ISSN XXXX-XXXX

GOVERNANCE, MANAGEMENT, AND REGULATORY CHALLENGES IN ADOPTING INTERNATIONAL NORMS ON GENETICALLY MODIFIED ORGANISMS CORN POLICY IN INDONESIA

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Abstract

The right to food represents a fundamental component of international human rights as stated in the Universal Declaration of Human Rights (1948), the International Covenant on Economic, Social and Cultural Rights (1966), and the FAO Voluntary Guidelines (2004). Indonesia has integrated these global norms into its national legal framework through Law No. 18/2012 on Food, Government Regulation No. 17/2015 on Food Security and Nutrition, and the National Action Plan for Food and Nutrition 2021–2024. One of the emerging governance challenges lies in the management of genetically modified organisms (GMO), particularly GMO corn. The Indonesian government regulates biosafety and GMO product release through Government Regulation No. 21/2005 and Minister of Agriculture Regulation No. 38/2022. While GMO corn adoption is expected to enhance productivity and national food security, concerns persist regarding biosafety risks, corporate seed control, and the vulnerability of smallholder farmers. This study aims to analyze the degree of international norm adoption into national policies, identify key governance and management obstacles, and propose corrective strategies based on good governance principles. Using a qualitative descriptive approach and policy document analysis, the study reveals gaps between global normative commitments and domestic policy practices, characterized by regulatory overlaps, weak inter-agency coordination, sectoral political dynamics, and institutional capacity limitations. Strengthening inter-sectoral coordination, harmonizing regulations, developing human resources, and expanding public participation are recommended to promote a more equitable and sustainable food governance system in Indonesia.

Keywords: governance, management, regulation, food security, GMO corn, biosafety, public policy

INTRODUCTION

Indonesia has formally embraced international norms surrounding food rights and biotechnology, notably through frameworks such as the Food and Agriculture Organization (FAO), the Universal Declaration of Human Rights (UDHR), and the International Covenant on Economic, Social and Cultural Rights (ICESCR). Nevertheless, the domestic

policy on Genetically Modified Organisms (GMO), particularly GMO corn, presents a regulatory paradox. While the government seeks to align with global commitments, local implementation remains fraught with fragmented regulations, weak inter-agency coordination, and socio-economic risks, especially for smallholder farmers (Darmawan, 2020).

This paper aims to critically examine these challenges through the lens of good governance, focusing on procedural consistency, institutional credibility, and transparency. Previous studies (Jasanoff, 2005; Suryana & Widiastuti, 2019) have addressed the risks and benefits of GMO policy, but few have interrogated the structural weaknesses within governance systems. This study contributes by mapping the regulatory ecosystem and offering practical recommendations for policy reform.

The urgency of addressing these governance shortcomings is amplified by Indonesia's dual ambition: achieving food security while preserving national sovereignty over agricultural innovation. GMO adoption, particularly in staple crops like corn, is often framed as a solution to increase productivity and reduce dependence on imports. However, this techno-centric narrative tends to overshadow critical governance dimensions—such as who controls access to biotechnology, how risks are assessed and communicated, and whether regulatory institutions are adequately resourced to manage potential externalities.

Furthermore, the public discourse on GMO in Indonesia remains polarized, with limited inclusive dialogue between policymakers, scientists, civil society, and farming communities. Mistrust in regulatory bodies, combined with limited access to transparent information, has led to suspicion and resistance, especially at the grassroots level. Without robust participatory mechanisms and equitable policy design, the diffusion of GMO technologies risks deepening existing inequalities and alienating the very stakeholders that policy interventions are meant to empower.

METHODOLOGY

This study employs a qualitative-descriptive approach, with document analysis as the primary method. The documents analyzed include legal, policy, and institutional frameworks at both national and international levels. Data sources comprise Indonesian regulations such as Government Regulation (GR) No. 21/2005 on Biosafety of Genetically Engineered Products, Law No. 18/2012 on Food, and Minister of Agriculture Regulation (Permentan)

No. 38/2022 on the Release of Genetically Modified Crops. Additional references include FAO biosafety guidelines and other international frameworks.

Content analysis was used to extract patterns, contradictions, and governance gaps across these documents. Triangulation was conducted by incorporating academic literature, policy evaluations, and expert interviews with relevant stakeholders, including officials from the Ministry of Agriculture, local NGOs, and university researchers.

