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Foundations of a Robust, Predictable and Innovation-Ready Food Regulatory System

Supporting the Modernization of Indonesia's Food Regulatory Environment

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ABSTRACT

Indonesia has developed a substantial food regulatory framework in which the Indonesian Food and Drug Authority (Badan Pengawas Obat dan Makanan, BPOM) has played a central leadership role, in collaboration with other competent authorities, government institutions, academia and the food sector. Continued modernization is therefore not a matter of questioning past achievements but an exercise in structured introspection: examining whether the regulatory regime continues to perform optimally in a food system characterized by rapid technological change, complex supply chains, evolving consumer expectations and a growing demand for innovation. This paper argues that the robustness of a food regulatory system should be assessed through the quality of its decision-making architecture, anchored in the risk analysis framework and in the guidance of the Codex Alimentarius Commission — notably CXG 82-2013 — and consistent with the requirements of the WTO SPS Agreement. It examines the foundations of such a system: sound legislation, functioning institutions, scientific capacity, risk-based and proportionate interventions, international benchmarking, clear governance, stakeholder engagement through recognized forums, and a culture of transparency, predictability and timeliness. Within the broader context of WNPG XII — Widyakarya Nasional Pangan dan Gizi, the 12th National Summit on Food and Nutrition — the paper positions regulatory modernization as an enabling component of Indonesia's sustainable food and nutrition ecosystem, capable of supporting food safety, consumer confidence, food and nutrition security, healthier consumption, innovation, entrepreneurship, investment and effective food-system governance. It concludes that regulatory robustness is a prerequisite for innovation readiness and frames questions intended to support the Jakarta workshop in identifying practical recommendations that can contribute both to the modernization of Indonesia's food regulatory system and to the broader deliberations and recommendations of WNPG XII.

Keywords: food regulatory systems; risk analysis; Codex Alimentarius; CXG 82-2013; SPS Agreement; regulatory predictability; food innovation; Indonesia; BPOM.

1. Introduction: Food Regulation as an Instrument of Public Value

Food regulation occupies a particular place within public policy. Its first responsibility is the protection of consumers from unacceptable health risks and from deceptive or unfair practices associated with food. At the same time, food regulation operates at the intersection of several broader national agendas: public health, agriculture and food production, and domestic and international trade. Food safety is not solely a public health function; it also conditions the development of the food and agri-food sector and the ability of businesses to access markets and compete fairly.

This wider role does not diminish the primacy of consumer protection. Rather, it recognizes that the way consumer protection is delivered has consequences well beyond enforcement of regulatory measures. An effective regulatory regime creates confidence; confidence supports investment; That can be in part achieved through predictability of food regulatory decisions. International alignment supports market access and trade; and a food regulatory environment capable of managing uncertainty enables innovation. Food regulation should therefore be considered part of a country's strategic institutional infrastructure — an enabling infrastructure for the food and nutrition ecosystem, connecting consumer protection, food security, innovation, entrepreneurship, investment and sustainability.

This perspective also aligns with Indonesia's broader food and nutrition development agenda, as advanced through WNPX XII — Widyakarya Nasional Pangan dan Gizi, the 12th National Summit on Food and Nutrition — for which a robust, science-based food regulatory system constitutes an essential enabling foundation.

Against this background, the present paper proposes a working definition of food regulatory robustness to anchor the discussion: **A robust food regulatory regime is one in which decisions are made according to risk analysis principles and according to processes that are known in advance. This approach ought to be consistently applied, scientifically grounded, internationally benchmarked, transparent, inclusive, proportionate and timely.**

2. CXG 82-2013: The International Foundation for Modern Food Control Systems

The Codex Alimentarius Commission, the international food standard setting body, provides the principal international reference for food standards and food regulatory guidance. For the design and operation of national food control systems, one of its most consequential texts is CXG 82-2013 – Principles and Guidelines for National Food Control Systems. Its importance lies partly in the fact that it does not prescribe a single institutional model: countries may operate through one integrated food authority or through several competent authorities, with responsibilities divided between primary production and processed food, between central and subnational levels, or among specialized agencies. Codex acknowledges and does not dispute this diversity.

What CXG 82-2013 provides instead is a common set of principles governing how the system should function: the primacy of consumer protection; a whole-food-chain approach; transparency; clearly defined roles and responsibilities; consistency and impartiality; risk-, science- and evidence-based decision-making; cooperation and coordination among competent authorities; preventive approaches; the need for self-assessment and review; recognition of other systems; sound legal foundations; regional and global harmonization as a goal in decisions taken nationally; and adequate resources devoted to food regulatory programs. The key implication is that a food control system is not simply

the sum of laws, inspectors, laboratories and enforcement actions. Its effectiveness depends on how those elements function together as a coherent system of food regulatory decision-making.

