

Implications of Natural and Artificial Disasters on the Performance of Agricultural Cooperative Society in Ekiti State

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ABSTRACT: The study examined the implications of natural and artificial disasters on the performance of agricultural Cooperative Society in Ekiti State. The specific objectives are to assess the frequency and intensity of natural and artificial disasters experienced, analyze the direct and indirect effects of disasters on the economic and operational performance and identify the coping mechanisms and resilience strategies employed by agricultural cooperative societies to mitigate the impact of disasters. The total number of the population of the study is one thousand four hundred and ninety-one (1,491) that is made up of 32 communities in the 16 Local Government areas in Ekiti State that engages in agricultural activities through cooperative societies. The sample was 315 respondents distributed using stratified sampling techniques. The method of data analysis used was both descriptive like frequency, simple percentage, mean and standard deviation while the inferential statistics used was multiple regression analysis. The result showed that frequency and natural and artificial disasters: frequency of disasters ($p = 0.000 < 0.05$), natural disasters ($p = 0.000 < 0.05$), artificial disasters ($p = 0.015 < 0.05$). Direct and Indirect Effect of disasters on Economic: flooding ($p = 0.003 < 0.05$) and sand and dust storm ($p = 0.000 < 0.05$) and coping mechanism and resilience strategies ($p = 0.000 < 0.05$). the study implied that there is significant effect of natural and artificial disasters on the performance of agricultural Cooperative Society in Ekiti State. The study concluded that Natural and Artificial disaster in whatever form has contributed to low performance of agricultural cooperative societies thereby leading to food shortage which has negatively halt food production with a far-reaching consequence on farmer's agricultural performance thereby leading to shortage of food. Unless coping mechanism and reliance strategy can be adopted as a result of early signal identified, cooperative farmer's performance will continue to diminish without adequate compensation.

KEYWORDS: Natural and artificial disasters, performance of agricultural Cooperative Society frequency of disasters, direct and Indirect of disasters, flooding, sand and dust storm and coping mechanism and resilience strategies.

I. INTRODUCTION

The impacts of identified disaster on the sustainability of agricultural activities of cooperative societies have been experienced globally in whatever season either dry or raining season (Okon, Falana, Solaja, Yakubu, Alabi, Okikiola, Awe, Adesina, Tokula, Kipchumba & Edeme, 2021). These have triggered a wide variety of physical and biological changes across the world with negative effects on agriculture, humans, and the environment (IPCC, 2014). It is important to note that while the vulnerability to these disaster impacts is higher particularly in Africa, the readiness to improve resilience ranks is very low (FAO, 2017). According to Muhammad, Sofia, Muhammad, and Abdul (2022), Agricultural productivity is measured as the ratio of agricultural outputs to inputs while individual products are usually measured by weight, which is known as crop yield, varying products that makes measuring overall agricultural output difficult. Agricultural productivity is seen as an important component of food security and in Nigeria, agriculture employed an estimate of about 70% of her population before the discovery of oil and its subsequent boom, agriculture was the main source of foreign exchange in the country however oil boom reduced this role. Toluwase and Apata (2013) affirmed that the peasant farmers produce over 90% of the food crop grown in Nigeria using traditional method coupled with obsolete farming implements.

Natural and artificial disasters pose significant challenges to agricultural productivity thereby affecting economic growth and causing disruptions to livelihoods, economies, and infrastructure. The agricultural sector heavily rely on natural resources but vulnerable to external shocks as it is particularly susceptible to the adverse impacts on such disasters. Okeleye, Olorunfemi,

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Sogbedji and Aziadekey (2016) identified some of the factors responsible for natural and artificial disaster to include but not limited to indiscriminate dumping of refuse inside the stream, river channels, inside the surface drains, along the road side and dumping of municipal wastes on the flood plain

In Ekiti State, Nigeria, agricultural cooperative societies play a crucial role in supporting farmers, enhancing agricultural productivity, and fostering rural development. However, the performance of these cooperative societies can be severely affected by the occurrence of disasters, hampering their ability to fulfill their vital functions. Natural disasters, such as extreme weather events (e.g. floods, droughts, and storms), pest outbreaks, and disease epidemics, can lead to substantial crop losses, damage to agricultural infrastructure, and disruptions in supply chains (FAO, 2017; Adetunji, Owolabi, & Popoola, 2019). Similarly, artificial disasters, including economic crises and political instability, can create uncertainties in the agricultural market, restrict access to credit and resources, and hinder cooperative operations (Huffman & Just, 2010).

