

FFI Report

Enterprise Risk Management: Implementation and Best Practices for Food Fraud Prevention with a Survey

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ABSTRACT/ SUMMARY

Background: This is the third report in a Food Fraud Insight Report (FFIR) series on COSO-based Enterprise Risk Management (ERM) for food fraud prevention. The first report presented an overview of the topic, and the second report expanded to insight into the decision-making and introduced a Food Fraud Management System. The example presented was the Kerry Group's Global Supply Quality Risk and Vulnerability Management System. As Food Fraud Prevention Strategies have matured, there is a need for this third report focusing on decision-making (e.g., risk appetite and risk tolerance). In addition, it is helpful to review a case study of the evolved Kerry system.

Methods: To supplement this work, an industry survey was conducted to gain insight into the awareness and implementation of this topic. These ERM-implementation questions were added to the Food Fraud Annual Update (FFAU) survey. The survey included a series of escalating detailed questions with answer responses of no, don't know, prefer not to answer, or yes that had confidence levels of 100% sure, 75%, 50%, and 25%. This series captured the risk assessor's confidence in their systems.

Results: Adopting an agile management philosophy is key to successfully reducing the fraud opportunity. The survey revealed that for food fraud prevention, there has been a focus on

flexibility from the start. While the self-assessment was of high expertise – responders felt they had a high expertise – the implementation seems incomplete or without a formal calibration to ERM/ COSO. Specifically, responses of the confidence of “Yes – 100% your systems are connected and calibrated” kept reducing.

Conclusion: The survey was conducted to focus on and understand the thoroughness of implementing Food Fraud Prevention Strategies. Food fraud prevention continues to evolve and formalize. The next step is more formal management systems, including more structured resource-allocation decision-making. Risk tolerance and risk appetite can become a standard and almost automatic process, which can decentralize split-second decision-making but still control the actions within an overall comfort level. A fully integrated system is possible and ideal for competently managing vulnerabilities and reducing the impact and cost of hazards. The case study example of the Kerry Global Supply Quality Risk and Vulnerability Management System will help food fraud managers understand implementation.

Keywords: Food Fraud, Enterprise Risk Management, Economically Motivated Adulteration, Risk Assessment, Crime

PRELIMINARY STATEMENT ABOUT RISK TOLERANCE:

Before starting, it is important to review the concept of ‘risk’ and an ‘optimal level’ referred to as ‘risk tolerance’ or ‘risk threshold.’ Many Food Scientists and Food Safety managers use the term ‘risk’ to define an unacceptable or intolerable level. In Codex Alimentarius (CODEX), this threshold is an ‘acceptable level of protection’ or ALOP. More broadly, risks are not all bad; it is usually inefficient or impractical – and sometimes impossible – to eliminate all risks. A company or agency operating with too little risk is usually inefficient in meeting the overall objectives set by its stakeholders. There are situations of ‘insufficient risk-taking’ that are the opposite of ‘excessive risk-taking.’ To use U.S. FDA terminology, there are ‘hazards,’ and only some of those are ‘hazards that require a preventive control.’ From the Committee of the Sponsoring Organizations of the Treadway Commission (COSO – a group of five top accounting or financial professional associations that created the foundation for the Sarbanes-Oxley Act compliance):

The Risk Assessment Process

“Within the COSO ERM framework, risk assessment follows event identification and precedes risk response. Its purpose is to assess how significant the risks are, both individually and collectively, in order to focus management’s attention on the most critical threats and opportunities, and to lay the groundwork for risk response. Risk assessment is all about measuring and prioritizing risks so that risk levels are managed within defined tolerance thresholds without being over-controlled or forgoing desirable opportunities.”[1]

In this report, ‘risk’ is separated from the concept of an ‘unacceptable risk’ or a ‘hazard that requires a preventive control.’ This ALOP threshold could be referred to as an ‘optimal’ level of risk. Several important points are:

- *Not all vulnerabilities are risks*
- *Not all risks are hazards*
- *Not all hazards are FSMA-defined ‘hazards that require a preventive control.’*

Risk is not always bad, but excessive risk-taking is unacceptable.

1 OVERVIEW

1.1 INTRODUCTION

Food fraud prevention strategies are evolving and maturing, but often with a critical flaw of not calibrating the vulnerability assessment of an incident with the overall enterprise-wide risk tolerance. Essentially, a manufacturing site food fraud vulnerability assessment might conclude a ‘high’ vulnerability without understanding – or considering the judgments of – how the overall enterprise defines ‘high’ or ‘low.’ There is often a misunderstanding of how the risk tolerance is defined and if it is exceeded. A question is raised of how the vulnerability ranks – likelihood, consequence, and the risk tolerance threshold – of very high, high, medium, low, and very low can be defined. Without a formal process to calibrate the food fraud vulnerability ranks, then the local¹ food fraud vulnerability assessments must be later translated for the resource-allocation decision-makers to compare and select risk treatments (e.g., the decision is for which projects are funded and how much is spent). Essentially, there is an unmet need to define ‘how bad is too bad’ and ‘how much is enough’ to spend on the risk treatments.

Based on the COSO-like principles, Enterprise Risk Management (ERM) is being applied across a company to support even front-line, operational, or tactical decisions. “The COSO framework was developed to help organizations design and implement a system of internal control, enterprise risk management, and fraud deterrence.” [2] At the start, ERM/ COSO was applied at a company’s Board of Directors level to communicate with investors and financial analysts. To provide visibility and control across an enterprise – to ‘connect everything to everything’ – the systems are implemented through internal controls and an integrated framework. The efficient ERM system helps balance and calibrate risk across the enterprise, which considers risk tolerance and risk appetite. The goal is that the entire enterprise is operating in the optimal risk range – not too much or too little risk-taking. The top-level decisions are based on input and management of front-line actions and decisions. Naturally, the ERM concepts became more integrated and formally adopted across enterprises. Adopting an operational system such as a Food Fraud Prevention Strategy is the ultimate example of adopting a calibrated risk assessment method. This is an ‘internal control’ and monitoring and controlling very different risk types as an ‘integrated framework.’ The key is that the risk assessments are not only calibrated but connected for quick responses.

While internal control and enterprise risk management are two well-known concepts, the third system is fraud deterrence or fraud risk management. The COSO Fraud Risk Management Guide was published in 2016 and updated in May 2023. [3] The guide is based on and utilizes the COSO enterprise risk management principles. The COSO concepts are based on the original framework published in 2013. The three concepts are created to function and operate in an integrated management system. In support of the overall internal controls, two fundamental Fraud Risk Management principles are: [3]

¹ Here the term ‘local’ is used to refer to a specific manufacturing site conducting a vulnerability assessment, a single product purchasing source team, or a decentralized or regional activity.

- “#3 – The organization selects, develops, and deploys preventive and detective fraud control activities to mitigate the risk of fraud events occurring or not being detected in a timely manner.”
- “#4 – The organization establishes a communication process to obtain information about potential fraud and deploys a coordinated approach to investigation and corrective action to address fraud appropriately and in a timely manner.”

A case study of an ERM system that covers fraud risk management is crucial for explaining how the system works and that it not only can but is being implemented. The Kerry Global Supply Quality model is presented as a use case.

The research justification for this project and survey was conducted to evaluate the level of adoption of ERM-type assessments or methods in current food fraud prevention strategies. This survey is part of a larger project to build upon previous publications and present a method for companies to integrate ERM/ COSO methods into their Food Fraud Prevention Strategy. The Food Fraud Task Force procedure includes a holistic approach to starting or reviewing a Food Fraud Prevention Strategy. [4] The larger scope of this report will consist of a current industry case study to demonstrate implementation.

1.2 BACKGROUND

Food fraud – intentional deception for economic gain using food – is a relatively new food industry concept, and the work methods are evolving and maturing. The nearly universal food fraud compliance requirements are based on the Global Food Safety Initiative (GFSI) benchmarking expectation for an acceptable Food Safety Management System. [5] For food fraud compliance, GFSI requires a Food Fraud Vulnerability Assessment (FFVA) and Food Fraud Prevention Strategy (FFPS) and confirmation that the food fraud assessment is calibrated with the food safety management system. [6-9]

Since food fraud is a relatively new concept, and the types of fraud and impact are evolving rapidly, it is very difficult to calibrate the risk assessments. Essentially, without many past decisions for similar problems², there is a big question of ‘how bad is too bad’ and ‘how much is enough’ to spend on the risk treatments.

Fortunately, a decision-support management system is already implemented at nearly all companies in one form or another. A firm’s Board of Directors usually includes a risk committee that monitors and manages an enterprise’s risk tolerance. **Risk tolerance** defines the level of uncertainty acceptable for the stakeholders, including financial investors or owners. To meet financial reporting compliance requirements, a Board of Directors defines the company’s risk level as well as the internal controls and

² Criminologists refer to ‘problems’ as a general term before it is defined as an event or incident. From Crime Analysis for Problem solvers: “A **problem** is a recurring set of related harmful events in a community that members of the public expect the police to address. This definition draws attention to the six required elements of a problem: Community; Harm; Expectation; Events; Recurring; and Similarity.”

integrated frame to manage the activities. In the U.S., financial reporting compliance is based on the Sarbanes-Oxley Act of 2002 (SOX or SARBOX).

In addition to risk tolerance, the over-arching concept of **risk appetite** is broader and more qualitative. This term is sometimes as informal as a ‘gut feel’ about much uncertainty, which is unacceptable. For example, quantitative measures or analytical findings may determine a situation is within the risk tolerance (below the level where a risk would be unacceptable), but, in the end, the risk assessor decides there is too much uncertainty.

More generally, the **risk attitude** is how an enterprise decides how to deal with business-impacted uncertainties, including monitoring and assessment formality in addition to acceptable levels and how risks are treated.

Once SARBOX was enacted, the industry created the **Committee of the Sponsoring Organizations of the Treadway Commission** (COSO) to develop methods and processes to meet compliance. [10] The founding members were the five largest financial and management accounting associations. The COSO group activity created Enterprise Risk Management (ERM) to meet the regulatory compliance requirement, which is how firms determine and manage risk tolerance. More broadly, ERM includes ‘internal controls’ that are common methods and an ‘integrated framework’ for calibrating the assessments across the firm. [11]

To be clear, ERM is not just an informal activity of adding up the results from several risk assessments and putting a few processes in place. ERM has very formal steps with an ever-increasing set of processes for a starting point, such as an initial screening all the way to a detailed assessment or full regulatory compliance certification. The food industry’s parallel concept is a food safety and HACCP plan. HACCP is not just a few procedures and a Word document summarizing the steps.