3. Foundations of a Robust Food Regulatory System

A robust system rests on several mutually reinforcing foundations. The first is a sound legislative and regulatory framework: food law must empower competent authorities to establish requirements, oversee food businesses, obtain information, inspect operations, manage incidents and enforce compliance. Food law establishes the roles and responsibilities and codifies the interaction between partners of a food system, producers, consumers and regulators. The second is institutional functionality: competent authorities require clear mandates, adequate resources, competent personnel, operational procedures and the ability to collaborate effectively with other authorities. The third is scientific capacity: food regulatory decisions increasingly require access to expertise in toxicology, microbiology, epidemiology, exposure assessment, analytical science, nutrition, food technology and other regulatory science disciplines.

A fourth foundation is less tangible but equally decisive: the manner in which decisions are made. The decision-making process should itself be anchored in an agreed framework, and that framework is food risk analysis. Risk analysis provides the structure through which scientific evidence is assessed, regulatory options are considered, stakeholders are engaged and final measures are selected. Institutional functionality and scientific capacity are not separate from risk analysis; they are indispensable enablers of it. The same holds for governance and collaboration: a risk analysis framework can only function effectively where responsibilities are clear, scientific advice is accessible and appropriately independent, competent authorities collaborate, and decisions are taken through known and transparent procedures.

A robust authority should consequently be capable of setting product standards, establishing requirements for food businesses, promoting and verifying compliance, managing incidents and non-compliance, accessing scientific assessment, communicating with consumers and stakeholders, and continuously evaluating its own performance (Figure 1).

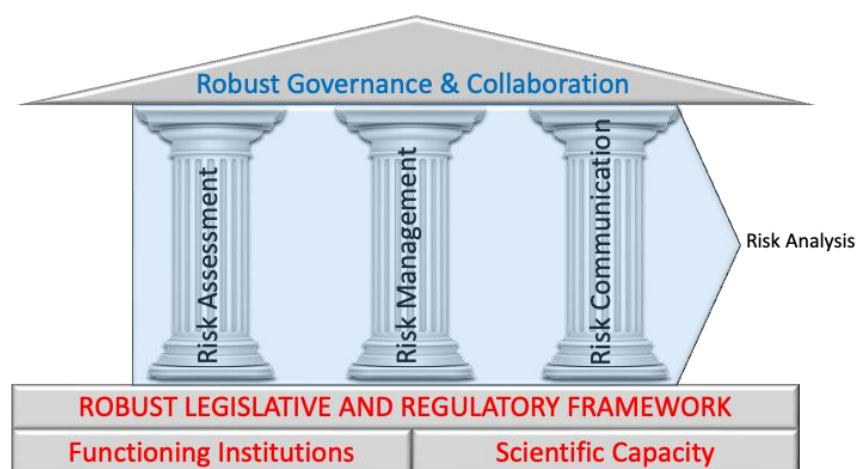


Figure 1. Requirements of a robust food control system, guided by CXG 82-2013.

4. Principles Governing Food Regulatory Interventions

Food regulatory interventions should follow a small number of clear principles. First, they should be **risk-based** rather than driven by hazard alone. A hazard represents the intrinsic potential to cause harm; risk considers that hazard together with the likelihood and magnitude of exposure. For chemicals, for example, a meaningful assessment requires information on both the occurrence of the substance in food and the consumption of the foods concerned: the difference between a hazard-based and a risk-based judgement is, in essence, exposure. From this follows a central principle of modern regulation — the impact of a regulatory decision should be commensurate with the level of risk that needs to be managed.

Second, regulatory measures should be anchored in international guidance and international scientific assessments, particularly where Codex has already established standards or guidance. The appropriate sequence is normally: What has Codex decided? What scientific assessment supports that decision? Are there specific national circumstances — consumption patterns, exposure levels, production conditions — that justify a different approach? This discipline applies across horizontal measures such as food additives, chemical contaminants, microbiological criteria and residues, where Codex standards and the assessments of JECFA, JEMRA and JMPR, the advisory scientific bodies of Codex provide the natural scientific starting point.

The same regulatory discipline should apply to labelling measures mandated through regulation. Some labelling requirements contribute directly to food safety risk management — allergen declarations, storage instructions, or preparation instructions where inadequate preparation may create a material safety risk. Others are principally intended to inform consumer choice. In both cases, mandatory requirements should have a clear objective and an appropriate evidentiary basis and should be proportionate and capable of meaningful implementation and enforcement.

More broadly, regulatory measures should be considered as contributors to a wider risk management strategy. Depending on the issue, effective risk management may combine regulation with consumer education, risk communication, industry guidance, surveillance, professional education and other public health interventions. Regulation should not automatically substitute for these measures; it should be selected and designed as the intervention — or part of the combination of interventions — that most effectively manages the identified risk.

