SSAFE
Food Fraud Vulnerability Assessment Tool

December 16th 2015

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Foreword/Acknowledgments

This Food Fraud Vulnerability Self-Assessment Tool has been developed by SSAFE in collaboration with Wageningen University and Research Center and VU University Amsterdam. SSAFE has also collaborated with PwC to develop an electronic version of this tool.

Legal Considerations/Disclaimer

Terms and Definitions

Food Fraud

A collective term encompassing the deliberate and intentional substitution, addition, tampering, or misrepresentation of food, food ingredients or food packaging, labelling, product information, or false/misleading statements made about a product for economic gain.

More specifically the following types of food fraud considered in this tool are:

- Dilution is the process of mixing a liquid ingredient with high value with a liquid of lower value.
- Substitution is the process of replacing an ingredient or part of the product of high value with another ingredient or part of the product of lower value.
- Concealment is the process of hiding the low quality of a food ingredients or product.
- Mislabeling is the process of placing false claims on packaging for economic gain.
- Unapproved enhancement is the process of adding unknown and undeclared materials to food products in order to enhance their quality attributes.
- Counterfeiting is the process of copying the brand name, packaging concept, recipe, processing method etc. of food products for economic gain.

NOTE: Grey market production/theft/diversion is out of scope for this tool. However, it may be picked up anyway.

Food Fraud Mitigation Measures
Hard and soft actions that are taken to combat against identified food fraud vulnerabilities.

Food Fraud Vulnerability
Susceptibility or exposure to a gap or deficiency that could place consumer health at risk and/or have an economic or reputational impact on a food company's operations if not addressed.

Food Fraud Vulnerability Assessment
The process of collection and evaluation of information on potential food fraud risk factors as well as mitigation measures which, when combined, determine the actual fraud vulnerability.

Introduction

Recent global food fraud scandals have further highlighted the need to strengthen companies' ability to mitigate against the risks of food fraud within their organizations and across their supply chain. Authorities, consumers and other stakeholders expect food companies to act proactively and mitigate against food fraud risks.

However, current food safety management systems are not designed for food fraud mitigation, which requires a different perspective and skill set than food safety or food defense. For instance, socio-economic issues and past food fraud incidents are not included in traditional food safety or food defense risk assessments. Vulnerabilities relating to food fraud can also occur outside the traditional activities of a company.

In this context, SSAFE has collaborated with Wageningen UR and VU University Amsterdam to prepare a science-based tool for assessment of a company's food fraud vulnerabilities and provide a basis to develop company-specific intervention strategies.

Scope of the Tool

The Food Fraud Vulnerability Assessment Tool provides companies with an assessment tool that can be used in the company's systematic process of assessing its vulnerabilities to food fraud.

This tool refers to food fraud as intentional food adulteration (i.e. dilution, substitution, concealment, unapproved enhancements, mislabelling) and counterfeiting for economic gain only. Ideologically motivated acts in the food supply chain are out of scope.

This tool can be used by businesses across the food supply chain, irrespective of size, geographical location or type of food business.

This tool can support companies in the implementation of the new GFSI requirements for food fraud mitigation.

In this tool, references are made to sources and to other tools if more specific or further in-depth analysis is required.

This tool provides a profile of a company's potential food fraud vulnerability, and this profile can form the basis for the development of company specific interventions to mitigate the identified vulnerabilities.

This tool does not provide specific recommendations for mitigation techniques. However, some of the referenced tools and information sources may provide such additional support.

