Strategic Communication: Resolving the GMO Paradox in African Food Security and Sustainability

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Abstract:
Genetically Modified Organisms (GMOs) have become central to global debates on agricultural innovation, particularly in sub-Saharan Africa where food insecurity remains a pressing concern. Nigeria, like many African countries, faces mounting pressures to modernise its agricultural sector amidst challenges linked to climate change, population growth, and scarce resources. Thus, GMOs are increasingly promoted as tools for enhancing productivity, yet they remain controversial due to concerns about health risks, farmers' rights to indigenous seeds, and broader socio-economic implications. This paper examines the positioning of GMOs within African agricultural policy discourses, with a focus on Nigeria as a case study. It explores how media and academic narratives, often invoking themes of "deglobalisation", reflect historical anxieties around capitalist development and state failure. The objective is to understand how communication strategies around GMOs intersect with broader development ideologies and to assess how the strategies shape public perception and policy direction. Drawing on critical discourse analysis, the paper proposes a framework that connects media narratives on GMOs with emerging African political-economic imaginary. It contrasts these discourses with China's "New Development Thinking," offering a comparative lens on how strategic communication reconfigures agricultural futures in the Global South. The paper argues that GMO advocacy in Africa is not only about science and food production but is also deeply entangled with contested visions of sovereignty, modernity, and economic independence. It concludes that the framing of GMOs in public discourse has significant implications for sustainable food security, agricultural policy, and Africa's positioning in global development frameworks.

Keywords: **Agricultural Policy, Communication Strategy, Food Security, GMOs, Media Discourse, Sovereignty.**

1. Introduction

Sub-Saharan Africa (hereafter, Africa) continues to grapple with chronic food insecurity, poverty, and malnutrition, with the region recording the highest global proportion of undernourished people at 30% fifteen years ago (FAO, 2010)[1]. These persistent challenges have intensified over time, driven by intersecting crises. The 2022 Global Hunger Index highlights how conflict, climate change, the COVID-19 pandemic, and the war in Ukraine have collectively exposed millions to food price shocks and disrupted global supplies of food, fuel, and fertilizer (von Grebmer et al., 2022)[2]. The Global Report on Food Crises (2022)[3] further revealed that acute hunger affected nearly 193 million people in 2021, underscoring systemic vulnerabilities in global and regional food systems.

Amid these pressures, African leaders face increasing urgency to ensure food security in the face of climate change, rapid population growth, and dwindling natural resources. Genetically modified (GM) crops are often promoted as a potential solution to boost agricultural productivity. However, adoption remains limited due to opposition from small-scale farmers, health and environmental concerns, and fears over the dominance of multinational interests (Aghaee et al., 2015).[4] Structural barriers, such as inadequate infrastructure, weak agricultural extension services, limited access to reliable information, and unresolved land tenure issues, further hinder the effective promotion and integration of GMOs into national food strategies.

Beyond technical and economic considerations, the GMO debate is entangled with broader geopolitical questions, including national sovereignty, seed ownership, and long-standing anxieties about foreign intervention. While some scholars argue for the potential of GMOs to improve agricultural outcomes in Africa (Adenle, 2011; Kedisso et al., 2015; Gurau & Ranchhod, 2016; Xanat et al., 2018),[5,6,7,8] others point to the complex socio-political dilemmas they introduce. These include contradictions between perceived benefits and actual risks, ethical and environmental implications, and contentious trade and equity issues (Pakseresht, 2017; Cabelkova et al., 2024).[9, 10]

Unfortunately, many of the existing literature approach GMOs in binary terms such as benefits versus risks or safety versus environmental harm while overlooking the nuanced interplay of cultural, social, economic, and political dynamics that shape agricultural policies and practices (Gaugitsch, 2002; König et al., 2004; Ghimire et al., 2023).[11,12,13] This paper addresses these gaps by examining the multidimensional nature of GMOs within African policy discourse, focusing on Nigeria as a case study. It explores how media and academic narratives frame

GMOs within broader development ideologies and proposes a framework for understanding how communication strategies shape public perception and policy direction.

