UDS International Journal of Development [UDSIJD] ISSN: 2026-5336
Volume 12 No. 1, 2025
https://www.udsijd.org

CHALLENGES TO FOOD SYSTEMS TRANSFORMATION IN AFRICA: CRITICAL REFLECTIONS

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Abstract
The transformation of food systems includes shifting from a linear model of production, processing, distribution, consumption, and waste to a circular model that prioritizes sustainability and resilience. This involves increasing the efficiency of resource use, reducing food waste, promoting local and regional food systems, incorporating new technologies, enhancing supply chain transparency, and improving food safety and nutrition. Overall, the goal is to create a more equitable, resilient, and sustainable food system for all. Thus, the systemic transition of African food systems unto sustainable Farm-to-Fork paths will no doubt address historical nutrition, health, environmental, income, and policy issues linked to the systems. However, the diverse complex and multi-dimensional foci will require an equivalent long-term transformation strategy through engagement and priority setting to achieve landmark shifts in all key aspects of the system. Here, we critically examined the challenges to food systems transformation in Africa. We argue that the underdeveloped agricultural sector that over-relies on primary production with little or no value addition is one of the key challenges to food systems transformation in the continent. Other critical challenges to food systems transformation in Africa are poor market access, poor infrastructure, globalization, repressive policies, and climate change.

Keywords: Food systems, Food security, Food transformation, Sustainability, Food issues

Introduction

"*Transformative change sometimes requires radically new interventions, policies, and partnerships. It moves us beyond incremental change and results in major long-term changes in the way systems operate*." Sabrina Chesterman.

Food systems transformation is rapidly gaining traction in academic and policy environments (Kok et al., 2019). Food system transformation is the fundamental change in the functional, structural, and relational elements and activities of the food system that creates new patterns of interactions and outcomes (Sonnino, 2023). It is different from food system transition which is characterized by shifts from a food system to another food system. The goal of food system transformation is to enhance food system resilience to shocks and stress from internal and external players in the food system while ensuring equitability through engagement and sharing of responsibility for accountability. The success of a transformed food system is measurable through critical domains like innovation, environmental sustainability, healthier diets, climate change and biodiversity loss mitigation, level of public-private engagement, and the true cost of

food. Whereas in Africa, food systems are rapidly transforming mainly through dietary shifts to fight malnutrition, nutrient insecurity, and poverty albeit with little to no defined structural and policy support besides the Malabo Declaration. Malnutrition coupled with rising rates of undernutrition and the burden of overweight/obesity remains a major challenge facing Africa (Asirvatham, Demi & Ezezika, 2022). The focus of the Comprehensive Africa Agriculture Development Programme (Malabo Declaration) is agricultural transformation through greater investment and trade to address hunger and poverty issues. However, the 2021 UN Food Systems Summit envisioned a "healthier, more sustainable and more equitable food systems" for the achievement of all 17 Sustainable Development Goals (SDGs). To achieve this requires working together to transform production, processing, distribution and consumption (United Nations, 2021).

Incentives, mental models, power dynamics, and institutions are critical in shaping the transformation agenda. A complex gamut of people, politics and places, is the messy reality of food systems that must be systematically worked on for success. As argued by Sonnino (2023), addressing all vulnerabilities affecting food systems by identifying actors that must be involved in transformative processes require stakeholders to not only think but also act systemically. According to Sonnino (2023), current debates on food system transformation lack empirical support. This paper reflects on the challenges militating successful food system transformation in Africa. It discusses empirical and conceptual issues connected to food system transformation and outlines the challenges bedeviling food system transformation in Africa. The aim is to bring to the fore areas where actions are needed to drive the success and sustainability of food systems transformation in Africa.

Methodology

The study employed a largely qualitative research design anchored in critical interpretive synthesis to investigate the systemic, structural, and institutional challenges to food systems transformation in Africa. The qualitative methods were employed because they allow researchers to explore complex systems, interconnections among institutions, actors and socio-ecological drivers that shape food system outcomes (Meadows, 2008). The food systems framework (Costas et al., 2021; Clapp et al., 2022) that describes food systems as dynamic configurations of production, processing, distribution, consumption, and waste management within environmental, economic, and social contexts guided the analysis.

