RESEARCH ARTICLE OPEN ACCESS
Website: http://ijwe.americanjournal.us/index.php/ijwe

International Journal of World Economic
Volume 1, Number 2, 2025 | ISSN: 3066-6554

The Role of Agricultural Institutions' Policies in Supporting Local Farmers in Facing the Climate Crisis and Fluctuating Commodity Prices

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Abstract

The agricultural sector in developing countries is facing dual challenges: the worsening climate crisis and fluctuating global commodity prices. Climate change has disrupted agricultural productivity through extreme weather patterns, while volatile prices have destabilized farmers' incomes and national food systems. These dual pressures threaten local food security, especially among smallholder farmers who are highly dependent on primary commodities. This study aims to analyze how agricultural institutional policies can strengthen the resilience of local farmers in dealing with these issues. Using a qualitative research approach through a literature review method, this study synthesizes findings from ten key academic articles, institutional reports, and case studies between 2019 and 2025. The analysis focuses on forms of institutional interventions, implementation barriers, and best practices for climate-smart agricultural policy. The results indicate that institutions play a pivotal role in providing early warning systems, implementing weather-indexed insurance schemes, and supporting climate-resilient crop innovation. However, significant challenges persist, such as fragmented governance, limited community participation, and dependency on global markets. Effective policies are those that integrate science, technology, and participatory planning, and are tailored to local ecological and social contexts. This study concludes that agricultural resilience can only be achieved through adaptive and inclusive institutional reforms. The findings contribute to the understanding of institutional dynamics and offer practical insights for policymakers aiming to secure agricultural sustainability amidst global crises.

Keywords: Agricultural Policy Institutions, Climate Crisis, Commodity Price Fluctuation.

INTRODUCTION

The global climate crisis has worsened food security and commodity price stability in many developing countries. The impacts of climate change on agriculture—such as extreme weather patterns, prolonged droughts, and floods—directly disrupt productivity and distribution of agricultural products (Olagunju et al., 2025). This condition makes it difficult for small farmers to maintain income continuity, especially when faced with highly volatile commodity prices due to global uncertainty (Balogh, 2020; Bayraktar, 2025).

The climate crisis has become one of the most important structural factors influencing global commodity price volatility in the last decade. Changes in extreme weather patterns such as droughts, floods, and storms directly affect the productivity of the agricultural and energy sectors. For example, disruptions to wheat harvests in Eastern Europe and the United States due to extreme temperatures have led to significant increases in global food prices (Adenle et al., 2017; Shaw et al., 2013). In addition, supply uncertainty due to the climate crisis has led to increased market speculation, exacerbating price volatility in commodities such as palm oil, coffee, and cocoa (Chowdhury, 2023; A. Das & Ghosh, 2023). In the long term, the climate crisis also reduces the carrying capacity of land and water resources, increasing the risk of food and energy inflation, especially in developing countries that are heavily dependent on primary commodities.

Furthermore, the impact of climate change is not only limited to supply, but also to changes in global demand and policies. For example, the shift towards green energy has led to a sharp increase in demand for critical metals such as lithium and cobalt, whose prices have soared due to concerns about the availability and sustainability of their supply (IEA, 2023; Pangestu, 2023). On the other hand, environmental regulations such as carbon emission restrictions affect the prices of fossil fuels and high-emission agricultural products. Therefore, commodity price dynamics are now determined not only by the market, but also by climate resilience, adaptation policies, and the global energy transition (De Winne & Peersman, 2021). Understanding the relationship between the climate crisis and commodity prices is key to formulating future fiscal, trade, and food security policies.

Amid these challenges, the role of agricultural policy institutions becomes increasingly crucial. Effective policies not only involve subsidies or price incentives, but also include strengthening farmers' access to weather information, climate-friendly agricultural technologies, and equitable distribution channels (Ben Hassen et al., 2025). Research shows that agricultural institutions that are

adaptive to climate challenges can increase the economic resilience of local farmers (Perelli et al., 2024). Without appropriate institutional interventions, smallholder farmers tend to be more vulnerable to crop losses and market price uncertainty (Sari et al., 2024).

The availability of support from national and local agricultural institutions is also greatly influenced by cross-sector coordination and adequate political support. In many cases, weak integration between climate policy and agricultural policy is an obstacle to the implementation of comprehensive adaptation strategies (Gebremikael et al., 2025; Rana et al., 2025). This shows the importance of transforming agricultural institutions towards a system that is more responsive to environmental and economic crises.

