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FISERA-8™: An Integrated Enterprise Capability Framework for
Food Innovation, Safety, Efficiency and Responsible
Commercialization

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Abstract

Purpose: This paper introduces and discusses FISERA-8™, an integrated enterprise capability framework for assessing whether food organizations have the organizational capability needed to turn ideas into safe, evidence-based, resource-efficient, and commercial innovations in foods. There is a recurring problem in the food industry. Decisions about safety, ingredients, preservation, packaging, sensory quality, research and development (R&D), food waste, and regulation are too often compartmentalized and not integrated despite risks or opportunities arising in one function that have impacts in others.

Materials and Methods: The current study applies an integrative desk-review and synthesis approach to develop evidence. Authoritative international and U.S. sources, including WHO, FAO, UNEP, Codex Alimentarius, FDA, USDA, Champions 12.3, and peer-reviewed literature on food safety culture, sensory science, packaging, food loss and waste, and enterprise capability were included. The evidence was used to formalize the eight dimensions of FISERA-8™ and its recurring capability-evidence-improvement assessment logic.

Findings: The evidence suggests that food innovation performance should be viewed as an enterprise-level capability and not simply an outcome associated with R&D activities. The FISERA-8™ framework organizes this

capability into eight dimensions: Food Safety & Risk Intelligence; Ingredient, Organic & Clean-Food Integrity; Preservation & Shelf-Life Intelligence; Packaging Innovation & Food-Contact Safety; Sensory Quality & Consumer Experience; Food Product Innovation & R&D Capability; Food-Waste & Resource-Efficiency Intelligence; and Regulatory, Sustainability & Responsible Innovation. A 24-item maturity model and cross-functional "perception gap" are proposed as the basis for enterprise diagnosis.

Unique Contribution to Theory, Practice and Policy: The capability framework provides a practical means of bridging organizational capability, dynamic capability, technical food-science evidence, responsible innovation, and continuous improvement. It is introduced as a conceptual framework for enterprise assessment, not as a means of replacing statutory inspection, HACCP verification, certification, laboratory testing, or regulatory approval. Formal psychometric and field validation of the tool are necessary.

Keywords: FISERA-8, Food Innovation, Food Safety, Enterprise Capability, Responsible Innovation, Food Waste, Packaging, Sensory Quality, R&D, Sustainability

JEL Classification: L66; O32; M11; M14; Q56

INTRODUCTION

Food innovation is often being done in a competitive context of multiple technical, commercial, regulatory, and societal demands. Food companies have to react to fast-changing consumer preferences, increase nutrition and sensorial value, decrease the negative environmental impact, manage volatile food supply chains, apply innovative technology and accelerate product development. At the same time, innovation in food has to ensure food safety, ingredient integrity, shelf life performance, packaging, traceability, regulation compliance and consumer trust. Therefore, the main management task is not the creation of innovative ideas. It is the development of the capability of the company to innovate in terms of food safety, traceability, shelf life, packaging, commercialization and improvement without transfer of unresolved risks between functional areas of enterprise.

The scale of risks involved illustrates the relevance of this issue. According to the revised statistics of World Health Organization, about 866 millions of people become ill after consuming food contaminated with microorganisms every year, with 1.52 million deaths. World Health Organization also estimates \$310 billion annual losses in productivity and medical expenses due to the consumption of unsafe food (WHO, 2026). These numbers put food safety under the spotlight of food enterprise not just as the matter of public health but also as an economic problem, since failures of the system can affect work productivity, operational continuity, access to markets, enterprise's reputation and consumer confidence. The figures presented above refer to the World Health Organization's official statistics for 2026 on food safety. World Health Organization

Food loss and waste are another two interrelated challenges that food enterprise faces. FAO states that about 13.2% of food are lost during the transition from harvest to retail, while UNEP Food Waste Index Report 2024 estimates 1.05 billion tons of food being wasted at the level of households, food service institutions and retail in 2022 (FAO, n.d.; UNEP, 2024). FAO Home All of these factors are interconnected with food innovation, since product and process design can influence preservation strategy, food safety, product protection and shelf life, excess inventory and food deterioration, food rejection and repeat purchases. This means that food safety, innovation performance and food loss are interdependent challenges faced by enterprise.

There is considerable amount of specialist expertise in management of particular elements of this system. Codex Alimentarius defines good hygiene practices as the core of effective food safety management and uses HACCP as the system of hazard identification and establishing control measures (Codex Alimentarius Commission, 2023). Importantly, Codex recommends multidisciplinary approach to HACCP implementation, as food safety decision making may require expertise in several domains like microbiology, public health, food technology, chemistry and engineering. FAO Home Similarly, preservation science manages stability and shelf life, packaging science takes care of product protection and food contact, sensory science analyses consumer responses, R&D systems manage new product development and regulation and sustainability manage compliance, claims, sourcing, environmental implications and responsible innovation. Therefore, the issue is not the lack of specialized knowledge, but possible fragmentation of decisions made within these specialist domains despite the interdependence of consequences.