ERM was created to calibrate all risks across an entire enterprise. ERM – or ERM-like systems – is the process companies use to understand and make resource-allocation decisions for emerging topics such as food fraud. The application is ‘ERM-like,’ not a full ERM regulatory compliance recommendation.

It is important to note that there may be situations where the work processes and decision-making – such as supplier selection and raw material monitoring – are centrally managed. In this case, there could be one over-arching food fraud vulnerability assessment and food fraud prevention strategy for the entire enterprise. A local site or facility may not need a separate or modified FFVA or FFPS if they confirm that they did not deviate from the overall system in any way.

2 REVIEW OF THE PREVIOUS ERM REPORTS

This section will review the two previous Food Fraud Insight Report (FFIR) publications on Enterprise Risk Management (ERM). The FFIR series on ERM was created after industry needs were identified. Industry

gifts funded both projects. The review here will summarize the overall report, focusing on best practices and implementation recommendations.

2.1 ERM REPORT 1

TITLE: The Role of Enterprise Risk Management in Food Fraud Prevention, By John W Spink, Ph.D., May 31, 2016 [This project was funded through a generous gift from a consulting firm sponsor.][12]

ERM Report 1: Conclusion and Call to Action

Addressing food fraud is a regulatory or standards compliance requirement for health hazards and securities reporting. Not addressing Food Fraud can lead to costly recalls, drastic losses in consumer confidence, or even federal felony criminal liability for company leaders and employees. Beyond intentional deceit, it has been proven that ‘willful blindness’ or even ignorance is not a defense. Food fraud is a known risk and vulnerability. It is expected that enterprises have knowledge of and manage their food fraud vulnerability.

The Next Steps or Call to Action is (Figure 1):

1. **Develop a corporate-level policy** to address Food fraud compliance with food and commerce laws as well as industry standards.
2. **Create and implement Food Fraud Vulnerability Assessment** integrated with resource-allocation decision-making systems such as Enterprise Risk Management.
3. **Create and Implement Food Fraud Prevention Strategy**
4. **Support with a Food Fraud Management System** that utilizes a wide range of current or new company intelligence to understand and monitor the evolving fraud opportunity.
5. **Integrate with the current enterprise-wide fraud surveillance** process that enlists all employees, regardless of their job function or level, to identify new or evolving fraud opportunities. This reporting system should reinforce the action, include an assessment or filtering system, and connect ERM to the Food Fraud Prevention Strategy.

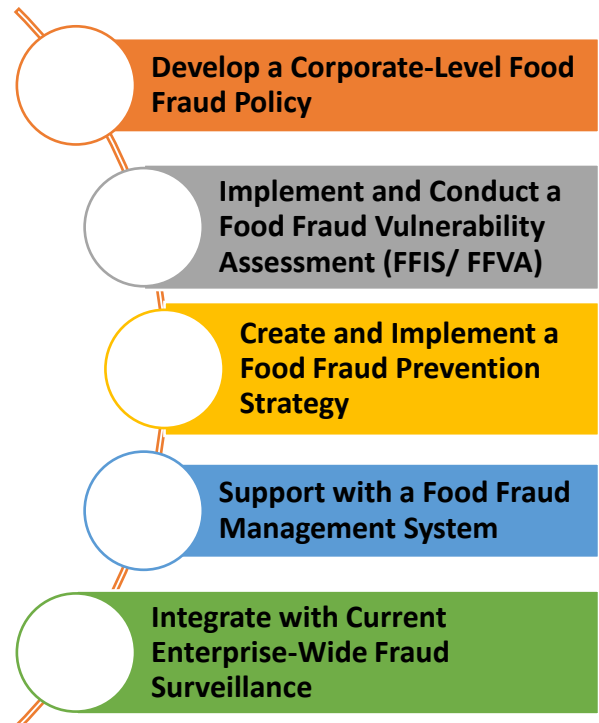


Figure 1: Call to Action for Initiating, Implementing, and Managing a Food Fraud Prevention Strategy (Note: These are the middle steps in a Food Fraud Task Force project.

This report was created to give every employee the confidence to report suspicious activity regardless of job function or level. The goal was also to provide the awareness of how the front-line fraud opportunities connect all the way up to Board level ERM... and to give C-Suite leaders the method for ERM-type insights to be applied all the way to the front line.

2.2 ERM REPORT 2

TITLE: Applying Enterprise Risk Management to Food Fraud Prevention – Workings of ROI vs. Vulnerability, Risk to Vulnerability, and then a Case Study Example of a complex Food Fraud Management System, By John Spink, Ph.D., August 2017 [This paper was supported by Kerry's Global Supply Quality team's program, case studies, and vendor management requirements.][13]

ERM Report 2: Conclusion and Call to Action

Food fraud is becoming an autonomous concept that has developed unique terminology, methods, countermeasures, and control systems. Food fraud prevention is being developed and integrated into current systems such as quality management (e.g., HACCP, HARPC, or a total quality management [TQM] system such as Six Sigma) and business resource-allocation decision-making (e.g., ERM/ COSO). Implementing food fraud internal controls must be addressed for a range of compliance requirements, including food laws, financial reporting requirements, industry standards, and generally competently managing a business.

After establishing an enterprise-wide commitment to uniquely addressing food fraud, it is important to put a process in place to handle **all** types of food fraud (e.g., from adulterant-substances to stolen goods and counterfeits) and for **all** products (e.g., raw materials to finished goods in the market). An example of the assessment system was provided in the Kerry Global Supply Quality Risk Management and Governance case study. Those types of assessments should connect into a central over-arching system that “connects everything to everything.”

Beyond the efficiency and simplicity of plotting the food fraud vulnerabilities on a Risk Map, there is great value in using ERM to defend resource-allocation. A typical Food fraud Vulnerability Assessment provides a general ranking of ‘high/ medium/ low.’ This ranking is based on the assessment creators' or risk assessors' general expert insight. This risk rank is not correlated to competing risks without additional adaptation or calibration. Different risks cannot be directly compared. Without a direct comparison, no analytical or quantitative method exists for resource-allocation decision-making (Figure 2).

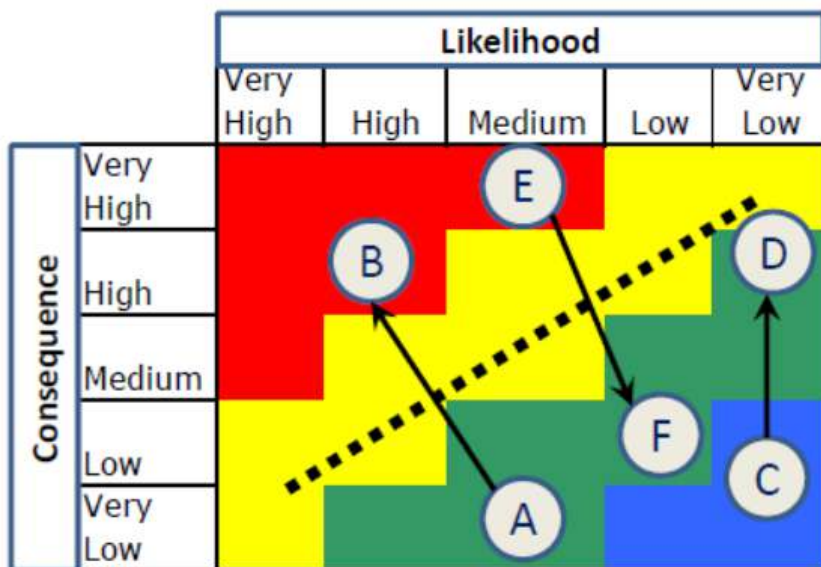


Figure 1: Application of Food Fraud Resource Allocation Decision Making that uses the ERM/COSO-based Risk Tolerance on a Corporate Risk Map [13]

The Food Fraud Insight Report series (‘FFI Report’ or FFIR) provides a range of insights that help with food fraud prevention assessment and implementation. The first steps can and should be small and straightforward. The resource-allocation decision-maker determines the following steps needed for information or responses. This ERM Application report provides deeper insight into enterprise-wide assessments and provides a case study example of a complex food fraud prevention strategy system.

2.3 AN UPDATED PERSPECTIVE ON ERM REPORT 1 AND REPORT 2

2.3.1 Review and Update of the Previous Recommendations

The ERM report series emphasizes several key discipline-level concepts, such as focusing on prevention rather than reaction and vulnerability rather than risk. Due to the changing and evolving nature of food fraud incidents, several key management-level processes exist. For example, management includes balancing centralized and decentralized processes to respond quickly to unique incidents but with an overall common structure.

Very early in the food fraud prevention research – including the article with the first definition of food fraud in a scholarly journal in 2011 – the COSO-based Enterprise Risk Management (ERM or ERM/COSO) concept was identified as helpful in defining the risk tolerance and ‘how much is enough’ for countermeasures or control systems. [7, 14] As food fraud prevention was being more fully implemented, there was a need for an overview of the ERM concept, such as in 2016 in ‘The Role of Enterprise Risk

Management in Food Fraud Prevention.’ [12] This 2016 ERM report concluded that ERM or ERM-like systems were already in place at most companies. Also, standard development and implementation steps could be adapted for food fraud prevention. Later, the Food Fraud Task Force project was created to formalize the steps. [4]

As food fraud prevention systems were more thoroughly implemented, there were more ERM questions addressed in 2017 in ‘Applying Enterprise Risk Management to Food Fraud Prevention – Workings of ROI vs. Vulnerability, Risk to Vulnerability, and then a case study example of a complex Food Fraud Management System. The conclusion of the 2017 ERM Report 1 was the recommendation for a more formal connectivity of activities such as in the Food Fraud Prevention Cycle (FFPC – later this was included in a Food Fraud Prevention Strategy - FFPS), as well as an explanation of the decision making for vulnerability rather than the more simplistic ROI calculations (referring to the formal return-on-investment accounting practices such as used by the resource-allocation decision-maker such as a CFO). [15]

2.3.2 Food Fraud Prevention as an Ultimate Example of ‘Agile Management Philosophy’

Food fraud prevention has evolved and adapted to meet the rapidly changing nature of the problem, embracing the understanding that no two events are exactly alike. Often, many events share very few commonalities, such as the food supply chain weak spot or how the fraud act was perpetrated. The food fraud prevention methods and procedures adjusted into what would now be classified as an ‘agile management’ structure. According to the Association for Project Management, Agile management starts with a clear overall goal (centralized oversight and goal setting) and then with “an iterative approach to delivering a project throughout its life cycle” (decentralized decision-making and product management). “Iterative or agile life cycles are composed of several iterations or incremental steps towards the completion of a project.” An example of food fraud prevention is applying a vulnerability assessment as an initial screen or pre-filter steps before developing the next level of deeper assessments. The agile philosophy is ‘Do it right the first time’ to complete the first iteration to get to the second assessment quickly. Along the way, there is a calibration with the enterprise-wide expectation of ‘how much is enough’ for the risk treatments and control within the risk tolerance. Sometimes, a very quick and simple assessment is all that is needed; other times, there must be thousands of data points.

