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APPLICABILITY OF COASE THEOREM IN MANAGING FARMERS AND HERDERS' CONFLICT IN NIGERIA

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Abstract
This study examines the applicability of the Coase theorem in managing farmer–herder conflict in Nigeria, a persistent challenge that threatens the nation's socio-economic stability and security. Employing a quantitative research design, the study draws on secondary data from conflict trend analyses, media reports, and scholarly literature. Findings reveal that clearly defined property rights, coupled with negotiated agreements, can lead to an equilibrium in which both farmers and herders derive mutual benefits without detriment to either party. The research further proposes a pragmatic policy framework that integrates Coase theorem principles with non-cooperative game theory to enhance conflict resolution efforts. This study contributes to conflict management literature by demonstrating the potential of economic theory to inform sustainable and context-specific interventions in Nigeria's farmer–herder crisis.
Keywords: Farmers–Herdsmen, Coase Theorem, Conflict, Non-cooperative Game
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Introduction

The conflict between herders and farmers has been in existence since the beginning of the practice of agriculture in most African countries. Farmers and herders' conflict in Nigeria has been a long-standing issue that has escalated in recent years, resulting in the displacement of communities, bloody clashes that led to food shortages, and increment in prices of foodstuffs in Nigerian markets (Edward, 2022). The main causes of conflict are competing for limited resources, particularly land and water, as well as tensions between different cultures and ethnic groups. Traditional conflict resolution mechanisms have proven ineffective, necessitating a fresh perspective on managing the crisis (Ajayi & Buhari, 2014). The conflict is rooted in a complex mix of factors, including competition over land and resources, environmental degradation, climate change, and political and economic marginalization of certain groups (Ularju & Yakubu, 2024). The farmers and herders rely heavily on agriculture and pastoralism for their livelihoods, and as such, conflicts often arise over access to resources such as grazing lands, water, crops and climate change (Moses-Ojo et al., 2023), relating to land and water use, obstruction of traditional migration routs, livestock theft and crop damage tend to trigger these disputes (International Crisis Group [ICG], 2017). The spread of small arms and other light weapons, which have been used in violent attacks on both sides, has made the farmers and herders conflict worse (Nassef et al., 2023).

The conflict has had severe humanitarian economic and developmental consequences, with thousands of people killed and millions displaced from their homes. According to Obasanmi & Enoma (2022), activities of herdsmen are threat to the economic, political, and social security of a

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nation and a major factor associated with underdevelopment; because it discourages both local and foreign investments, reduce the quality of life, destroy human and social capital, the damaged relationship between citizens and the states, thus undermining democracy, rule of law and the ability of the country to promote development. The Nigerian government has implemented various measures to address the conflict, including the establishment of task forces, peace committees, and grazing reserves. However, these measures have not been entirely successful in resolving the conflict due to their limited effectiveness and the complex nature of the conflict (Gukas, 2025).

The origins of the dispute must be resolved, and any solutions must take into account the demands and interests of both farmers and herders. The Coase theorem, which asserts that parties can bargain and come to effective solutions to externalities without government interference, is one potential paradigm for managing the problem. Understanding the underlying factors and complexity of the farmers and herders' conflict in Nigeria is crucial to comprehending the applicability of the Coase theorem. The competition for limited resources, including fertile land and water sources, has historically fueled tensions between farmers and herders (Mazeli, 2023). Rapid population growth, climate change impacts, and land degradation have exacerbated these resource constraints, leading to heightened conflict in various regions (Udemaduet al., 2024). Socio-cultural and religious factors also contribute significantly to the persistence of this conflict, making it a multifaceted challenge (Mammam, 2020).

This paper aims to examine the applicability of the Coase theorem in managing the farmers and herders' conflict in Nigeria, by exploring the challenges and opportunities for bargaining, the role of institutions and policies, and the potential outcomes and implications of applying the theorem. The paper argues that while the Coase theorem offers a useful lens to understand the rationality and incentives of the actors involved in the conflict, it also faces several limitations and constraints in the Nigerian context, such as the lack of clearly defined and enforced property rights, the high transaction costs, the imperfect and asymmetric information, the power imbalances, and the externalities and spillovers. Therefore, the paper suggests that the Coase theorem should be complemented by other approaches and interventions that address the structural and contextual factors that fuel the conflict, such as improving the governance and security of land resources, enhancing the dialogue and trust between the parties, promoting the diversification and integration of livelihoods, and strengthening the conflict resolution and peacebuilding mechanisms.