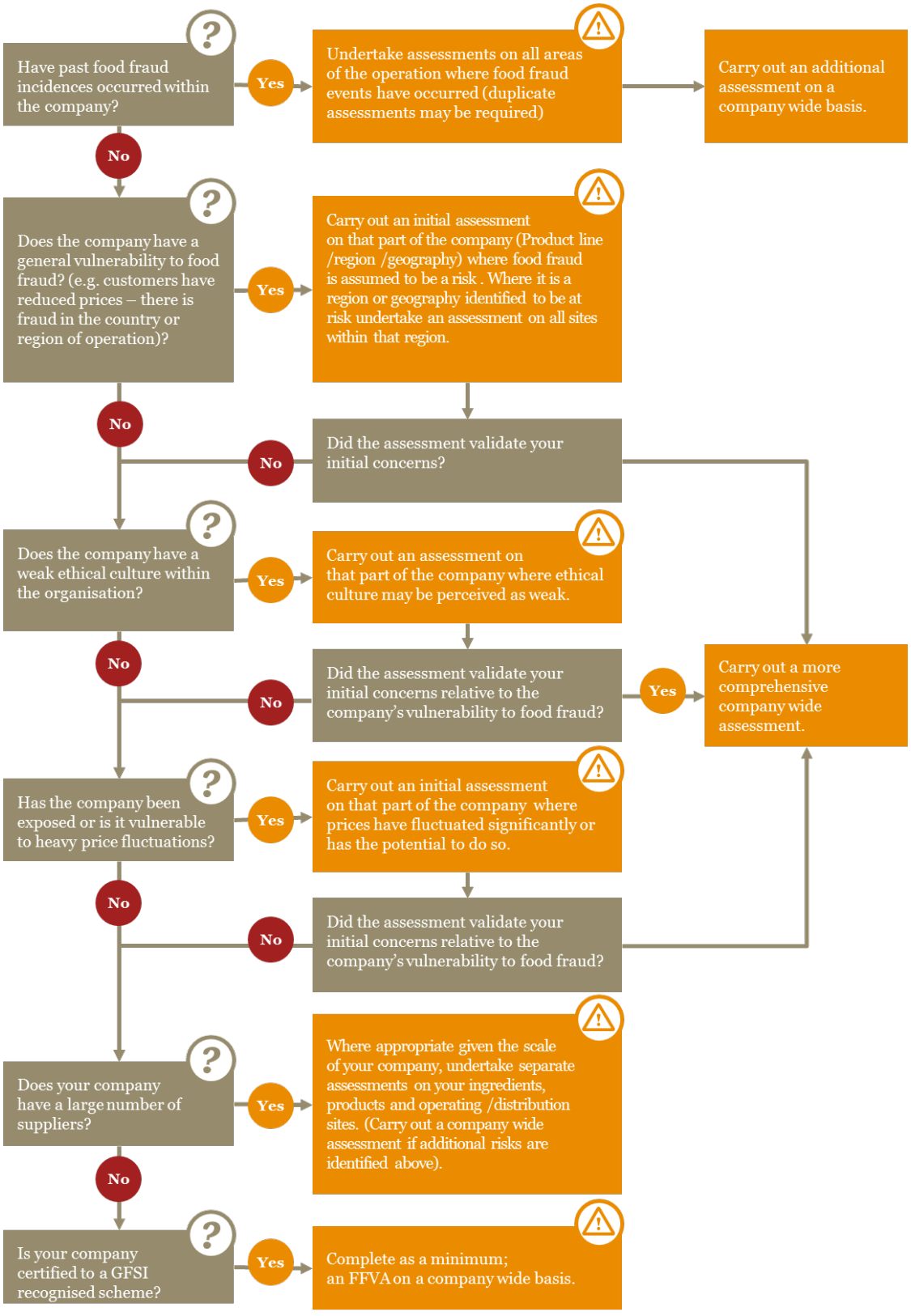
This tool is not designed to detect fraud nor predict future food fraud incidents. However, by addressing identified vulnerabilities, unknown fraudulent activities may be identified and provide companies with the opportunity to stop them from occurring.

Companies can use this tool and its outcomes as an integral part of their food safety management system.

NOTE: Food fraud vulnerabilities are dynamic and may change over time. Therefore, this is a "living tool" that requires regular usage.

Decision Tree

The tool can be used to assess the vulnerability to fraud at an ingredient, product, brand, facility, country or company-wide level and, where applicable, major direct suppliers and customers. To help determine where to apply the tool (i.e. set your scope), the following Decision Tree, or pre-filter, can be used.



The Assessment Team

An assessment of food fraud vulnerabilities requires a wide range of expertise. Depending on the selected scope of the assessment, knowledge with regard to general controls (e.g., internal audits, security, QA, laboratory analyses, external audits, supply chain), procurement, finance and other management functions could be required. The tool provides advice regarding what type of expertise may be required to answer each question.

Large companies should compose a multifunctional team, whereas smaller companies might need external support from subject experts or consultants.