This point is consistent with organizational and innovation theories. It is well known that new product development is a multi-disciplinary process that requires collaboration of R&D,

operations, marketing and other functional areas of the enterprise (Olson et al., 2001). ScienceDirect Enterprise architecture research demonstrates the necessity of the integration of organizational processes, information, technological capabilities, human capabilities and management in order not to let fragmented systems emerge (Hazen et al., 2017). ScienceDirect Similar conclusions are drawn by dynamic-capabilities theory that says that organizations facing changing technological and market conditions require capabilities to sense opportunities, seize them and reconfigure resources and processes according to the changes (Teece, 2007). SMS Thus, these perspectives support the treatment of food innovation as the enterprise capability rather than R&D department's outputs.

This systems perspective also provides a logical connection between the global problem of food safety failures and the framework of this article. Useful enterprise diagnostic tool has to be wide enough to capture principal technical and organizational interfaces through which food innovation creates value and poses risks, but not too broad to be useful for decision-makers. FISERA-8™ framework incorporates eight dimensions based on three design criteria of the conceptual nature: lifecycle coverage, functional distinctiveness and managerial parsimony. First, the dimensions have to cover the principal decision-making domains ranging from ingredients and product conception to food safety, preservation, packaging, consumer acceptance, commercialization, resource use and governance. Second, each of the dimensions has to reflect a distinct capability, that has to be diagnosed separately, as deficiency in one area can remain hidden behind success in others. Third, the model consciously limits the degree of fragmentation: a much wider configuration can divide related capabilities into several operational categories and decrease usefulness of the diagnostic tool, while narrower configuration can merge the different risks and obscure important trade-offs.

Thus, eight dimensions represent different but interconnected elements of food innovation process. Food Safety and Risk Intelligence dimension addresses the ability of the enterprise to deal with food risks. Ingredient, Organic and Clean-Food Integrity addresses inputs, supplier integrity, functionality, traceability and claims. Preservation and Shelf-Life Intelligence addresses product safety and quality. Packaging Innovation and Food-Contact Safety addresses physical system that protects, distributes, contains and preserves the food product. Sensory Quality and Consumer Experience dimension addresses translation of the technical performance into consumer acceptance. Food Product Innovation and R&D Capability addresses the ability of the enterprise to translate innovation opportunities into tested and scalable products or processes. Food-Waste and Resource-Efficiency Intelligence addresses the prevention and measurement of the avoidable losses. Finally, Regulatory, Sustainability and Responsible Innovation dimension addresses the governance of innovations. These are eight dimensions identified in the fundamental FISERA-8™ framework. (FISERA-8_Enterprise_White_Paper)

It should be noted that eight-dimensional configuration cannot be considered as an empirically proved claim that eight dimensions are optimal for the framework. Right now, it is a conceptual framework aimed to find a balance between comprehensiveness and diagnostic usability. In the future, formal empirical research is needed to verify whether the dimensions are distinct in practice, which of them have to be merged or divided, and whether the framework is stable in different food industry contexts. This clarification is essential as right now FISERA-8™ is an evidence-informed framework rather than validated psychometric tool. White paper of FISERA-8™ identifies expert content review, pilot testing, internal consistency analysis, factor structure

and inter-dimension relationship analysis, test-retest and inter-rater reliability, and eventually development of benchmark norms as the steps for the further validation of the framework. (FISERA-8_Enterprise_White_Paper)

In this conceptual architecture, FISERA-8™ framework, standing for Food Innovation, Safety, Efficiency & Responsibility Assessment™, is proposed as the framework of integrated enterprise capability for analysis of whether food organization possesses the interconnected capabilities to go from innovation opportunities to the innovation that is safe, efficient and commercially viable (Olajire, 2026). (FISERA-8_Enterprise_White_Paper). Such cross-functional approach is needed due to the fact that modification of one element of innovation can lead to the consequences in other element of it. Ingredient reformulation can change the shelf-life and sensory quality of the food, packaging redesign can affect food safety, environmental performance and food waste, sustainability intervention can bring up trade-off between material performance and food protection and accelerated product development can lead to evidentiary gaps.

Recent regulatory changes emphasize the need in such interconnected approach. For example, final guidance for ready-to-eat fresh-cut produce issued by FDA in August 2026 describes food contamination risk as the risk arising on several stages of produce lifecycle including growing, transportation, manufacturing, commingling and retail stages (FDA, 2026). U.S. Food and Drug Administration FISERA-8™ expands this systems perspective beyond the question of food safety and asks whether the enterprise is able to integrate capabilities, evidence and continuous improvement across all eight dimensions.

Therefore, each FISERA-8™ dimension is analyzed using three recurring questions: Can we do it? Can we prove it? Are we improving it? The first question concerns existence of appropriate capabilities and systems, the second addresses the fact whether claims of enterprise are backed by evidence and measurements, while the third question deals with continuous learning and improvement over time. (FISERA-8_Enterprise_White_Paper). Purpose of this article is therefore to introduce and theorize FISERA-8™ as the framework of integrated enterprise capability, to explain the logic behind its eight-dimensional architecture and set a research agenda for future empirical validation and practical applications.