Significance of the Study

This study underscores the vital role of Strategic Communication (SC) in advancing the sustainable adoption of GMOs in Africa. Fundamentally, SC bridges the gap between scientific innovation and public understanding by promoting inclusive, transparent, and culturally sensitive messaging. By dispelling myths, addressing health and sovereignty concerns, and fostering trust among stakeholders, SC supports informed decision-making. The study positions GMOs within broader development goals, offering a roadmap for overcoming resistance and achieving agricultural transformation aligned with Africa's socio-economic and food security priorities.

Methodology

This study adopts a systematic review methodology to investigate how GMOs are positioned within African agricultural discourse, using Nigeria as a focal point. The review synthesizes findings from 35 peer-reviewed publications selected through comprehensive database searches (Scopus, Web of Science, Google Scholar) using key terms such as GMOs, agricultural development, strategic communication, public concerns on GMOs, adoption of GMOs in Africa, sustainable communication, participatory philosophy, food security, and deglobalization and African food crises. Inclusion criteria required that relevant sources were published between 2005 and 2024, focused on Africa, and addressed at least two of the core themes.

The selected studies were analyzed using a qualitative content analysis framework to identify recurring themes, discursive patterns, and theoretical underpinnings. Emphasis was placed on how media, academia, and policy actors communicate GMO-related narratives, and how these intersect with ideological debates around development, sovereignty, and globalization. Particular attention was given to representations of public trust, risk perceptions, indigenous knowledge systems, and the framing of technological adoption.

The review enables a multidimensional understanding of GMO communication in Africa, contrasting Western biotech narratives with localized African concerns and Chinese developmental discourses. It provides a basis for proposing a communication model that incorporates participatory and culturally grounded strategies for sustainable agricultural transformation in the Global South.

Trends in African Nations' Adoption of Genetically Modified Crops

Agriculture in Africa is underperforming, contributing to persistent poverty and food insecurity. Drought, low-yielding crop varieties, pests, diseases, poor soils, minimal fertiliser use, limited irrigation, and a lack of modern technologies remain widespread. These issues are further compounded by foreign pressures and global economic interests that influence the direction of agricultural innovations.

Genetically modified (GM) crops are often presented as a silver solution to these constraints by some international development agencies and partners. Okeno et al. (2013)[14] argued that GM crops could address many of Africa's agricultural challenges. South Africa, Burkina Faso, Egypt, Kenya, Nigeria, and Uganda have adopted GM crops on a commercial scale. In Nigeria, for example, the government approved TELA Maize in 2021, a drought-tolerant and insect-resistant variety. Released in 2024 under the National Biosafety Management Agency (NBMA), TELA Maize is projected to save the country ₦268 billion annually in pest control costs (Muthie, 2024).[15]

Some twenty years ago, economic analyses showed some potential benefits for GM crop adoption as West African countries such as Mali, Benin, Burkina Faso, Côte d'Ivoire, and Senegal could gain millions annually from cultivating GM crops like Bt cotton, cowpea, and virus-resistant tomatoes (Cabanilla et al., 2004; Gbegbelegbe et al., 2007).[16,17] Ghana could earn $920/ha from GM tomato and $1,542/ha from GM cabbage (Horna et al., 2008).[18] In contrast, Uganda's delay in approving GM banana has resulted in foregone annual benefits of $179–$365 million (Kikulwe et al., 2008).[19]

The TELA Maize Project, also implemented in Ethiopia, Kenya, Mozambique, and South Africa, reflects strong government support for GM technology to boost food security. South Africa has led in GM adoption, increasing GM crop land area to 2.2 million hectares by 2010 (James, 2010)[20]. Despite these gains, adoption faces obstacles such as licensing difficulties, low public awareness, and weak regulatory capacity (Adele, 2011; Okeno et al., 2013).[5,14]

However, adoption trends are often influenced by external interests rather than local needs and realities. Martin (2022)[21] argued that Europe's anti-GMO stance and geopolitical influence reflect a form of neocolonialism, limiting Africa's autonomy in biotechnology policy. While GMOs offer potential solutions to food insecurity, the slow pace of adoption reflects deeper structural and geopolitical constraints. To achieve sustainable GM technology adoption, African nations must assert policy independence, align biotechnology with local agricultural priorities, and resist external agendas. Strengthened legislative frameworks, increased public awareness, and responsive governance are essential for fostering strategic and farmer-focused adoption of GM crops.