The analytical process was carried out systematically, with a focus on identifying institutional and policy aspects that revealed inconsistencies or regulatory voids. The findings were categorized into key themes such as regulatory overlap, inter-agency disharmony, and sectoral political dynamics. This approach not only illustrates the normative content of legal texts but also reveals how these provisions are interpreted and implemented in practice. The result is a more detailed mapping of vulnerable points in Indonesia's GMO governance framework.

In-depth semi-structured interviews were conducted to gather insights from key stakeholders involved in GMO policy implementation. Informants were selected based on their roles and relevance to biosafety and agricultural biotechnology issues, including technical ministry officials, environmental activists, and academics specializing in food and biotechnology policy. The interview data served to contextualize the document findings, capturing practical dynamics and implementation challenges not explicitly reflected in formal regulations. This approach is intended to produce a more comprehensive and reflective understanding of GMO governance realities in Indonesia.

RESULT AND DISCUSSION

a. Regulatory Overlap

The legal framework concerning biosafety and the release of genetically modified organisms (GMOs) in Indonesia reveals a lack of harmony between sectoral regulations. For instance, Government Regulation No. 21 of 2005 on the Biosafety of Genetically Engineered Products and Minister of Agriculture Regulation No. 38 of 2022 on the Release of Transgenic Plants are not fully aligned with Law No. 18 of 2012 on Food. This inconsistency creates ambiguity in the implementation process, particularly in licensing, risk assessment, and post-planting monitoring. As a result, businesses, researchers, and farmers intending to utilize GMOs often face legal uncertainty.

This regulatory overlap also leads to weak coordination between ministries and state institutions. For example, the authority between the Ministry of Agriculture, Ministry of Environment and Forestry, and the National Food and Drug Agency (BPOM) is often poorly defined when it comes to biosafety testing, certification, and supervision. When jurisdictional conflicts arise, bureaucratic processes become sluggish and unresponsive to field needs. This situation reflects a lack of policy coherence and regulatory governance in the management of agricultural biotechnology in Indonesia.

Furthermore, there is a tendency for technocratic dominance in GMO policymaking, with minimal public participation, especially from small farmers and civil society organizations. In fact, the principle of inclusive governance emphasizes the importance of stakeholder involvement at all stages of decision-making. Public consultations are often symbolic and fail to provide genuine space for vulnerable groups to voice their interests. This exacerbates the knowledge gap between policy elites and grassroots communities who are directly affected by the implementation of such t

Sectoral political dynamics further worsen the fragmentation of GMO policies in Indonesia. Some regulations are driven by economic and investment interests, while aspects of sustainability, environmental justice, and the right to information are often neglected. For instance, transgenic seed release projects backed by foreign investors are granted accelerated approval, yet are not always based on thorough ethical or environmental assessments. This suggests that policy capture by economic actors may weaken the accountability of state instituti

The direct implications of this suboptimal GMO governance are most acutely felt by smallholder farmers. Limited technical assistance, restricted access to information about risks, and a technology landscape dominated by large corporations are major barriers to equitable biotechnology adoption. In several regions, farmers experience confusion distinguishing between local and transgenic varieties and are not adequately informed about their legal rights and obligations. This illustrates the lack of strong institutional capacity at the local level to support participatory and

Therefore, improving GMO governance in Indonesia requires a multi-level and cross-sectoral approach. Regulatory harmonization, strengthened institutional

coordination, enhanced capacity at the local level, and increased civil society participation must become priorities.

b. Weak Interagency Coordination

Cross-sectoral coordination is a crucial aspect of public policy governance, especially in complex issues such as biosafety and biotechnology. In the context of GMO policy in Indonesia, inter-agency coordination remains weak, both normatively (in the legal framework) and in implementation practices. Yet, the cross-cutting nature of GMO policy which spans agriculture, health, environment, and trade demands strong and sustained institutional synergy (Jasanoff, 2005; Darmawan, 2020).

Institutionally, there is overlapping jurisdiction between the Ministry of Agriculture (responsible for crop variety release and seed certification), the Ministry of Health (which addresses food safety and public health concerns), and the Ministry of Environment and Forestry (which monitors the environmental impact of GMOs). Each operates under its own legal and operational framework, often without a formal coordination mechanism (Suryana & Widiastuti, 2019).

The absence of a supra-sectoral coordinating body, such as a national authority focused specifically on GMO oversight, results in fragmented processes from policy formulation to implementation. According to the National Development Planning Agency (Bappenas, 2021), many cross-sector programs in Indonesia fail due to "buck-passing, sectoral ego, and the absence of policy integrators." This situation not only hampers administrative efficiency but also creates confusion for businesses, farmers, and the public involved in the GMO production and consumption chain.
In some cases, this lack of coordination has led to real-world consequences. For example, a dispute arose between ministries over the approval of a specific GMO corn variety: the Ministry of Agriculture deemed it safe based on internal laboratory tests, while the Ministry of Environment withheld approval due to unresolved concerns over biodiversity impact. As Darmawan (2020) notes, such disagreements lead to policy stagnation and expose weaknesses in science-based governance.