How to Use this Guideline – the Guideline Structure

The Components

The Food Fraud Vulnerability Assessment Tool has seven parts:

i. A general information sheet regarding company information and the team that completed the information in the tool
ii. A decision tree to help the user decide where to apply the tool
iii. Fifty assessment questions
iv. Main spider webs providing a general overview of the findings
v. Detailed spider webs providing further insight into the findings
vi. Outputs enabling the user to prepare potential mitigation strategies and techniques for identified vulnerabilities
vii. A final report summarizing the outcome of the assessment

The Questions

The tool includes **fifty** questions for food fraud vulnerability assessment, and it is structured in two dimensions. The first dimension involves the elements affecting criminal behaviour, i.e. opportunities, motivations, and control measures. The second dimension concerns the company and the layers of its external environment, i.e. its direct suppliers and customers, its supply chain, and the (inter)national governance environment.

The **opportunities section** includes indicators related to product and process characteristics, features of the chain/industry network, and historical evidence of fraud with particular food products and ingredients.

The **motivations section** includes indicators for organizational aspects such as business culture, historical offenses, and economic conditions of the company, suppliers and customers. The indicators for motivations are subdivided according to the second dimension – the environmental layers. Indicators are provided for the own company, the direct suppliers, and the wider environment.

The **control measures section** consists of 19 indicators for mitigation and contingency control measures. A subdivision is provided for the environmental layers, i.e. the internal hard controls, internal soft controls, and external controls at the level of the direct suppliers/customers and the wider environment.

For each opportunity and motivations indicator, three descriptions are provided that reflect three risk levels (low, moderate, and high). Similarly, for each control indicator, three descriptions are provided to reflect the level of control. The description that reflects the company situation needs to be selected for each indicator.

ANNEX I - References & Further Reading

References

Business Culture

Cohen, D. V. (1995). "Ethics and crime in business firms: Organizational culture and the impact of anomie." The Legacy of Anomie Theory **6**: 183-206.

Kaptein, M. (2008). "Developing a measure of unethical behavior in the workplace: A stakeholder perspective." Journal of Management **34**(5): 978-1008.

Kaptein, M. (2008). "Developing and testing a measure for the ethical culture of organizations: The corporate ethical virtues model." Journal of Organizational Behavior **29**(7): 923-947.

Kaptein, M. (2011). "Understanding unethical behavior by unraveling ethical culture." Human Relations **64**(6): 843-869.

Conceptual Underpinning Management Systems

Kirezieva, K., J. Nanyunja, et al. (2013). "Context factors affecting design and operation of food safety management systems in the fresh produce chain." Trends in Food Science & Technology **32**(2): 108-127.

Kirezieva, K., L. Jacxsens, et al. (2013). "Assessment of Food Safety Management Systems in the global fresh produce chain." Food Research International **52**(1): 230-242.

Luning, P. A., L. Bango, et al. (2008). "Comprehensive analysis and differentiated assessment of food safety control systems: a diagnostic instrument." Trends in Food Science & Technology **19**(10): 522-534.

Luning, P. A., W. J. Marcelis, et al. (2009). "Systematic assessment of core assurance activities in a company specific food safety management system." Trends in Food Science & Technology **20**(6–7): 300-312.

Luning, P. A., W. J. Marcelis, et al. (2011). "A tool to diagnose context riskiness in view of food safety activities and microbiological safety output." Trends in Food Science & Technology **22, Supplement 1**: S67-S79.

Economic Circumstances

Jenkins, A. and J. Braithwaite (1993). "Profits, pressure and corporate lawbreaking." Crime, Law and Social Change **20**(3): 221-232.

Martin, K. D., J. B. Cullen, et al. (2007). "Deciding to bribe: A cross-level analysis of firm and home country influences on bribery activity." Academy of Management Journal **50**(6): 1401-1422.

May, P. J. (2004). "Compliance motivations: Affirmative and negative bases." Law & Society Review **38**(1): 41-68.

McKendall, M. A. and J. A. Wagner III (1997). "Motive, opportunity, choice, and corporate illegality." Organization Science **8**(6): 624-647.

Orlitzky, M., F. L. Schmidt, et al. (2003). "Corporate social and financial performance: A meta-analysis." Organization studies **24**(3): 403-441.

