

Appendix 8: What works to prevent food fraud- comparison of food fraud vulnerability assessment models and tools and food fraud prevention strategies

Table 8.1 Food Fraud Vulnerability Assessment Models

Source	Joint Nordic Food Fraud Threat Assessment for Food Fraud	Spink et al. (2016a)	Spink et al. (2019)	Van Ruth et al. (2017)	Silvis et al. (2017)	Yang et al. (2019)	van Ruth and de Pagter-de Witte, (2020)	Song et al. (2021)
Metrics	33 measures 5 x 5 matrix for assessment of impact and probability. 4 x 4 matrix for assessment of impact and probability used in the national threat assessments with the unknown dimension.	5 X 5 Matrix	5 X 5 Matrix	50 measures in radar diagram	50 measures in ribbons SSAFE tool	48 measures (adaption of SSAFE tool) in radar diagrams and ribbons	50 measures with ranking	50 measures in radar diagrams and ribbons
Risk criteria	Impact and probability 5 levels. Very high, high, moderate, low, very low. National threat Impact and probability 4 levels high, moderate, low, unknown	5 levels Very high, high, medium, low, very low	5 levels Very high, high, medium, low, very low	3 levels High, medium, low	-	-	-	-
Likelihood		X	X	-	-	-	-	-
Impact	X Financial X Societal	X	-	-	-	-	-	-
Consequences	-	-	X	-	-	-	-	-
Opportunities	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space	X Technical opportunities; Opportunities in time and space
Motivations	X Financial motives; Culture and conduct	-	-	-	-	X Economic drivers; Culture and behaviour	X Economic drivers; Culture and behaviour	X Economic drivers; Culture and behaviour
Control (supervisory) measures	X Technical; Prevention	-	-	-	-	X Technical measures; Managerial measures	X Technical measures; Managerial measures	X Technical measures; Managerial measures