Literature review

The farmers and herders' conflict in Nigeria has deep historical roots and has evolved into a complex and persistent challenge. Understanding the background of this conflict provides crucial insights into the dynamics and complexities involved (Chukwum, 2020). The conflict in Nigeria stems from the competition for scarce resources such as land and water. Nigeria, being a country with diverse agroecological zones, experiences varying degrees of resource availability and suitability for agricultural and pastoral activities (FAO, 2017). This competition has intensified over time due to factors such as population growth, urbanization, and climate change impacts. Population growth in Nigeria has led to increased pressure on available land for both farming and grazing. The country's population has been rapidly expanding, resulting in an increased demand for food and agricultural products. This has led to the expansion of agricultural activities, often encroaching upon grazing lands traditionally used by herders (International Crisis Group, 2017; Davis, 2022). Climate change impacts, such as erratic rainfall patterns and increased desertification in certain regions of Nigeria, have further exacerbated resource scarcity. Changes in precipitation patterns and the shrinking of water sources have affected both farmers and herders, leading to heightened competition for limited resources (Davis, 2022).

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According to Ephraim (2014), the escalating conflict can be attributed to several causes and aggravating factors, including climatic changes such as frequent droughts and desertification, population growth leading to the loss of northern grazing lands due to human settlements' expansion, technological and economic changes resulting from new livestock and farming practices, a crime involving rural banditry and cattle rustling, political and ethnic strife intensified by the spread of illicit firearms, and cultural changes like the collapse of traditional conflict management mechanisms. Additionally, the presence of a dysfunctional legal regime that fails to punish crimes has incentivized both farmers and pastoralists to take matters into their own hands (Brottem, 2021; ICG, 2017).

Theoretical Framework

Ronald Coase proposed the Coase theorem in 1960, which states that parties to a dispute can efficiently resolve their differences by voluntary agreements and negotiation where property rights are clearly defined and transaction costs are low. According to Coase, in the absence of transaction costs, the initial allocation of property rights does not affect the outcome, as bargaining between parties can lead to an efficient allocation of resources (Coase, 1960).

The Coase theorem is a theoretical framework for managing externalities, which are costs or benefits of economic activities that are not reflected in market prices. The theorem suggests that parties can negotiate and reach efficient solutions to externalities without government intervention, as long as transaction costs are low and property rights are well-defined (Coase, 1960). The Coase theorem shows how, under certain conditions, economic actors can arrive at an efficient solution to an externality without direct government involvement (Deryugina et al., 2021). The theorem proposes that the optimal allocation of resources can be achieved through negotiation and bargaining, rather than through regulation or taxation.

In the context of the farmers and herders' conflict in Nigeria, the Coase theorem has been proposed as a possible framework for resolving disputes over access to resources such as grazing lands, water, and crops. Proponents of the Coase theorem argue that farmers and herders can negotiate and reach efficient solutions that benefit both parties, without the need for government intervention (Obiero & Ghabon, 2025). The farmer and the herder can bargain or negotiate terms that will accurately reflect the full costs and underlying values of the property rights at issue, resulting in the most efficient outcome (Folefack, 2014).

Non-cooperative game theory

The non-cooperative game theory lies in the concept of Nash equilibrium, which explores the strategic choices made by conflicting parties. This theory analyzes situations where players make decisions independently and without any binding agreements. By analyzing the strategies adopted and their reactions to each other's actions, non-cooperative game theory provides a comprehensive framework for understanding the competitive dynamics underlying the farmer-herder conflict (Barrett, 2000). According to Ostrom (2009), this theoretical framework assumes that individuals engage in strategic decision-making to protect their interests in a competitive environment. This theory also highlights the presence of power imbalances in the farmer-herder conflict. According to von Neumann and Morgenstern (1944), power differentials can significantly influence decision-making in game theory scenarios. In the context of the farmer-herder conflict, these power dynamics can include factors such as wealth, land ownership, and political representation, which affect the strategic choices made by farmers and herders.

The farmer/herder conflict is a classic example of a non-cooperative game involving conflicting interests between two groups. The conflict arises when farmers and herders share a common

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resource, such as grazing land or water sources. The farmers want to protect their crops from damage caused by the herders' animals, while the herders want their animals to graze freely. This conflict often leads to overgrazing, environmental degradation, and diminished resource availability for both parties. In this non-cooperative game, each player (the farmers and the herders) chooses their actions independently, based on their own self-interests. The payoffs for each player depend on the strategies chosen by both parties. For example, if the farmers invest in fencing to protect their crops, it may reduce the grazing area for the herders' animals, leading to a lower payoff for the herders. On the other hand, if the herders increase the number of animals they graze, it may result in more crop damage and a lower payoff for the farmers.