Deglobalisation and African Food Crises

Globalisation is often portrayed as creating a borderless world dominated by international markets and social interactions. Yet, persistent national boundaries, trade policies, and political dynamics demand a reassessment of global solutions to development, particularly in agriculture and food security. This reassessment has become urgent for Africa as it confronts the limitations of globalised agricultural models, especially the widespread promotion of genetically modified organisms (GMOs).

Though globalisation has improved trade and technological exchange (Hoffmann & Kumar, 2002),[22] Africa's experience with GM crop adoption has been mixed. In India and parts of Africa, the integration of GMOs into local agriculture has produced unintended consequences (Schnurr & Mujabi-Mujuzi, 2014).[23] This has fuelled support for *deglobalisation,* a movement for localised approaches to development (Jordaan, 2022).[24] Drivers of GMOs in Africa often overlook local realities, sidelining smallholder farmers who form the backbone of African agriculture. Yawson (2017)[25] argued earlier that biotechnology in Africa should prioritise low-cost, low-risk innovations aligned with the continent's specific needs, such as robust policy support, rural infrastructure, and strong agricultural research systems.

The 2024 Global Hunger Index (GHI)[26] reported severe food insecurity in countries such as Burundi, Chad, Madagascar, Somalia, and South Sudan, with global hunger affecting 733 million people and 2.8 billion unable to afford a healthy diet (Wiemers et al., 2024).[27] The global food crisis, recently intensified by events of the Russia-Ukraine war, has exposed Africa's vulnerability due to its dependence on external food systems. On 24 February 2022, Russia invaded Ukraine, starting the largest and deadliest war in Europe since World War II, in a major escalation of a conflict which began in February 2014 with the covert invasion of the Ukrainian autonomous republic of Crimea by disguised Russian Army (Global Conflict Tracker, 2025).[28] The global push for GMOs as a panacea for Africa's food crises raises concerns. Much of the advocacy originates from international donors, corporations, and policy actors, with limited involvement from local stakeholders (Schnurr & Mujabi-Mujuzi, 2014).[23] This top-down approach often fails to address practical challenges faced by African farmers, high input costs, limited market access, and intellectual property restrictions.

Since the 2008-09 global financial crisis, there has been a marked decline in trade integration, fuelling scepticism toward globalisation and prompting a shift toward deglobalisation (Goldberg & Reed, 2023; EPRS, 2022).[29,30] For African agriculture, this trend promotes solutions rooted in local contexts rather than globalised technologies that may not align with regional realities.

To ensure GM crop adoption benefits African societies, have implemented interventions that prioritise any or combination of the following:

i. **Empowering Local Stakeholders:** Involve smallholder farmers meaningfully in GMO decision-making processes.

ii. **Strengthening Food Sovereignty:** Develop and regulate GMOs locally to avoid foreign dependency.

iii. **Investing in Sustainable Agriculture:** Complement GM technologies with agroecological methods, rural infrastructure, and traditional seed systems.

iv. **Promoting Regional Collaboration:** Build regional frameworks for context-specific agricultural innovations.

Africa's experience from all these is that while GMOs may contribute to addressing specific agricultural challenges, their adoption must be part of a broader, locally grounded strategy. Balancing global opportunities with African realities is essential for sustainable food security and true agricultural transformation.

Public Concerns and the Imperative for Sustainable Communication of Genetically Modified Crops in Africa

Health concerns further complicate public perception. Early studies linked GM foods to allergies and cancer—such as StarLink corn and lectin-producing potatoes—though many findings were later discredited (Arjó et al., 2013).[31] Nonetheless, media amplification of these studies continues to shape public opinion in Africa (Azadi & Ho, 2010).[32] With rising awareness of environmental and social issues, a shift in communication is essential. Traditional top-down methods often alienate communities (Futerra & Joyel, 2005).[33]

One major fear is the potential transfer of herbicide resistance to wild weeds, creating "superweeds", a risk already observed in parts of the United States of America (USA), where farmers resorted to hand-weeding and increased chemical use (Gilbert, 2013; Sosnoskie & Culpepper, 2014).[34,35] The widespread use of herbicide-tolerant GM crops, especially those engineered to tolerate glyphosate (e.g., Roundup Ready crops), has led to the evolution of herbicide-resistant weed species in the USA. Studies by agricultural scientists and institutions, for instance, the Weed Science Society of America**,** the USDA, and university extension services**)** confirmed that over 40 weed species worldwide (w**i**th many in the US) have developed resistance to glyphosate.