Problem Statement

Food business organizations typically operate using a range of standards, audits, technical controls, measures of performance and functional specializations. These processes are required in order to manage different domains like food safety, quality assurance, regulatory compliance, packaging, new product development, sustainability and consumer research. However, high performance in each of these functional areas does not mean that the organization possesses a more integrative capability of food innovation.

For instance, the organization may have high levels of performance in the domain of food safety management but exhibit low levels of competence in the domain of consumer acceptability, sustainable packaging, measuring waste, cross-functional coordination or food innovation governance. At the same time, the organization may possess high levels of commercial creativity and fast product development but lacks evidential discipline required to prove the integrity of ingredients, shelf-life performance, product claims and responsible commercialization decisions.

Such discrepancies reveal the existence of a conceptual gap between the functional excellence and food innovation capability of the organization.

The problem examined in this article is therefore conceptual in nature: how the capability of food innovation can be organized and measured on the enterprise level without being substituted for the currently functioning specialist, technical, regulatory or certification processes? FISERA-8™ is suggested as a conceptual solution to this problem through the structuring of eight interrelated capability domains within a single diagnostic framework.

Notably, this article is not claiming that the suggested eight-dimensional model has already been empirically validated or that any of its dimensions have confirmed psychometric properties or scoring architecture which can be generalized for all food enterprises, sectors or jurisdictions. The current contribution is only aimed at the framework development, theory integration and articulation of the structured diagnostic logic. In the same way the foundational FISERA-8™ article describes this framework as conceptual and evidence-informed and explicitly states that this framework should not yet be considered a scientifically validated psychometric instrument. (FISERA-8_Enterprise_White_Paper)

Therefore, the current goal is not to set up population-level norms, causal relationships, predictive validity or performance benchmarks. Instead, it is aimed at providing a conceptual framework which will subsequently be tested by experts, piloted, evaluated on reliability, validated as to the construct, factored and compared inter-rater in addition to sector-specific empirical testing. These are the stages identified as future steps in the development of FISERA-8™. (FISERA-8_Enterprise_White_Paper)

Purpose and Objectives

The purpose of this article is to introduce FISERA-8™, a theoretical and evidence informed framework for enterprise innovation capability assessment. In particular, the paper aims to: (a) state the need for a cross-functional food innovation capability model; (b) define and justify eight FISERA-8™ dimensions; (c) explain recurring capability-evidence-improvement logic and maturity scoring; (d) provide an illustration of FISERA-8™ interpretation by an example case from outside the organization; and (e) outline validation agenda that should precede scientific validation of FISERA-8

Theoretical and Conceptual Foundation

Dynamic Capabilities and Enterprise Food Innovation

Dynamic capabilities theory provides a solid ground for FISERA-8™ as it focuses on the firm's sensing, seizing and reconfiguring abilities instead of looking merely at the resources available (Teece, Pisano, & Shuen, 1997). Food companies operate precisely in such an environment. Science moves forward, regulators update their guidance, the supplier base changes, consumer expectations change, novel ingredients and technologies emerge, and changing climate and logistical conditions bring new risks. Compliance is sometimes necessary, but it is not enough for innovation performance.

In FISERA-8™, dynamic capability is implemented via three recurring questions: can the enterprise do it (has it the right people, systems, processes and decision rights), can it prove it (is there the relevant record, testing, measuring and evidence) and is it improving it (does the

organization learn from any problems, incidents, feedback, science and other conditions). This logic transforms abstract idea of dynamic capability into a manageable one.

Socio-Technical Integration and Food Safety Culture

One of the basic principles of FISERA-8™ is that the capability of an enterprise cannot be defined based on the presence of policies, procedures, or technologies in itself. Capability is formed when organizational practices are developed, are based on evidence, and are constantly monitored and improved through learning. This principle correlates with the existing models of food safety assurance. The Codex Alimentarius model of food safety assurance states that Good Hygiene Practices (GHPs) and Hazard Analysis and Critical Control Point (HACCP) principles are the basic mechanisms of controlling the hazards associated with food safety, whereas the preventive controls framework of the U.S. FDA provides for the need to conduct hazard analysis, to implement risk-based preventive controls, monitor their effectiveness, verify that the controls are being implemented, to conduct corrective actions and to document all those activities (Codex Alimentarius Commission, 2023; U.S. FDA, 2026a). Those examples show one important thing – the presence of a formal policy does not equal to having an organizational control. The assurance requires the existence of evidence, its verification, corrective actions and organizational learning.

In FISERA-8™, this idea of evidence and learning is integrated in a broader context of a dynamic-capabilities architecture. According to the dynamic capabilities theory, an enterprise responds to changes through the perception of emerging risks and opportunities, acting accordingly and adjusting its resources and routines to cope with those changes. FISERA-8™ uses the same logic as a means of treating evidence as not a simple proof of compliance but as the source of information that will help an enterprise to detect weaknesses, to assess the functionality of control measures and to reconfigure its products, processes, technologies and governance mechanisms. Thus, in the FISERA-8™ questions "Can we do it?", "Can we prove it?" and "Are we improving it?" correlate respectively with the presence of organizational capability, the assurance of it based on evidence, and learning and reconfiguration capability.