Onugu and Abdulahi (2012) opines that food production in Nigeria is not keeping pace with population growth annually. This has resulted in the upward trend in the price of agricultural commodities thereby creating a wide gap between the demand and supply of agricultural produce no thanks to natural and artificial disaster that has affects farmer's production year in year out. Understanding the implications of disasters on the performance of agricultural cooperative societies is critical for devising effective strategies to mitigate their adverse effects and enhance the resilience of these societies. Amadi and Aleru (2019) opines that agricultural damage incurred through natural and artificial disaster affects rural farmers to go for other livelihood options leaving crop and livestock production given that majority of dwellers are peasant farmer in nature and thus, do not have adequate capacity to survive with the disaster shock at that point of occurrence. Also, Ajoke and Sharafadeen (2021) affirmed that hazards in whatever form exacerbate the already low standard of living in Nigeria making poverty rampant among people. When it occurs, poverty becomes even more entrenched. Though the nature of disaster is a threat to agriculture and non-agricultural socioeconomic development, agricultural production activities are generally more vulnerable to disasters than other sectors. This is because agricultural production in African countries (Nigeria inclusive) is dependent on weather and climate (Okunlola, Oke, Adekunle, & Owolabi, 2018).

1.1. Research Objective

The broad objective of the study examines the implication of Natural and artificial disaster on the performance of agricultural cooperative societies in Nigeria. The specific objectives are to;

- i. assess the frequency and intensity of natural and artificial disasters experienced by agricultural cooperative societies in Ekiti State.
- ii. analyze the direct and indirect effects of disasters on the economic and operational performance of these cooperative societies.
- iii. identify the coping mechanisms and resilience strategies employed by agricultural cooperative societies to mitigate the impact of disasters.

2.0 LITERATURE REVIEW

2.1.0 Agricultural cooperatives and Its Performance in Nigeria

Agricultural cooperative societies are considered as one of the important economic and social organization within the rural communities as they provide farmers with the necessary knowledge, skills and the ability to increase rural participation in the realisation of economic sustainability (Ajayi, 2023). Cooperatives are business enterprises or organizations owned and controlled by the members with the aim of rendering services for the benefit of all members as they are self-reliant, self-controlling and self-sustaining movement (Okoro, Amaechi, Chijioke-Okoro & Eze, 2021). The activities of cooperative business has been adopted within the society as its impact is felt in various sectors of the economy ranging from production to marketing of cooperative services that includes agricultural services. According to Onugu and Abdulahi (2012), Cooperative societies are economic enterprises founded by and belong entirely to the members. These enterprises are created in order to render the best possible service at the lowest possible cost to their members. Cooperatives are the only form of business organization that addresses fully all the economic, democratic, and social dimensions of poverty reduction simultaneously. Especially, an agricultural cooperative is widely considered as a vital foundation that can help smallholder farmers to overcome the constraints that hinder them from taking advantages of their business as it empowers economically weak farmers by enhancing their collective bargaining power and thereby reduces the risks that they face in the market (Ahmed & Mesfin, 2017). Onwuchekwa (1985) defines agricultural cooperatives to be group of farmers who comes together to assist members in rural areas to improve their productive and marketing activities. The study of Ugwu (2006) as cited in Okoro, Amaechi, Chijioke-Okoro, and Eze (2021) went further to affirm that the performance status of any agricultural cooperative society succinctly depends on the knowledge and effective

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application of the principles of agricultural economics in her operations. According to Adefila and Madaki (2014), agricultural cooperative societies do engage in the production, processing, marketing and distribution of agricultural products. An important form of agricultural cooperative in Nigeria is the group farming societies. Members of this society engage in the production of a variety of crops while they also arrange for the marketing of the products.

Agricultural cooperative societies play a crucial role in sustaining the food hub of every communities that transcends to the nation by extension. The importance of agricultural cooperatives becomes vital through the provision of farmer's empowerment that includes farming knowledge and skills, enhancing rural participation, and contributing to economic sustainability. Notably, Agricultural cooperatives, especially, serve as a basis for smallholder farmers, overcoming constraints and empowering them economically through collective bargaining, reducing market risks.