Furthermore, the dynamics of fluctuating commodity prices are an additional challenge that disrupts the economic stability of farmers. Uncertain prices increase the risk of failure of farming businesses, especially for strategic commodities such as rice, corn, and horticulture (Dou et al., 2023; Shah, 2024). Policy interventions in the form of price buffer systems, the establishment of distribution cooperatives, and partnerships with institutional buyers have been shown to provide short- and long-term economic protection (Bendijo et al., 2024).

The urgency of this research lies in the increasing need for agricultural policies that are able to address the dual challenges: the climate crisis and price instability. When the agricultural sector is the backbone of national food security, the sustainability of local farming businesses must be ensured through evidence-based interventions that are oriented towards long-term sustainability (IEA, 2023; Iliyasu & Sanusi, 2024). Without policy reform, the vulnerability of local farmers will continue to increase, resulting in decreased production and national food security.

Several previous studies have discussed the impact of climate change on smallholder farmers and the effectiveness of price subsidy policies. For example, research by Olagunju et al. (2025) show the importance of providing incentives for the adoption of climate-friendly technologies in developing countries. Meanwhile, Ben Hassen et al. (2025) highlight how institutional innovations such as agricultural digitalization and weather information systems have helped farmers in decision-making. However, there are not many studies that specifically examine the relationship between agricultural institutional policies and local farmers' ability to cope with climate and market pressures simultaneously.

This study aims to evaluate how agricultural institutional policies can support local farmers' resilience in the face of the climate crisis and commodity price fluctuations. The focus of this study includes an analysis of successful institutional interventions, identification of implementation challenges at the local level, and the preparation of policy recommendations based on adaptive and participatory approaches. With this approach, this study is expected to provide conceptual and practical contributions to policy makers, academics, and agricultural actors at the grassroots level.

METHOD

This study uses a qualitative approach with a literature review as its main method. Literature review was chosen because it allows researchers to explore various previous research results, policy reports, and academic documents related to the role of agricultural policy institutions in responding to the challenges of the climate crisis and commodity price fluctuations. This method is considered appropriate in exploring policy patterns, institutional approaches, and agricultural adaptation strategies that have been implemented in various regions, both at the national and international levels (Snyder, 2019).

The data sources in this study consist of indexed scientific journal articles, academic books, reports from government institutions and international organizations such as FAO, IEA, and World Bank, as well as policy documents from national agricultural institutions. The data used were selected purposively based on the relevance of the theme, year of publication (2019–2024), and the availability of open access for validation. Several primary sources were obtained from the Google Scholar, ScienceDirect, and ProQuest platforms which provide the latest studies on agricultural policy, climate crisis, and commodity market dynamics (Booth et al., 2021).

Data collection techniques were carried out through a process of documentation and systematic review of relevant literature. All documents were reviewed using inclusion criteria such as direct relevance to the issue of the climate crisis or commodity prices, mention of the role of agricultural institutions or policies, and the context of local farmers as the main actors. Data were selected

using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach to ensure transparency and accuracy of the screening process (Tricco et al., 2018).

Data analysis was carried out using the thematic content analysis method. Each collected literature was analyzed based on thematic categories such as: agricultural institution policy strategies, support mechanisms for local farmers, responses to the climate crisis, and commodity price protection. This analysis process was carried out inductively, by identifying patterns and relationships between themes to then be synthesized in the form of findings and critical discussions (Elo & Kyngäs, 2008). This approach allows researchers to explore the depth of the context and compare the effectiveness of policies that have been implemented in various countries.

RESULTS AND DISCUSSION

This table presents 10 core articles selected from a broader set of literature reviewed. These articles were chosen for their direct relevance to the topic: The Role of Agricultural Institutions' Policies in Supporting Local Farmers in Facing the Climate Crisis and Fluctuating Commodity Prices. The findings highlight the diverse institutional approaches and policy mechanisms used globally.