Study Design and Approach

A multi-stage desk-based analytical approach comprising three core phases as detailed below was employed:

- Scoping and problem framing,
- Critical interpretive review, and
- Thematic synthesis.]

The analytical approach used methodologies in socio-technical transitions and sustainability research. This approach according to Smith et al. (2005) and Scoones et al. (2020) emphasizes system complexity, multi-level interactions, and the interplay between structure and agency. The authors selected the interpretive synthesis because of its suitability in integrating diverse evidence. It is able to glean from peer-reviewed journals, policy documents, institutional reports, and grey literature into a coherent analytical framework.

Data Sources and Selection Criteria

Data were sourced from:

- Peer-reviewed journal articles,
- Policy reports by multilateral organizations (FAO, IFAD, WFP, UNDP, World Bank),

- Regional assessments of African agricultural systems, and
- Analytical studies on food system drivers, sustainability transitions, and agrifood governance.

Inclusion criteria:

- Provide empirical or conceptual insights into African food systems,
- Address transformation, resilience, sustainability, or equity dimensions,
- Published between 2000 and 2024,
- Relevant to at least one domain of the food systems framework (production, value chains, consumption, governance, or environmental sustainability).

Analytical Framework

The paper employed a thematic analytical framework that combined:

- Systems thinking to map drivers, feedback loops, and interconnected constraints (Meadows, 2008).
- Sustainability transitions theory to identify institutional path dependencies, power relations and structural lock-ins (Smith et al., 2005; Klerkx & Begemann, 2020).
- Food justice perspectives to analyze access, inequality, and socio-spatial disparities (Agyeman & McEntee, 2014).
- Resilience and vulnerability assessment to situate climate change, stressors and shocks in relation to system resilience (UN, 2021).

Thematic Analysis Procedures

The thematic analysis employed involved following a number of steps. The first step was open coding to identify recurring concepts such as governance failures, climate vulnerability, market concentration, technological gaps, and socio-economic inequities. The second code was axial coding to establish relationships among codes and map them onto broader categories aligned with food system components (Allen et al., 2019). The third was to cross-case synthesis across literature sources to compare patterns across regions, commodities, and institutional contexts (Scoones & Thompson, 2011; Lang & Barling, 2012). The fourth involved the use of interpretive integration to combine coded themes and interpret them using transition theory lenses and systems thinking.

Validity, Reliability, and Reflexivity

To ensure rigor:

- Triangulation across multiple literature types,
- Prioritization of peer-reviewed and institutionally validated sources,
- Reflexive memoing to document analytical decisions,
- Conceptual saturation to determine completeness of thematic coverage.

Findings are analytically generalizable and intended to inform policy, practice, and research.

Results

Challenges to Food Systems Transformations in Africa

The results of the analysis identified six (6) major challenges to food systems transformation in Africa (Table 1). The first major challenge is underdevelopment of the agricultural sector across the continent. This significantly affects efficient production, processing, and distribution of food across space and time. There is also the challenge of inadequate access to markets and poor infrastructure that creates serious challenges to food systems transformation. Globalization is another challenge confronting food systems transformation across the continent. The rest are repressive policies, climate change and technologies. These challenges are discussed in detail in the proceeding subsections.