The role of socio-technical systems theory can be explained as an establishment of the operating conditions for those dynamic capabilities. The innovations and assurance of food production and processing depend on the cooperation of people, technologies, work processes, information systems, organizational structure and management practices. Therefore, the most sophisticated control measure will remain ineffective if the employees lack necessary competences, the information does not reach those who make decisions, there is a problem with responsibility and organizational incentives to escalate problems. Within the FISERA-8™, socio-technical alignment is considered not as an additional theoretical layer that can compete with dynamic capabilities but as the organizational infrastructure for sensing, generating evidence, making decisions and reconfiguring.

Similar role belongs to Innovation Diffusion Theory that helps to explain the process of institutionalization of the new practices, technologies and organizational routines. The introduction of a new preservation technology, a new traceability system, a new waste-measuring technology, a new packaging solution or a new control mechanism does not guarantee the capability of an enterprise by itself. The value of such innovations lies in the adoption of them by relevant people, their integration into work routines and constant use and further development in appropriate

organizational context. From the FISERA-8™ perspective, diffusion is one of the mechanisms of transformation of an isolated innovation into organizational capability.

Therefore, the theoretical streams can be perceived as complementary but not as independent from each other. The dynamic capabilities provide the general logic of organizational adaptation, socio-technical systems theory explains how the people, processes and technologies must be aligned to implement it, innovation diffusion explains how the new practices are adopted and institutionalized, and food safety culture determines if people are able to perform required actions consistently. Evidence-based assurance provides the feedback about the performance of the organization and thus integrates all these aspects.

Therefore, in FISERA-8™ the continuous improvement is understood as the repeated cycle of organizational learning, where evidence shows gaps in performance, multidisciplinary team interprets the reasons for that, some correction or innovation is implemented, its adoption is monitored and as a result, the performance informs about further actions. The logic is applied not only for food safety controls but also for all other eight dimensions of the FISERA-8™, including ingredient integrity, shelf-life management, packaging, sensory quality, R&D, food waste reduction, and responsible innovation.

Materials and Methods

The research makes use of an integrative desk-review methodology together with the creation of a conceptual framework. An explicitly multidisciplinary set of sources was selected because the phenomenon under analysis enterprise food innovation capability is multidisciplinary, encompassing the areas of food safety, food science, packaging, consumer science, sustainability, operations, and strategic management. Sources were selected based on normative authority or relevance to one or more of the framework dimensions.

Normative and industry sources included those from WHO, FAO, UNEP, Codex Alimentarius, FDA, USDA, Champions 12.3, and Ingka Group reporting. Literature review sources were used to further develop the conceptual connections regarding the topics of food safety culture, consumer science, packaging trade-offs, food loss measurement, and organization capabilities. The process of the framework creation involved four stages: identifying recurring enterprise capability dimensions, combining similar dimensions into eight distinct dimensions, applying the same capability-evidence-improvement logic to each of them, and designing a maturity framework for diagnosing enterprises and keeping the distinction of dimensions.

Primary survey, experiment, or psychometric validation was not performed within this research. As a result, the proposed scoring model should be regarded as a conceptual maturity model rather than a validated scale. The article does not claim that a FISERA-8™ score is associated with food safety, regulatory compliance, profitability, or innovation success before empirical testing of such associations.

The FISERA-8™ Enterprise Architecture

FISERA-8™ comprises eight interdependent dimensions. Each dimension answers a distinct enterprise question, but no dimension is designed to operate in isolation. Table 1 summarizes the architecture.

Table 1: The Eight FISERA-8™ Enterprise Dimensions. Source: Adapted from Olajire (2026)

No.	FISERA-8™ Dimension	Core Enterprise Question
1	Food Safety & Risk Intelligence	Can the enterprise prevent hazards, detect weak signals and sustain a proactive risk culture?
2	Ingredient, Organic & Clean-Food Integrity	Can the enterprise govern suppliers, ingredient functionality, substitutions, traceability and product claims?
3	Preservation & Shelf-Life Intelligence	Can the enterprise protect safety and quality over time under realistic storage and distribution conditions?
4	Packaging Innovation & Food-Contact Safety	Can packaging protect the product, remain appropriate for food contact, support usability and reduce overall system impact?
5	Sensory Quality & Consumer Experience	Can technical product quality translate into consistent consumer acceptance and use experience?
6	Food Product Innovation & R&D Capability	Can ideas move through disciplined development, evidence gates, scale-up and post-launch learning?
7	Food-Waste & Resource-Efficiency Intelligence	Can the enterprise locate, quantify, prevent and learn from food loss and resource inefficiency?
8	Regulatory, Sustainability & Responsible Innovation	Can the enterprise justify commercialization decisions against regulation, evidence, sustainability and consumer welfare?

Dimension 1: Food Safety & Risk Intelligence

Food Safety & Risk Intelligence measures the ability of the organization to identify, prevent, control, and learn from biological, chemical, physical, allergen, and operational risks. Intentionally wide in scope compared with audit readiness, it asks about the combination of role-specific competence, sanitation, traceability, temperature management, supplier control, verification, complaint data, near misses, and corrective action as a whole risk intelligence capability. Conceptually aligned with GHP/HACCP approaches from Codex (2023) and preventive controls from FDA (2026a), the dimension puts hazard analysis, monitoring, verification, and corrective action at the heart of prevention.