2.1.1 Natural Disasters on Agricultural Cooperative Societies

Yearly, natural disasters affect almost every country worldwide. This type of event is usually unpredictable and affects every facet of human activities. At a macroeconomic level, natural disasters has the capacity to inflict significant damage to the cooperative's assets and disrupt its operations as it hinders agricultural productivity that impact negatively on the livelihoods of the cooperative's members and aggravating food security concerns (Caruso, 2015). According to the study of FAO (2015) within the last decades, natural disasters in developing countries has affected more than 1.9 billion people and caused over US\$494 billion in estimated damage. How much of this damage was on the agriculture sector is unreported and is therefore unknown. When disasters strike, they have a direct impact on the livelihoods and food security of millions on both subsistence and commercial farmers, pastoralists, fishers and forest-dependent communities in developing countries. Natural disaster is a global challenge to agricultural productivity. Agricultural produce in the agricultural sector has faced challenges such as changes in rainfall patterns, droughts, floods, and others. Balasubramanian (2014) identified the types of natural disaster affecting the performance of agricultural cooperative society to include; Earthquake, Volcanic eruption, Tsunami, Tropical cyclone (typhoon, hurricane), Flood, Landslide, and Bushfire (or wildfire).

According to the study of Norouzi and Taslimi (2012), among every form of natural disasters, floods and storms cause the greatest loss and damage in modern society as the level of damage arising from floods and storms only during the last decade has been higher than damage from earthquakes. The damage from earthquakes is less due to the improvement of construction methods and others, but unfortunately, the natural trend of development in some countries, such as Iran, has caused damage to the environment and natural resources, and the damage from floods is in progress. Lattana, Hwa and Dong (2021) opines that floods as a major identity of have severely affected farmers' livelihoods, post-flood food shortages have increased food insecurity, confirming that the growth and development of crops on farmland is affected by floods, floods make it impossible for plants to absorb the nutrients needed for proper growth, floods cause erosion or loss of nutritional status of community crops. The damages of flood include tangible and intangible losses. Tangible losses are classified in direct and indirect losses. Direct tangible losses can include the followings: human damages and losses, flooded houses and residential and industrial places, flooded farms and losing of agriculture productions and animal damages, damages of infrastructure installations such as roads and bridges and power transmission lines and networks of water and gas (Norouzi & Taslimi, 2012). According to Muhammad et al (2022), agriculture is the most affected sector of every nation's economy in terms of natural disasters. It destruct agricultural production that leads to a reduction in crop yield, non-availability of irrigation water, and potential evapotranspiration. The agricultural sector faced approximately 16% of total damage, 31% of total disaster loss, and 23% of total damage and loss in the world. The damage to agricultural production poses serious threats to food security, especially in countries where the majority of smallholders depend upon agriculture for their livelihoods and subsistence. Despite these challenges, agricultural cooperative societies have displayed resilience and implemented coping mechanisms to mitigate the impact of natural disasters. Disaster preparedness measures, such as early warning systems and contingency plans, have been put in place to improve response capacity and reduce disaster-induced losses. Collaborative efforts with government agencies, non-governmental organizations, and extension services have also strengthened disaster resilience through capacity-building programs and knowledge sharing (Nhemachena, Nhamo, Matchaya, Nhemachena, Muchara, Karuaihe & Mpandeli, 2020).

2.1.2 Artificial Disasters on Agricultural Cooperative Societies

Ezihe, Agbugba, Eigege and Etowa (2020) opined that agricultural environment is under constant threat from artificial disasters resulting from expanding population and this remains one of the biggest challenges to the quality of agricultural produce. In every part of Nigeria, burning represents a useful cultural tradition that cannot be done away with but unconsciously causing hindrance to the performance of cooperative farmer's in terms of productivity. Apart from natural disasters, agricultural cooperative societies also face challenges arising from artificial disasters, which can significantly impact their performance and overall functionality. Artificial disasters according to Scott (2007) is a condition that result from a range of policies and deliberate state actions that produce adverse effects on agricultural performance and facilitate the breakdown of social networks and community.

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Examples include farmer/herder crisis, actions of repressive regimes, failure to halt the spread of preventable disease and epidemics, economic sanctions and neo-liberal economic strategies. This can exert detrimental effects on agricultural cooperatives, affecting their financial stability, access to resources, and ability to function effectively as well as contamination spread through air, rains, dust, and water circulations. Barnabas, Jibril, and Abubakar (2021) further stated that artificial disaster may sometimes be intentional (economic or political) or it could be accidental (bush burning, oil spillage, poor sewage disposal) as its effects cannot be underestimated as it causes serious damages to agricultural productivity. Artificial disaster has often left agricultural cooperatives traumatized and vulnerable as a result of loss of assets, housing, and crop harvest further exacerbate their already low food and income security, which may usher them deep into a poverty cycle (Ezihe et al., 2020). Mohamed, Abdul, Tamba, Daniel, Abdul, Chernor and Sahr (2023) claims that accidental artificial disaster has a negative effect on soil conditions for agricultural purposes as it takes much longer to recover this invariably causes the soil to heat up and dry out, destroying the fertility of the land for agricultural processes