Table 1: Synthesis of Major Challenges to Food Systems Transformations in Africa

Challenge	Mechanisms / Causes	Impacts on Food Systems Transformation	References
Underdeveloped Agricultural Sector	- Reliance on primary production with minimal value addition - Low soil fertility, nutrient depletion - Limited use of fertilizers, improved seeds, mechanization - Environmental degradation, deforestation, overgrazing - Rain-fed agriculture, minimal irrigation	- Low productivity and crop yields - High vulnerability to climatic variability - Low income for farmers, limited investment in quality/value addition - High pre- and post-harvest losses	AGRA (2025); Ndlovu *et al.* (2024); Sithole & Olorunfemi (2024); Akpensuen & Rivero (2025)
Poor Market Access & Infrastructure	- Inadequate rural roads and transport - Limited storage and cold chain facilities - Weak market integration and capital constraints - Lack of market information and traceability systems	- Difficulty accessing urban and export markets - Reduced profits and investment incentives - High post-harvest losses - Limited ability to meet quality standards	Benassai-Dalmau et al. (2025)
Globalization	- Exposure to subsidized imports from developed countries - Dominance of transnational corporations in value chains - Requirement for compliance with international standards	- Local producers face competition, reduced profitability - Potential loss of employment and poverty reduction opportunities - Pressure to meet global standards without adequate support	Brookings (2025)
Repressive Policies	- Favoritism toward large-scale agribusiness or politically connected regions - Exclusion of smallholder farmers and cottage industries - Weak policy support for inclusive value chains	- Marginalization of critical actors in value chains - Reduced efficiency and productivity - Limited value addition and rural development	Davis et al. (2022); Kennedy et al. (2023)

Climate Change	- Increased droughts, floods, temperature extremes - Rainfall variability affecting predominantly rain-fed agriculture - Land degradation, desertification, soil erosion	- Reduced agricultural productivity and crop yields - Higher investment risks, lower profitability - Exacerbation of rural poverty and vulnerability - Impaired resilience of food systems	Akpensuen & Rivero (2025)
Technology	- Limited adoption of precision agriculture, ICT tools, blockchain, gene editing, vertical farming - Poor infrastructure, low financial capacity, limited extension services - Regulatory gaps and low digital literacy	- Potential to improve yields, efficiency, and sustainability remains underutilized - Reduced ability to increase transparency, traceability, and resilience - Constraints on adoption delay food systems transformation	Brookings (2025); Sithole & Olorunfemi (2024)

Source: *Authors Compilation, 2025*

Underdeveloped agricultural sector

Significant proportion of food production on the continent of Africa is dependent on the natural weather/rainfall with very minimal irrigation infrastructure across many countries. As a result, food production in Africa is vulnerable to adverse weather conditions. The situation is exacerbated by declines in farm input investments by African governments resulting in less than adequate use of fertilizers, improved seeds, and technology adoption. Many countries in Africa depend on the global north to meet their fertilizer needs, which is largely determined by market liberalization and trade policies that they have no control over. The result is increasing fertilizer prices relative to commodity prices. This is made worse by repressive policies that limit access to markets and infrastructure, limited development of output, input, and credit markets, and poverty and cash constraints that limit the farmer's ability to purchase fertilizer and other inputs. Soils and ecosystem degradation continue to account for significant reductions in the productivity of the farms. Soil fertility depletion in Africa largely caused by the limited adoption of fertilizer replenishment strategies and soil and water conservation measures is therefore a critical challenge to food systems transformation in the continent. The situation is made worse by population growth and urbanization that have contributed to the reduction in the length of fallow periods, expansion in agricultural production into marginal and fragile lands, and the removal of vast tracts of vegetation through overgrazing, logging, development, and domestic use. What is more, is the fact that the tropical climatic conditions of Africa make foods produced in the continent prone to pests and diseases leading to very high pre- and post-harvest losses. Therefore, poor handling and lack of state-of-the-art storage infrastructure pose a serious challenge to food systems transformation on the continent.

Poor market access and infrastructure

Access to markets is another major challenge to food systems transformation

in Africa. Poor market infrastructure makes it almost impossible to effectively link production areas to consumption centres even within countries. This has been compounded by a limited capital asset base, lack of information, weak support institutions, and poor policies among others that continuously reinforce the status quo. The issue of poor market infrastructure is more critical because of the rippling effects on the ability of farmers and other agricultural commodity value chain actors to profitably take their produce to markets without facing the high cost of transportation. This significantly reduces the market penetration, particularly in rural Africa where most of the food production takes place. There is also an issue of market standards, poor information, traceability requirements, limited product differentiation, and repressive policies that hinder food systems' transformation in Africa.

