies demonstrate their commitment to food safety, ethical sourcing and regulatory compliance. However, the industry still has a long way to go, with only 25% of supply chain professionals reporting fully digitalised supply chains (World Economic Forum).

The challenge now is clear: businesses must move beyond pilot programmes and fragmented digital efforts and instead focus on scaling digital solutions across their end-to-end supply chain. As digitalisation becomes a regulatory and operational necessity, companies that embrace it strategically will not only ensure compliance but also gain a competitive advantage in an increasingly transparent food marketplace.

Why digitalisation is a priority for food businesses today

Inconsistent, error-prone data collection has long been a weak link in food safety management. Kimberly re-stressed the importance of moving away from outdated, manual record-keeping: "Paper-based systems introduce too much variability, we need digital tools to reduce the potential for human error, enable process consistency and provide a real-time view of food safety compliance."

Data overload and analysis

The food industry is generating more data than ever before, but managing and making sense of this information is an increasing challenge. As Bizhan explained, "We are dealing with so much data that it's no longer possible to handle it manually. We need to collect, analyse and use it more effectively to track key performance indicators and continuously improve food safety standards."

Digitalisation offers a structured, automated approach to data management, enabling businesses to track, analyse and act on insights in real time rather than relying on outdated, reactive methods. "This shift is critical; unstructured or siloed data can result in inefficiencies, compliance risks and missed opportunities to enhance food safety" Bizhan emphasised.

Enhancing food safety and reducing risks

Food safety is not just about compliance; it's about protecting lives. When data is poorly managed, siloed or outdated, the consequences can be catastrophic: increased prevalence of recalls, consumer illness and injury, and irreversible damage to public trust. Without a robust digital infrastructure, food businesses are blind to potential hazards, relying on slow, reactive processes instead of proactive, data-driven safeguards. As Kimberly put it,

"Data saves lives and it's important we capture, analyse and use data findings to prevent harm to consumers." Every moment wasted in tracking the source of contamination increases risk. Every missing data point is a gap in food safety oversight."

Digital tools such as blockchain and cloud-based ERP systems help companies track raw materials, monitor production environments and verify product safety throughout the supply chain. In ideal conditions, advanced tracking can pinpoint a food's origin in seconds, dramatically improving recall efficiency and minimising health risks to consumers (FDA).

Boosting operational efficiency and cost reduction

Beyond safety, digital transformation is proving to be a game-changer in efficiency and cost management. A 2024 survey of food manufacturers found that 51% of businesses invest in digitalisation primarily to improve production efficiency, while 47% focus on enabling better data-driven decision-making and 45% aim to cut costs (Food Industry Executive).

Digitised processes help optimise labour use, reduce manual errors and streamline compliance checks, particularly in an industry facing labour shortages and increasing regulatory scrutiny. Small food plants that have adopted ERP software reported 11% lower operating costs, thanks to better data visibility and automation (Novolyze, 2024). As Kimberly noted, “Digitalisation isn’t just about safety; it’s about making smarter, faster decisions that improve efficiency while reducing the cost of meeting food safety requirements.”

A competitive advantage in a changing market

For many businesses, digital transformation is no longer just an option; it’s a competitive necessity. Research indicates that 54% of food manufacturers believe digital tools provide a competitive edge, a sharp increase from 30% just a year ago (Food Industry Executive). Echoing Kimberly’s sentiment, Melody said:

“Digitalisation is so much more than keeping up with regulations, yes it’s compliance and it’s improving efficiencies and reducing costs, but it’s also future-proofing businesses to meet rising consumer expectations and industry demands.”

Companies that adopt digital solutions gain greater supply chain visibility, improve risk management and ultimately enhance their brand reputation.

While some companies are still hesitant due to cost concerns and integration challenges, the benefits of digitalisation – from ensuring food safety and compliance to improving operational efficiency and strengthening consumer trust – make it one of the most critical investments for the future of the food industry.