Simpson, S. S. and M. Rorie (2011). "Motivating Compliance: Economic and Material Motives for Compliance." Explaining Compliance: Business Responses to Regulation: 59.

Empirical Data Management Systems

Luning, P. A., K. Kirezieva, et al. (2015). "Performance assessment of food safety management systems in animal-based food companies in view of their context characteristics: A European study." Food Control **49**: 11-22.

Osés, S. M., P. A. Luning, et al. (2012). "Food safety management system performance in the lamb chain." Food Control **25**(2): 493-500.

Sampers, I., H. Toyofuku, et al. (2012). "Semi-quantitative study to evaluate the performance of a HACCP-based food safety management system in Japanese milk processing plants." Food Control **23**(1): 227-233.

Sampers, I., L. Jacxsens, et al. (2010). "Performance of Food Safety Management Systems in Poultry Meat Preparation Processing Plants in Relation to Campylobacter spp. Contamination." Journal of Food Protection **73**(8): 1447-1457.

Food Fraud Occurrence and Analytical Methods

Aylott, R. (2013). Chapter 16 - Analytical Strategies Supporting Protected Designations of Origin for Alcoholic Beverages. Comprehensive Analytical Chemistry. G. Miguel de la and G. Ana, Elsevier. **Volume 60**: 409-438.

Capuano, E., R. Boerrigter-Eenling, et al. (2013). "Analytical authentication of organic products: an overview of markers." Journal of the Science of Food and Agriculture **93**(1): 12-28.

Cubero-Leon, E., R. Peñalver, et al. (2014). "Review on metabolomics for food authentication." Food Research International **60**(0): 95-107.

Esslinger, S., J. Riedl, et al. (2014). "Potential and limitations of non-targeted fingerprinting for authentication of food in official control." Food Research International **60**(0): 189-204.

Lopez, M. I., E. Trullols, et al. (2014). "Multivariate screening in food adulteration: untargeted versus targeted modelling." Food Chemistry **147**: 177-181.

Luykx, D.M.A.M. and S.M. van Ruth (2008). "A review of analytical methods for determining the geographical origin of food products." Food Chemistry **107**: 897-911.

Manning, L. and J. M. Soon (2014). "Developing systems to control food adulteration." Food Policy **49, Part 1**(0): 23-32.

Shears, P. (2010). "Food fraud - a current issue but an old problem." British Food Journal **112**(2): 198-213.

Spink, J. and D. C. Moyer (2011). "Defining the Public Health Threat of Food Fraud." Journal of Food Science **76**(9): R157-R163.

Spink, J. and D. C. Moyer (2013). "Understanding and combating food fraud." Food Technology **67**(1): 30-35.

Tähkäpää, S., R. Maijala, et al. (2014). "Patterns of food frauds and adulterations reported in the EU Rapid Alarm System for Food and Feed and in Finland." Food Control **47**: 175-184.

Historical Evidence of Criminal Offences

Baucus, M. S. and J. P. Near (1991). "Can illegal corporate behavior be predicted? An event history analysis." Academy of Management Journal **34**(1): 9-36.

Piquero, N. L. and D. Weisburd (2009). Developmental trajectories of white-collar crime. The Criminology of White-collar Crime, Springer**:** 153-171.

van Onna, J. H. R., V. R. van der Geest, et al. (2014). "Criminal Trajectories of White-collar Offenders." Journal of Research in Crime and Delinquency: 1-26 DOI: 10.1177/0022427814531489 .

Organizational Strategy

Agnew, R., N. L. Piquero, et al. (2009). General strain theory and white-collar crime. The Criminology of White-collar Crime, Springer**:** 35-60.

Huisman, W. (2015) Criminogenic Organizational Properties and Dynamics. In: Benson, M.B., F.T. Cullen and S. von Slyke (ed.) *The Oxford Handbook of White-Collar Crime*, Oxford: Oxford University Press.

Passas, N. (1990). "Anomie and corporate deviance." Contemporary Crises **14**(2): 157-178.

Simpson, S. S., N. L. Piquero, et al. (2002). "Rationality and corporate offending decisions." Rational Choice and Criminal Behavior: Recent Research and Future Challenges **32**: 25.

