



RESEARCH METHODOLOGY

Food Safety Digital Maturity Benchmark

An independent primary-research program measuring digital and technology adoption across food safety operations.

This methodology note documents the research design, sampling approach, data quality procedures, and analytical methods behind the Food Safety Digital Maturity Benchmark.

1. Study Overview

The Food Safety Digital Maturity Benchmark is an independent, primary-research program designed to measure the state of digital and technology adoption across food safety operations in food and beverage manufacturing and processing organizations. The study is conducted annually and produces a publicly available industry benchmark report, a validated maturity model framework, and an ROI quantification of digital adoption.

The core hypothesis driving the research is that digitally mature organizations achieve measurably lower contamination risk, reduced operational downtime and waste, and faster corrective action cycles than their less mature counterparts. The study is designed to test this hypothesis rigorously, to identify which technology investments most strongly predict favorable outcomes, and to reveal the business pressures, organizational capabilities, and implementation patterns that differentiate high-maturity organizations from the rest of the industry.

Study title	Food Safety Digital Maturity Benchmark
Edition	2026 (inaugural year)
Primary audience	Food safety, quality, operations, and technology leaders at food and beverage manufacturers and processors
Geographic scope	Global, with primary focus on North America and Europe
Research approach	Mixed methods: quantitative online survey + qualitative depth interviews
Target sample	N ≥ 200 qualified survey respondents; 15–20 depth interviews
Fieldwork period	Q3–Q4 2026
Report publication	Q1 2027

2. Research Design and Approach

The study employs a sequential mixed-methods design, combining a large-scale quantitative survey with a targeted qualitative interview program. This approach is standard practice in benchmark research and is appropriate given the study’s dual objectives: (1) producing statistically reliable, industry-wide estimates of digital maturity and related KPIs; and (2) generating rich, practitioner-level insight into the mechanisms, decisions, and organizational factors that drive or impede digital adoption.

The quantitative survey provides breadth, enabling cohort analysis across sectors, company sizes, geographies, and maturity stages. The qualitative interviews provide depth, surfacing the explanatory context, nuanced motivations, and illustrative case examples that quantitative data alone cannot capture. Findings from both streams are integrated in the final benchmark report.

DESIGN PRINCIPLE

All research instruments, sampling procedures, and analytical methods are designed to support meaningful year-over-year tracking, allowing the benchmark to serve as a longitudinal index of industry digital maturity as the program matures across successive annual editions.

3. Quantitative Survey

3.1 Survey Instrument

The survey instrument comprises 20 substantive questions organized into six thematic sections:

- ◆ Digital maturity current state
- ◆ Business pressures and strategic drivers
- ◆ Technology investments
- ◆ Objectives and outcomes
- ◆ Capabilities gained
- ◆ Future intentions

In addition, we segment respondents based on self-identified demographic and firmographic categories designed to enable cohort analysis. Question formats include single-select, multi-select, matrix rating scales, open numeric fields, and short open-text responses.

The instrument was developed to operationalize each of the study's four key research dimensions: digital maturity stage (positioning respondents on a five-stage maturity ladder from manual to fully integrated), operational and risk KPIs (measuring concrete performance indicators such as CAPA cycle time, audit outcomes, scrap rates, and recall frequency), preventive behavior metrics (capturing the depth and consistency of proactive food safety practices), and technology investment profile (inventorying deployed technologies, vendors, and spend levels).

All rating scales use consistent 5-point anchors to facilitate cross-question comparison and year-over-year tracking. The instrument is designed for self-administration via an online survey platform and is estimated to require 10 to 15 minutes to complete.

3.2 Target Population and Eligibility

Eligible respondents must meet all screening criteria:

- ◆ Employed at an organization that manufactures, processes, or co-manufactures food or beverage products
- ◆ Hold a role with direct, indirect, or economic responsibility for food safety, quality assurance, operations, IT/digital transformation, regulatory compliance, or executive management
- ◆ Work at an organization with at least one physical manufacturing or processing facility

- ◆ Have sufficient familiarity with their organization's food safety technology investments to answer substantive questions, screened via a knowledge confirmation question during intake

Organizations engaged solely in food retail, distribution, foodservice, or agricultural production (without processing) are excluded. Responses from vendors, consultants, and technology providers are collected separately and excluded from the primary benchmark dataset to preserve the practitioner perspective.