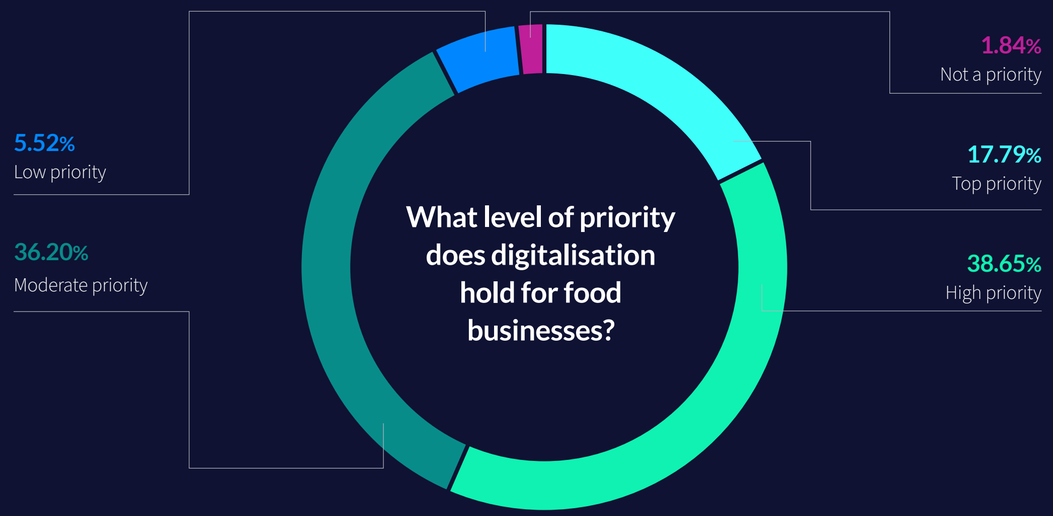
Identifying key areas for digitalisation

Implementing digital tools for food safety and quality

Once key priorities are identified, businesses need to select and integrate the right technologies. According to Bizhan, digital tools should not just collect data but actively improve food safety management. He shared real-world applications that have had a direct impact on compliance and efficiency at McDonalds:

- **Real-time monitoring systems provide continuous oversight of food safety conditions, reducing reliance on manual checks and ensuring compliance with regulatory standards.**
- **Image capture technology has transformed handwashing verification processes, offering objective, chemical-free methods to ensure hygiene protocols are followed.**
- **Temperature monitoring and trend analysis have helped reduce food spoilage and enhance product safety, allowing for data-driven decision-making when managing refrigeration and storage conditions.**

By integrating these tools, companies can replace reactive, paper-based processes with automated, proactive food safety management systems. However, Melody cautioned that digitalisation is not a one-size-fits-all solution: “We need to ensure that the data we collect is meaningful; technology should enhance food safety, not just add more information without purpose.”



To assess where digitalisation is at in the food sector, industry professionals were surveyed on its priority within their organisations. The findings aligned with expectations, revealing that most businesses view digitalisation as a key strategic focus. **Over 92%** of respondents acknowledged its significance, with **92 organisations (56.4%)** ranking it as a high or top priority.

However, despite this recognition, implementation remains uneven. **59 businesses (36.2%)** noted that while digitalisation is important, it competes with other operational demands, highlighting the challenges of balancing digital investment with existing business pressures. A smaller segment – **just 12 companies (7.4%)** – indicated that digitalisation is a low priority or not a focus at all, reinforcing that while industry-wide progress is being made, some businesses have yet to fully engage with digital transformation.

Challenges and barriers in digitalising food safety

While digitalisation presents clear benefits for food safety and operational efficiency, many businesses struggle to fully implement and optimise digital tools. From data overload and high costs to internal resistance to change, food companies must overcome several key challenges to unlock the full potential of digital transformation.

Focusing on actionable insights

One of the biggest risks in digitalisation is drowning in data without knowing how to use it effectively. As Bizhan pointed out earlier,

"Just because we can capture data doesn't mean we should collect everything. Too much data can overwhelm decision-making rather than improve it."

Many companies introduce digital tools without a clear data strategy, leading to massive volumes of information that are poorly structured, siloed or not used to drive meaningful decisions. To avoid this, businesses must focus on practical, useful data, capturing insights that directly support food safety, compliance and operational improvements.

Cost, ROI and organisational resistance

Another significant challenge is the cost of digitalisation, particularly for small and mid-sized food businesses. Advanced technologies such as AI-powered analytics, blockchain traceability and real-time monitoring require upfront investment and many organisations hesitate due to concerns about ROI and integration challenges.

As Kimberly noted, "One of the biggest hurdles to digitalisation is proving financial return; businesses need to see clear cost savings or efficiency gains to justify the investment."