Food fraud prevention theory developed naturally, based on real-life examples and real-time adjustments. This flexibility is the management concept of ‘agile philosophy’ (i.e., applying management procedures designed to adapt to future changes). Food fraud prevention was developed to meet ever-changing needs, and the prevention strategies demonstrate an agile philosophy in practice.

Future research is needed to understand the application of the risk tolerance and risk appetite in relation to formalizing the basic procedures into a more formal general ‘management system’ (For more, see ISO management system standards). The more direct application of risk tolerance and appetite will help streamline the formal management system and simplify resource-allocation decision-making. In some cases, more (or much more) resource allocation will be justified, and in other situations, the work may be

reduced from active tracking to more general monitoring. There was also a need to explain how ERM and risk communication work together more thoroughly. Finally, there was a need to explain ‘how’ the system works and ‘how to start.’

3 EMERGING AWARENESS OF THE RISK TOLERANCE AND RISK APPETITE

3.1 DEFINITIONS OF RISK TOLERANCE AND RISK APPETITE

Risk tolerance is generally more of a measure, and risk appetite is more of a qualitative or gut judgment. The risk attitude is the general way of considering risk management.

From ISO standards:

- **Risk attitude** (ISO Guide 73:2009): “An organization’s approach to assess and eventually pursue, retain, take or turn away from risk.” This includes risk tolerance and risk appetite. [16]
- **Risk appetite** (ISO 22380): “The amount and type of risk an organization is willing to pursue or retain.” [17]
- **Risk tolerance** (ISO 22380): “An organization’s readiness to bear the risk after risk treatment in order to achieve its objectives.” [17]

From ERM/ COSO and the report Risk Appetite – Critical to Success:

“Various documents use the terms ‘risk appetite’ and ‘risk tolerance’ in different ways, even interchangeably. Though related, they are different ideas.”³

- **Risk Appetite (COSO)**: “the uncertainty comfort level of the owners in relation to the business goals.”[1]
- **Risk Tolerance (COSO)**: “is a level that should not be exceeded (or the deviation must be disclosed).”[18]

Those are textbook definitions. To understand these terms, it is helpful to have a real-world example. A case study is included at this document's end to provide insight into a real-world application.

³ Note: COSO does not have a definition of risk attitude.

3.2 APPLICATION OF RISK TOLERANCE AND RISK APPETITE

Risk tolerance and risk appetite are often challenging to understand in practice. “Various documents use the terms ‘risk appetite’ and ‘risk tolerance’ in different ways, even interchangeably. Though related, they are different ideas.” [1, 2]

In application (Figure 3): [19]

- Risk tolerance is a conclusion after measuring or considering many factors.
- Risk tolerance is often defined as a threshold or limit. Above the risk tolerance, the situation must be managed (to back under the threshold) or publicly disclosed (such as in a quarterly or annual report).
- Risk appetite is a more theoretical or qualitative threshold.
- The risk appetite is reviewed after the risk tolerance is assessed and determined.
- A company’s Board of Directors – or assigned manager such as CEO, CFO, President, or accountable party – determines ‘we’re not comfortable with this situation.’ Risk appetite is often more of a ‘gut feel’ where data or analysis may accept a risk level, but, in the end, the risk level may be unacceptable.

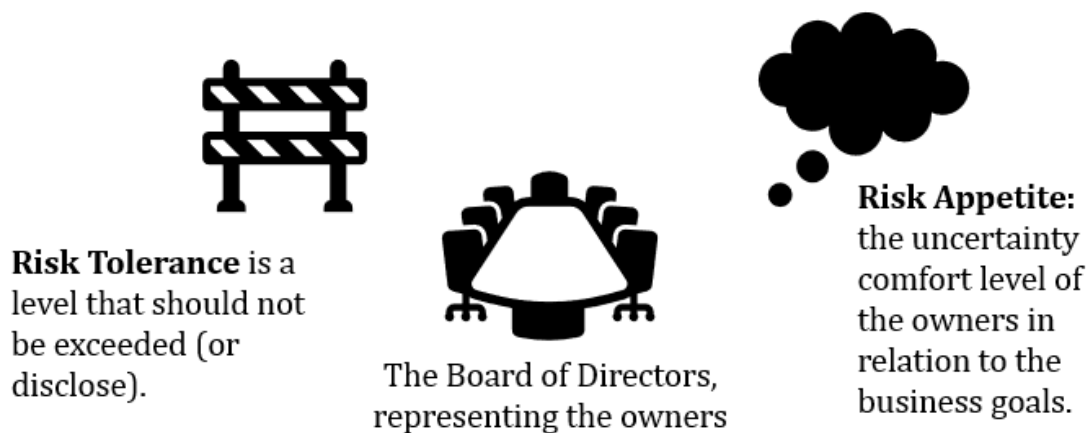


Figure 2: COSO/ ERM Relationship between Risk Appetite, Risk Tolerance, and Guidance from the Board of Directors [19]

3.3 FOOD FRAUD AND APPLICATION OF RISK TOLERANCE AND RISK APPETITE

Enterprise Risk Management (ERM/ COSO) was created to be able to consider and assess a wide range of risks that also are new or emerging. Often, when a new problem arises, the C-Suite leaders need to quickly determine if this is a real problem or ‘how bad is bad?’ For many of these emerging or urgent problems,

there is little time to respond and little data. The ‘initial screening’ or ‘pre-filter’ concept is a fundamental step in ERM/ COSO, but it’s a type of assessment that many employees never see.

Food fraud is an ultimate type of enterprise-wide, emerging problem. The ERM/COSO methods are ideal for determining a risk tolerance level and considering resource-allocation decision-making concerning the risk appetite.

While the methods and processes efficiently address food fraud, there is often little knowledge of the systems. The next section includes an industry survey of the application of ERM/ COSO to food fraud prevention.

4 SURVEY

4.1 INTRODUCTION

A survey was conducted to gain insight into the level and type of industry adoption to support the implementation and best practices for Enterprise Risk Management. This insight will help to identify unmet research needs.

4.2 METHODS

Five ERM-specific questions were added to the Food Fraud Annual Update (FFAU) online survey. The overall FFAU survey has 23 questions; after these, the new questions are 24 to 29. The FFAU survey is conducted by the Food Fraud Prevention Academy and distributed to several expert groups. The first targeted group is a list of 50 food fraud experts. The second list is a 1000+ contact list of those who subscribe to the Academy’s publications. Finally, the survey link was posted on social media outlets focusing on food fraud and prevention. The survey participants are experts who represented cutting-edge industry insights.

4.3 RESULTS AND DISCUSSION

The preliminary results are provided. The discussion is included with the results.

4.3.1 Survey Demographics

Several questions from the overall FFAU survey provide demographic insight. The questions are important to identify if the respondents actually have insight into the enterprise-wide assessment and procedures. For example, some middle managers are unaware of or involved in enterprise risk management. In some cases, such as quality group managers, they may provide officially notarized quarterly information on

nonconformities, but they are unaware that the information feeds into a regulatory summary such as the U.S. Sarbanes-Oxley Act reports. Only selected demographic questions that directly apply will be presented and reviewed here. [The question numbers are from the overall FFAU survey.]

Q4: My comments represent the business level of (select all that apply):

For this question, approximately 35% of the respondents represent direct work activity in corporate-wide or enterprise risk management (note: the respondent could select more than one response to the question, which adds up to more than 100%) (Figure 4). The other 65% possibly have direct insight into ERM. Based on the survey population, later questions must attempt to understand the full awareness of formal ERM.

An insight from this question is that there does seem to be a need to provide more resources and support to apply the role of ERM in food fraud vulnerability assessments.

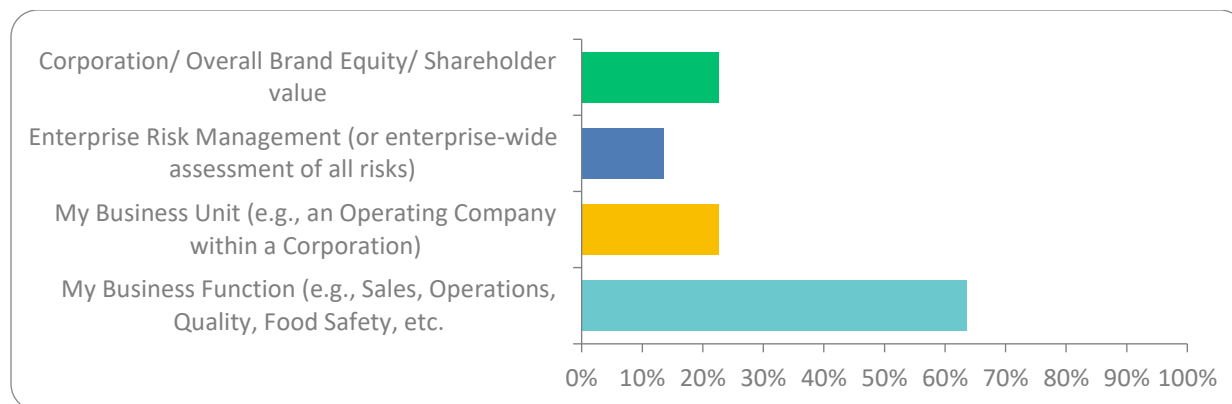


Figure 4: Q4: My comments represent the business level of (select all that apply)

Q5: The business function I represent is:

For this question, the overwhelming majority of survey respondents are from within the quality/ food safety function (Figure 5). Based on the groups that were surveyed, this is an expected outcome.