Like the conceptual component, the organizational aspect is crucial. Literature on food safety culture suggests that organizational commitment and leadership substantially affect food safety behavior. Therefore, even a weaker enterprise may possess the necessary documentation and rely on a small team of specialists, deal with repeated deviation without root cause learning, or fail to send risk signals up the hierarchy. These conditions are regarded by FISERA-8™ as capability deficits, not just documentation gaps (Pai et al., 2024).

Dimension 2: Ingredient, Organic & Clean-Food Integrity

Ingredients are important from the point of view of safety, formulation effectiveness, sensory attributes, cost, nutritional value, traceability, and regulatory compliance. This dimension checks for qualification of suppliers, management of specifications, functionality of ingredients, risk assessment of substitutes, and evidence-based claims about consumer-facing products. An example of necessity for precision is provided by the U.S. requirements for organic products: products declared as "organic" usually must contain at least 95 percent of certified organic content, whereas products made with organic products must contain at least 70% of organic ingredients (subject to restrictions) (USDA Agricultural Marketing Service, 2026).

FISERA-8™ does not consider clean-label positioning as a sign of greater maturity of food production. Replacing a preservative, substituting an ingredient, and changing a supplier are not

innovative moves in themselves if their downstream implications for safety, texture, stability, shelf life, nutrition, or regulation are not taken into account. Mature ingredient integrity is therefore characterized by trade-off management, traceability, and evidence.

Dimension 3: Preservation & Shelf-Life Intelligence

Shelf life is the result of interactions of formulation, processing, water activity, pH, temperature, packaging, transportation, microbiological risks, oxidation, and sensory degradation. The FISERA-8™ preservation dimension assesses the capacity of the enterprise to select, validate with necessary studies, and revalidate appropriate preservation strategy whenever necessary. Purposefully, it does not treat maximum shelf life or "preservative free" as universal objectives.

Organizational implications are commercial and technical. A mistake related to shelf life can result in product spoilage, customer complaints, markdowns, write-offs, withdrawals, and safety issues. In turn, greater shelf-life intelligence leads to better transportation, inventory performance, and waste prevention. The preservation dimension is therefore placed by FISERA-8™ among the cross-functional decision domains where R&D, quality, packaging, manufacturing, logistics, and marketing meet consumer understanding.

Dimension 4: Packaging Innovation & Food-Contact Safety

Food packaging needs to contain and protect the food product, preserve its quality, support shelf life, facilitate transportation, convey information, and minimize environmental impact. FDA guidance on food contact substances makes it clear that there is a safety component in any packaging decision since migration and toxicological exposure are assessed against the expected use (U.S. FDA, 2024).

The recent research provides additional confirmation for this systemic perspective. Hemachandra, Hadjikakou, and Pettigrew (2024), who reviewed the studies on lifecycle assessment of packaging-related food waste, discovered that shelf-life extension changed the outcome of the environmental assessment many times: a packaging design with higher direct material costs might provide better overall environmental performance due to lower amount of food waste. FISERA-8™, therefore, checks the ability of the enterprise to reduce the impact of packaging without causing losses due to spoilage, damage, contamination, or return.

Dimension 5: Sensory Quality & Consumer Experience

Product can be safe, compliant, and stable yet uncompetitive on the market due to low level of consumers' satisfaction and understanding. Sensory quality connects formulation and processing decisions to taste, smell, texture, appearance, mouthfeel, and consistency. Modern sensory science is not limited to simple "taste testing," but develops into a set of tools for analyzing perceptions, emotions, context, and consumer acceptance (Drake, Watson, & Liu, 2023).

At FISERA-8™, the sensory evidence is introduced at the early stage of decision-making instead of being considered as the last resort validation tool. Reformulation for the purpose of cost, nutrition, sustainability, or shelf life may change sensory characteristics of the product; packaging may create expectations before consumption; and change in processing may alter texture or smell. Mature enterprises, therefore, correlate technical quality, sensory testing, customer complaints, repeat purchase signals, and post-launch learning with product development.

Dimension 6: Food Product Innovation & R&D Capability

The definition of innovation capability used here implies the ability to repeatedly develop products, processes, or business model which survives technical testing, safety assessment, scale-up, consumer evaluation, and commercialization. FISERA-8™ examines whether an enterprise follows a systematic approach from insights and concepts through formulation, prototyping, validation, scale-up, launch, and post-launch learning. Moreover, the tool checks whether R&D function is connected with quality, procurement, packaging, supply chain, regulatory affairs, finance, marketing, and consumer insights.

It matters because creativity and innovation capability are two different things: the former extends the set of options available for an enterprise, whereas the latter decides which of the options will be selected, evidence-based, scaled, and improved. The theory of dynamic capabilities supports this interpretation of innovation capability by focusing on organizational routines through which the firms sense opportunities and reconfigure the resources (Teece et al., 1997).