Table 1. Literature Review

No	Author	Years	Findings
1	deBoe, G. (OECD)	2020	Many producer support policies overlap and hinder climate adaptation. Recommends redirecting support toward R&D, infrastructure, and biosecurity.
2	OECD	2023	Out of 587 climate adaptation programs, most remain at the planning stage. Implementation, monitoring, and evaluation are critical gaps.
3	Olabanji & Chitakira (South Africa)	2025	Formal institutions (extension services, finance, farmer groups) are critical for upscaling CSA (climate-smart agriculture) innovations among smallholders.
4	Das et al. (India)	2025	Integrating climate data into price models enhances planning. Tools like MSP (Minimum Support Price) act like "put options" for price stabilization.
5	Amundsen et al.	2021	Multi-level governance bottlenecks limit climate policy execution in agriculture. Stronger coordination among institutions is needed.
6	Chaplin et al.	2022	Feedback loops delay diversification efforts in agriculture. Timing and social dynamics must guide policy interventions.
7	Chetri et al. (India)	2021	ICT access (weather services, market info) significantly increases farmers' adaptive capacity to climate risks.
8	Eaton & Shepherd (FAO)	2005–2015	Contract farming gives smallholders market and input access and reduces price risks—but requires institutional safeguards.
9	GIZ Handbook	2013	Emphasizes the role of cooperatives in contract negotiation and sustainability. Institutional capacity is key to success.
10	FAO Case Studies	2021	Strengthening institutions like seed banks and market infrastructure is essential for CSA success in local settings.

The body of literature selected for this review provides a rich, multidimensional understanding of how institutional agricultural policies can either support or hinder local farmers' resilience in the face of climate change and commodity price volatility. Across diverse contexts—from OECD economies to smallholder communities in South Africa, India, and Sub-Saharan Africa—a consistent theme emerges: institutional design and policy coherence are central to enabling adaptive agricultural systems.

A foundational insight comes from deBoe (2020), who reviews a broad swath of OECD agricultural policies and finds that many existing subsidy structures not only overlap but also inadvertently discourage long-term sustainability. These policies often fail to promote climate-resilient investments, particularly in research and development (R&D), infrastructure, and disease prevention (biosecurity). Instead of reactive subsidies, the review calls for a proactive redirection of funds towards capacity building, climate information systems, and the modernization of institutional frameworks (DeBoe, 2020).

Complementing this view, the OECD's 2023 report on adaptation policies across 34 countries reveals a gap between planning and implementation. While over 580 national or sub-national programs exist to support agricultural adaptation, most remain stuck in the planning stage. Few have undergone meaningful evaluation or follow-up, and institutional fragmentation often leads to poor coordination among environmental, agricultural, and local governance bodies. This underscores a systemic challenge in turning policy intentions into functional, ground-level interventions (OECD, 2023).

Delving into the African context, Olabanji and Chitakira (2025) emphasize the decisive role that formal agricultural institutions—including extension services, farmer cooperatives, and microfinance networks—play in the adoption and scaling of climate-smart agriculture (CSA). Their findings in South Africa demonstrate that institutional trust, technical training, and market access, when provided collectively, significantly enhance smallholders' willingness and ability to implement adaptive practices such as crop diversification, conservation agriculture, and efficient irrigation (Olabanji & Chitakira, 2025).

Similarly, Das et al. (2025) explore how integrating climate forecast models into agricultural price volatility prediction tools can help manage market risk in India. By using econometric tools like EGARCH, the study shows that early warning systems and minimum support price (MSP) schemes can act as de facto "insurance" or "put options" for farmers, particularly in monsoon-sensitive regions. These findings suggest that policy mechanisms which bridge climate science and market stabilization can form a critical component of institutional support (S. Das et al., 2025).

In another African-focused study, Amundsen et al. (2021) examine multi-level governance challenges in climate policy implementation. Through case studies in Uganda and Ghana, they identify bottlenecks such as overlapping mandates, limited local capacity, and absent feedback loops between national policymakers and local implementers. Without functional coordination between ministries, agencies, and local institutions, even well-designed climate policies struggle to deliver tangible benefits.

Chaplin et al. (2022) add a systems-level dimension to this discourse by employing a social-ecological modeling framework. Their study illustrates how entrenched behavioral patterns, community norms, and timing of interventions shape farmers' decisions to diversify. For example, if a diversification program is introduced during economic downturns or without local legitimacy, its uptake tends to fail. Hence, policies must be sensitive not only to ecological realities but also to social feedback systems (Chapman et al., 2022).

Chetri et al. (2021), in their study of farmers in Haryana, India, highlight the pivotal role of ICT (Information and Communication Technology) in enhancing adaptive capacity. Access to mobile-based weather forecasts, market prices, and real-time extension advice significantly boosts farmers' decision-making autonomy. The research shows that digital literacy, institutional delivery mechanisms, and sustained user engagement are key determinants of ICT success (Chetri et al., 2021).

Turning to market-based interventions, Eaton and Shepherd (2005–2015) provide a broad review of contract farming arrangements across Asia, Africa, and Latin America. These contracts—whereby buyers provide inputs and guarantee purchase of harvests—help reduce price volatility for farmers. However, such systems are only beneficial when balanced by strong institutional safeguards to prevent exploitation and ensure equitable risk-sharing (Eaton & Shepherd, 2001).