An insight from this question is further emphasis on the need to provide education and training on the ERM concept. A part of the communication should be to find a way to help the target population realize that they need more education and training (that they are generally overconfident or not aware of the usefulness of ERM to food fraud decisions).

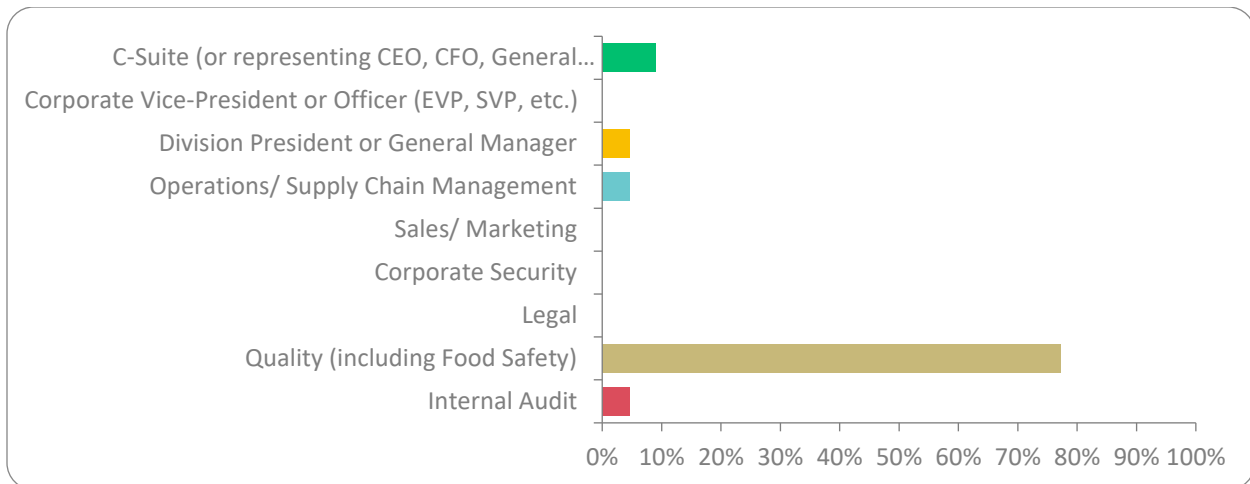


Figure 5: Q5: The business function I represent is:

Q7: Who at your company is held accountable for protecting against risks such as food fraud (who would be investigated or blamed if there is a lack of a thorough prevention plan)? (Select all that apply):

This question was included to understand who is accountable (who is to blame if there is a problem) for food fraud prevention (Figure 6). The higher in the enterprise the accountable party, the more formal the expected formality of risk assessment and a more direct connection to the ERM-based risk tolerance.

An insight from this question is to help the lower-level employees, who are often accountable for food fraud prevention implementation, understand ERM and the reporting methods to communicate more clearly. For example, to communicate in risk management terminology the: (1) current risk in relation to the overall enterprise risk tolerance and (2) submit a request for funding in terms of the ERM risk tolerance.

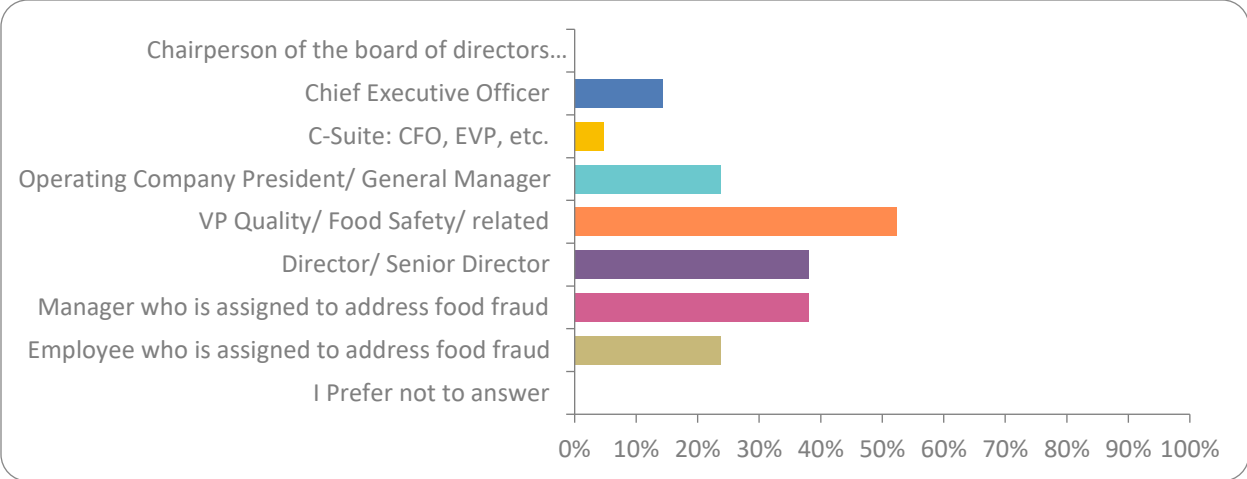


Figure 6: Q7: Who at your company is held accountable for protecting against risks such as food fraud (who would be investigated or blamed if there is a lack of a thorough prevention plan)? (Select all that apply):

Q12: Has your organization conducted a Food Fraud Vulnerability Assessment?

For this question, it is amazing that over 20% of the respondents stated their company had NOT conducted activities to meet the compliance requirements of a food fraud vulnerability assessment. It is important to note that there were zero responses of ‘don’t know’ – so ‘no’ is a definitive ‘no’ (Figure 7).

An insight from this question is to explore further the responses from companies that are required to conduct food fraud vulnerability assessments for compliance based on the Global Food Safety Initiative (GFSI) benchmark. The results identified a concern that the over 70% of respondents who thought they conducted food fraud vulnerability assessments were actually incomplete or not fully compliant. As more detailed survey questions were asked, more insight was gained on the discrepancies.

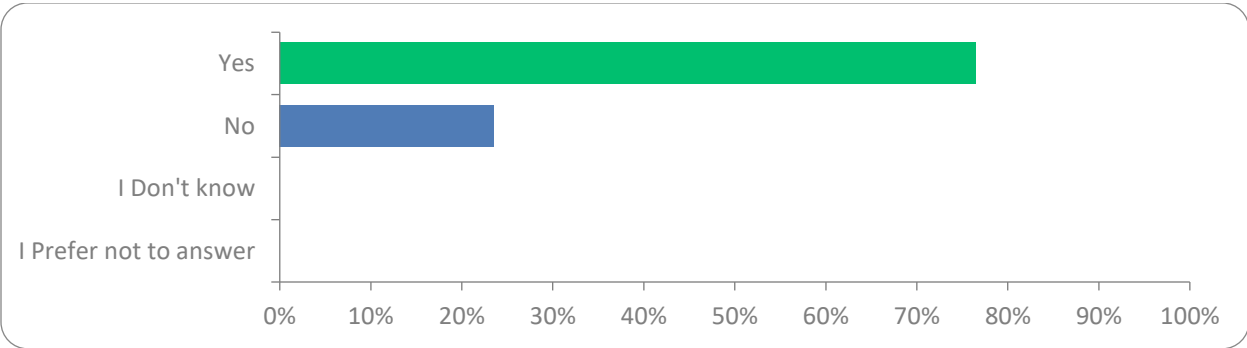


Figure 3: Q12: Has your organization conducted a Food Fraud Vulnerability Assessment?

In conclusion, considering the demographics, there seems to be an opportunity to help front-line employees, who are often responsible for implementing and managing food fraud prevention strategy, to understand and utilize ERM/COSO.

4.3.2 ERM-Related Questions

The next section will review the ERM-specific questions. The goal is to build upon the previous insight and explore the type and level of ERM education and training that is needed.

Q24: Do you have a method and system to compare food FRAUD with food SAFETY risks or vulnerabilities?

For this question, over 90% of the respondents calibrated the food FRAUD assessment risk levels with food SAFETY assessments (Figure 8). Also, of the total, 40% are 100% sure that their systems are connected and calibrated. This implies that about half the respondents are only ‘pretty sure’ their risk ranking is calibrated.

The next step could be understanding whether ‘yes or no’ is calibrated and asking more questions about the processes and methods. Also, there should be more examination of whether the food fraud vulnerability assessments cover all the compliance requirements. Overall, there seems to be uncertainty or over-confidence that the current food fraud prevention strategies are fully compliant for all types of fraud for all products. The ‘high confidence’ appears to be ‘high OVER-confidence.’

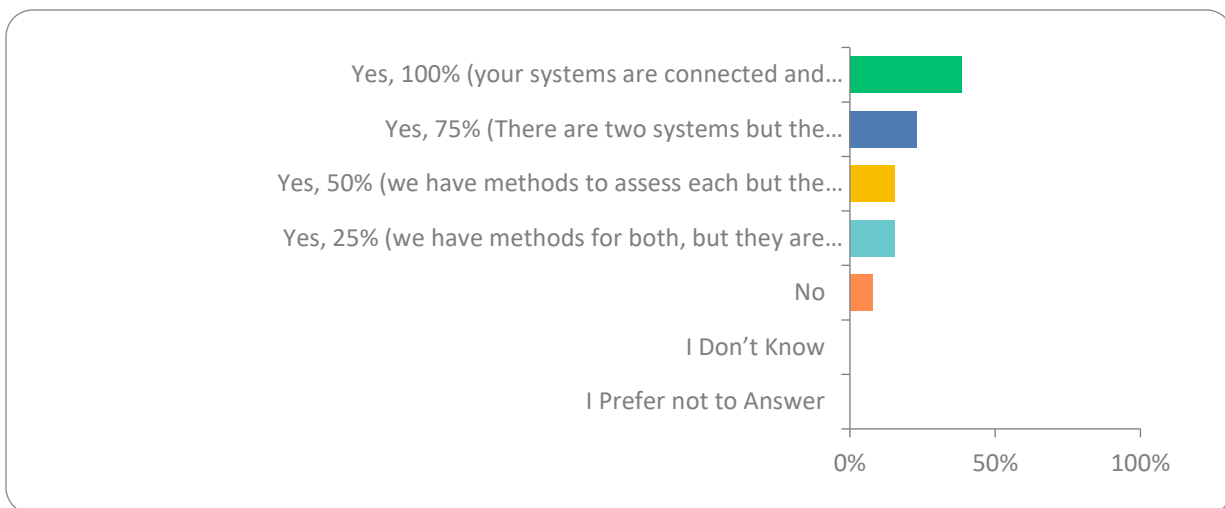


Figure 4: Q24: Do you have a method and system to compare food FRAUD with food SAFETY risks or vulnerabilities?