Procedurally, biosafety assessments—which ideally should be comprehensive are instead distributed across multiple bureaucratic desks. The lack of a shared information system among ministries results in data duplication,

inconsistencies in safety test outcomes, and delays in decision-making. According to FAO (2008), effective biosafety governance requires "coordination mechanisms across agencies and sectors" to balance health protection, environmental sustainability, and agricultural innovation.

This weak coordination also erodes public perception of transparency and institutional credibility. When government bodies deliver conflicting messages on matters affecting public health, the environment, and food, public trust inevitably declines (Jasanoff, 2005). The problem is exacerbated by the absence of a unified public communication strategy to inform citizens about GMO safety evaluations, monitoring protocols, and complaint mechanisms.

Other countries have developed coordinated GMO governance models that Indonesia could emulate. For example, the Philippines has the Bureau of Plant Industry, which acts as the coordination hub among ministries and serves as a technical spokesperson to the public (Escaler et al., 2019). In the European Union, the European Food Safety Authority (EFSA) functions as a cross-national scientific coordination body, offering transparent, data-driven policy recommendations. Indonesia could adopt a similar model by establishing an inter-ministerial authority or independent body overseeing the entire GMO regulatory chain from upstream to downstream.

Another obstacle to coordination is the absence of a shared Standard Operating Procedure (SOP) among ministries. Each agency operates with internal SOPs that are not aligned. As a result, processes such as risk assessment, laboratory testing, and environmental documentation proceed out of sync in terms of timing, methodology, and validation standards. As noted by Nasution (2022), such procedural disintegration leads to inconsistent and unresponsive biotechnology policies.

Coordination problems are also evident at the regional level. Provincial and district agencies responsible for agriculture, health, and environment often lack consistent technical guidelines from the central government let alone access to national GMO databases. This results in inconsistent and poorly informed local implementation. According to Sulastri and Pambudi (2021), “misalignment between central and local policy creates disparity in GMO oversight and regulatory enforcement.”

To overcome this fragmented governance, Indonesia must establish a permanent cross-sectoral coordination platform with clear authority and access to integrated information systems and trained human resources. Additionally, strong political will is needed among sectoral leaders to overcome institutional egos for the sake of broader public interest. Effective coordination not only enhances bureaucratic efficiency but also strengthens the legitimacy of GMO policy in the eyes of the public and the international community.

c. Sectoral Political Dynamics

The adoption of genetically modified organisms (GMOs) in Indonesia is inextricably linked to underlying political and economic interests. While the government frames its commitment under the discourse of food sovereignty, this objective often collides with global agribusiness agendas that promote the spread of genetically engineered seeds. Multinational seed corporations such as Monsanto and Syngenta play a pivotal role in pushing for GMO commercialization in developing countries, including Indonesia (Jasanoff, 2005; Scoones, 2008).

GMO policy is often promoted under the narrative of increasing productivity and agricultural efficiency. However, this technocratic approach rarely includes a comprehensive assessment of Indonesia's diverse and fragile food systems. The framing tends to marginalize local agricultural knowledge, ignore smallholder perspectives, and oversimplify complex environmental and socio-political conditions (Altieri, 2009). In this light, GMO adoption is less a neutral scientific innovation and more a contested political intervention.

Indonesia's political economy of agriculture has long been entangled with both nationalist development goals and the influence of transnational capital. The state's reliance on high-yield, industrial-scale models of food production opens space for GMO technologies to be embedded into public policy through elite networks and donor influence (Winarto et al., 2020). As a result, GMO adoption becomes a top-down process driven by regulatory and financial interests, not grassroots demand or democratic consensus.

The expansion of GMO crops also reshapes the structure of control over genetic resources. In practice, this means shifting power away from local farmers and communities and toward corporate entities that control seed patents and intellectual

property rights. The privatization of seeds fundamentally undermines the traditional practice of seed saving and exchange, which has been essential to Indonesia's agrarian heritage and agro-biodiversity (Shiva, 2016).