Dimension 7: Food-Waste & Resource-Efficiency Intelligence

In FISERA-8™, food waste is considered as the sustainability challenge and productivity metric. The dimension checks whether the enterprise is able to discover food waste, measure it, identify root causes, and redesign processes in order to prevent future waste. The evidence provided by the global literature demonstrates the scale of the problem, but it also highlights the importance of measurement issues and differentiation between food waste and food loss at various stages of agrifood systems (Delgado, Schuster, & Torero, 2023; Spang et al., 2019).

The business case for dealing with food waste is quite substantial. The Champions 12.3 reported that the review of 114 restaurants across 12 countries discovered savings of \$7 per each dollar invested in reducing kitchen food waste, while a review of 86 catering sites across 6 countries resulted in 6:1 return on investment and 36% average food waste reduction in the first year (Champions 12.3, 2018, 2019). However, FISERA-8™ gives priority to prevention over valorization: recovery and redistribution can provide additional value, but sometimes the most efficient waste is waste that is not created.

Dimension 8: Regulatory, Sustainability & Responsible Innovation

Dimension 8 of FISERA-8™ considers the capacity of an enterprise to govern itself in a way that ensures innovation occurs only after adequate safety, regulatory, evidentiary, environmental, and consumer-welfare considerations have been taken into account. The intent is neither to stifle innovation nor accelerate the process, but to protect innovation from commercial pressure before safety and governance issues have been adequately resolved. Therefore, as part of the FISERA-8™ framework, this dimension assesses whether an organization is able to make responsible commercialization decisions, show the evidence supporting those decisions, and adjust its governance procedures as additional evidence and changing circumstances dictate. FISERA-8_Enterprise_White_Paper...

Capability. At the capability level, an enterprise should have clear accountability with respect to regulatory monitoring, sustainability considerations, claims governance, emerging technologies, and responsible commercialization. This involves the ability to conduct horizon scanning, multidisciplinary reviews, to escalate disagreements between technical and commercial functions, and the use of decision gates where an innovation effort will be approved, revised, deferred or

rejected. A mature organization would be able not only to ask itself whether a product can be commercially released, but whether the organization has adequate technical, regulatory, and ethical justifications to support the release under proposed conditions. The presence of the governance mechanisms in question would become especially significant in cases where innovation speed, competitive pressure, and financial considerations would normally lead to premature commercialization.

Evidence. Having the capabilities alone would not be sufficient without being able to show how responsible innovation decisions are made. Evidence could be collected in the form of regulatory reviews, risk assessments, claim substantiation, sustainability assessments, technical approvals, escalation records, decision gate documentation, and post-release monitoring data. Evidentiary discipline becomes particularly critical when organizations make claims regarding safety, environmental performance, characteristics of the ingredients used, sourcing or other attributes that might affect the regulatory agencies and consumers. In FISERA-8™, the primary question is therefore not whether the governance procedures are in place, but whether an enterprise can prove that the relevant evidence was taken into consideration, uncertainties were analyzed, disagreements were escalated properly, and the decision to go forward was justified.

The ever-changing nature of the regulatory environment serves as an example of the necessity of such evidentiary discipline. The FDA's final guidance for the year 2026 with regard to the ready-to-eat fresh-cut produce provides an example of how the regulatory environment could be expected to change as more scientific knowledge and practical experience accumulate (U.S. FDA, 2026b). FISERA-8_Enterprise_White_Paper... Therefore, organizations need mechanisms to detect changes in the environment, understand their significance, document organizational reaction to them, and implement them into the operational practice.

Improvement. This improvement element assesses whether the governance procedure itself changes in response to regulatory change, operational experience, scientific evidence, post-launch performance, stakeholder concerns, and lessons learned from previous innovation efforts. Innovation should therefore be viewed as a continuous learning process and not merely pre-launch decision-making exercise. An enterprise at a higher maturity level would be using the post-launch evidence, regulatory changes, near-misses, complaints, environmental performance, and the results of internal review in order to improve decision gates, evidentiary requirements, escalation procedures, and accountability mechanisms.

Using the FISERA-8™ tripartite logic, Dimension 8 therefore poses the following questions: Does the enterprise have the mechanism for governing the process of responsible innovation? Is it able to prove that the decisions about commercialization of innovations are based on appropriate evidence? Does it continuously improve those governance procedures in the light of evolving knowledge, regulations, technologies and stakeholder expectations?

Table 2: Illustrative Maturity Rubric for Food-Waste & Resource-Efficiency Intelligence