In heavily affected areas, especially in the southeastern USA**,** farmers had return to manual labour (hand-weeding) and use additional herbicides in combination with glyphosate or even revert to older, more toxic chemicals. Sosnoskie & Culpepper (2014)[35] documented how resistant Palmer amaranth (Amaranthus palmeri) has become a major issue in cotton and soybean fields in Georgia and other southern states, prompting these very measures. Public concerns about herbicide-resistant "superweeds" in GM crop systems stem largely from management practices, not genetic modification itself. The heavy reliance on glyphosate in herbicide-tolerant GM crops has accelerated resistance, but studies showed this can be mitigated. In Brazil, Silva et al. (2020)[36] found that rotating herbicides and using cover crops effectively reduced resistant weeds.

Similarly, Evans et al. (2016)[37] showed that best management practices like herbicide diversification and crop rotation lowered weed seedbanks without sacrificing yields. These findings argued that integrated weed management (IWM), not genetic technology, determines resistance outcomes. When used responsibly, GM crops can be part of sustainable agriculture. While such cases have been scarcely documented in Africa, they fuel public scepticism as concerns are often attributed to misinformation (Zhang et al., 2010).[38]

However, deeper issues exist, particularly the erosion of smallholder farmers' rights to save and share seeds, a practice essential to Africa's food security and biodiversity (Peschard et al., 2023).[39]

Global institutions such as the WTO and UPOV have reinforced intellectual property laws that undermine traditional seed systems. The 2018 UN Declaration on the Rights of Peasants (UNDROP)[40] urges countries to safeguard these rights and interpret trade laws accordingly. However, communication in countries like Nigeria often frames GMOs solely around

productivity, ignoring broader socio-ecological implications (Ismail, 2023).[41]

Sustainable communication, defined by Godemann and Michelsen (2011)[42] as fostering ecological and social wellbeing, offered a more inclusive model. Weder et al. (2021)[43] proposed deliberative (dialogue-based) and action-oriented (empowerment-based) strategies as vital for GM communication in Africa. These approaches promote informed decision-making and respect local values. To ensure responsible GM adoption in Africa, communication must:

i. Empower Local Stakeholders: Include farmers in GMO decisions.
ii. Preserve Traditional Practices: Support indigenous seed systems and agroecology.
iii. Ensure Transparent Risk Communication: Address concerns with evidence.
iv. Strengthen Policy Frameworks: Align policies with rights-based frameworks such as the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas(UNDROP),[40] Adopted by the United Nations General Assembly in 2018, the declaration aims to protect the rights of peasants and rural workers, including their rights to land, seeds, biodiversity, food sovereignty, and participation in decision-making processes that affect their livelihoods.

Strategic Communication, GMO and African Agriculture and Food Security

Strategic communication (SC), a purposeful communication, has evolved as a vital tool for addressing complex socio-economic challenges, including food insecurity in Africa. Jaffe (2006),[44] highlighted early concerns with international biosafety frameworks such as the Cartagena Protocol, criticising the protocol's lack of clear guidance for integrating socio-economic considerations into GMO decision-making. Similarly, Owino (2012)[45] traced Africa's scepticism towards GMOs to the 1996 Convention on Biological Diversity (CBD) negotiations, which prioritised biosafety and environmental protection over technological adoption.