Wang, X. and K. Holtfreter (2011). "The effects of corporation-and industry-level strain and opportunity on corporate crime." Journal of Research in Crime and Delinquency **49**(2): 151-185.

Legal Framework

Huisman, W. (2014) Compliance and corporate crime control, in: Weisburd, D. and G.J.N. Bruinsma (eds.) *The Encyclopedia of Criminal Justice*, New York: Springer.

Huisman, W. and J. van Erp (2013). "Opportunities for Environmental Crime A Test of Situational Crime Prevention Theory." British Journal of Criminology **53**(6): 1178-1200.

Kagan, R. A. and J. T. Scholz (1980). The "criminology of the corporation" and regulatory enforcement strategies. Organisation und Recht**:** 352-377.

Paternoster, R. and S. Simpson (1996). "Sanction threats and appeals to morality: Testing a rational choice model of corporate crime." Law and Society Review: 549-583.

Managerial Control Measures

Miceli, M. P., J. P. Near, et al. (2009). "A word to the wise: How managers and policy-makers can encourage employees to report wrongdoing." Journal of Business Ethics **86**(3): 379-396.

Miceli, M. P., J. P. Near, et al. (2012). "Predicting employee reactions to perceived organizational wrongdoing: Demoralization, justice, proactive personality, and whistle-blowing." Human Relations **65**(8): 923-954.

Parker, C. and S. Gilad (2011). "Internal corporate compliance management systems: Structure, culture and agency." Explaining Compliance: Business responses to regulation, Christine Parker and Vibeke Nielsen, eds., Edward Elgar.

Parker, C. and V. L. Nielsen (2008). "Corporate compliance systems: could they make any difference?" Administration & Society: doi: 10.1177/0095399708328869.

Further Reading

BSI (2014). PAS 96 Guide to Protecting and Defending Food and Drink from Deliberate Attack. http://shop.bsigroup.com/Browse-by-Sector/Food--Drink/PAS-96-2014/.

Campden BRI (2014). TACCP (Threat Assessment and Critical Control Point): a practical guide 2014 (Guideline G72). http://www.campdenbri.co.uk/publications/pubDetails.php?pubsID=4640..

De Lange, E. (2013). Food Crisis, Fraud in the Food Chain, and Control Thereof. http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2013/2091(INI).

Elliott, C. (2014). Elliott Review into the Integrity and Assurance of Food Supply Networks – Final Report. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/350726/elliot-review-final-report-july2014.pdf.

European Commission (2015). RASFF – Food and Feed Safety Alerts. http://ec.europa.eu/food/safety/rasff/index_en.htm.

FMI/GMA Trading Partner Alliance (2014). Brand Protection and Supply Chain Integrity: Methods for Counterfeit Detection, Prevention and Deterrence. A Best Practices Guide. http://www.gmaonline.org/file-manager/Collaborating_with_Retailers/GMA_Inmar_Brand_Protection.pdf.

Food and Drink Federation (2015). Food Authenticity – Five Steps to Help Protect your Business from Food Fraud. http://www.fdf.org.uk/corporate_pubs/Food-Authenticity-guide-2014.pdf.

FoodShield (2015). Economically Motivated Adulteration Databases. https://www.foodshield.org/discover-tools-links/tools/.

Gee, J., L. Jack, et al. (2014). Minimising Fraud and Maximising Value in the UK Food and D4rink Sector 2014. http://www.port.ac.uk/media/contacts-and-departments/icjs/ccfs/PKF_LittleJohn_-_Fraud_in_the_food_sector_report.pdf.

USP (2014). FCC Forum December 2014 Appendix XVII: Guidance on Food Fraud Mitigation. http://www.usp.org/sites/default/files/usp_pdf/EN/fcc/Notices/guidance_on_food_fraud_mitigation.pdf.

USP (2015). USP Food Fraud Databank. http://www.foodfraud.org/node?destination=node.

Wilson, B. (2008). *Swindled: The Dark History of Food Fraud, from Poisoned Candy to Counterfeit Coffee*, Princeton: Princeton University Press, 400 pp.

ANNEX II - The Scientific Framework Behind the Tool

The often-cited principle in food fraud mitigation is "Think like a criminal." Criminology is the science studying criminal behavior and criminal decision-making. This includes fraud, which is an economically motivated crime.