Maturity Level	Capability	Evidence	Improvement
1 – Very Low	Waste management is largely reactive; responsibilities and measurement processes are unclear or absent.	Little or no systematic data exist on quantities, locations, causes, or costs of food waste.	Improvement occurs mainly after major problems; lessons are rarely documented or reused.
2 – Low	Some waste-reduction practices exist, but they are inconsistent or dependent on individual employees or sites.	Basic waste information may be collected periodically, but coverage, accuracy, or comparability is limited.	Isolated corrective actions occur, with little structured follow-up or organization-wide learning.
3 – Moderate	The enterprise has defined responsibilities and established processes for measuring and reducing important sources of waste.	Data are available for major waste streams, with some analysis of causes, operational impacts, or costs.	Improvement projects are undertaken, although learning and replication across functions or locations remain uneven.
4 – High	Waste prevention is integrated into operational planning, product design, forecasting, storage, production, and related decisions.	Reliable data identify where waste occurs, why it occurs, and how interventions affect performance.	Results are reviewed systematically, and successful interventions are incorporated into standard operating practices.
5 – Very High	Waste and resource efficiency are embedded as enterprise capabilities and integrated with innovation, sustainability, operations, and commercial decision-making.	Continuous and decision-relevant measurement supports benchmarking, root-cause analysis, investment decisions, and management accountability.	The enterprise continuously tests, scales, and refines waste-prevention approaches and uses learning to influence product, process, supply-chain, and innovation decisions.

The above matrix corresponds with the current FISERA-8™ maturity matrix, whereby capabilities range from being mostly nonexistent or informal at level 1 to being embedded, measured, continuously improved, and demonstrated at level 5. FISERA-8_Enterprise_White_Paper... It also conforms to the treatment of food waste by the framework as a capability where organizations are expected to identify the losses, quantify them, identify the causes thereof, and then design the system to eliminate the losses. (FISERA-8_Enterprise_White_Paper)

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Fisera-8™ Assessment Architecture, Scoring and Maturity Framework

The core EA utilizes three diagnostic questions per eight dimensions, yielding 24 items total. The logic is intentionally consistent: capability ('Can we do it?'), evidence ('Can we prove it?'), and improvement ('Are we improving it?'). Each item is evaluated based on the maturity scale of one to five points (Very Low / Not Established to Very High / Leading). The highest possible raw score

is 120, which can be converted to 0 to 100 EA score. Every dimension has a raw score of 15 points maximum and can also be calculated based on the 0 to 100 scale.

Table 2: Proposed FISERA-8™ Item-Level Maturity Scale

Score	Maturity Interpretation	Operational Meaning
1	Very Low	Capability largely absent, informal or rarely demonstrated
2	Low	Some practices exist but are limited or inconsistent
3	Moderate	Capability exists in important areas but is not fully integrated or measured
4	High	Capability is well established and supported by systems and evidence
5	Very High	Capability is embedded, measured, continually improved and demonstrated

For the purpose of managerial interpretation, the existing conceptual framework utilizes five enterprise bands: less than 60, Food Innovation Vulnerability Zone™; 60-69, Food Innovation Developer™; 70-79, Food Innovation Performer™; 80-89, Food Innovation Leader™; and 90-100, Food Innovation Vanguard™. The said bands work as heuristics for managers rather than norm-referenced cut points. The empirical reliability of the bands must be established before they can be used as scientific standards.

The FISERA Perception Gap™

A single enterprise score can hide an important disagreement. For mid-size and large enterprises, it is better to conduct a survey involving multiple respondents from the following functions: executive level, food safety and quality, R&D, operations, packaging, logistics, procurement, regulation affairs, sustainability, culinary, and consumer insights. The FISERA Perception Gap™ measures the difference in scores between different respondents. If leadership rates Packaging Innovation score as 88 and operations rate the same as 62, the gap of 26 points in itself presents an important diagnostic information that requires further investigation.

Illustrative Case Mapping: Ingka Group / Ikea Food-Waste Reduction

As an illustration of the capability-evidence-improvement logic from outside the FISERA-8™ context, consider Ingka Group, which is the largest IKEA retailer. The case does not show evidence that the company uses FISERA-8™; instead, it serves to map out waste reduction practices as reported to public sources to serve as an illustrative example of how capability-evidence-improvement logic can be applied to one of the eight dimensions of food innovation maturity.

In 2017, IKEA started the Food is Precious program, using smart scales and digital tools to measure waste and its causes. By 2022, Ingka Group reported 54% reduction in production food waste in comparison with 2017 figures. In its 2024 annual report, the company indicated a 60.5% reduction in production food waste at IKEA stores, representing about 37.8 million portions of food saved

since 2017. Ingka Group reports an AI-powered "waste watcher" solution used in hundreds of stores (Ingka Group, 2024).

The case demonstrates the application of three questions logic, since the capability was enhanced through operating routines, technology, and staff engagement; evidence was generated through measurement of food waste and its causes, and improvement took place as the data were used to modify behavior and reduce further waste. Yet, the overall FISERA-8™ question is whether similar capability-evidence-improvement maturity can be seen in all eight dimensions, rather than only in waste reduction.

Discussion

Food Innovation as a System Rather than a Department

The major theoretical proposition of FISERA-8™ is that successful innovation is an enterprise characteristic. Although the role of R&D in food innovation is undoubted, it cannot guarantee safety, traceability, stability, package compatibility, consumer acceptability, resource efficiency, and responsible commercialization of innovations independently. Thus, the framework changes the level of analysis to move from projects to organizational systems.