2.1.3 Direct and Indirect effects of disasters on the economic and operational performance.

2.1.3.1 Flood

The importance role of agriculture in the survival of human across the globe cannot be overemphasized ranging from the basis of life to the food we eat and the clothes we wear which is a major contribution to the economy. Agriculture serves as the backbone of a nation's economy. Activities ranging from raising livestock to growing crops are incorporated into agriculture (Lattana et al., 2021). The economy of Nigeria depends on natural resource and the agricultural sector of the economy accounts for about 42% of the Gross Domestic Product. Major floods that has occurred in the country in the time past has a significant impact on agricultural productivity that negatively affect the national economic performance of the country. In the past four decades, economic losses as a result of floods disasters have resulted in major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damages during this period (Shehu, 2014). According to Ibrahim, Ndatsu and Yisa (2020), Nigeria in the last few years have experienced severe flooding across the nation destroying properties, farmlands and displacing millions of people from their homes as this threat to lives and property by floods is now becoming an annual event in many urban and rural areas of the country. While flooding is not restricted to Nigeria and Africa alone, Bangladesh is at high risk of flood among the South and Southeast Asian countries. The annual flow of water especially during the wet season is remarkable, which eventually becomes threatening for this low-lying country (Dewan, 2015). Also, Xi, Zhanyan, and Huili (2022) opined that China is part of the country affected by flood as the country suffers from the ravages of extreme flood events and that the accompanying crop damage created by flooding is likely to be greater under future climate conditions. Consequently, the management of agricultural floods is expected to face more challenges.

It's also worth noting that climate change, which has now become a worldwide phenomenon, contributes to flooding by increasing annual rainfall. Flooding is the most common disaster in Nigeria as reported by Adaku (2020). It was also confirmed that majority of Nigeria's states are increasingly suffering from annual flooding during the rainy seasons caused by increased (Ajoke & Sharafadeen, 2021)

2.1.3.2 Sand and Dust Storm

Sand and dust storms are a natural disaster that affect large areas of continents and can even produce impacts across continents. There are impacts on human health, agricultural production and the economies of countries. Sand and dust storms are related to soil erosion and land degradation. One of the most direct impacts is the loss of crop and livestock (Stefanski & Sivakumar, 2009). Dust storms often occurring in the semi-arid regions of the world and their occurrence history going back to 70 million years ago are capable of carrying massive amounts of particulate matters with a concentration of particles (Tahereh, Mariyeh, Fatemeh & Mohana, 2017).

The essential prerequisite for sand and dust transport are sandy and dusty particles under dry and loose condition of dry surface as well as wind strong enough to mobilise these particles by deflation from the surface and to transport them (Opp, Michael, Hamidreza & Mansour, 2021). Sand and dust storms often demolish critical agricultural assets and infrastructure, distort production cycles, trade flows, and livelihoods generation. The impacts of Sand and dust storm threaten global food security and cause additional disruptions throughout food value chains, particularly in communities where agriculture and food production account for a large share of income, employment, and food security, and nutrition (Ahmadzai, Malhotra & Tutundjian, 2023). From a socio-economic perspective, the negative externalities of sand and dust storms encompass floods, temperature changes, soil erosion, heavy rains, and pollution. These undesired factors result in crop losses, reduced employment opportunities, decreased livestock activity, and heightened poverty and unemployment rates (Ahmadi, Zamani, Mirzaei & Azad, 2024).

The severity of the damage caused by sand and dust storm to agriculture is of considerable importance, these storms have different effects on agriculture among them reducing the performance of agriculture, garden and livestock products, spreading plant pests and diseases and consequently, reduction of agricultural production up to 5-30% can be noted (Tahereh et al., 2017).

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Also, Ahmadi et al., (2024) affirmed that sand and dust storm damage crops, deplete soil fertility, and pose cardio-vascular health risks. In general, it can be argued that the dust storm affects the livelihoods of pastoralists by contaminating the vegetation and water required for livestock and spreading livestock diseases. Fatemeh, Masoumeh, Masoud and Abdolazim (2020) affirmed that sand and dust storms, therefore, may endanger achieving sustainability in the countries heavily dependent on the agricultural sector. Under these conditions, agriculture can only survive when farmers identify useful and adaptive strategies and apply them to the face of dust particles.