In contemporary criminology, economically motivated crimes are seen as the outcome of the aggregation of 1) opportunities, 2) motivations, and 3) the absence of control measures (see Figure 1). These three elements have been the topic of extensive study and theory testing and form the basis for this assessment tool.

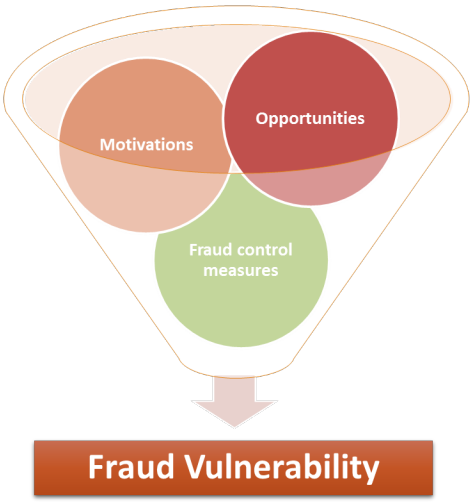


Figure 1 – Fraud Vulnerability: the three elements affecting criminal behavior

Opportunities
In the case of food, ingredients and products are – by the nature of their composition, qualities, and geographical or production origin – attractive for adulteration, substitution, mislabeling or counterfeiting.

Motivations
Fraud can be committed by **individual offenders** working in a company or in organized networks, as well as by **corporate offenders** such as companies operating across the supply chain. Fraudsters can be operators within the supply chain or external operators trying to infiltrate or manipulate the supply chain.

Economic motivation assumes the pursuit of individual material gain or some kind of business advancement. Depending on the offender and the situation, this economic motivation can take two different forms: *profit maximization* or *loss minimization*. In other words, *greed* versus *need*: the drive for more material gain versus the perception that law breaking is unavoidable for economic survival.

Furthermore, additional factors such as organizational strategy, business culture, level of competition, and relationships with suppliers will have an impact on the motivations to commit food fraud.

Mitigation Measures

Businesses and **systems** can implement control measures to detect or prevent fraud and intervene in case of deviations. In criminology, informal guardians are distinguished from formal guardians, and exercising guardianship (control) is the formal and professional duty of the latter. From a company perspective, formal internal guardians can be food quality and safety officers, while the national Food Safety Authority exercises formal external guardianship. Informal guardians can be employees, suppliers, or customers. From a company's perspective, the most appropriate system to exercise guardianship is the Food Safety Management System, which can (and should) include measures to mitigate the risk on fraud such as detection systems or preventive measures in the form of both hard and soft controls.

The Influence of the Environment

Research has established that people have the psychological tendency to place threats of crime outside the social group or the organization to which they belong (the "alien conspiracy"). However, criminological studies repeatedly show that in most cases where companies are victimized by fraud, the offenders are employees. Therefore, potential opportunities and motivations for food fraud should be assessed in both the internal and the external environment of the company.

From the perspective of the company conducting the assessment, the internal and external environment consists of various levels:

- The company
- The direct suppliers and customers across the company's supply chain
- The industry segment
- The national and/or international environment.

Along this dimension of environmental layers, the company's ability to manage opportunities and motivations decreases. Similarly, the company's ability to obtain reliable data on the elements "Opportunities," "Motivations," and "Mitigation Measures" decreases along the axis (as illustrated in Figure 2).

Figure 2 - The environment of the company and the three elements of food fraud

How The Scientific Framework Relates to this Tool

This food fraud vulnerability assessment takes the criminological framework as a starting point. The three elements are the main factors determining a company's vulnerability to food fraud. The elements are producing risks in the following manner: **Opportunities** and **motivations** are determined by the company's internal and external environment and are defined as the potential fraud risk factors. The potential risk resulting from these two elements can be mitigated by the third element: the **mitigation measures** in place in the company's Food Safety Management System and/or external controls in the supply chain, industry segment, and/or legal framework.

Companies operating in a high-fraud risk environment (e.g. due to opportunities, drivers or motives inherent to the environment) will require advanced and specific fraud-monitoring systems and preventative measures to limit their vulnerability. Contingency measures may be required alongside mitigation measures to limit damage in case fraud issues occur within the company or its environment.