5. International Benchmarking, Codex and WTO Disciplines

A modern national food regulatory authority does not operate scientifically in isolation. A substantial body of international scientific and regulatory work already exists through Codex, JECFA, JEMRA, JMPR, FAO, WHO and other recognized international mechanisms. For food safety measures, Codex should therefore normally represent the first international benchmark. International convergence should be the normal starting point, while divergence remains possible where justified by national circumstances such as different food consumption patterns, exposure levels, production conditions, vulnerable populations or new scientific evidence. The critical point is that divergence should be deliberate, transparent and justified.

This approach is reinforced by the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures. The SPS Agreement requires measures to be based on scientific principles and on an assessment of risk, designates harmonization with international standards — with Codex as the recognized reference for food safety — and promotes consistency,

equivalence, non-discrimination and transparency. These disciplines support a single overall philosophy: food safety measures should not emerge from an unpredictable process. They should be understandable, scientifically defensible, proportionate, communicated and capable of implementation.

6. Governance, Collaboration and Predictability

Scientific quality alone does not create regulatory predictability; the governance surrounding regulatory decisions matters equally. A robust system makes clear who frames the issue, who conducts or commissions the scientific assessment, who evaluates management options and takes the final decision, how the independence of scientific advice is protected, how stakeholders contribute, how the rationale is documented, and when decisions are reviewed. This clarity is important both internally — for officials within BPOM and other competent authorities — and externally, for scientific experts, regulated parties and other participants in the system. The objective is to ensure that professional and policy judgement is exercised within known principles and a recognized process.

Governance is inseparable from collaboration among regulatory partners. Food systems do not align neatly with administrative boundaries: primary production, animal health, plant health, food processing, imports, environmental monitoring, disease surveillance and consumer protection may fall under different authorities. The relevant question is therefore not how many regulators exist, but whether they operate as **one functioning food control system**. Where responsibilities are shared, legal mandates should be clear, institutional interfaces understood, information flows effective, overlaps and gaps identified, and mechanisms available to coordinate responses and resolve differences.

Predictability also includes timeliness. A robust regulatory system should not only reach sound decisions; it should reach them within a reasonable and understandable timeframe. Timeliness should not compromise scientific rigor: it should result from stronger governance, clearer evidence requirements, established methodologies, effective internal coordination and appropriate reliance on international scientific assessments. Quality, transparency, coordination and speed are complementary characteristics of a mature regulatory system.

7. Transparency, Inclusiveness and Regulatory Trust

Transparency should not be understood simply as publishing a decision after it has been taken; it is part of the architecture of regulatory decision-making. Affected parties should, where appropriate, understand the issue being considered, the evidence being evaluated, the proposed approach, how the decision will be made and how they may contribute.

Stakeholder engagement also gives regulators access to information that government may not otherwise possess. Industry can provide information on production technologies, analytical methods, feasibility, supply chains and implementation; academia can provide specialized scientific expertise; consumers and civil society organizations can contribute perspectives on consumer understanding and societal impact; and other government institutions bring their respective technical and policy mandates. The regulator remains responsible for the final decision — consultation does not mean co-decision — but a robust system benefits from clear and credible forums through which stakeholders provide evidence and perspectives while regulatory independence is maintained. Transparency and

stakeholder engagement therefore serve not only communication objectives, but the larger purpose of building regulatory trust.

8. Compliance, Enforcement and Regulatory Culture

The same principles should extend beyond standard setting to compliance and enforcement. Food businesses should understand what is required, how compliance will be assessed, how non-compliance will be classified, how corrective measures may be used, and when stronger enforcement action may follow. A mature regulatory program seeks not simply to enforce **compliance**, but **to promote it**. The objective is a food sector capable of consistently meeting regulatory requirements, with preventive and corrective approaches taking precedence, wherever possible, over reactive or punitive enforcement measures.

This is also why regulatory culture matters. Formal procedures alone do not guarantee regulatory quality. Officials should routinely ask: What is the evidence? What is the risk? What is the international benchmark? Is the intervention proportionate? Are comparable cases treated consistently? Have the relevant authorities and stakeholders been engaged? Can the decision be explained and implemented? Is it being reached within a reasonable timeframe? Sustaining this culture requires continued investment in regulatory science, data, laboratories, risk assessment, professional competencies and continuing education. A robust food regulatory system is therefore not simply a set of regulations; it is an institutional capability and an institutional culture.

9. Robustness as the Foundation for Innovation Readiness

Innovation represents one of the clearest tests of regulatory robustness. Established products are comparatively straightforward to regulate because standards, precedents and assessment pathways already exist; innovation introduces uncertainty. New ingredients, precision fermentation, cellular agriculture, functional ingredients, novel processing technologies and new forms of food distribution may not fit neatly within traditional regulatory categories. The regulator's role is not to eliminate uncertainty before engaging with innovation, but to manage uncertainty through a credible process.