2.1.3.3 Farmer/Herders Conflict

Conflict is an interaction between two groups who are of different extractions that could be in tribal, ethnic, linguistic, religious, socio-economic, political form in which the involved participants engage in constant opposing actions and use coercive behaviour to destroy, injure, thwart, or otherwise control their opponents. Herdsmen-crop farmer's conflict is, therefore, the interaction between the Fulani herders and farmers in which they engage in mutually opposing actions and use coercive behavior to destroy, injure, and even kill their opponents creates artificial disaster that negatively halt food production with a far reaching consequences (Dennis & Fidelis, 2022). Factors attributed to violent confrontation between farmers and herders in Nigeria as submitted by Adisa, Famakinwa, Adeloye and Adigun (2022) include water scarcity, desertification, porous national borders, crop damage, farmland destruction, indiscriminate bush burning, and politicization of issues among others. If conflict between farmers and herders is not effectively managed, it can degenerate into violent and destructive clashes, and become counter productive which could threaten national security and integration

The herders and farmers clash, often termed an artificial disaster, refers to the conflicts arising between nomadic pastoralists and sedentary agriculturalists over land and resources. These clashes are primarily driven by competition for grazing land, water sources, and crop fields. As herders move their livestock in search of pastures, they sometimes encroach on farmers' lands, leading to destruction of crops and violent confrontations. Okoro (2018) averred that herdsmen-farmer or harder-farmer conflicts are conflicts occurring between peasant farmers or subsistence cultivators and nomadic or transhumant livestock keepers. The frequent conflicts between Fulani herdsmen and the farmers came into existence as a result of encroachment of farmlands by the Fulani herders. It is on record that many Nigerians lost their lives, properties/farm lands or crops every year to Fulani herders. This however resulted to scarcity of food production and high cost of living as well (Olowo, 2021). This conflict severely impacts agricultural cooperative performance. The destruction of crops by cows of herders has a negative implication on food production that leads to food insecurity and economic hardship farmer's cooperative.

The creation of this artificial disaster allows of food and nutrition security concerns persist in many low-income countries. Several reasons attributing to Farmer-Herder conflicts includes changing climatic conditions, unfavorable land zoning, and national agricultural policies affecting herders, conflicting national and state government policies leading to diverted use of grazing land and reallocation of water resources away from grazing land to farming (Amaka, Wanglin, Nazmun & Alan, 2022).

2.1.3.4 Bush Burning

Fire hazard has contributed largely to the destruction of valuable resources (man-made and natural) globally. Yearly, billions of dollar worth of properties has been ravaged and lost to fire outbreak (Alo, Adelana & Ayeni, 2022). In recent time, the rate at which farm fire through bush burning ravages agricultural land use is alarming and calls for the attention of land managers coupled with environmentalists to quickly rise up to the occasion in other to address the menace in due course. Bush burning is the indiscriminate setting ablaze of the vegetation cover and the burning down of grassland and forest resources by fire. To the peasant farmer, it is the cheapest means of clearing farmlands. To the nomad, it is the easiest way to clearing garbage to allow for early sprouting of fodder for the animals, the hunters say, it is a technique for hunting games (Ezihe et al., 2020).

However, the negative impacts of fire can be brought on by human activity that is natural, intentional, unintentional, or careless, and they can have terrible effects on agriculture, the environment, and human livelihood. Unrestrained and careless bush burning has become a yearly occurrence throughout the dry seasons in Africa (Mohamed et al., 2023). Bush burning, whether as a result of wildfire or a controlled burning affects not only the appearance of the landscape but the quality of the soil. The landscape may quickly recover after a fire with fresh new growth and emerging seedlings but on the part of bush burning, it has a negative effect on soil conditions and soil may take much longer to recover (Barnabas et al., 2021). Bush burning are considered as destructive factor in most forest ecosystems of tropical and temperate climates. The rates of nutrient loss that affects the agricultural produce from bush burning are among the highest of any fire and sustaining site fertility depends on a detailed understanding of the nutrient fluxes and losses that accompany such bush burning (Alhaji & Abdullahi, 2021).

2.1.4 Coping Mechanisms Strategies

During the post-disaster phases, households and communities tend to sell their own assets such as land and animals, or generate cash through migration, and so on, as part of solving their immediate predicaments. It is stark clear that the combination

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of high level of disaster variability, poor infrastructure and a range of other problems associated with known disaster will constitute important challenges for African countries and Nigeria in particular (Okunlola, et al., 2018).

Kayode, Ayorinde, Abiodun, Abigail and Adedayo (2020) identified the coping strategies adopted by agricultural cooperative societies against disaster includes; praying to god/gods against any form of disaster, early planting and harvesting of agricultural produce and also as cooperatives, farming in groups as an advantage as it encourages forms of farming activities that includes crop rotation, shifting cultivation or mixed farming.

Padhan and Madheswaran (2023) likewise, emphasise the importance of constant education to cooperative societies in disaster preparedness as it is crucial to guide against the possibility of future occurrence. Constant education enables agricultural cooperative societies to recover faster in the post-disaster phase. Improved access to farm storage facilities, provision of technological equipment and financial assistance for agricultural facilities, equipment, agribusiness and house construction and repair (Abner, 2021).