This point is reinforced by the GIZ Contract Farming Handbook (2013), which emphasizes the importance of farmer cooperatives and collective bargaining mechanisms in sustaining contract farming models. Institutional support, particularly in legal literacy, contract enforcement, and dispute resolution, is vital to protect the interests of smallholder farmers in buyer-seller relationships (Organization Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 2013).

Lastly, the FAO (2021) showcases real-world CSA case studies that demonstrate how local-level institutional strengthening—such as community seed banks, climate-resilient infrastructure, and inclusive extension systems—enhance both productivity and resilience. Successful initiatives often combine top-down policy frameworks with bottom-up community participation, ensuring that the institutional ecosystem is both adaptive and responsive (FAO, 2021).

This synthesis illustrates that institutional policies are not just abstract directives but active determinants of smallholder resilience. Their effectiveness depends on coordination across governance levels, integration of market and climate intelligence, and sustained support to both social and technical dimensions of agriculture. Institutions that are agile, transparent, and inclusive are more likely to foster adaptive behaviors and equitable outcomes for local farmers in a time of intensifying climate and market instability.

Discussion

Effective Forms of Institutional Intervention

In facing the challenges of climate crisis and commodity price instability, policy intervention by agricultural institutions is a determining factor in strengthening the resilience of local farmers. Among the forms of intervention that have proven effective, climate-based early warning systems, risk protection schemes such as weather index insurance, and increased investment in agricultural research and innovation are the three main pillars that are currently the global focus in agricultural resilience strategies.

One of the most significant forms of intervention is the implementation of early warning systems and climate information. International research institutions such as the CGIAR (Consultative Group on International Agricultural Research) have encouraged the integration of weather prediction technology in agricultural planning. This technology allows farmers to adjust planting times and choose crop varieties that are appropriate to predicted climate conditions. For example, in Ethiopia and Tanzania, early warning systems developed by the Climate Change, Agriculture and Food Security (CCAFS) program have succeeded in increasing dryland productivity by providing more accurate planting time information. Farmers who use this system show an increase in crop yields of up to 20% compared to those who do not use climate information (Beddington et al., 2012). This technology has proven to be very crucial, especially for small farmers who are very vulnerable to extreme weather variability such as drought or excessive rain.

In addition, innovations in financial risk protection are also an important focus. One form is the weather-indexed insurance scheme, which pays compensation to farmers not based on actual damage claims, but on measurable weather parameters, such as low rainfall. In India, the Weather Based Crop Insurance Scheme (WBCIS) program has been implemented by the central government together with local insurance companies. This program provides protection to farmers against crop failure due to climate anomalies. A study by Lybbert and Sumner (2012) showed that this scheme reduced farmers' income losses by 15–30% during extreme growing seasons. Similar schemes in Malawi and Kenya even involve satellite technology to monitor climate indices and accelerate the disbursement of insurance funds, providing responsive protection against weather risks (Lybbert & Sumner, 2012).

No less important is investment in research and development of crop varieties that are resistant to climate stress. A study by Vermeulen et al. (2012) noted that many countries in Africa and Asia are now directing public investment towards developing varieties that are resistant to drought, salinity, and extreme temperatures (Vermeulen et al., 2012). In India, for example, the Sahbhagi Dhan rice variety developed by the International Rice Research Institute (IRRI) has been shown to be more drought-resistant and yields 1–2 tonnes per hectare more than conventional varieties during the dry season. This has had a significant impact on household food security, especially in poor areas that depend on a single growing season. The adoption of climate-resilient varieties not only supports sustainable production but also encourages farmers to remain in the agricultural sector when market prices are volatile.

From this presentation, it can be concluded that the success of agricultural institutional policies is closely related to their ability to integrate technology, finance and scientific research into local farmer support systems. Interventions that are adaptive, evidence-based and developed in collaboration with local communities have proven to be more effective in building agricultural resilience to climate and market uncertainty.