Such a systems approach is valuable because many food-enterprise trade-offs are multidimensional. Cost-driven ingredient replacement can increase formulation variation, decrease preservation, or change sensory properties. The package redesign can reduce the amount of material usage but increase food waste due to decreased barrier performance. Sustainability claims can add market value while increasing the regulatory risk due to poor evidence. Rapid launch process can increase the speed of bringing the new product to the market but decrease the time for its validation. FISERA-8™ framework highlights such interactions and does not allow optimizing each function independently.

The Role of Evidence in Preventing False Confidence

The second proposition of the FISERA-8™ framework is that maturity should not be assessed based on the existence of certain policies or expertise. Organizations can overestimate their capability when they have the documented procedures that are not being followed, non-representative testing, and ineffective corrective actions that do not lead to learning. Asking the question "Can we prove it?" FISERA-8™ adds evidentiary layer to the well-established food safety and quality concepts and goes beyond them into innovation, packaging, sensory, and sustainability considerations.

Perception Differences as Management Data

The Perception Gap™ concept introduces behavioral and governance dimension. Senior executives view their organization according to policies, dashboards, and investment decisions, while frontline and technical teams operate with the operational constraints, workarounds, data limitations, and trade-offs. Large gap in scores does not necessarily mean who is right, but indicates that deeper investigation is required. Further empirical research will need to study whether the perception gaps can predict audit findings, incident frequency, innovation delays, product withdrawals, food waste or failed launches.

Practical Application

The practical implementation of FISERA-8™ framework can consist of five steps. First, it is necessary to define the scope and select respondents who have enough visibility across business unit, facility, or enterprise. Second, to conduct the diagnostic with 24 questions and calculate overall, dimension and perception gap scores. Third, validate the scores in the lowest scoring dimension not based on self-report but against operational evidence. Fourth, transform the three priority gaps into a 90 to 180 days improvement plan with assigned owners, measures, and milestones. Fifth, reassess after the meaningful period of time. The framework brings value only when the results affect investment priorities, operating behavior, product development decisions, or executive attention.

Unique Contribution to Theory, Practice and Policy

Contribution to Theory

FISERA-8™ framework contributes to theory by translating the concept of dynamic capability into the food enterprise architecture. Instead of considering innovation capability as generic strategic construct, the framework specifies eight technical-organizational dimensions and applies consistent capability-evidence-improvement logic. Cross-functional perception divergence is also proposed as potentially meaningful indicator of organizational integration.

Contribution to Practice

Practitioners can find value in FISERA-8™ framework as a common language for food scientists, food quality engineers, packaging technologists, operations, supply chain specialists, sustainability experts, marketers, and executives. It can be used as a baseline assessment, a pre/post transformation tool, business unit comparison, or facilitated management discussion. Due to the fact that dimension scores are preserved, enterprises can prevent false reassurance of strong overall score that masks a major deficiency in one of dimensions.

Contribution to Policy and Industry Development

For policymakers, industry associations, and institutions working on capacity building, FISERA-8™ framework could help to establish sectoral benchmarking and capability development in the future, when sufficient validation data would become available. However, it should not be considered as a proxy for statutory compliance or certification. The potential value of the framework in policy terms may be found in the structured diagnostic that would help organizations to assess their needs for capability and evidence systems development.

Limitations and Research Agenda

The major limitation of FISERA-8™ framework is that it is currently a conceptual proprietary assessment framework rather than a validated psychometric instrument. 24-item architecture, scoring bands and management interpretation require empirical testing. The framework also depends on self-report and therefore might be influenced by optimism, functional bias, and limited visibility. However, multi-respondent administration and evidence validation can help to mitigate such risks.

The next step in empirical research should include expert content validation across food science, food safety, packaging, R&D, sensory science, operations, sustainability, and regulation fields; cognitive validation of items; pilot testing in manufacturing, retail, food service, and hospitality

industries; assessment of internal consistency and inter-rater reliability; exploratory and confirmatory factor analysis; evaluation of convergent and discriminant validity; test-retest reliability where possible; and prediction studies of linkage of FISERA-8™ scores to external performance indicators. Normative benchmarks should be developed only after obtaining sufficient multi-sector data.

Maturity labels and thresholds should be considered as provisional until validated. Score of 90 does not mean that the enterprise is "safe," "compliant," or free from risk. Lower score should be seen as a reason for further investigation and capability development rather than for any regulatory judgment. Such boundaries are important for the professional credibility of the framework.

Conclusion

Food innovation future depends not only on creativity. Enterprises need to protect their consumers, govern ingredients and claims, manage shelf life, design packaging properly, preserve sensory value, reduce food loss, scale up R&D, address regulations, and make responsible decisions under commercial pressure. The evidence considered in this paper proves that these capabilities are difficult to separate in practice.

FISERA-8™ framework gives a structured way to ask whether these capabilities exist in an enterprise, whether the organization has the evidence proving them, and whether it learns fast enough to improve them. The contribution of the framework is integrative, not substitutive: it does not replace HACCP, food safety certification, laboratory tests, shelf life validation, regulatory approval, or any other technical methods. Instead, it offers an enterprise level architecture of interaction between these systems. The next step is empirical validation. If validated across industries and linked to performance outcomes, FISERA-8™ can provide a maturity model for organizations seeking to improve food innovation safety, efficiency, responsibility, and commercial robustness.

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