3.3 Sample Design and Target Size

The study targets a minimum of 200 completed, qualified responses. This threshold is calibrated to support reliable subgroup analysis across the primary cohort dimensions while remaining achievable within a realistic fieldwork window. Subgroups with fewer than 20 respondents will be reported directionally with appropriate caveats rather than as statistically representative findings.

The study seeks representative coverage across the following cohort dimensions:

Cohort dimension	Categories
Manufacturing segment	Meat/poultry/seafood, dairy, bakery/snacks, beverages (alcoholic and non-alcoholic), fruits/vegetables/prepared foods, ingredients, pet food, contract manufacturing
Company revenue	Under \$50M / \$50M–\$250M / \$251M–\$1B / \$1B–\$5B / Over \$5B
Facility footprint	Single-site, multi-site domestic, multi-site international
Geography	North America, Europe, Asia-Pacific, Latin America, Middle East & Africa
Respondent role	Food safety/QA, operations, IT/digital, regulatory, executive

Quota controls will be applied to prevent any single segment or company-size band from accounting for more than 40% of the total sample. If organic response rates produce imbalanced coverage, post-stratification weighting will be applied to align the sample to estimated industry population proportions.

3.4 Respondent Recruitment and Panel

Respondents will be recruited through a combination of channels to maximize coverage and minimize channel-induced bias:

- ◆ Proprietary opt-in panels maintained by the research partner, pre-screened for food and beverage manufacturing roles
- ◆ Outreach through industry associations and professional networks, including relevant GFSI scheme bodies, industry trade associations, media partner membership and subscriber lists, and food safety professional networks
- ◆ Promotion through the sponsoring organization's owned channels (email, website, social media), with clearly disclosed sponsorship to maintain respondent trust

- ◆ Snowball referrals solicited at the close of the survey for respondents willing to recommend peers

To mitigate self-selection bias, recruitment messaging will emphasize the practical value of benchmark participation — specifically, access to the resulting report and maturity scorecard — rather than compensation. Where incentives are offered through panel partners, they will be modest and consistent with standard research practice.

3.5 Data Collection and Quality Controls

The survey will be administered online via a secure, GDPR-compliant survey platform. The following data quality procedures will be applied:

- ◆ **Median completion time monitoring:** responses completed in less than one-third of the median completion time will be flagged for review and excluded if responses show evidence of straight-lining or random answering
- ◆ **Attention checks:** at least two embedded attention check items will be included to identify inattentive respondents
- ◆ **Logic and consistency validation:** branching logic and cross-question consistency checks will be programmed to flag internally contradictory responses
- ◆ **IP and duplicate detection:** duplicate submissions from the same IP address within the fieldwork window will be reviewed and deduplicated
- ◆ **Open-text review:** open-text responses will be reviewed manually to identify and remove responses that are clearly non-substantive, machine-generated, or duplicative

3.6 Fieldwork Timeline

The quantitative fieldwork will proceed according to the following schedule:

Phase	Timing	Activities
Phase 1	Weeks 1–2	Instrument programming, soft-launch pilot (n = 10–20); timing, logic, and comprehension review; instrument refinement
Phase 2	Weeks 3–8	Full fieldwork launch; rolling data quality review; quota monitoring; supplemental recruitment to address coverage gaps
Phase 3	Weeks 9–10	Fieldwork close; final data cleaning and quality audit; dataset preparation and codebook finalization

4. Qualitative Depth Interviews

4.1 Purpose and Role of the Interview Program

The qualitative interview program serves as the interpretive complement to the quantitative survey. While the survey establishes the pattern, the interviews illuminate the process: why specific investments were made, how

adoption challenges were overcome, what leadership and organizational factors enabled success, and what a “lived experience” of digital transformation looks like at the practitioner level.