Implementation Challenges at the Local Level

The implementation of agricultural policies at the local level faces various structural challenges that often hinder the effectiveness of programs in supporting farmers in facing the climate crisis and commodity price fluctuations. One of the main obstacles is the weak coordination between central and local government institutions. Although strategic policies are usually designed at the national or even international level, their implementation is highly dependent on the capacity and alignment of local institutions. Unfortunately, in many cases, there is a policy gap between the central and local levels, both in terms of technical understanding, policy priorities, and funding mechanisms. Binswanger and Deininger (1997) explain that this institutional fragmentation often leads to overlapping programs, inefficient resource allocation, and confusion among farmers as beneficiaries (Binswanger & Deininger, 1997). One concrete example can be seen in Nigeria, where the national fertilizer subsidy program failed to reach small farmers evenly because local governments did not have adequate distribution systems and often had local political interests that

differed from central policies. This resulted in low adoption of agricultural technologies that were actually designed to improve local food security.

The second crucial challenge is the low involvement of farmers in the planning and decision-making process. Many policies are made with a top-down approach without meaningful consultation with farming communities, so that the programs launched are often not in accordance with local needs and conditions. Ajay Agrawal (2008) in a World Bank report highlighted the importance of the role of local institutions in building adaptive capacity to climate change. He showed that the most effective climate adaptation occurs when farmers are not only the objects, but also the subjects of policy making. In Nepal, for example, a water conservation project initiated by the central government to overcome drought in the mountains failed because it did not involve communities in the technical design of the irrigation system. In contrast, when the program was adapted to involve local farmer groups in Lamjung District, the results showed an increase in efficient water use and higher land productivity.

Furthermore, the dependence of local economies on export markets and imported products makes farmers vulnerable to global price volatility that is beyond their control. This situation is reflected in the case of the 2007–2008 global food price increase, where the spike in rice and wheat prices caused social unrest in many developing countries. Von Braun et al. (2008), in their report to the CGIAR, underscore how dependence on global markets without domestic buffer systems weakens farmers' economic resilience (Von Braun & Tadesse, 2012). In Bangladesh, dependence on wheat imports has resulted in local food shortages when world prices have soared, while local farmers have been disadvantaged because poor logistics infrastructure has prevented them from selling to markets at high prices. This inequity reflects the weak institutional protection of local farmers in the face of global market dynamics.

These three challenges demonstrate that the success of agricultural policy implementation is not solely determined by the quality of the design on paper, but rather by the extent to which the policy is adapted to local institutional and social realities. Cross-institutional synergy, community participation, and efforts to diversify local economies are prerequisites for building resilient and equitable agricultural systems amidst climate and economic crises.

Adaptive and Participatory Policy Recommendations

In the face of climate crisis and commodity price fluctuations, adaptive and participatory agricultural policies are essential. Climate-Smart Agriculture (CSA) is one approach that combines climate adaptation, emission mitigation, and productivity improvement. For example, in Limpopo, South Africa, the implementation of CSA such as water-efficient irrigation and drought-resistant crop rotation increased crop yields by 20% during the dry season (Ziervogel & Ericksen, 2010).

The success of the policy also depends heavily on the capacity of local institutions. In Zambia, training extension workers and strengthening farmer cooperatives led to widespread adoption of adaptive agricultural techniques. As many as 800 farmers were trained and successfully disseminated the practices to other communities (Neubert et al., 2011).

Participatory monitoring systems have also proven effective. In Andhra Pradesh, India, involving farmers in monitoring drought risk accelerated aid distribution and increased community resilience to crop failures (Hazell et al., 2010).

These three approaches demonstrate that successful agricultural policies are not just about technology, but about empowerment, local institutions, and active community participation.

CONCLUSION

The study affirms that agricultural policy institutions hold a central role in supporting local farmers facing climate-induced disruptions and commodity price volatility. Through evidence drawn from global and local contexts, it is clear that institutions which offer climate-smart solutions—such as weather-based insurance, early warning systems, and climate-resilient crops—help mitigate both environmental and economic risks. Institutional coherence, community empowerment, and scientific integration emerge as core components of effective agricultural policy responses.

Practical Suggestions

To enhance local farmer resilience, it is essential that policy institutions prioritize adaptive interventions grounded in participatory processes. Programs must be co-designed with farming communities to ensure relevance and effectiveness. Strengthening coordination between national and local bodies, expanding access to agricultural technology, and fostering farmer cooperatives can improve implementation. Furthermore, investments in digital infrastructure and ICT services will allow farmers to make informed decisions in real-time.

Suggestions for Future Research

Further studies should adopt a mixed-methods approach, combining field-based interviews with policy analysis to understand the lived experiences of farmers under institutional interventions. Comparative cross-country studies are also needed to examine how local institutional contexts affect the outcomes of similar agricultural policies. Lastly, longitudinal research is recommended to track the long-term effectiveness of institutional reforms in managing climate and market volatility.

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