In Africa, most farm produce sells at village-level markets without regard to standards and so producers find it difficult to meet the demands of consumers in the urban centres where there is discrimination against produce that is comparatively inferior. For food systems transformation, therefore, farmers must learn to produce to meet the standards and requirements of these consumers, and this means they must produce only that which will sell. This is particularly important in helping connect farmers to high-end markets where subjective standards that operate in rural markets do not work. This means that African farmers must be incentivized to produce to meet objective standards such as size, quantity, and quality. The quality aspect of the standards is particularly important where produce is meant for the export market where standards are more rigid and enforced to the letter. These requirements which are very demanding in most cases including nutritional content per serving size, allowable bacterial load, and residual pesticide are mostly new in rural Africa. Thus, the variation in the standards across African markets makes it more difficult for food systems transformation in the continent. This brings an extra burden to farmers who are supposed to identify the market before production and yet these markets are not static. To the extent that the standards and volumes required are dynamic means increased risk for farmers. This is particularly so because standards in themselves provide a bottleneck as to the crop and volume that a farmer can produce. Standards also put a strain on who can produce thereby limiting farmers' access to the international markets. Food systems transformation in Africa must have inherent in it standards that must be met across board and this requires investments in information gathering and production technology adoption. This might require external help for smallholder farmers who cannot largely afford it.

Globalization

The world has become a global village and so the transformation of the food systems goes beyond boundaries. So, globalization is a critical driver of food systems transformation because it allows technology transfers, capital flows and access to larger export markets in the long term. However, globalization effects depend on the level of development, economic structures, and flexibility. These are within the context of economic, political, social, and cultural linkages across countries at the world level. The tendency for universal application of economic, institutional, legal, political, and cultural practices are a very important determinant of food systems transformation. With globalization, policies formulated in one country will have effects on others, leading to markets liberalizations. This causes the dumping of subsidized goods in developing countries with consequent premature exposure nascent industries to genuine competition from producers in developing and

developed countries. This reduces the potential for poverty reduction to direct employment alone due to profits repatriation by transnational companies.

Repressive policies

Repressive policies have greatly affected food systems transformation in Africa. This is particularly so in instances where policies, structures, and institutions do not focus on the people themselves leading to exclusion. Repressive policies tend to exclude the majority of people from playing active roles in societal development. With regards to food systems transformation, repressive policies result in the exclusion of critical agricultural commodity value chain actors such as rural smallholder farmers from efficiently performing their functions. This creates weaknesses in commodity value chains thereby negatively affecting food systems transformation. Governments in many developing countries, particularly in Africa engage in implementing repressive policies that result in preferential development due to political expediencies. A typical example is policies promoting large-scale monopolistic industries to the detriment of small-scale industries.

Climate Change

Climate change is another factor that critically affects food systems transformation in Africa. Climate change affects all sectors including the food sector. Climate change have different effects across places and people depending on vulnerability levels. Africa's climate change vulnerability is defined by exposure to droughts, floods, and sea erosion. The most affected are the socio-economic, politico-cultural and environmental factors. The combined effects are that these affect food systems transformation in ways that determine the vulnerabilities of various livelihood groups and places. Agricultural production in Africa is largely rain-fed. Thus, changes in rainfall patterns seriously impact productivity. Changes in climatic conditions will deepen vulnerability to poverty in rural areas in particular, enhancing land degradation and desertification. This will make agricultural investments more expensive, risky, and less profitable. All these will determine the rate of food systems transformation in Africa.

Technology

There are several new technologies being incorporated to support food systems transformation. These include precision agriculture, which relies on sensors and data for optimized crop yield to reduce waste; blockchain technology, which enhances supply chain management and transparency by tracking the journey of food from farm to plate; gene editing, which can improve crop resilience and increase nutritional value; and vertical farming, allowing for year-round crops production in controlled environments using less water and land. In addition, current trends support increased focus on plant-based and cell-cultured meat alternatives. This is to reduce the environmental impact of traditional animal production in agriculture. These technologies could dramatically transform the food systems and address many of the current challenges. It is however, difficult to predict the technology that will have the biggest impact on the food system because each has its unique benefits and challenges. That notwithstanding, each of the underlisted technologies among others might contribute to food systems transformation:

- Precision agriculture has the ability to increase crop yields and reduce waste, that could lead to better management and efficient use of resources.
- Blockchain technology could enhance supply chain

transparency, trackability and traceability, that could help to build trust between consumers and producers with the objective of reducing the risk of food fraud and contamination.