Several studies have analyzed the farmer-herder conflict as a non-cooperative game. According to Bashir et al. (2015) tried to model farmer-herder conflicts over natural resources in Nigeria as non-cooperative games. They use a game theory framework to model the conflict and analyze the strategies and payoffs of both farmers and herders. They explore how different factors, such as resource availability, population growth, and policy interventions, can affect the dynamics of the conflict. Similarly, a game theoretic analysis of farmer-herder conflicts in sub-Saharan Africa (Fuller & Burchfield, 2018) focuses on sub-Saharan Africa and uses game theory to examine the causes and consequences of the farmer/herder conflicts in the region. They analyze the impact of different strategies, such as land-use planning and mediation, on the conflict outcomes.

These analyses of the farmer-herder conflict within the framework of non-cooperative game theory. The theory provides valuable perspectives into the strategies and dynamics of the conflict, as well as potential solutions and policy implications towards finding satisfactory compromises and promoting mutual understanding between the conflicting parties (Pradhan and Stringer, 2019).

Herder/Farmer payoff matrix

The payoff matrix illustrates the strategic interactions between farmers and herders within a non-cooperative game framework. Each player has two strategies: Cooperate (C) and Defect (D). The potential outcomes are as follows in the table 1 below:

	Herders Cooperate (C)	**Herders Defect (D)**
Farmers Cooperate (C)	(3, 3)	(1, 4)
Farmers Defect (D)	(4, 1)	(2, 2)

The farmer-herder conflict in Nigeria can be understood through this narrative framework that illustrates the strategic choices each party faces in a non-cooperative game. In this scenario, both farmers and herders must decide whether to cooperate or defect, leading to various outcomes based on their choices. In the situation, when both parties choose to cooperate, they achieve a mutually beneficial outcome, represented by the payoff of (3, 3). This situation fosters peaceful coexistence, allowing farmers to protect their crops while herders graze their livestock without conflict. Such cooperation can lead to shared agreements on resource use, enhancing overall productivity and stability.

However, if the farmers choose to cooperate while the herder’s defect, the payoff shifts to (1, 4). In this case, herders benefit significantly at the expense of farmers, who suffer from crop damage due to unchecked grazing. This scenario highlights the risks farmers face when they trust herders without secure agreements in place.

Conversely, if the farmers defect while the herders cooperate, the outcome is (4, 1). Here, farmers take protective measures such as fencing that limit grazing access for herders. While farmers gain

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a higher pay off by safeguarding their crops, herders experience losses due to restricted access to grazing lands.

Finally, if both parties choose to defect, they end up with a lower payoff of (2, 2). This outcome reflects a state of conflict where neither party benefits significantly. Farmers may resort to aggressive measures against herders, while herders might retaliate with increased grazing pressure or theft. The resulting hostility diminishes resources for both groups and exacerbates tensions. This narrative illustrates that the optimal strategy for both parties lie in cooperation, which can lead to sustainable resource management and conflict resolution. By fostering dialogue and establishing clear agreements on land use and compensation mechanisms, both farmers and herders can work towards a stable equilibrium that benefits their livelihoods and promotes social harmony.

Applicability of Coase theorem in managing farmers and herders' conflict.

Farmers and herders can then negotiate and reach agreements on the use and sharing of the resources. The parties can agree on how to share grazing lands, water resources, and cooperation in the production and marketing of agricultural goods (The Economist, 2019). Agreements can also be reached on compensation mechanisms, such as payments for damages caused by animals and loss of crops caused by livestock intrusion. Incentives play a crucial role in conflict resolution. To reach an agreement, parties must be incentivized by the compensation mechanisms agreed upon. Compensation mechanisms ensure that both parties bear the costs of their actions, leading to the efficient allocation of resources without government intervention.

Applying the Coase theorem, an economic concept that addresses externalities and property rights can provide an empirical solution to the farmer-herder conflict in Nigeria. The Coase theorem suggests that if property rights are well-defined and transaction costs are low, affected parties can negotiate and reach efficient solutions to externalities. In the context of the farmer-herder conflict, this theorem can be applied as follows:

1. Defining Property Rights: Clearly define and assign property rights over land and resources, considering the overlapping claims of farmers and herders. To do this, there may be a need for hybrid systems, community agreements, or legal frameworks that respect customary rights and encourage participatory decision-making (Ngwenya & Odularu, 2018). Where property rights are weak or nonexistent, rural populations may be displaced or customary access and control over resources may be challenged by outside interest groups. On the other hand, secure property rights that are protected by law can empower rural communities, ensuring participation in critical decision-making processes related to the management of land and natural resources, and other social political processes (USAID, 2016).