Ajoke and Sharafadeen (2021) itemize coping strategies that can be adopted to guide against flooding to include; filling of bags with sand that is the most commonly used strategy by farmers, early planting of crops to avoid flooding which mostly occur due to excessive rainfall and agricultural insurance of farms. Several coping measures against sand and dust form climate change in their different farms ranging from planting of shades and shelters, increased water conservation methods, planting of different crops on the same farmland, increasing their farm size, observing certain agroforestry practices and choosing different planting dates when the conditions are not favorable (Okunlola et al., 2018). Adisa et al., (2022) identified early harvest of farm crops would prevent the loss of crops to cattle herders, seeking help from relatives and friends to ameliorate the effects of conflict was the only support seeking coping strategy often utilised by crop farmers and most importantly religious belief that prayers play an important role in conflict resolution between farmers and herders.

3.0. METHODOLOGY

3.1 Research Design

The study used a descriptive survey research design. This is because descriptive research design provides opportunity for organized description of facts and characteristics of the respondent. The design was considered appropriate for the study because survey is concerned with describing, recording, analyzing and reporting conditions that exist or existed.

3.2 Area of the Study

The study was carried out in Ekiti State, Nigeria. Ekiti State is one of the six States in South-West geopolitical zones of Nigeria. The States in the South West geopolitical zone consists of Lagos, Ogun, Oyo, Ondo, Osun and Ekiti. The cooperative nature of the Ekiti people is observed in every household and community in the state.

3.3 Population and Sample Size

The total number of the population of the study is one thousand four hundred and ninety-one (1,491) that is made up of 32 communities in the 16 Local Government areas in Ekiti State that engages in agricultural activities through cooperative societies.

$$\frac{\frac{N}{1 + N(e)^2}}{1 + 1491(0.05)^2} = 315$$

Table 3.2: Sample Size

S/N	Local Government	Cooperative Societies	Number of Questionnaires
1	Ado	140	$\frac{(315)(140)}{1491} = 30$
2	Efon	150	$\frac{(315)(150)}{1491} = 32$
3	Emure	79	$\frac{(315)(79)}{1491} = 17$
4	Ekiti East	76	$\frac{(315)(76)}{1491} = 16$

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5	Ekiti South West	103	$\frac{(315)(103)}{1491} = 22$
6	Ekiti West	80	$\frac{(315)(80)}{1491} = 17$
7	Ido-Osi	126	$\frac{(315)(126)}{1491} = 27$
8	Irepodun/Ifelodun	103	$\frac{(315)(103)}{1491} = 22$
9	Ikere	109	$\frac{(315)(109)}{1491} = 23$
10	Oye	31	$\frac{(315)(31)}{1491} = 7$
11	Ijero	120	$\frac{(315)(120)}{1491} = 25$
12	Ilejemeje	52	$\frac{(315)(52)}{1491} = 11$
13	Ise Orun	59	$\frac{(315)(59)}{1491} = 12$
14	Ikole	54	$\frac{(315)(54)}{1491} = 11$
15	Ayekire (Gboyin)	152	$\frac{(315)(152)}{1491} = 32$
16	Moba	57	$\frac{(315)(57)}{1491} = 12$
	Total		315

3.9 Model Specification

The modified functional and linear regression models of this study is stated below:

$$PAC = f(\text{FNAD}, \text{DID}, \text{CMR}) \dots \dots \dots (1)$$

$$PAC = f(\text{ND}, \text{AD}) \dots \dots \dots (2)$$

$$PAC = \alpha_0 + \alpha_1 \text{FD} + \alpha_2 \text{ND} + \alpha_3 \text{AD} + U \dots \dots \dots (3)$$

$$PAC = f(\text{FLD}, \text{SDS}, \text{FHC}, \text{BB}) \dots \dots \dots (4)$$

$$PAC = \alpha_0 + \alpha_1 \text{FLD} + \alpha_2 \text{SD} + \alpha_3 \text{FHC} + \alpha_4 \text{BB} + U \dots \dots \dots (5)$$

$$PAC = \alpha_0 + \alpha_1 \text{CMR} + U \dots \dots \dots (6)$$

Where:

FD = frequency of disasters; ND = natural disasters; AD = Artificial Disasters

PAC = Performance of Agricultural Cooperative society; FLD = Flooding

SDS = Sand and Dust Storm; FHC= Farmer Herder Clash; BB= Bush Burning

DID = $f(\text{FLD}, \text{SDS})$; CMR = Coping Mechanism and Resilience Strategies