Q25: Are the same formulas or algorithms used to assess those food FRAUD and food SAFETY risks or vulnerabilities?

This Q25 was included for this question to gain more insight into the question started in Q24. These are essentially the same questions asked in two different ways (Figure 9). Significantly, in Q24, the ‘no’ response was around 10%, and for Q25, the ‘no’ response was approximately 30% -- when the question included more detail, the confidence decreased. Also, just as important, the ‘don’t know’ response increased from zero responses to around 10%.

The next step is the same as Q24 or asking for more detail.

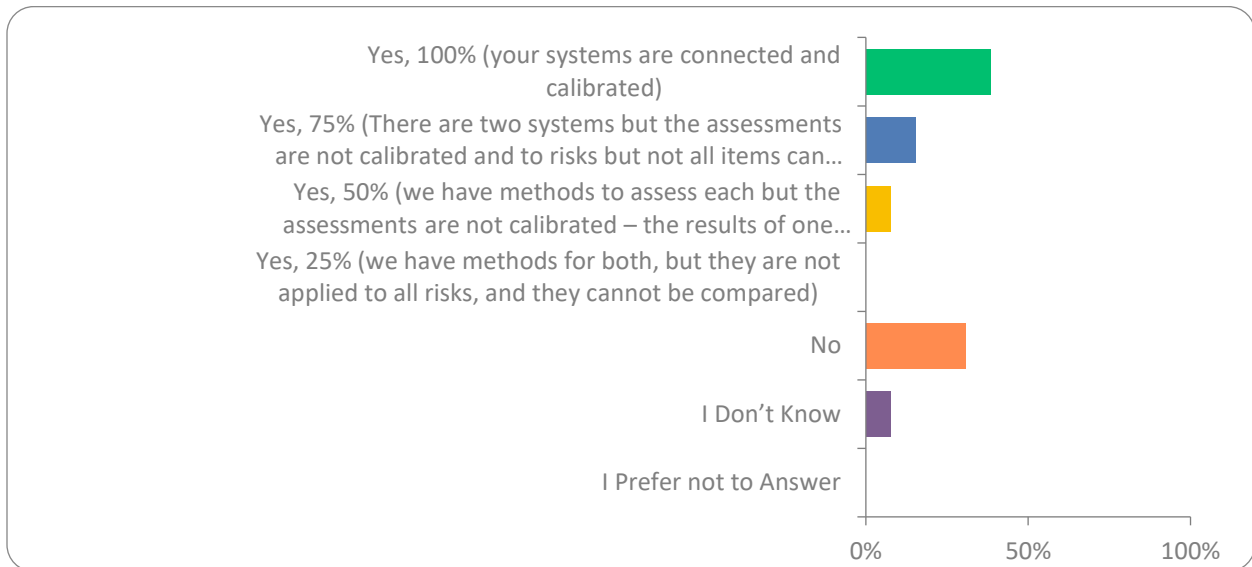


Figure 9: Q25: Are the same formulas or algorithms used to assess those food FRAUD and food SAFETY risks or vulnerabilities?

Q26: Do you have a corporate-wide, recognized, and supported method and system to review and assess risks or vulnerabilities (e.g., such as a system that is in place to support Sarbanes-Oxley Act requirements, including Enterprise Risk Management – ERM/ COSO or the like):

This Q26 was the same question as Q24 and Q25 but more detailed (Figure 10). From Q24 to Q25, confidence decreased again. The ‘no’ responses now exceeded the ‘yes, 100%’ responses. The ‘no’ response stayed the same, approximately 30%, but the ‘don’t know’ and ‘prefer not to answer’ increased from 10% to 15% and from zero to around 8%, respectively. As the questions got more detailed, the respondents’ confidence decreased.

A next step is the same as for Q24 of more education and training on ERM but also for the scope of food fraud prevention and the methods to calibrate the risk rankings from food fraud to food safety to the overall enterprise-wide risk tolerance.

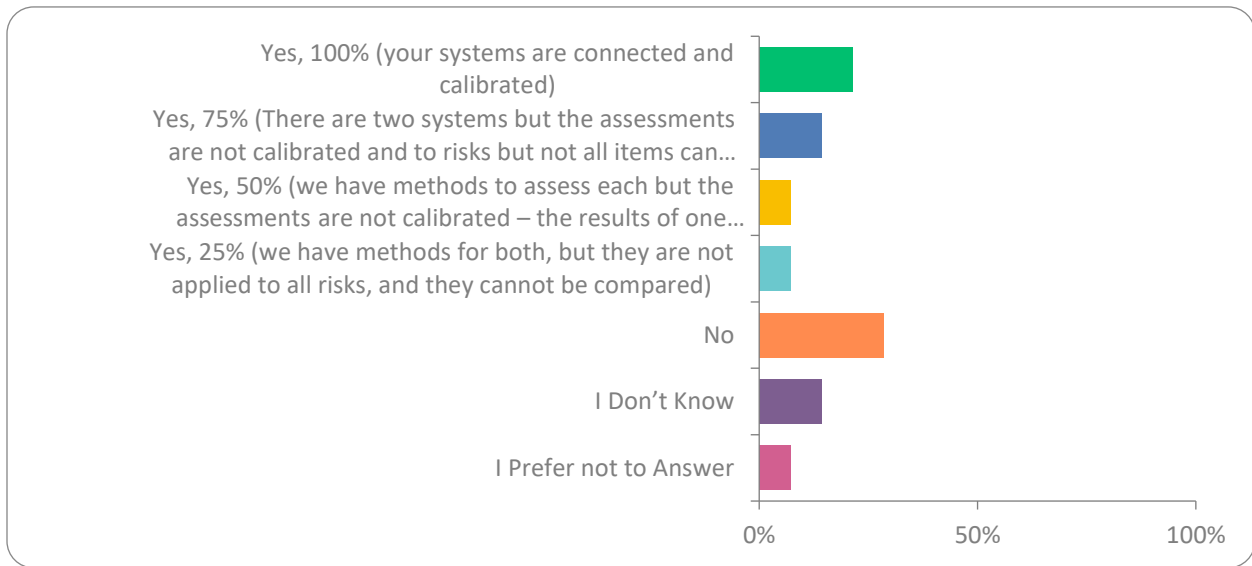


Figure 10: Q26: Do you have a corporate-wide, recognized, and supported method and system to review and assess risks or vulnerabilities (e.g., such as a system that is in place to support Sarbanes-Oxley Act requirements, including Enterprise Risk Management -- ERM/ COSO or the like):

In conclusion, food fraud vulnerability assessments are being conducted, but the risk assessors' survey questions revealed an apparent overconfidence. Also, there is a lack of calibration of food FRAUD problems to food SAFETY ranks and enterprise-wide risk tolerance. However, the implementation seems incomplete or without a formal calibration to ERM/ COSO.

4.3.3 Food Fraud/ Food Quality Systems Automation

The next section will review the final set of questions that explore the methods and extent of the automation of ERM and risk communication systems. A key is to build upon the food industry and government agency's focus on traceability and transparency. This focus is intended to leverage the speed and accuracy of artificial intelligence and machine learning to increase the speed of identifying problems with centralized data in an integrated system to improve analytics quality and facilitate automation. The reality is that there is no single system that can cater to a company's one-size-fits-all requirements.

The ultimate goal is to centralize data management in an integrated system. Data management and security are prerequisites for an integrated system and creating a data-ready system. This will support the

ability to quickly share information and change manufacturing or logistics operations to stop using suspicious raw materials of the product being manufactured or shipped, stop consumption, and ultimately reduce the hazards and costs of product recalls.

As the food safety problems are more clearly understood, this will most likely combine with efficiently capturing the right information and will build upon the increasing information and communication technology (ICT). For example, this could leverage emerging technology and resources such as the 'Internet of Things' (many systems are connected to a communication information technology infrastructure), 5G (more bandwidth is being implemented to share more information more quickly), artificial intelligence (rapid analysis of data sets to identify anomalies or trends) and refining the data output and dashboards to speed communication and decision-making. There is a severe practical limitation until 'enough' of the 'right information' is digitized and available for rapid access. Once that is realized, then machine learning can support the rapid identification of food safety root causes and quicker suggestions or automated responses. Artificial intelligence (AI) could contribute, but only after the step-by-step advances from the current state of more reactive machine learning to applying those technologies and resources.

The next series of questions were included to ask the same question in several different ways.

Q27: Do you have a food FRAUD risk management system that is one system for your entire enterprise (e.g., all operations are connected into one risk assessment system)?

For this question, almost 80% of the respondents state that all their food fraud information and data are connected to one system (Figure 11). About 30% of the respondents said they did NOT have the food fraud information connected, and about 10% stated they 'prefer not to answer.' Possibly, the respondents understood this question to refer to the food fraud vulnerability assessment method, such as the Food Fraud Initial Screening Tool (FFIS) or the SSAFE Food Fraud Vulnerability Assessment Tool (FFVAT).

A next step is to understand the responses more thoroughly. This finding is NOT consistent with the literature and public reports. This also possibly defines further over-confidence, as found in the full food fraud prevention compliance questions. Possible future research should provide more explanation of the 'one system for your entire enterprise.'