By 2013, Thorson identified SC as a growing subfield within communication, noting its role in fostering purposeful, cross-sectoral engagement.[46] That same year, the World Hunger Report revealed that 870 million people, mostly in developing regions remained malnourished, reinforcing the inadequacy of global agricultural models to address local needs(WHR, 2013).[47] In 2015, Khobondo et al. underscored the importance of evaluating socio-economic impacts in GMO policies, as required by the Cartagena Protocol and reflected in national frameworks in Kenya, Nigeria, and Uganda.[48]

However, implementation remained inconsistent. By 2016, Gurau and Ranchhod revisited the Green Revolution's shortcomings, arguing that its global application failed to alleviate hunger in regions like Africa, Asia, and South America due to disregard for local realities.[7]

Heath et al. (2018)[49] defined SC as a multidimensional approach integrating public relations, crisis response, and strategic management.

The authors emphasised aligning communication with public interest, particularly when engaging stakeholders like governments, NGOs, researchers, and communities. More recently, Khamala (2022) warned that GMO adoption could undermine African food sovereignty through dependency on foreign intellectual property rights.[50] This warning underscores the need for SC strategies that emphasise African ownership and participatory decision-making in GMO adoption.

The key tenets for employing SC in communicating GM crops in Africa include:

i. Localized Messaging: Crafting GMO messages tailored to country-specific realities, adoption goals, and local agricultural priorities.
ii. Country-Based Goals: Aligning GMO communication with national objectives and future agricultural strategies to prioritize African interests over global agendas.
iii. Inclusive Stakeholder Engagement: Ensuring SC strategies incorporate inputs from smallholder farmers and consumers to build trust and credibility in GMO products.
iv. Local Branding and Recognition: Establishing GM crops as a recognizable and trusted solution within national agricultural frameworks, free from globalized expectations.
v. Contextual Crisis Response: Adapting SC strategies to address unique crises in each country, enabling timely and effective communication and adoption measures.

To this end, effective SC in African agriculture must ensure localised messaging, align with national development goals, engage stakeholders inclusively, build local recognition, and remain adaptable to country-specific crises. Such an approach empowers African nations to shape GMO narratives within culturally and socio-economically relevant frameworks.

A Stra-Sus-Communication Framework for GM Crops in Africa: An Integrated Approach to Communication

This paper proposes the Stra-Sus-Communication Framework, integrating Strategic Communication (StraC) and Sustainable Communication (SusC) to guide GM crop dissemination for sustainable adoption in Africa. Unlike corporate-focused models, this framework promotes participatory, inclusive, and rights-based communication, addressing both productivity and socio-environmental concerns. It differs from Sustainable Strategic Communication by Roettger and Rettler (2024),[51] which adapts corporate evaluation metrics (input, output, outcome, outflow) and Elkington's (1997)[52] triple bottom line (economic, social, ecological) for organisational contexts. While informative, that model requires adaptation for African agriculture. The Stra-Sus framework prioritises local stakeholder engagement, indigenous knowledge, and intergenerational equity, making it more suitable for Africa's unique agricultural, socio-cultural, and environmental needs.

Participatory Philosophy: The Core of Stra-Sus-Communication

The Stra-Sus-Communication Framework centres on participatory communication, ensuring African farmers and rural communities actively shape GM crop policies. Inspired by Freire's (1970) dialogic model, this approach fosters mutual learning, transparency, and empowerment through critical dialogue. Rather than merely transmitting information, the model encourages inclusive dialogue, especially on concerns such as herbicide-resistant "superweeds" reported by Gilbert in 2013 and also by Sosnoskie and Culpepper in 2014. Community workshops involving scientists and farmers can co-create mitigation strategies that suit local ecosystems. While strategic communication ensures clarity and planning, combining it with sustainable communication adds ethical depth, intergenerational focus, and attention to rights. As Peschard, Golay, and Araya (2023) noted, GM crops can undermine small-scale farmers rights and country's seed sovereignty if adopted radically, especially by developing countries. This framework, therefore, supports mechanisms that will enable African farmers to voice preferences and protect traditional practices, ensuring that communication is inclusive, rights-based, and responsive to local realities.

The Framework Design

A. ***Independent Variable: Strategic Communication (StraC)***

In this framework, StraC is defined as a deliberate, planned approach to creating, delivering, and assessing messages that align with stakeholder goals. For the communication of GMOs in Africa, the communication process should involve:

i. Targeted Messaging: Culturally relevant, context-specific communication tailored to diverse African communities.
ii. Stakeholder Engagement: Inclusive processes that involve farmers, policymakers, advocacy groups, and consumers.
iii. Transparent Information Flow: Openly addressing health, economic, and ecological impacts of GMOs.