Interview data is not intended to be statistically representative. Rather, it provides the explanatory texture and practitioner voice that give benchmark findings credibility, specificity, and narrative resonance with the report’s audience. Selected interview excerpts and anonymized case vignettes will be woven throughout the published benchmark report.

4.2 Interview Sample and Selection

The program will conduct 15 to 20 semi-structured in-depth interviews. Interviewees will be drawn primarily from the quantitative survey respondent pool, with additional outreach to subject-matter experts and practitioners identified through industry networks. Selection will be purposive rather than random, designed to ensure representation across the following dimensions:

- ◆ **Maturity stage:** 2–3 interviews at each of the five maturity stages identified by the survey
- ◆ **Company size:** a mix of large enterprise, mid-market, and smaller independent manufacturers
- ◆ **Manufacturing segment:** at least five distinct segments represented
- ◆ **Role type:** a mix of food safety/QA leadership, operations leadership, and IT/digital roles
- ◆ **Geography:** primarily North America and Europe, with at least two interviews from other regions

Priority will be given to respondents who indicated strong or surprising outcomes in the survey — either significantly above- or below-average ROI — as these cases offer the greatest explanatory value. Survey respondents who indicated willingness to be contacted for follow-up will receive an interview invitation; participation is voluntary.

4.3 Interview Design and Protocol

Each interview will be conducted via video conference and is designed to run 45 to 60 minutes. Interviews will be semi-structured: a standardized discussion guide will ensure consistent coverage of core topics across all sessions, while allowing the interviewer latitude to explore unexpected themes or particularly informative tangents as they emerge.

The discussion guide will be organized around the following thematic areas:

- ◆ Organizational context and food safety program overview
- ◆ Digital transformation journey: origins, milestones, and current state
- ◆ Technology investment decisions: drivers, selection process, and vendor relationships
- ◆ Implementation experience: change management, integration challenges, and lessons learned
- ◆ Outcomes and value realization: specific KPI impacts, ROI evidence, and unanticipated benefits or costs
- ◆ Organizational enablers and barriers: leadership, culture, talent, and infrastructure factors
- ◆ Forward outlook: next investments, emerging risks, and evolving priorities

The guide will be reviewed against the quantitative survey instrument to ensure alignment and to allow interviewers to probe on specific patterns observed in the data. With respondent consent, interviews will be recorded and transcribed to support analysis.

4.4 Analysis and Integration

Interview transcripts will be analyzed using a structured thematic coding approach. A codebook aligned to the study's key research dimensions will be developed prior to analysis; codes will be applied systematically across all transcripts by a trained analyst, with a second reviewer checking a sample of transcripts for coding reliability.

Qualitative findings will be integrated with quantitative data in the final report in two ways. First, quantitative patterns of particular significance, such as the correlation between maturity stage and KPI outcomes or the most commonly cited barriers to adoption, will be contextualized with relevant interview excerpts that explain or illustrate the mechanism behind the pattern. Second, anonymized practitioner vignettes will be developed from interview material to provide concrete, relatable examples of the maturity journey at different stages.

5. Quantitative Data Analysis

Quantitative analysis will be conducted in three layers. **Descriptive analysis** will characterize the overall sample: frequency distributions for categorical variables, means and medians for rating scales, and top-box and top-two-box summaries for key agreement and satisfaction measures. These form the primary benchmark figures published in the report.

Subgroup analysis will compare responses across cohort dimensions — maturity stage, sector, revenue band, and geography — using chi-square tests for categorical variables and ANOVA or Kruskal-Wallis tests for scale variables, with statistical significance assessed at the $p < 0.05$ level. Differences that are both statistically significant and practically meaningful (assessed via effect size) will be highlighted in the report.

Multivariate analysis will be used to identify which investment and capability factors are most strongly associated with positive KPI outcomes, controlling for company size and sector. Logistic or ordinal regression models will be used to estimate the independent contribution of digital maturity stage, technology category deployment, and specific capabilities to outcomes such as recall avoidance, CAPA cycle time reduction, and audit score improvement. These analyses underpin the study's ROI quantification and maturity model framework.