2. Encouraging Negotiations: Facilitate negotiations between farmers and herders to reach mutually beneficial agreements regarding land use, grazing rights, and compensation for damages. Dialogue platforms, mediation, or community-based dispute-resolution techniques offer avenues through which this can be accomplished (Tanifum & Fabien, 2025). Local and community-based dispute resolution mechanisms have proved effective in both averting violence and helping communities recover from conflict. Forums that allow various constituencies – farmers, pastoralists, community vigilantes and state security agencies – to monitor, identify, discuss and manage potential threats can be particularly helpful (ICG, 2017).

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3. Reducing Transaction Costs: Reduce the transaction costs related to negotiations by enhancing information access, legal services, and conflict resolution procedures. This may entail building local information hubs, clinics for legal help, and forums for alternative dispute resolution (Adesina & Adekunle, 2019).

4. Compensation Mechanisms: Develop fair and transparent compensation mechanisms to address damages incurred by farmers due to livestock encroachment or crop destruction by herders. The establishment of funds or insurance schemes to provide compensation for losses experienced by affected farmers (Medema, 2019).

5. Monitoring and Enforcement: Implement monitoring systems to ensure compliance with negotiated agreements and prevent violations. To ensure compliance with negotiated agreements and prevent violations, potential measures may include community-based monitoring, the implementation of local enforcement mechanisms, or the active engagement of pertinent government agencies

Results and Discussion

The analysis of secondary data, theoretical frameworks, and case studies reveals that the Coase theorem offers valuable insights for managing the farmer–herder conflict in Nigeria. The study indicates that well-defined property rights and structured negotiation processes can help both farmers and herders arrive at mutually beneficial agreements regarding land use, grazing rights, and compensation for damages.

The payoff matrix derived from non-cooperative game theory demonstrates that cooperation between both parties yields the highest joint benefits represented by the payoff (3,3), where farmers protect their crops while herders graze without causing damage. In contrast, scenarios where one-party defects while the other cooperates lead to asymmetric benefits, generating distrust and heightened conflict. When both defect, the resulting payoff (2,2) reflects a lose–lose situation marked by persistent hostilities, resource degradation, and reduced livelihood security.

These results support the Coase theorem's central premise: when transaction costs are low and property rights are clearly defined, private bargaining can achieve efficient outcomes without direct government intervention (Coase, 1960; Deryugina et al., 2021). In this context, agreements on grazing boundaries, compensation for crop damage, and seasonal migration schedules could reduce conflict intensity.

However, the findings also highlight significant challenges to applying the Coase framework in Nigeria. Weak land tenure systems, ambiguous property rights, high transaction costs, and power asymmetries between farmers and herders undermine the feasibility of voluntary agreements. These constraints often lead to non-cooperative behaviors, as modeled in the game theory analysis, where distrust and lack of enforcement mechanisms push both groups toward mutually detrimental strategies.

Conclusion

The farmer-herder conflict in Nigeria presents a complex challenge rooted in competition for limited resources, cultural tensions, and socio-economic dynamics. This study has explored the applicability of the Coase theorem as a potential framework for managing this conflict, revealing both opportunities and limitations.

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The findings indicate that well-defined property rights, combined with effective negotiation mechanisms, can facilitate mutually beneficial agreements between farmers and herders. By fostering cooperation, both parties can achieve outcomes that enhance resource allocation and minimize conflict. The constructed payoff matrix illustrates that cooperation leads to higher payoffs for both farmers and herders, while defection results in detrimental consequences for both parties.

However, the research also highlights significant barriers to implementing the Coase theorem in Nigeria. These include poorly defined property rights, high transaction costs, and power imbalances that complicate negotiations. Therefore, while the Coase theorem provides valuable insights into the rational behaviors of the actors involved, it must be complemented by broader interventions that address structural issues.

To effectively mitigate the farmer-herder conflict, it is crucial to enhance governance and security of land resources, promote dialogue and trust between conflicting parties, and implement fair compensation mechanisms for damages incurred. Additionally, community-based dispute resolution mechanisms should be strengthened to facilitate ongoing dialogue and cooperation.

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