Furthermore, the regulatory landscape surrounding GMOs is vulnerable to capture by corporate lobbying and influence. Regulatory institutions, already fragmented and weak in coordination, are at risk of adopting biased risk assessments or fast-tracking approval processes to meet market pressures. This form of regulatory capture can bypass participatory mechanisms and marginalize dissenting scientific or civil society voices (Paarlberg, 2010).

Public consultation in GMO-related policymaking remains perfunctory or symbolic at best. Local communities, farmer organizations, and environmental groups are often excluded from the early stages of policy design and risk assessment. This exclusion reinforces a democratic deficit in Indonesia's biotechnology governance and fuels public skepticism regarding the legitimacy of GMO policies (Escaler et al., 2019).

In many cases, civil society opposition to GMOs is not rooted in anti-science sentiment but in demands for transparency, ecological sustainability, and farmers' rights. When these concerns are dismissed or ignored by regulators and policymakers, resistance movements grow, as evidenced in the protests against Bt corn cultivation in South Sulawesi and Lampung. These episodes reveal the social tensions that arise when technoscientific agendas override local priorities (Jasanoff & Kim, 2015).

Sectoral politics also manifest in the bureaucratic competition between ministries. For instance, while the Ministry of Agriculture may advocate for the rapid expansion of GMO crops for economic reasons, the Ministry of Environment may raise concerns about ecological risks. These conflicting interests, in the absence of an overarching integrative governance framework, result in incoherent and unstable policy directions.

Regional autonomy further complicates the picture. Some provincial governments resist central government initiatives on GMO introduction due to local environmental concerns or political opposition. This tension reflects not only the decentralization of governance but also the uneven distribution of risk and benefit across regions. In essence, GMO adoption can exacerbate center-periphery divides in policy reception and implementation.

The political narrative of "food sovereignty" is often instrumentalized to justify GMO policies, despite the contradictions it entails. While sovereignty implies autonomy and self-determination, adopting foreign-owned and patent-protected seed technologies places national food systems at the mercy of global capital. This contradiction exposes a deeper ideological tension within Indonesia's development paradigm between national control and neoliberal integration.

From a governance perspective, these sectoral political dynamics highlight the urgent need for inclusive, deliberative, and accountable policy frameworks. Institutional mechanisms must be established to ensure that all stakeholders—particularly marginalized and affected communities—are genuinely involved in decision-making. This would not only enhance the legitimacy of GMO policies but also improve their long-term sustainability.

In conclusion, GMO adoption in Indonesia cannot be treated as a purely technical choice. It is a deeply political process shaped by global economic structures, national development agendas, and local resistance. Any serious attempt to reform GMO governance must begin by addressing the asymmetries of power and participation that currently define the sector.

d. Smallholder Farmer Vulnerability

Smallholder farmers represent one of the most vulnerable groups in the governance of genetically modified organisms (GMOs) in Indonesia. While the introduction of GMO technology is often framed as a solution for increasing productivity and food security, the lived realities of smallholders show a different picture. Their limited access to information, technology, and capital places them at a structural disadvantage compared to large agribusiness actors. This vulnerability is further exacerbated by the complexity and opacity of regulatory systems, which are often not designed with small-scale farmers in mind.

One major issue is the asymmetry of knowledge and access to technical information. GMO seeds, licensing procedures, environmental impact assessments, and post-planting biosafety guidelines are often not communicated in accessible language or through farmer-friendly channels. Consequently, smallholders may adopt transgenic seeds without fully understanding the ecological and legal implications. In

several cases, farmers have been found to unknowingly plant GM seeds without the required permits or biosafety approvals, risking sanctions or crop destruction.

Second, market dependency and seed monopolization contribute significantly to smallholder vulnerability. GMO seeds are typically patented and controlled by multinational corporations or local licensees, requiring farmers to repurchase seeds each planting season. This disrupts traditional practices of seed saving and increases production costs. Moreover, contractual obligations tied to seed use such as exclusive agreements or technology use restrictions further reduce farmer autonomy. This trend is known as the corporatization of agriculture, where control over production inputs shifts away from farmers to commercial entities.

Third, smallholder farmers often lack access to legal protection and grievance mechanisms. If a dispute arises over crop contamination, seed quality, or unanticipated environmental effects, legal recourse is rarely accessible to farmers in remote or rural areas. The absence of legal literacy, combined with the high cost of litigation, disincentivizes them from seeking redress. This legal marginalization illustrates a deeper governance failure in ensuring equal protection under biosafety regulations.