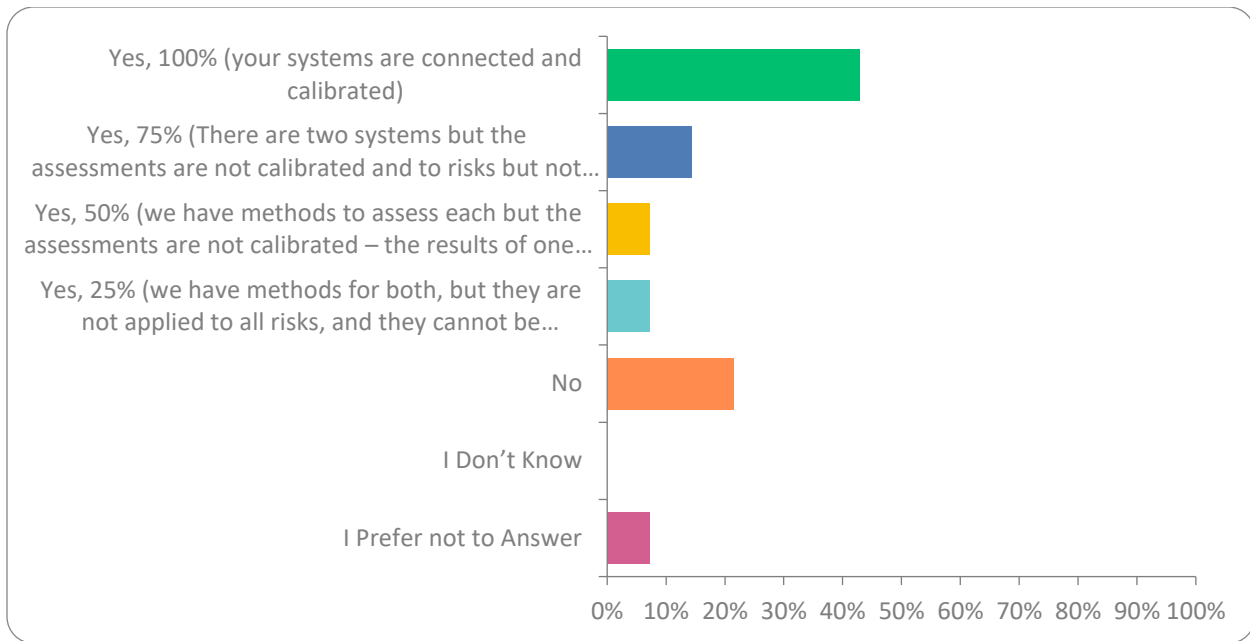


Figure 5: Q27: Do you have a food FRAUD risk management system that is one system for your entire enterprise (e.g., all operations are connected to one risk assessment system)?

Q28: Do you have a food FRAUD risk management system that could stop the production or shipment of products globally (e.g., an alert at one point in the operations or supply chain could stop all production or shipments at all your facilities)?

For this question, as with Q27, there are questions about how the respondents defined their system, assessed fraud, communicated suspicious activity, or responded to problems such as recalls (Figure 12). Essentially, all companies have some type of formal system to react to food quality or food safety product recalls. This is a different type of system than was intended to be reviewed.

A next step is to clarify the question further. In part, there is a need to explain the vision of an entire system or a case study example.

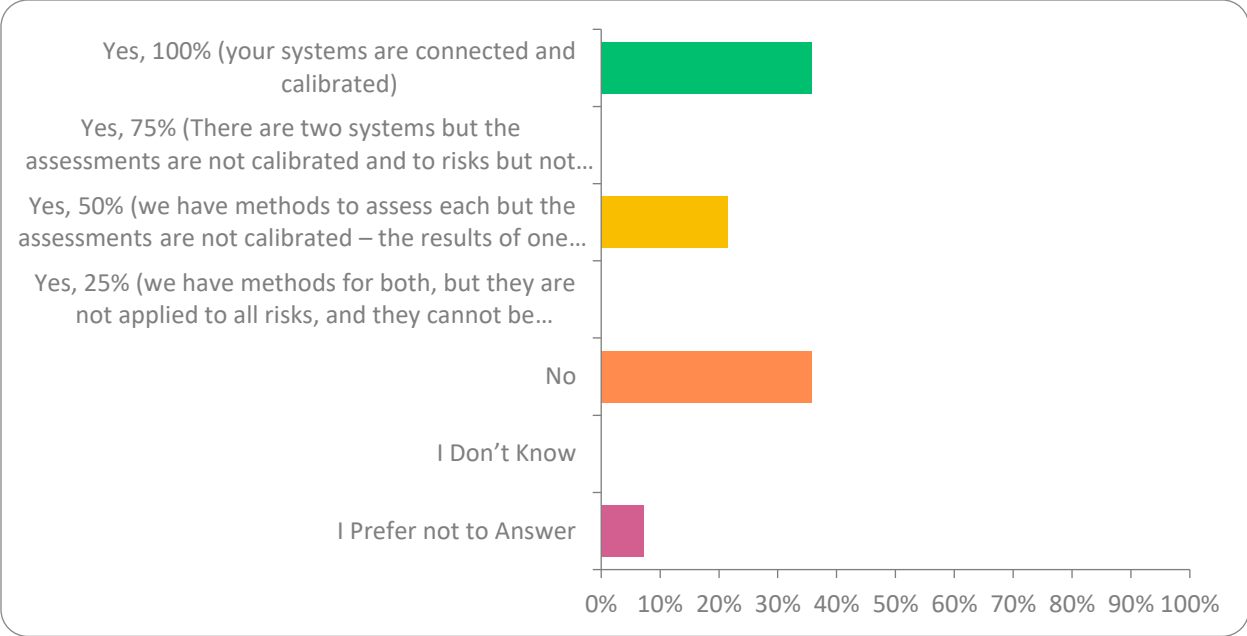


Figure 12: Q28: Do you have a food FRAUD risk management system that could stop the production or shipment of products globally (e.g., an alert at one point in the operations or supply chain could stop all production or shipments at all your facilities)?

Q29: Do you receive clear corporate direction on the assessment of 'risk tolerance,' such as the difference between likelihood and consequence categories such as very high, high, medium, low, and very low (or whatever ranking system you use)?

For this question, as in the previous section, the respondents' confidence decreased as more detailed questions were asked (Figure 13). The 'yes, 100%' response of over 30% contradicts what was expected. If this is truly the case, this is a very important and impressive state of the food industry. This is another question that could be interpreted in different ways by the respondent.

A next step, as with the previous questions in this section, there would be value in further explaining the vision of an entire system or a case study example.

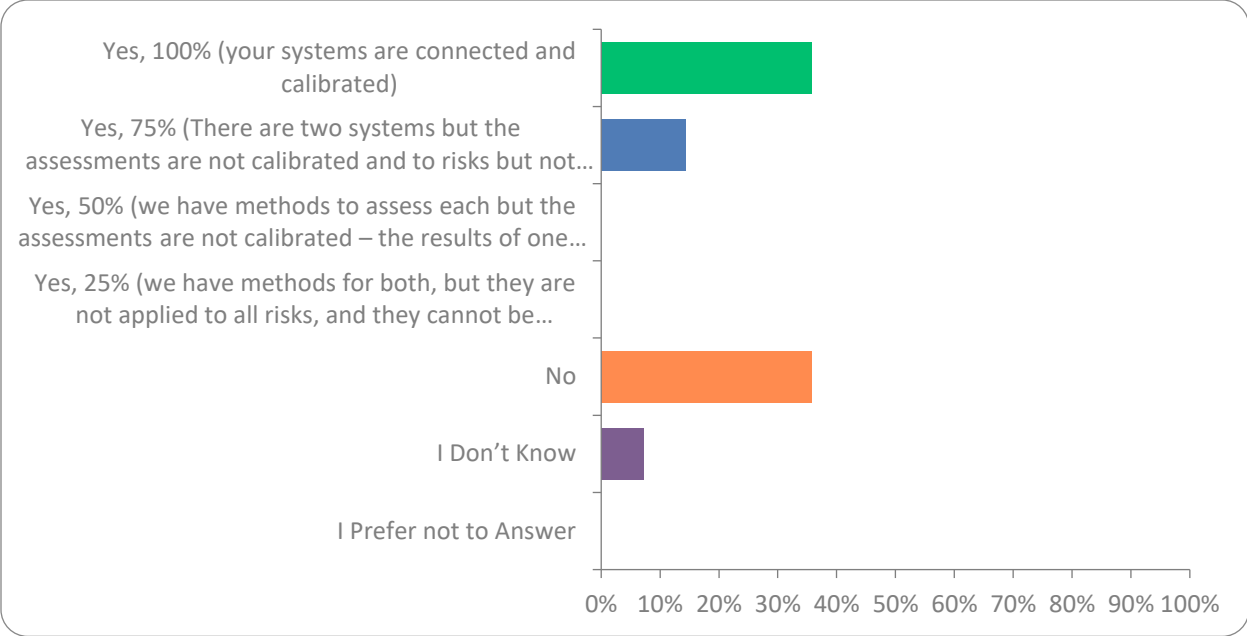


Figure 6: Q29: Do you receive clear corporate direction on the assessment of 'risk tolerance,' such as the difference between likelihood and consequence categories such as very high, high, medium, low, and very low (or whatever ranking system you use)?

4.4 CONCLUSION

From the survey and previous Food Fraud Annual Update reviews, there seems to be overconfidence in the application of ERM/ COSO – specifically, if the ERM/COSO concepts are being accurately and optimally applied. A simple risk summing of many types of risks is not formal ERM/COSO.

The overconfidence of the risk assessors and managers would suggest that self-assessments may be biased.

It will be helpful to provide a step-by-step guide to applying ERM/COSO to food fraud decision-making regarding evaluating the risk tolerance.

To demonstrate full and efficient implementation, including a real-world case study – a review of an existing FF/ ERM system that identifies the company and not just a hypothetical example would be helpful.

The food chain stakeholders and partners, anywhere in the supply chain, may have massive overconfidence in their level of food fraud prevention compliance, a basic understanding of the compliance requirements, a lack of calibration of their risk tolerance assessments (and thus, the identification of food fraud vulnerabilities that are a problem), the efficient connection between the FFVA and ERM risk tolerance, and an inefficiency or lag of crucial product recall information sharing.

5 USE CASE: THE EVOLVED KERRY GLOBAL SUPPLY QUALITY SYSTEM – A FOOD FRAUD EXAMPLE

To help companies understand the full scope of food fraud prevention compliance requirements and the explanation of a centralized and integrated management system, a case study of an implemented model is included here. To demonstrate the use case in detail – and not get too overwhelmed – a food fraud example is the focus of this section. Specifically, the updated Kerry Global Supply Quality Management Programs created the Supply Quality Risk and Vulnerability Management and Governance model that has evolved over the ten years this group has been operating. This section includes an overview of the Kerry Group and the Kerry Global Quality Supply Team, a summary of the basic management and governance model published in 2017, and a case study regarding the updated model.