A robust system is able to determine what is genuinely new, what potential hazards arise, what exposure is expected, what evidence is required, what international precedents exist, what uncertainties remain, and whether those uncertainties can be appropriately managed. Innovation-ready regulation is therefore not deregulation: innovation readiness requires stronger regulatory science, risk assessment, data, foresight and institutional competence.

The economic implication is equally important. Innovation requires investment, and investment abhors uncertainty. Businesses can adapt to demanding requirements when they understand the rules, the evidence required, the assessment pathway and the timeframe. What is far harder to manage is procedural uncertainty: unclear jurisdiction, changing evidentiary requirements, unexplained departures from international precedent, indefinite review periods or inconsistent interpretation. A predictable regime does not guarantee approval; it guarantees a credible process.

10. Framing the Discussion for Indonesia

Indonesia's food regulatory system has served the public and the food sector well over many years, and BPOM has provided important regulatory leadership in collaboration with Bappenas, other ministries

and competent authorities, scientific institutions, academia and the productive sector. The appropriate exercise is one of introspection and continued modernization: every mature regulatory system should periodically ask whether its processes remain optimized for the environment in which it now operates. That assessment should go beyond confirming the existence of legislation, inspectors, laboratories and enforcement powers; it should also examine whether the regulatory regime continues to protect public health while supporting fair trade, regulatory predictability, entrepreneurship, investment and responsible innovation.

This regulatory modernization agenda should also be understood within the broader objectives of Indonesia's national food and nutrition development agenda and the deliberations of WNPG XII. A robust and innovation-ready food regulatory system is not an end in itself, but an enabling component of a sustainable food and nutrition ecosystem. By strengthening food safety, scientific and risk-based decision-making, regulatory coordination, consumer trust and the responsible introduction of food innovation, regulatory modernization can contribute to the availability and accessibility of safe food, affordability, healthier consumption, nutrition security and more effective governance of the food system. The outcomes of this workshop can therefore provide a regulatory-system perspective to the recommendations emerging from WNPG XII and help translate food and nutrition priorities into an enabling, science-based and implementable regulatory environment.

How can Indonesia build on the strengths of its existing food regulatory system, and BPOM's leadership within it, to ensure that regulatory decision-making remains science- and risk-based, internationally benchmarked, transparent, coordinated, predictable and timely, while continuing to protect public health and support trade, entrepreneurship, investment and innovation?

The discussion can then focus on a limited number of practical dimensions: whether risk analysis is consistently applied; whether standards are systematically benchmarked against Codex; whether inter-agency governance is sufficiently clear; whether stakeholders have meaningful opportunities to contribute through recognized forums; whether decisions are proportionate and timely; and whether the regulatory system possesses the scientific capacity and institutional culture required to manage increasingly complex food technologies and markets. Such an exercise implies no criticism of the existing regime; it is the form of continuous improvement expected of any mature food regulatory system.

11. Conclusion: Robustness Before Innovation Readiness

A modern food regulatory system must protect consumers; that responsibility remains paramount. Effective consumer protection, however, does not arise simply from imposing additional rules — it results from a credible regulatory system capable of making sound decisions. CXG 82-2013 provides an internationally agreed architecture for such a system, built on science- and risk-based decision-making, transparency, clarity of responsibilities, consistency, collaboration, harmonization, prevention and continuous improvement.

Risk analysis provides the decision-making framework through which these principles are translated into practice. International benchmarking, particularly against Codex, enables national authorities to benefit from the considerable scientific investment already undertaken internationally. Good governance clarifies how decisions are made; collaboration ensures that multiple authorities operate as one system; transparency and stakeholder engagement strengthen both the evidence base and regulatory legitimacy; proportionality keeps regulatory interventions connected to risk; and timeliness ensures that scientific rigor does not inadvertently become regulatory uncertainty. Together, these characteristics build trust — among consumers, that health protection remains central; among regulators, that their decisions can withstand scientific and public scrutiny; among food producers, that requirements will be applied fairly; and among innovators and investors, that regulatory uncertainty can be managed.

Sound principles → robust governance and collaboration → science- and risk-based decisions → transparency, predictability and timeliness → regulatory trust → investment confidence → responsible innovation.

For Indonesia, the opportunity is to build upon a regulatory system that has already contributed significantly to consumer protection and food system development, and to consider how that system can continue to evolve. The objective is not simply a stronger food control system; it is a modern regulatory ecosystem capable of protecting consumers while supporting the food system Indonesia will need in the years ahead — safe, innovative, entrepreneurial, competitive and sustainable. That is the ambition underlying the Jakarta workshop and its contribution to the Jakarta Recommendations on Advancing Indonesia's Food Regulatory System, as well as to the broader deliberations and recommendations of WNPG XII on strengthening Indonesia's sustainable food and nutrition ecosystem.

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