α_0 = Intercept

$\alpha_1 - \alpha_4$ = Coefficient of independent variables

U = Error term

4.0 RESULT AND DISCUSSIONS

4.1 Demographic Distribution

The gender distribution of respondents reveals that one hundred and fifty-nine (67.4%) of the respondents are male respondents while seventy-seven (32.6%) of the respondents are female respondents. Age distribution of respondents indicates that one hundred and seven (45.3%) of the respondents are ages between 18-24years, one hundred and thirteen (47.9%) of the respondents are ages between 25-30years, sixteen (6.8%) of the respondents are ages between 31-35years which implies that

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more youth are involved in agriculture in Ekiti state. Educational qualification of respondents indicates that one hundred and eighty (76.3%) of the respondents are without formal education qualification, thirty-six (15.3%) of the respondents are primary education, three (1.3%) of the respondents' secondary school graduates while seventeen (7.2%) of the respondents are tertiary school qualification. Occupation of the respondents reveals that one hundred and forty-three (60.6%) of the respondents are civil servant while ninety-three (39.4%) of the respondents are farmers. Years of Membership of the respondents shows that ninety-three (39.4%) of the respondents have spent between 1-3years, one hundred and four (44.1%) of the respondents have spent between 4-6years in farming business, fourteen (5.9%) of the respondents have been in the business seven years while twenty-five (10.6%) of the respondents have been in the business of farming for above 10years.

4.2 Hypotheses Testing

4.2.1 Frequency and Intensity of Natural and Artificial Disasters and Performance of Agricultural Cooperative society

To test this hypothesis, the respondents' scores on two variables of frequency and natural and artificial disasters and performance of Agricultural Cooperative society were computed and subjected to multiple regression analysis. From Table 4.2.1, the R (correlation Coefficient) gives a positive value of 0.865; this indicates that there is a very strong and positive relationship between frequency and natural and artificial disasters and performance of Agricultural Cooperative society in Ekiti State. The R² is a portion of the total variation in the dependent variable that is explained by the variation in the independent variables. From the results obtained, R² is equal to 0.747, this implies that frequency and natural and artificial disasters brought about 74.7% variance in performance of Agricultural Cooperative society in Ekiti State, this is further proven by the adjusted R² that shows the goodness of fit of the model which gives a value of 0.744, implying that when all errors are corrected and adjustments are made, the model can only account for 74.4% by frequency and natural and artificial disasters; while the remaining 25.6% are explained by the error term in the model as shown in Table 4.2.1.

The unstandardized beta co-efficient of frequency of disasters is 0.458 with $t = 7.737$ and ($p = 0.000 < 0.05$). These results showed that frequency of disasters has a positive relationship with performance of Agricultural Cooperative society. This suggests that natural disasters have caused considerable damage to the cooperative's assets and disrupted its operations. They adversely affect farmers' livelihoods and the nation's food security. Cultural traditions have inadvertently impeded the productivity of cooperative farmers. The deliberate (economic or political) consequences of artificial disasters inflict severe harm on agricultural productivity, while the unintentional (bush burning, oil spillage) effects of artificial disasters also result in significant damage to agricultural productivity.

The unstandardized beta co-efficient of natural disasters is 0.487 with $t = 8.195$ and ($p = 0.000 < 0.05$). These results showed that natural disasters have a positive relationship with performance of Agricultural Cooperative society. This suggests that natural disasters affected your agriculture production and productivity.

The unstandardized beta co-efficient of artificial disasters is -0.148 with $t = -2.462$ and ($p = 0.015 < 0.05$). These results showed that artificial disasters have a negative relationship with performance of Agricultural Cooperative society. This suggests that fake disasters affected your access to resources and support services (e.g., credit, government assistance).

Table 4.2.1: Frequency and Intensity of Natural and Artificial Disasters and Performance of Agricultural Cooperative society

Variable	Coeff.	Std. Error	t-value	Sig.
Constant	0.756	0.061	12.443	0.000
Frequency of disasters	0.458	0.059	7.737	0.000
Natural Disasters	0.487	0.059	8.195	0.000
Artificial disasters	-0.148	0.060	-2.462	0.015
R	0.865			
R Square	0.747			
Adj. R Square	0.744			
F Stat.	228.800(0.000)			

Dependent variable: Performance of Agricultural Cooperative society

4.2.2 Direct and Indirect Effect of disasters on Economic and Operational Performance of Agricultural Cooperative society