The program has evolved to integrate supplier verification and raw material specification compliance, including automated food fraud prevention activities such as horizon scanning and food authenticity test results. This is made possible because of a centralized structure and data management systems. The crucial benefit of this model is when a problem is identified and communicated to relevant stakeholders, workflows are triggered to implement appropriate system controls, and countermeasures are initiated.

5.1 OVERVIEW OF KERRY GROUP AND GLOBAL SUPPLY QUALITY TEAM

An overview of the Kerry Global Supply Quality process review was conducted to provide a case study of applying ERM in food fraud prevention. They have group revenue of \$9.6 billion – with 147 manufacturing facilities and 23k+ people globally operating across 50 countries. Kerry Group has a broad range of core technologies spanning both taste and nutrition. The core technologies encompass Taste, Proactive Health, Beverage, Food and Meat Systems, and Kerry Dairy. They have had revenue growth of 10 percent per year over the previous thirty years. Kerry has a range of suppliers and customers that demonstrate impact and influence up and down the supply chain.

The Kerry Global Supply Quality team developed the **Supply Quality Risk and Vulnerability Management and Governance** model in partnership with key stakeholders, and it has been publicly shared with industry partners, peers, and customers. The model’s overall goal is to protect the quality of Kerry products and increase consumer confidence in their supply chain. The **objective** is to identify, manage, and coordinate a series of business processes that meet the goal as well as control operational costs, including the cost of goods within the low optimal/ unacceptable risk level set by the stakeholders. By tightening and controlling their supply chain, this model is intended to increase customer confidence in their products, reduce the cost associated with product failures, and increase the product quality while reducing the vulnerability, which may increase the value of their products.

The model has helped the Kerry Supply Quality team manage the introduction of newly acquired companies and their increasing supply chain complexity.

Provided below is the previous Kerry Global Supply Quality model for **Supplier Quality Risk and Vulnerability Management and Governance** (Figure 14). This demonstrates how the separate activities are linked and coordinated.

The model used by Global Supply Quality has three main components:

1. **Supply Quality Business Processes,**
2. **Supplier Quality Governance Review,** and
3. **Food Safety Risk and Vulnerability Management.**

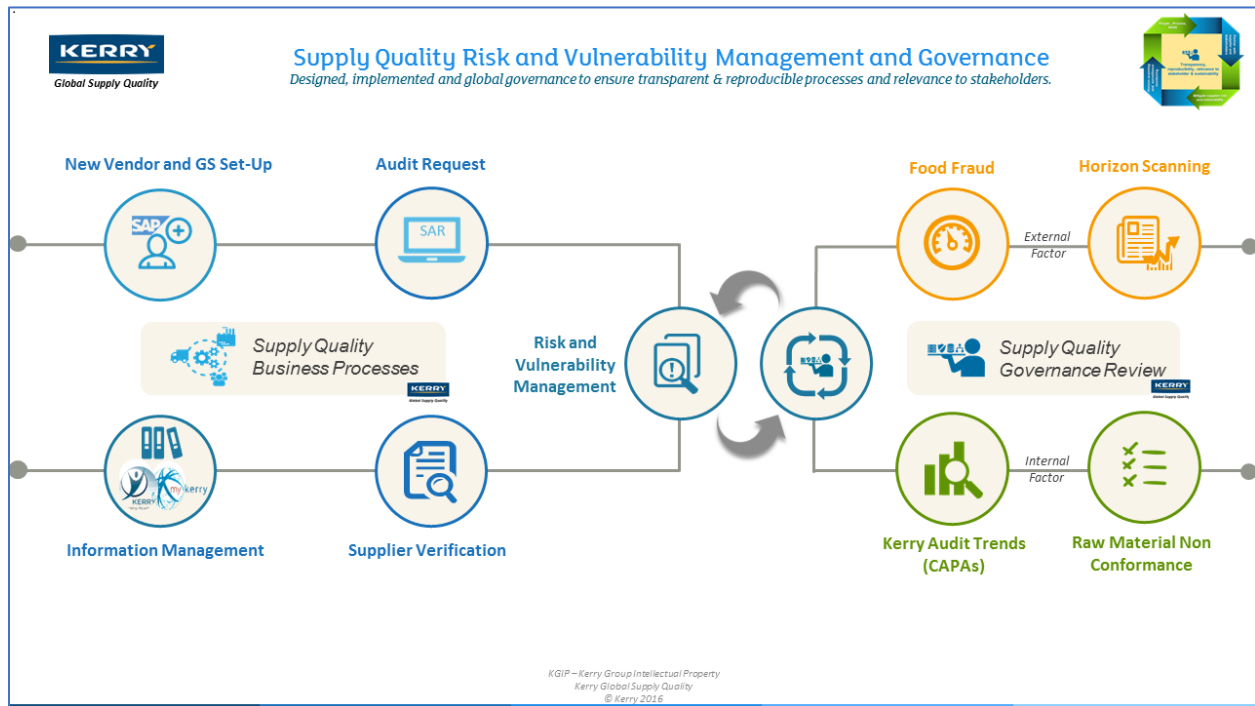


Figure 7: Kerry Global Supply Quality model for Supply Quality Risk and Vulnerability Management and Governance (copyright permission granted from the rights holder)

For more background on the Kerry Global Quality model, please see the full 2017 FFIR report on ‘Applying Enterprise Risk Management to Food Fraud Prevention’ (ERM2), available for download at: <https://foodfraudpreventionthinktank.com/wp-content/uploads/2021/05/BKGFF17-FFI-Backgrounder-2016-ERM-ERM2-v46-2.pdf>

5.2 EVOLVED KERRY GLOBAL SUPPLY QUALITY MODEL – 2023

5.2.1 Overview of Case Study

To provide an example of an integrated, holistic, and automated Supply Quality Risk and Vulnerability Management and Governance, the updated Kerry Global Supply Quality Team model is presented. This section will explain the model’s workings and why and how the scope was expanded. This is an example of a best-in-class food fraud prevention strategy for raw materials and supplier management. The overall model is used for all raw materials and supplier quality management, but to help provide a narrower use case, the focus here will be on food fraud prevention.

5.2.2 Foundation System – Expanded Scope and Response Automation

The Kerry Global Supply Quality Group was created ten years ago, and part of the objective was to change the way of doing business. The scope of focus is supplier quality and, thus, quality assurance – e.g., monitoring, reinforcing, improving, and managing the raw materials and incoming goods supplied to the overall Kerry Group businesses. A key focus was implementing more formal and standardized work processes.

Management systems became more streamlined after international standards were created. Defined by the International Standards Organization (ISO) (emphasis added):

“A **management system** is how an organization manages the interrelated parts of its business to achieve its objectives. ISO management system standards (MSS) help organizations improve their performance by specifying repeatable steps that organizations consciously implement to achieve their goals and objectives and to create an organizational culture that reflexively engages in a continuous cycle of self-evaluation, correction, and improvement of operations and processes through heightened employee awareness and management leadership and commitment.” [20]

The Supply Quality Risk and Vulnerability Management and Governance model demonstrates a robust management system, especially since it includes “a continuous cycle of self-evaluation, correction, and improvement.”

These types of integrated and proactive systems do not just automatically appear. The evolving systems take focus and commitment – the commitment of management and employee time, the commitment of financial resources for the positions as well as the technology development, and commitment from stakeholders across the supply chain from the earliest upstream suppliers through to the internal business unit purchasing group and many supply logistics partners.

Food product recalls or supply chain disruptions can be inconvenient, costly, or could amplify to be catastrophic for the business.

The evolved model objective is presented here to illustrate an end-to-end program that manages both suppliers and raw materials within the enterprise management system. This demonstrated if and how to optimize synergies globally and embed one way of working. The evolved model functionality goals were developed to be more transparent and to 'have more eyeballs on everything':

- **Expanded Supply Chain:** The Kerry Global Supply Quality Risk and Compliance Program scope leverages and optimizes global processes when engaging with suppliers and customers in a complex/diverse supply chain.
 - There are now over 100,000+ supplier sites of manufacture and raw material SKU combination that manage the enhanced purchased information records (ePIR) in SAP.
 - The supply chain monitoring expanded from the direct supplier ('one step up' or Tier 1) all the way to the manufacturing site (farther upstream to the source or production).
 - The additional supply information allows for supply chain mapping, which helps identify hot spots or speeds up traceability.
- **Compliance:** Use the model to increase visibility and verification of available supplier information, such as raw material buying specifications, certificate of insurance, and growing sustainability demands.
- **Evolving Requirements:** The first versions of the model focused on the most pressing concern: food safety. In the previous version, the emerging food fraud concepts were added. In the near future, ERM is expected to include new compliance requirements, such as sustainability claims made by the businesses.

The updated model included a new system architecture that increased the connectivity of the activities.

5.2.3 The Overall System

The overall model incorporates information on one side from the 'Supplier' company and the other side from the evaluation of the 'Raw Material' (Figure 15). The key node is the connection to 'Global Governance,' where the information is presented in a way that aids decision-making.

The model's Supplier side covers the end-to-end process, from supplier setup and approval to supplier verification activities.

- The Raw Material side focuses on raw material buying specification, quality assurance activities, and non-conformance management.
- 'Horizon Scanning' reviews the marketplace for any new information that could indicate a concern, suspicious activity, or an incident. The goal is to have a way to seek out further information – even 'weak signals' – that could indicate a concern of any kind.

- ‘Collaboration’ – such as with groups such as suppliers, customers, peers, and academia – this reviews the latest management systems or methods to test or track products through the supply chain.

The change management of all the processes above flows into a global governance structure.

One of the most important points to assure continuing compliance is that the processes and programs are embedded in corporate policies, systems, ways of working, and corporate reporting.



Figure 8: The Full Kerry Supply Quality Risk and Compliance Programs, including the Central Global Governance and the two key Concepts of Supplier and Raw Material

5.2.4 Supplier Side – A Focus on the Risk and Verification

The model’s left side is ‘Supplier’ information and includes third-party or contract manufacturers (Figure 16). The goal is to clearly state the expectations and then be able to assess and verify compliance with external and internal food safety standards and applicable regulations.