However, beyond financial concerns, companies also face cultural and organisational resistance. Many employees and stakeholders are reluctant to move away from established manual processes, fearing complexity, job disruptions or steep learning curves associated with new digital tools. Melody highlighted the importance of communication and alignment: "Digitalisation isn't just a food safety initiative, it's a company-wide transformation. The earlier you engage stakeholders, the easier the transition becomes."

Ensuring internal buy-in from leadership, operations teams and compliance managers is essential for successful digital adoption. Training, clear communication and demonstrating quick wins can help overcome scepticism and build confidence in digital solutions.

Overcoming barriers

Despite these challenges, the food industry cannot afford to remain stagnant. As digitalisation becomes more critical for regulatory compliance, supply chain resilience and consumer trust, businesses must find scalable, cost-effective ways to integrate technology. This means:

- Prioritising high-impact digital initiatives that deliver immediate safety and efficiency improvements.
- Focusing on quality over quantity when collecting and analysing data.
- Gaining leadership and stakeholder buy-in through early engagement and education.
- Approaching digitalisation as an evolving process rather than a one-time investment.

While challenges remain, the cost of inaction is far greater. Businesses that fail to embrace digitalisation risk inefficiency, compliance failures and loss of competitive advantage.

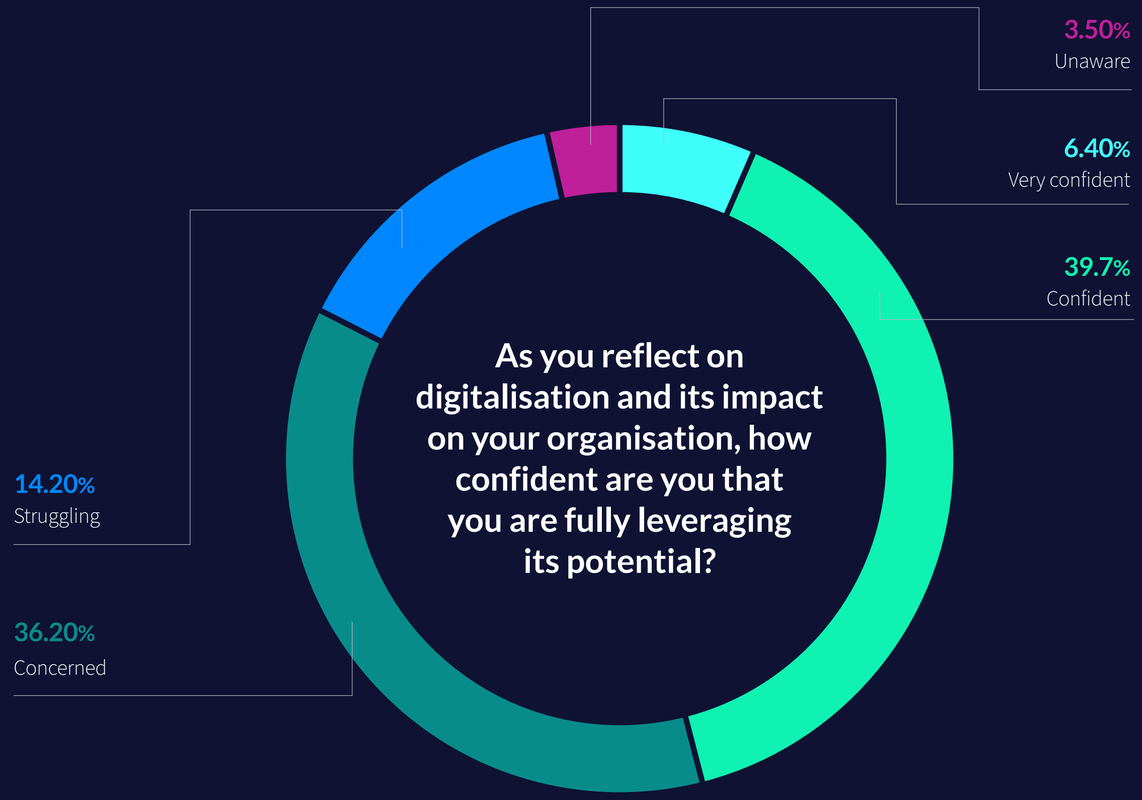
Challenges and barriers in digitalising food safety

Industry confidence in digitalisation

While many food businesses are actively embracing digitalisation, confidence levels remain uneven across the industry. When asked about their ability to leverage digital advancements, **46%** of food industry professionals indicated they feel confident or very confident, suggesting that a significant portion of organisations are making strong progress in integrating digital tools. However, **36%** of businesses expressed concerns about keeping pace with rapid technological changes, highlighting the struggle to adapt to evolving digital requirements while managing existing operational pressures.