- Gene editing technology that could improve crop resilience and nutritional value by addressing issues of pest infestations, drought, and malnutrition among others.
- Vertical farming to support all year-round crop production in controlled environments to help to improve food security and reduce the environmental impact of unsustainable agricultural practices.
- Plant-based and cell-cultured meat alternatives to help reduce the environmental impact of traditional animal production practices with the objective of ensuring that the growing demand for animal protein is met in a sustainable way.

Conclusion and Policy Implications

Conclusion

Based on the results of the analysis, it is concluded that food systems transformation in Africa is challenged by underdevelopment of the agricultural sector across the continent, which has significantly affected the efficient production, processing, and distribution of food across space and time. There is also the challenge of inadequate access to markets and poor infrastructure that create serious challenges to food systems transformation. Globalization makes food systems transformation more challenging because of the potential of dumping of inferior, cheap and heavily subsidized food items from developed countries to developing countries, especially those in Africa. The other challenges of food systems transformation in Africa are repressive policies, climate change and technologies. These challenges have serious implications for policy across the continent. It requires integrated and context-specific policy interventions to ensure successful food systems transformation.

Policy Implications

Based on the conclusions, the following are the implications for policy:

1. To deal with the underdevelopment of the agricultural sector across the continent, which significantly challenges the efficient production, processing, and distribution of food across space and time, there is the need for policy interventions targeting the various segments of the agricultural value chain. This includes policy interventions that target increased production, processing, storage and distribution of food.
2. There is also the challenge of inadequate access to markets and poor infrastructure that create serious challenges to food systems transformation. To address this challenge, it is important to create opportunities for improved market access through investments in infrastructure. For example, the provision of transport infrastructure linking production centres in rural areas to consumption centres in urban centres will significantly support food systems transformation.
3. Globalization makes food systems transformation more challenging because of the potential of dumping of inferior, cheap and heavily subsidized food items from developed countries to developing countries, especially those in Africa. To address this challenge, there is the need for policy interventions that create opportunities for local producers to access global markets while protecting them from unfair competition from established producers in the developed world. This

requires trade policies that utilize the strengths in local production systems to overcome the inherent weakness while taking advantage of the opportunities of expanded market access and protecting against the threats of unequal power asymmetries and unfair competition.

4. The other challenge of food systems transformation in Africa is repressive policies. African nation states must ensure that policies that tend to repress local food systems resilience are avoided. While signing international trade treaties are important, the negative impacts of such on local production must be addressed using the appropriate policy interventions.
5. Climate change remains one of the critical challenges of human existence. African food systems rely heavily on weather dependent production systems. Majority of farmers continue to rely on rain-fed agriculture with limited access to irrigation that ensure all year-round crop production. Animal husbandry remains largely rudimentary and significantly challenged by seasonality that affects feed availability for improved production. There is the need for tailored policy interventions that address these challenges and promote sustainable and inclusive climate change adaptation and mitigation.
6. The world is currently going through a technological revolution. It is important for African nation states to formulate policy interventions targeting investments in appropriate technologies for food systems transformation. For example, climate smart-agriculture, precision farming and use of drone and artificial intelligence in farming have become requirements for food systems transformation. Policy interventions in this regard must be integrated and context-specific to ensure successful food systems transformation.

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Author Contributions

Katherine Kaunza-Nu-Dem Millar contributed to conceptualization, methodology, investigation, formal analysis, writing–original draft preparation, and visualization. Mamudu Abunga Akudugu contributed to conceptualization, supervision, validation, writing–review and editing. Both authors read and approved the final manuscript.

Conflict of Interest Statement

The authors declare no conflicts of interest related to the research, authorship, or publication of this manuscript.

Ethics Declarations

This study did not involve human participants, personal data, or animal subjects and therefore did not require formal ethical approval. All sources used in this research were properly cited, and the study adhered to established academic and research integrity standards.

Funding Disclosure

No funding was received for this work.