The primary activities include:

- Supplier Requirements and Setup

- Risk Assessment, Audit Planning & Management
- Supplier Verification & Audit Trends

In practice, the expectation is clearly stated, the methods are defined, trends are tracked, and there is an entry point for communicating concerns. Any new information automatically communicates through the system. For example, suppose a supplier process has been out of specification (e.g., an upstream supplier had a quality control incident that was found out later). In that case, the information can be immediately shared to review remediation options and corrective action.

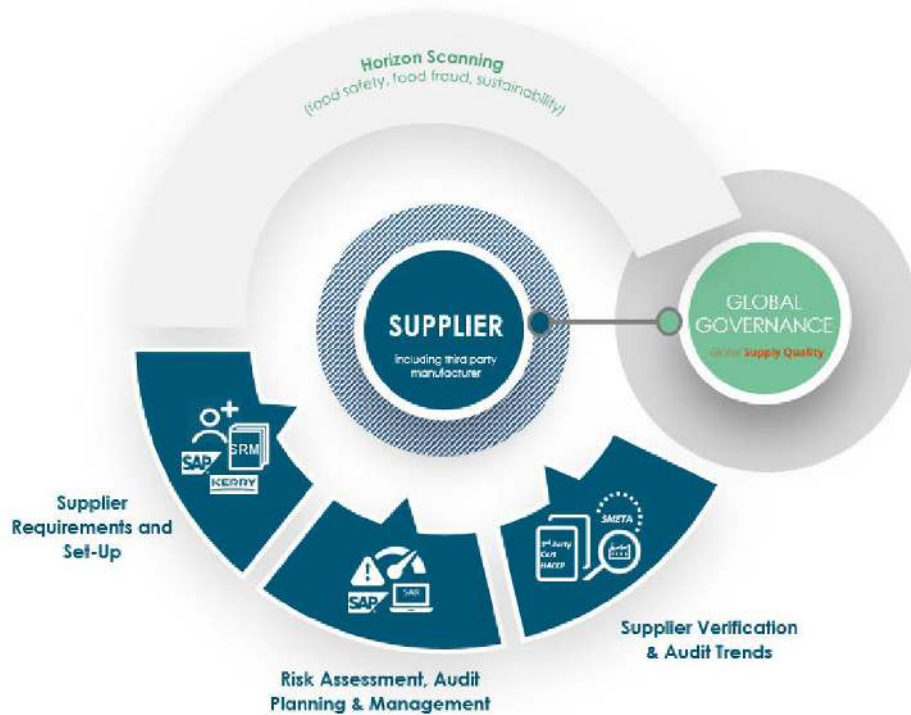


Figure 9: The Left Side of the System that includes Supplier Focused Activities (with linkage to Global Governance)

5.2.5 Raw Material Side – A Focus on the Compliance

The right side of the model is 'Raw Material' (Figure 17). The goal is to ensure and verify compliance of the raw materials that are supplied to Kerry. A key point is an expansion from only focusing on specifications that tell suppliers what is expected in the way of processes and procedures to compliance with the application of the activities. Adding to this is a proactive approach of more due diligence that includes raw materials quality assurance through additional surveillance monitoring.

The primary activities include:

- Raw Material Buying Specification Management
- Raw Material Assurance
- Raw Material Non-Conformance

In practice, the expectation is clearly stated, raw material food safety and quality parameters are outlined and monitored, and there is an entry point for problems or non-conformance to be communicated. Any new information automatically communicates through the system. For example, suppose a raw material non-conformance is identified (e.g., a food safety risk in a batch of a raw material). In that case, the information can immediately be transferred across the entire Kerry Group system, which could lead to stopped use of that product, stop the shipment, or other countermeasures.

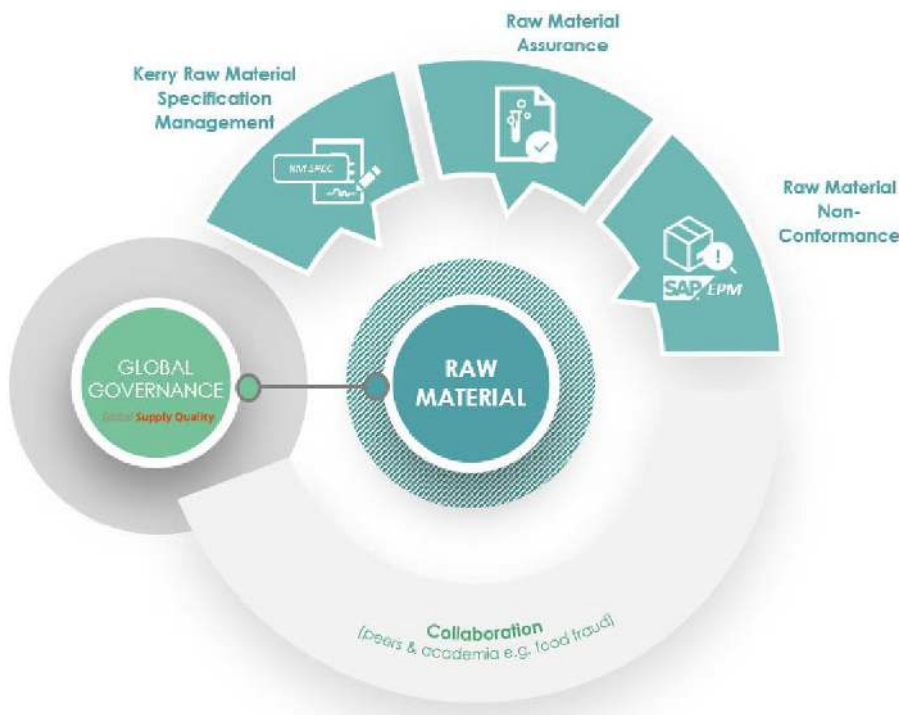


Figure 10: The Right Side of the System that includes Raw Material Focused Activities (with Linkage to Global Governance)

5.2.6 Evolved Management and Relationships

Automation and digital sharing of information speed up the process, but maximum efficiency is created by communication and relationship building.

- Ask suppliers if they can comply with the requirements.
- Include 'supplier development' to help suppliers become more efficient and effective.

- Confirm that all the expectations are met, such as food fraud prevention, sustainability claim certification, etc.
- Review and confirm that documentation such as Certificates of Analysis is proper, authentic, and accurate.
- Include resources to ask suppliers to do something and to follow up to assure compliance.
- Create an open communication network – the quicker information is received and processed, the quicker the systems can respond. By engaging a more comprehensive range of sources of information, the goal is to find problems – or even vulnerabilities – as soon as possible.

5.2.7 Case Study Call to Action

The Kerry Global Supply Quality model is a centralized, integrated, end-to-end management system. The case study provides a use case and insight and illustrates how it helps the business run more efficiently, with more control and less uncertainty.

6 REPORT CONCLUSION AND CALL TO ACTION

Food fraud prevention continues to evolve and formalize. The next step is more formal fraud ‘risk management’ systems, including more structured resource-allocation decision-making. This is the natural evolution of food fraud prevention strategy and is consistent with broad business ‘fraud risk management’ such as what is published by COSO.

Risk tolerance and risk appetite can become a standard and almost automatic process that can decentralize split-second decision-making but still control the actions within an overall comfort level.

A fully integrated system is possible and ideal for competently managing vulnerabilities and reducing the impact and cost of hazards.

To apply the lessons learned from this survey and case study, risk assessors could start with:

- Explore and understand internal ERM practices, including risk tolerance and risk appetite. Often, this is managed under the Chief Financial Officer (CFO) or Chief Risk Officer (CRO).
- Use the ERM survey questions to understand the use and level of adoption of a food fraud prevention strategy for the company and then for their suppliers.
- Leverage the basic food fraud gap analysis methods to evaluate the overall strategy.
- Evaluate the formality and efficiency of how risk tolerance and risk appetite are determined and how the ranking is related to the overall ERM levels.
- Consider the Kerry case study as an example of an integrated system.

6.1 AFTERWORD

6.1.1 About the Authors

This report was led by Director Dr. John Spink, Director of the Food Fraud Prevention Academy (www.FoodFraudPrevention.com). He is also an Assistant Professor (Fixed-Term) in the Department of Supply Chain Management in the Business College at Michigan State University. Note: Our team conducts a wide range of teaching, research, and outreach projects. The Food Fraud Insight Report series (“FFI Report” or FFIR) was created to review specific emerging topics or recent laws, regulations, certifications, standards, or best practices. The summary and insight are not legal advice and are not intended to replace the counsel of a food law expert.

6.1.2 Acknowledgment

This paper included food industry case studies, Kerry’s Global Supply Quality team’s program, and vendor management requirements. The author is especially thankful for the insight and feedback from Janice Ho, Director of Global Supply Quality, Risk, and Verification; Ann Marie Carillo, Director of Global Supply Quality – CI and Compliance; Hui Ying Tan, Continuous Improvement Manager Global Supply Quality; and Adrian Sharpe, Global VP Supply Quality. Link to Kerry Group: <http://www.kerry.com/>

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7 ATTACHMENTS:

7.1 SURVEY QUESTIONS

Food Fraud Annual Update survey questions were expanded to support the third ERM report (ERM3). The following list of ERM-application-specific questions will be the 'data' in a future report.

The Multiple-Choice Response Options:

- Yes, 100% confidence
- Yes, 75% confidence
- Yes, 50% confidence
- Yes, 25% confidence
- No
- Don't Know
- Prefer not to Answer

New ERM-Related Questions:

1. Do you have a method and system to compare food FRAUD with food SAFETY risks or vulnerabilities?
2. Are the same formulas or algorithms used to assess those food FRAUD and food SAFETY risks or vulnerabilities?
3. Do you have a corporate-wide, recognized, and supported method and system to review and assess risks or vulnerabilities (e.g., a system in place to support Sarbanes-Oxley Act requirements, such as Enterprise Risk Management - ERM/ COSO or the like)?
4. Do you have a system for food FRAUD risk management that is one system for your entire enterprise (e.g., all operations are connected into one risk assessment system)?
5. Do you have a system for food FRAUD risk management that could stop the production or shipment of products globally (e.g., an alert at one point in the operations or supply chain could stop all production or shipments at all your facilities)?
6. Do you receive clear corporate direction on the assessment of 'risk tolerance,' such as the difference between likelihood and consequence categories such as very high, high, medium, low, and very low (or whatever ranking system you use)?

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