Additionally, institutional support at the local level remains weak. Agricultural extension services, which could play a crucial role in advising farmers on GMO risks and best practices, are often underfunded or understaffed. The focus of these agencies frequently remains on productivity rather than precaution or environmental sustainability. As a result, smallholders are left without adequate guidance in navigating new biotechnological interventions.

Moreover, socio-cultural factors such as low education levels, generational gaps in technological adaptation, and community reliance on customary farming practices also influence vulnerability. In regions where indigenous agricultural knowledge dominates, GMO introduction may disrupt local wisdom systems and challenge communal decision-making structures. This raises ethical concerns about the cultural appropriateness of technological imposition without participatory consent.

The economic risks associated with GMO crop failure also disproportionately impact smallholders. Unlike large agribusinesses with insurance or diversified capital, small farmers often stake their livelihoods on a single planting

season. If GMO crops fail due to pest resistance breakdown, climate variability, or unsuitable local conditions, the economic shock can be devastating. In this context, vulnerability is not merely a result of external structures, but also of internal precarity and lack of safety nets.

Given these intersecting dimensions of vulnerability, it is essential for policymakers to adopt a pro-poor governance approach in GMO management. This means embedding principles of social justice, equitable risk-sharing, and targeted support for smallholders in regulatory frameworks. Participatory risk assessments, community-based monitoring, and legal aid for farmers should be institutionalized to reduce the governance gap. Only through a rights-based and inclusive approach can the promise of agricultural biotechnology be made accessible to all, not just the privileged few.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The governance of genetically modified organisms (GMOs) in Indonesia remains fragmented, institutionally weak, and misaligned with the principles of inclusive and participatory policymaking. Regulatory overlaps, lack of coordination among ministries, and the dominance of technocratic approaches have created a system that is difficult to navigate, particularly for smallholder farmers. The current framework tends to privilege large-scale agribusiness interests while sidelining the voices and needs of rural communities. As a result, the promised benefits of GMO adoption—such as increased yields and food security—risk being overshadowed by new forms of socio-economic exclusion and environmental uncertainty.

Smallholder farmers, in particular, face multilayered vulnerabilities stemming from information asymmetry, seed dependency, weak legal protections, limited institutional support, and socio-cultural disruptions. Their marginalization in both regulatory and technological spheres reflects broader patterns of inequality within agricultural governance. Without deliberate efforts to address these asymmetries, GMO policies may exacerbate, rather than alleviate, rural poverty and deepen distrust in science-based interventions. Thus, meaningful reform is not merely a technical issue but a matter of justice, equity, and democratic accountability.

Recommendations

1. Regulatory Harmonization and Coherence

   The government must prioritize harmonizing sectoral regulations on GMO biosafety, food security, and environmental protection. Establishing an integrated legal framework ideally under a single, accountable authority will reduce institutional fragmentation and ensure clearer mandates across agencies.

2. Pro-Poor and Participatory Governance

   Ensure that smallholder farmers are actively involved in decision-making processes, particularly in the development, testing, and release of GMOs. Institutionalizing participatory risk assessments and community consultations will build trust and social legitimacy for biotech policies.

3. Strengthening Local Institutions and Extension Services

   Invest in the capacity of agricultural extension officers to deliver tailored, culturally relevant, and up-to-date guidance to farmers. Training programs should emphasize biosafety literacy, environmental sustainability, and adaptive farming strategies for smallholders.

4. Legal Empowerment and Grievance Mechanisms

   Develop accessible legal aid services for farmers to address disputes related to seed use, contamination, or failed harvests. Establishing farmer-friendly complaint mechanisms and simplifying regulatory procedures will enhance legal protection and reduce bureaucratic exclusion.

5. Safeguards Against Corporate Monopolization

   Impose transparent rules on licensing and seed distribution to prevent market monopolies and ensure fair access. Encourage public research institutions to develop non-patented, open-access GMO varieties suited to local contexts.

6. Socio-Economic Risk Mitigation

   Introduce safety nets such as crop insurance, subsidy programs, and post-harvest support targeted at smallholder farmers engaging in GMO cultivation. These mechanisms are essential to protect farmers from economic shocks linked to crop failure or market volatility.

7. Inclusive Monitoring and Accountability Systems

   Establish independent oversight bodies with representation from civil society, academia, and farming communities to monitor GMO implementation. These

bodies should publish regular impact assessments and policy evaluations to ensure transparency and responsiveness.

By aligning technological innovation with the principles of good governance, Indonesia can develop a more equitable, transparent, and resilient agricultural biotechnology policy. Empowering smallholder farmers is not only a moral imperative but also a strategic necessity for achieving long-term national food security and environmental sustainability.

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