B. ***Dependent Variable: Sustainable Communication (SusC)***

SusC emphasizes long-term, equitable, and environmentally conscious communication. In the framework, it builds on StraC by incorporating:

i. Rights-Based Communication: Advocating for farmers' rights, including the right to own and use indigenous seeds.
ii. Inter-Generational Equity: Ensuring communication supports decisions that benefit both current and future generations.
iii. Participatory Methods: Facilitating active involvement of stakeholders in decision-making processes.

Discusson

The Stra-Sus-Communication Framework integrates the deliberative strengths of Strategic Communication (StraC) with the ethical and participatory principles of Sustainable Communication (SusC), aiming to reshape how genetically modified (GM) crops are communicated in Africa. Freire (1970) first established the foundation for participatory communication, emphasising dialogue, empowerment, and the co-creation of knowledge, principles echoed in this framework.[53] By the early 2000s, Klaus Töpfer (2005) underscored the indispensable role of communication in achieving sustainable development, reinforcing the necessity of a communicative model that is socially responsive and environmentally conscious.[54]

As GM crops gained prominence globally, concerns arose about their contextual relevance to Africa. Gilbert (2013) and Sosnoskie and Culpepper (2014)[35] documented cases of herbicide-resistant "superweeds" in the United States, attributing their emergence to poor herbicide management in GM systems. These concerns prompted calls for precautionary approaches, especially in Africa, where regulatory and extension systems are weaker or not functional in some countries. Subsequently, Peschard et al. (2023) highlighted the socio-political implications of GM adoption, including threats to indigenous seed systems, food sovereignty, and farmers' rights to save and exchange seeds.[39]

Recognising these tensions, the framework encourages deglobalisation by favouring localised solutions. This shift moves away from a one-size-fits-all model, advocating instead for community-driven awareness campaigns, participatory research, and inclusive policy dialogues. The Cartagena Protocol and later the UN Declaration on the Rights of Peasants (UNDROP) provided further legitimacy by affirming the rights of farmers to participate in decisions impacting biodiversity and seed sovereignty.[40]

Unlike traditional corporate-focused frameworks (Roettger & Rettler, 2024), the Stra-Sus model centres African farmers and rural communities, aligning with international human rights instruments and ecological imperatives.[51] Strategic Communication here acts as the independent variable, structuring and delivering messages, while Sustainable Communication emerges as the dependent variable, shaped by inclusivity, rights, and long-term impact. Measured through indicators such as food safety, environmental sustainability, seed rights, and participation, this framework offers a pathway to communicate GMOs in Africa and in Nigeria based on respect for local realities, cultural knowledge, and socio-ecological equity.

Stra-Sus-Communication Framework in Action

i. Community-Led Awareness Campaigns: NGOs and agricultural extension services could facilitate campaigns that prioritize local narratives and experiences with GM

crops. These campaigns should include testimonials from farmers who have successfully integrated GM crops into their practices while maintaining biodiversity and cultural traditions.

ii. Participatory Research and Development: Farmers should be involved in the research and development of GM crop technologies to ensure that these innovations align with their needs and values. For instance, participatory breeding programs could combine GM techniques with traditional knowledge to develop crops that are resilient to local conditions.

iii. Inclusive Policy Dialogues: Governments and international organizations should create platforms for multi-stakeholder dialogues that include farmers, researchers, policymakers, and civil society groups. These dialogues would provide a forum for discussing the ethical, social, and economic dimensions of GM crop adoption.

The proposed framework positions Strategic Communication (StraC) as the independent variable influencing Sustainable Communication (SusC), which serves as the dependent variable. The framework evaluates the deglobalized adoption of genetically modified organisms (GMOs) in Africa using four key indicators: food safety, participation, right to own indigenous seeds, and environmental safety.