Table 8.2 Food Fraud Prevention Models

Model	Food Fraud Initial Screening Model (FBO level)	Food Fraud Prevention Strategy (FBO Level)	Food Fraud Prevention Strategy (national level)	Stages of food fraud prevention (FBO level)	Food fraud prevention cycle (FBO level)	HACCP-DP
Source	Spink et al. (2016a)	Spink et al. (2016b)	Spink et al. (2017)	Spink (2019)	Spink et al. (2019)	Wi?niewska (2015); Codex (2020)
Stage 1 Define scope, basic terms and screen hazards/threats	<p>Food Fraud Initial Screening (FFIS) Matrix Variables Product or Group AND Market or Region</p> <p>Step 1 define the scope and basic terms.</p> <p>Step 2 Review incidents (databases) and suspicious activity</p> <p>Step 3A Conduct FFIS for health hazards. Step 3B Conduct FFIS for enterprise wide risks and financial impact.</p>	<p>Food Fraud Initial Screening (FFIS) Matrix Review phase Organise team</p> <p>Create Food Fraud Policy, Mission Statement, Draft Food Fraud Prevention Strategy/Plan</p> <p>Conduct FFIS Gather background information to inform FFVA</p>	<p>Developing a common starting point and the developing and sharing of best practices for vulnerability assessments. Third parties develop standards and protocols so approaches can be audited and certificated.</p>	<p>Gap Analysis – ask seven questions</p> <ol style="list-style-type: none"> 1. FFVA undertaken (Y/N) 2. FFVA Documented (Y/N) 3. Food Fraud Prevention Strategy Implemented (Y/N) 4. FFPS Documented (Y/N) 5. Annual Food Fraud Incident Review completed (Y/N) 6. All types of Food Fraud addressed (Y/N) 7. All products from both incoming goods and finished goods through to the consumer. Addressed (Y/N) <p>Concept</p> <ol style="list-style-type: none"> 1. Develop and implement a food fraud policy statement. Concept 2. Create a FFPP Complete seven steps of implementing and managing food fraud prevention. <p>Step 1 Convene a Food Fraud Task Force</p> <p>Step 2 Create an Enterprise-wide Food Fraud Policy/Mission Statement and begin drafting a Food Fraud Prevention Strategy/Plan</p> <p>Step 3. Conduct the pre-filter Food Fraud Initial Screening (FFIS).</p>	<p>Step 1. Consider new information through</p> <ol style="list-style-type: none"> 1A. Review specific food fraud incidents internally or externally. 1B. Scanning. Consider broad changes for example, market changes. 1C. Public Policy. Consider policy and regulatory changes. <p>Step 2. Fraud Opportunity.</p> <ol style="list-style-type: none"> 2A Consider guardians and hurdles. 2B. Consider victim. 2C. Consider fraudster. <p>Step 3. Undertake vulnerability assessment.</p> <ol style="list-style-type: none"> 3A. Initial screening. 	<p>Step 1. Assemble HACCP Team and Identify Scope</p> <p>Step 2. Describe product</p> <p>Step 3. Identify intended use and users (especially vulnerable groups)</p> <p>Step 4. Construct flow diagram</p> <p>Step 5. On-site confirmation of flow diagram</p> <p>Step 6 (part). List all potential hazards that are likely to occur.</p>
Stage 2 Conduct hazard analysis/vulnerability assessment and document	<p>Food fraud vulnerability assessment (very high to very low) Step 4 (paper states this is risk ranking)</p>	<p>Undertake FFVA</p>	<p>Undertake FFVA at national and business level</p>	<p>Step 4. Review additional needs including additional information or a more detailed Food Fraud Vulnerability Assessment (FFVA).</p>	<p>Step 3.</p> <ol style="list-style-type: none"> 3B Undertake a vulnerability assessment. 3B. Detailed vulnerability assessment. 	<p>Step 6. (part) Conduct a hazard analysis to identify the significant hazards (Principle 1)</p>
Stage 3 Undertake risk ranking using matrix or decision tree or other tool.	<p>Corporate Risk Map Plots FFIS risk assessments 5x5 matrix likelihood (very high to very low) AND Impact (very high to very low).</p> <p>Step 4 In Spink et al., (2019) this changes to Likelihood and consequences</p>	<p>Map food fraud vulnerabilities</p>	-	<p>Step 5. Review specific food fraud vulnerabilities in an enterprise risk amp (Enterprise Risk Management)</p>	<p>Step 4. Enterprise Risk Rank</p>	<p>Step 6. (part) Conduct a hazard analysis to identify the significant hazards (Principle 1). Often likelihood and severity used.</p>

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Stage 4 Development, validation, implementation and verification of a food control management system (FCMS)	Resource Allocation Decision based on risk rating. (Step 4)	Consider countermeasures and control systems to address Very High and high vulnerabilities. Propose a Food Fraud Prevention Plan.	Develop and implement appropriate countermeasures and control systems.	<p>Step 6. Consider countermeasures and control systems to address the ;very high' and 'high' vulnerabilities.</p> <p>Step 7. Propose a Food Fraud Prevention Strategy including the calibration of the Food Fraud risks on the enterprise risk map.</p>	<p>Step 5. Rank</p> <p>Step 6. Countermeasures and control system.</p> <p>Feedback loop back into Step 1.</p>	<p>Step 6 (part) Consider any measures to control identified hazards (principle 1).</p> <p>Step 7. Determine the Critical Control Points (CCPs) (Principle 2).</p> <p>Step 8. Establish validated critical limits for each CCP (Principle 3).</p> <p>Step 9. Establish a monitoring system for each CCP (Principle 4)</p> <p>Step 10. Establish corrective actions (Principle 5)</p> <p>Step 11. Validation of the HACCP Plan and verification procedures (Principle 6)</p> <p>Step 12. Establish documentation and record keeping (Principle 7)</p> <p>Step x. Training (Codex requirement but not described as a step).</p> <p>Step y. Food defence plan Determine CDPs in your process. Devise food defence mitigations.</p> <p>Step z. Implement, test, assess and maintain the defence mitigations.</p>