More concerning, **14%** of organisations admitted they are struggling and are unsure how to implement the right changes, underpinning the need for clearer guidance, investment and support in digital transformation efforts. Encouragingly though, only **3.5%** of respondents stated they were unaware of the value of digitalisation, confirming that industry-wide awareness is high, even if execution varies.

These findings reveal a stark divide; while some businesses are successfully leveraging digitalisation to enhance food safety and efficiency, many remain uncertain about how to move forward effectively. To bridge this gap, organisations must prioritise targeted digital investments, focused on the most prevalent areas of food safety risk and internal collaboration to ensure they are not left behind in an increasingly technology-driven food industry.



The role of AI in food safety and supply chain risk

Artificial intelligence (AI) is undoubtedly the buzzword of the moment, with industries across the board exploring its potential. However, while AI holds significant promise for food safety and supply chain risk management, the reality is that the focus for most food businesses is still on getting automation and meaningful digitalisation of controls right, let alone full-scale AI implementation.

As Kimberly pointed out, “We are still figuring out what AI can do for us. Right now, the focus should be on ensuring we have clean, structured data before we start applying AI to it. Otherwise, we’re just feeding bad data into an even more complex system.” This highlights a critical issue; AI is only as effective as the quality of data it processes, and many food companies are not yet at a stage where AI can deliver meaningful insights.

Balancing AI’s potential with realistic implementation

AI has the power to revolutionise food safety; from predictive analytics that identify contamination risks before they occur, to automated quality control that reduces human error. But these innovations are only accessible to businesses that have already laid a strong digital foundation. As Melody noted, “AI isn’t a magic solution, it’s a tool. It has to be built on solid data, combined with scientific expertise and managed by people who understand its limitations.”

This balance between human intervention and AI automation is crucial. AI should be used to enhance food safety, not replace the expertise of food safety professionals. There is also growing scepticism and resistance to AI adoption, particularly in smaller businesses that lack the resources or technical expertise to integrate AI effectively. Bizhan echoed these concerns:

“AI is exciting, but we need to make sure we understand what it’s telling us and not just assume it’s always right.”

Managing AI risks

As AI adoption increases, ensuring its responsible use in food safety and supply chain risk management will become critical. AI is only as reliable as the data it’s trained on and poorly managed AI systems can introduce bias, incorrect decision-making and compliance risks. To address these challenges, ISO 42001 – the first international standard for AI management – has been developed to provide guidance on ethical AI implementation, data governance and risk management.

For food businesses exploring AI, certification to ISO 42001 can serve as framework, helping companies ensure that AI systems:

- Are transparent and accountable, avoiding black-box decision-making.
- Use structured, high-quality data to minimise risks of misinformation.
- Integrate with existing food safety protocols, rather than replacing human expertise.
- Comply with regulatory requirements, reducing legal and reputational risks.

While large multinational food companies are beginning to experiment with AI-driven food safety tools, the focus today should be on building strong digital foundations, integrating automation where possible and ensuring AI is implemented responsibly when the industry is ready.