MATURITY SCORING

Each respondent will receive a composite Digital Maturity Score derived from their responses to questions covering maturity stage self-assessment, breadth of digitized functions, system integration level, and capability ratings. This score will be used to validate and refine the five-stage maturity model and will serve as the primary independent variable in outcome analyses. Identities of respondents will be masked and kept anonymous. Respondents may contact FSTR for follow-on workshop engagements to compare and assess the underlying causes and factors contributing to their Digital Maturity Score.

6. Ethical Standards and Respondent Confidentiality

The study will be conducted in accordance with the ICC/ESOMAR International Code on Market, Opinion and Social Research and Data Analytics, and in compliance with applicable data protection regulations including GDPR and CCPA.

The following principles govern respondent data handling throughout the research program:

- ◆ **Informed consent:** all survey respondents will be presented with a clear description of the study's purpose, data use, and confidentiality protections before beginning the survey; participation is voluntary and respondents may withdraw at any time.
- ◆ **Anonymity in reporting:** no individual or organization will be identifiable in published findings; data will be reported in aggregate, and subgroups with fewer than 30 respondents will not be reported separately.
- ◆ **Interview confidentiality:** interview participants will be offered the option of full anonymity in any published quotation or vignette; no direct quotes will be attributed to named individuals or organizations without explicit written consent.
- ◆ **Data security:** survey response data and interview recordings and transcripts will be stored on encrypted, access-controlled systems that are not integrated with any publishing systems; personally identifiable information will be separated from response data and stored separately.
- ◆ **Data retention:** raw data will be retained for a period of five years following publication to support longitudinal analysis across study editions, after which it will be securely deleted.
- ◆ **Conflict of interest disclosure:** any commercial relationships between the research sponsor and technology vendors referenced in the study will be disclosed transparently in the report's methodology notes.

7. Study Outputs and Deliverables

The research program will produce the following published deliverables:

Deliverable	Description
Benchmark Report	A comprehensive, publicly available report (estimated 30–50 pages) presenting the full findings of the quantitative and qualitative research, including the industry digital maturity distribution, KPI benchmarks by cohort, technology investment landscape, and practitioner case vignettes. Publishing date est. Q4 2026–Q1 2027.
Maturity Model Framework	A validated, five-stage digital maturity model for food safety organizations, with stage-specific capability profiles, diagnostic criteria, and recommended technology and process investments for each progression step. Created concurrently with the benchmark report, and available through private engagement.
ROI Quantification	A data-driven analysis quantifying the operational and financial return on investment associated with digital adoption at each maturity stage, drawing on KPI data collected in the survey and contextual evidence from interviews. Available as a companion document or integrated section of the benchmark report.
Respondent Scorecard	An individualized digital maturity scorecard available to each survey participant, positioning their organization on the maturity model relative to their sector and size peers. Delivered via private engagement, and available within four weeks of fieldwork close.
Methodology Note	A published technical appendix to the benchmark report documenting the research design, sampling approach, data quality procedures, and analytical methods (i.e. this document).

8. Limitations and Researcher Caveats

As with all primary benchmark research, the findings of this study are subject to several inherent limitations that readers should consider when interpreting results.

Self-report bias. All quantitative data is collected via self-report. Respondents' assessments of their organization's maturity, technology investments, and KPI improvements reflect their own perceptions, which may differ from independently verified measures. Questions are designed to minimize this risk by asking for concrete, specific indicators where possible, but some degree of perception-based reporting is unavoidable.

Sampling limitations. Despite quota controls and multi-channel recruitment, the sample cannot be guaranteed to be perfectly representative of the global food and beverage manufacturing population. Organizations with more sophisticated food safety programs may be more likely to engage with benchmark research, potentially overstating industry-wide maturity levels.

Causal inference. Associations between digital maturity and KPI outcomes, even when statistically controlled, should not be interpreted as proof of causation. Organizations that invest more in food safety technology may also differ from less-invested peers on other dimensions, such as management culture, resources, or baseline risk profile. These differences may independently affect outcomes.

Inaugural edition constraints. As the first edition of this benchmark, no longitudinal baseline is yet available. Maturity distributions and KPI benchmarks reported in 2026 will serve as the baseline for tracking change in subsequent annual editions.