Implementation Approach and Indicators of Deglobalized GMO Adoption

The following indicators assess the Stra-Sus-Communication Framework's effectiveness in fostering the sustainable adoption of GMOs:

i. Stakeholder Mapping: Identify and prioritize key groups, including farmers, NGOs, and policymakers.

ii. Heuristic Analysis: Apply participatory tools to ensure feedback mechanisms align with stakeholder needs.

iii. Iterative Evaluation: Monitor and adapt communication strategies based on feedback from the four indicators.

By integrating StraC and SusC, this framework fosters a balanced approach to GMO communication and adoption, ensuring alignment with African agricultural priorities and global sustainability goals.

Table 1: Summary of the Stra-Sus-Communication Framework for GMO adoption in Africa

Element	Definition	Implementation Features	Indicators of Deglobalized Adoption	Metrics
Strategic Communication (Independent Variable)	A deliberate approach to create, deliver and assess impactful messages.	- Targeted messaging - Stakeholder engagement - Transparent information flow	**Food Safety**: Emphasizing the safety of GMOs for public health	- Trust in GM food safety - Reduction in misinformation - Alignment with dietary practices
			Participation: Inclusion of diverse voices in policy and communication	- Number of participatory forums - Diversity in representation - Perception of inclusivity
			Right to Own Indigenous Seeds: Protecting Seed Sovereignty	- Legal protections for indigenous seeds - Awareness of seed rights - Satisfaction with seed diversity
			Environmental Safety: Ensuring ecological compatibility of GMOs	Understanding of ecological effects - Adoption of sustainable practices - Confidence in environmental monitoring
Sustainable Communication (Dependent Variable)	Long-term, equitable, and environmentally conscious communication.	- Rights-based communication - Inter-generational equity - Participatory methods	**Outcome:** Building trust and fostering informed, sustainable adoption	- Stakeholder trust - Adoption rates aligned with socio-cultural values - Sustainability impact evaluations

Source: Authors (2025).

Conclusion

Building on the Stra-Sus-Communication Framework, this paper underscores the urgent need for policy coherence across agriculture, biodiversity, and development sectors to support sustainable seed systems in Africa. Importantly, such policies must be co-developed with farming communities to ensure that peasant and indigenous seed systems are meaningfully integrated into national food security strategies. Rather than treating traditional and modern agricultural technologies as mutually exclusive, the framework advocates for their strategic coexistence, grounded in local realities and knowledge systems. Sustainable communication plays a pivotal role in achieving this balance.

By fostering inclusive, transparent, and participatory dialogues, the Stra-Sus model not only builds trust among stakeholders but also empowers farmers to make informed choices that reflect both cultural values and technological innovation. Nevertheless, such an approach must go beyond rhetorical commitments; it demands structural reforms that address power imbalances, protect farmers' rights, and institutionalise mechanisms for genuine engagement.

As Klaus Töpfer (2005) aptly stated, "Communications will make sustainable development a reality"; yet, communication must not merely promote top-down narratives of progress or productivity. For GM crops to effectively contribute to Africa's agricultural transformation, there must be a deliberate shift from technocratic optimism towards a critical engagement with the social, ecological and ethical dimensions of agricultural development.

Thus, the Stra-Sus-Communication Framework in this paper offers more than a dissemination tool. The proposed framework presents a strategic and rights-based paradigm for navigating the complex terrain of agricultural biotechnology in Africa. It challenges policymakers, researchers, and development actors to rethink agricultural futures not just in terms of output, but in ways that uphold biodiversity, cultural heritage, and food sovereignty. Through this integrated and critical lens, Africa can define a path toward food security that is not only productive but also equitable, resilient, and contextually rooted.

Ehtical Consideration

This study does not involve human or animal subjects; therefore, no ethical approval was required. However, the research is grounded in literature and international frameworks such as UNDROP and the CBD, supporting farmers' rights, food sovereignty, and biodiversity. This study adheres to high ethical standards, promoting integrity, transparency, and respect for human rights, indigenous knowledge, and environmental sustainability. The Stra-Sus-Communication Framework advocates participatory and culturally sensitive approaches to GM crop communication in Africa. All sources are cited following APA 7th edition. The study rejects top-down narratives and promotes inclusive, community-led communication processes that empower local stakeholders and ensure ethically responsible agricultural development.

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