A measured approach to AI management

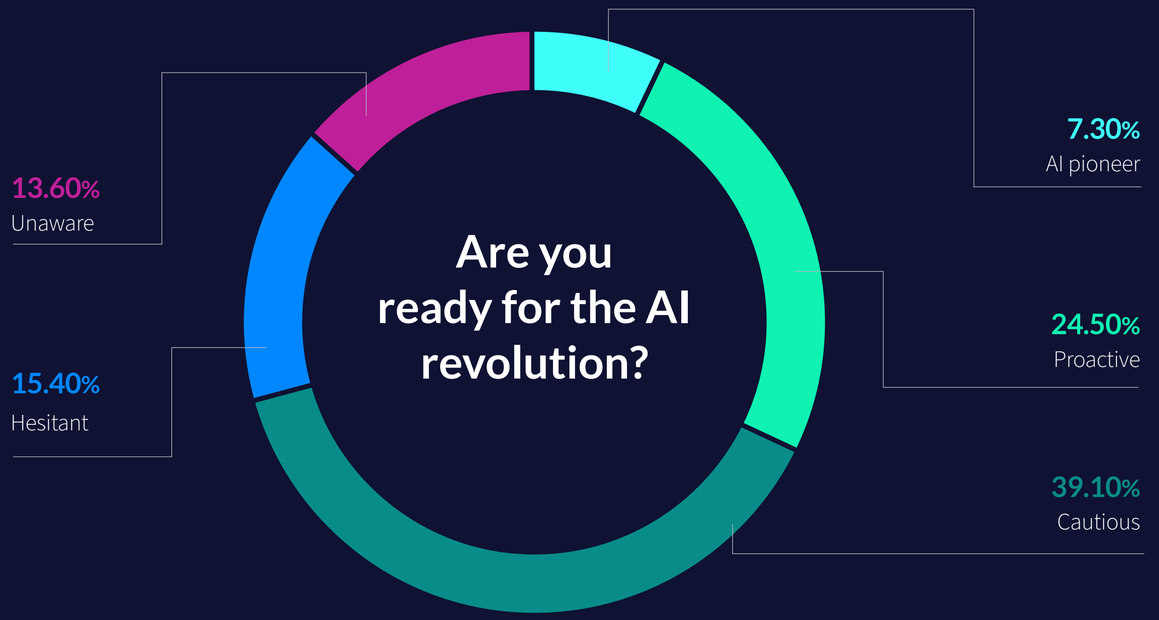
We asked industry professionals about their readiness for what many are calling the “AI revolution” and the results reveal a measured approach. While AI is firmly on the industry’s radar, most businesses are taking a cautious, observatory stance rather than diving headfirst into implementation. Only **7.3%** of organisations identify as AI pioneers, actively integrating AI into their operations. A slightly larger **24.5%** are taking a proactive approach, gradually investing in AI adoption.

However, the majority **(39.1%)** remain cautious, closely monitoring AI developments but yet to take significant action, reinforcing that while interest in AI is growing, many businesses are still in the evaluation phase, assessing its feasibility, return on investment and practical applications before committing to full-scale adoption.

It is unsurprising that the responses for hesitant **(15.5%)** and unprepared **(13.6%)** businesses are so closely aligned, as both reflect uncertainty around AI’s role in the food sector. While some organisations are hesitant – unsure about AI’s value and reluctant to commit – others are entirely unprepared, with no clear strategy or plans for adoption.

These figures highlight a key challenge: for many businesses, AI remains an abstract concept rather than a tangible, actionable solution.

These findings reflect the broader reality of digitalisation in the food sector: while some larger, more technologically advanced and resource ready companies are moving ahead with AI, most businesses are still finding their way with automation and digitalisation, rather than taking on the complexities of AI integration.



How LRQA is helping businesses navigate digital transformation

As the food industry accelerates its digital transformation, businesses must adopt connected risk management strategies to ensure supply chain resilience and traceability, regulatory compliance and most importantly food safety.

LRQA is leading this shift, working with some of the world's most recognisable household brands to enhance visibility, traceability and security across their global supply chains.

Driving digitalisation in food safety and supply chain risk management

LRQA plays a key role in helping businesses digitalise their approach to supply network risk management, ensuring they move beyond manual, paper-based verification systems towards an integrated, risk-based framework that enables data-driven decision-making. With years of experience in verifying supply network compliance and strategic diagnostic risk modelling, LRQA supports companies with:

- Building digital supply network risk management strategies that streamline compliance monitoring processes and improve operational insights.
- Enhancing supplier segmentation using digital tools to map, assess and identify areas of greatest risk (and focus) across global supply chains.
- Designing supply network verification programmes that are risk based, data informed and targeted to ensure product integrity is achieved.

By embedding digitalisation and advanced analytics into supply chain risk management, LRQA is ensuring that businesses can better understand their suppliers, strengthen traceability and mitigate emerging food safety risks.

EiQ

At the core of LRQA's digital solutions is EiQ, a world-leading data and analytics platform that provides real-time risk intelligence across the supply chain. EiQ enables businesses to harness the power of digitalisation, offering actionable insights through accurate, verifiable data.

With EiQ, food companies can:

- Digitally pinpoint vulnerabilities within their supply chain, improving response times to emerging risks.
- Use advanced analytics to enhance supply chain transparency and understand sourcing risks associated with food products.
- Shift the view of supply network due diligence from siloed compliance data to one based on multifaceted risk indices that provide a deeper understanding of where the greatest risk lies, guiding the industry towards a digital-first future.

As digitalisation and AI reshape the food industry, businesses must move beyond fragmented, reactive approaches to proactive risk management. LRQA's food sector risk intelligence and focus on digital transformation ensures that companies are prepared for the next evolution of food safety and supply chain risk management.

Conclusion

Throughout this whitepaper, industry leaders have highlighted the immense potential of digital transformation while also recognising the practical challenges businesses face in implementing these technologies.

From enhancing data transparency and compliance to leveraging AI for identification of predictive risk indicators, digital tools have the power to redefine risk management in food safety. However, many companies are still struggling to move beyond outdated, manual processes. The reality is that the industry must first establish strong digital foundations by embracing automation, real-time monitoring and traceability before fully integrating AI-driven solutions.

One of the most significant barriers remains cost and internal resistance to change. As Kimberly pointed out, businesses must demonstrate clear ROI to secure leadership buy-in, while Melody emphasised that cross-departmental communication and stakeholder involvement are essential to successful digital adoption.

While AI presents exciting opportunities, most businesses are not yet ready for large-scale AI integration. Structured, high-quality data must come first, ensuring that companies have the right systems and processes in place before scaling AI-driven solutions. As AI adoption grows, certifications such as ISO 42001 will be essential to ensure AI is used responsibly, transparently and effectively within food safety and supply chain management.

Key takeaways for the industry

Digitalisation is a necessity, not an option.

The majority of food businesses recognise its importance, but adoption remains uneven. Prioritising digital transformation is critical for ensuring compliance, improving efficiency and building consumer trust.

Data is only valuable when used effectively.

Companies must move beyond simply collecting data, focusing instead on actionable insights that improve decision-making and risk management.

AI is on the horizon, but the industry must first strengthen its digital foundations.

While AI offers potential in delivering higher levels of food safety risk management, most companies must first address gaps in digitalisation before implementing AI-driven solutions.

The cost of inaction is high.

Companies that fail to modernise risk falling behind competitors, facing inefficiencies, compliance challenges and potential reputational damage.

Recommendations for food industry leaders

For businesses looking to successfully implement digitalisation while navigating the challenges of adoption, the following strategies can help:

1. Prioritise digital tools based on business needs

- Identify key food safety control points where digitalisation can deliver immediate improvements.
- Focus on ROI-driven digital investments that enhance compliance and efficiency.
- Avoid overwhelming the organisation with too many new tools at once; start with solutions that integrate seamlessly into existing workflows.

2. Implement digitalisation in phases: Start small, scale smart

- Begin with small-scale digitalisation efforts in high-impact areas, such as temperature monitoring, compliance automation and traceability enhancements.
- Once initial tools are proven effective, gradually scale digital adoption across supply chain operations, production and quality assurance teams.
- Ensure that data collected is structured and actionable, so insights can be effectively applied to food safety strategies.

3. Drive organisational buy-in through communication and stakeholder involvement

- Engage stakeholders early – from leadership to operations teams – to create alignment and build confidence in digital transformation.
- Melody emphasised that ‘digitalisation should not be seen as just a food safety initiative, but rather a business-wide transformation’.
- Provide training and continuous support to help employees transition from manual processes to digital systems.

4. Stay ahead of technological advancements

- Keep up to date with emerging technologies, such as IoT monitoring devices, distributed ledgers and cloud-based Enterprise Resource Planning (ERP) systems, advanced analytics, and AI-driven risk models.
- Consider adopting AI responsibly, ensuring that governance frameworks like ISO 42001 are in place to manage risks and ensure transparency.
- Remain flexible and open to new innovations that improve food safety and supply chain resilience.

The food industry cannot afford to wait. Digitalisation is the foundation for safer, more transparent and more efficient food systems. While many companies are making progress, others risk being left behind if they fail to act. The businesses that succeed will be those that integrate automation thoughtfully, strategically adopt digital tools, and prepare for the long-term evolution of AI in food safety.

Ultimately, digital transformation is not a one-time investment; it is a continuous process of improvement.

The companies that embrace it today will be the industry leaders of tomorrow.

About LRQA:

LRQA is a leading global assurance partner, bringing together decades of unrivalled expertise in assessment, advisory, inspection and cybersecurity services – underpinned by data-driven insights – to help its clients navigate a new era of risk.

Operating in more than 160 countries with a team of more than 6,000 people, LRQA's award-winning compliance, supply chain, cybersecurity and ESG specialists help more than 61,000 clients across almost every sector to anticipate, mitigate and manage risk wherever they operate.

Get in touch

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