To test this hypothesis, the respondents' scores on two variables of direct and indirect disasters (flooding, sand and dust storm, farmer/herders conflict and bush burning) and Performance of Agricultural Cooperative society were computed and subjected to multiple regression analysis. From Table 4.2.2, the R (correlation Coefficient) gives a positive value of 0.875; this indicates that there is a strong and positive relationship between direct and indirect disasters and Performance of Agricultural Cooperative

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society in Ekiti State. The R^2 is a portion of the total variation in the dependent variable that is explained by the variation in the independent variables. From the results obtained, R^2 is equal to 0.766, this implies that direct and indirect disasters brought about 76.6% variance in Performance of Agricultural Cooperative society in Ekiti State, this is further proven by the adjusted R^2 that shows the goodness of fit of the model which gives a value of 0.762, implying that when all errors are corrected and adjustments are made, the model can only account for 76.2% by direct and indirect disasters; while the remaining 23.8% are explained by the error term in the model as shown in Table 4.2.2

The unstandardized beta co-efficient of flooding is 0.153 with $t = 3.012$ and ($p = 0.003 < 0.05$). These results showed that flooding has a positive relationship with Performance of Agricultural Cooperative society. This implies that the flood adversely impacts cooperative agricultural productivity, and farmers' failure to anticipate climate change further affects this productivity.

The unstandardized beta co-efficient of sand and dust storm is 0.670 with $t = 11.931$ and ($p = 0.000 < 0.05$). These results showed that sand and dust storm have a positive relationship with Performance of Agricultural Cooperative society. This implies that the destruction of agricultural assets by sand and dust storms disrupts the agricultural product lifecycle, hence jeopardizing agricultural sustainability through cooperation due to the impact of sand and dust.

The unstandardized beta co-efficient of farmers/herders conflict is 0.002 with $t = -0.125$ and ($p = 0.970 > 0.05$). These results showed that farmers/herders conflict have a negative relationship with Performance of Agricultural Cooperative society. This implies that the conflict between farmers and herders has negatively halt food production with a far-reaching consequence and has always been on the basis of competition for grazing land, water sources, and crop fields which has reduced farmer's agricultural performance thereby leading to shortage of food.

The unstandardized beta co-efficient of bush burning is -0.089 is 0.153 with $t = -1.713$ and ($p = 0.088 > 0.05$). These results showed that bush burning conflict have a negative relationship with Performance of Agricultural Cooperative society. This implies that bush burning process destroys fertility of the soil for agricultural productivity and lack of education allow farmers adopt bush burning as a means of land clearing for agricultural use.

Table 4.2.2: Direct and indirect disasters and Performance of Agricultural Cooperative society

Variable	Coeff.	Std. Error	t-value	Sig.
Constant	0.620	0.061	10.139	0.000
Flooding	0.153	0.051	3.012	0.003
Sand and Dust storm	0.670	0.056	11.931	0.000
Farmer/Herders conflict	0.002	0.055	-0.125	0.970
Bush burning	-0.089	0.052	-1.713	0.088
R	0.875			
R Square	0.766			
Adj. R Square	0.762			
F Stat.	188.739(0.000)			

Dependent variable: Performance of Agricultural Cooperative society

4.2.3 Coping Mechanism and Resilience Strategies and Performance of Agricultural Cooperative society

To test this hypothesis, the respondents' scores on two variables of Coping Mechanism and Resilience Strategies and Performance of Agricultural Cooperative society were computed and subjected to simple regression analysis. From Table 4.2.3, the R (correlation Coefficient) gives a positive value of 0.813; this indicates that there is a strong and positive relationship between Coping Mechanism and Resilience Strategies and Performance of Agricultural Cooperative society. The R^2 is a portion of the total variation in the dependent variable that is explained by the variation in the independent variables. From the results obtained, R^2 is equal to 0.661, this implies that Coping Mechanism and Resilience Strategies brought about 66.1% variance in performance of Agricultural cooperative society, this is further proven by the adjusted R^2 that shows the goodness of fit of the model which gives a value of 0.659, implying that when all errors are corrected and adjustments are made, the model can only account for 65.9% by coping mechanism and resilience strategies; while the remaining 34.1% are explained by the error term in the model as shown in Table 4.2.3.

The unstandardized beta co-efficient of coping mechanism and resilience strategies is 0.675 with $t = 21.340$ and ($p = 0.000 < 0.05$). These results showed that coping mechanism and resilience strategies has a positive relationship with performance of Agricultural cooperative society. This implies that participate in income-generating endeavors beyond agriculture to diversify

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revenue streams and assess the efficacy of early warning systems and disaster preparedness strategies in alleviating the effects of disasters on your agricultural operations.

Table 4.2.3: Coping Mechanism and Resilience Strategies and Performance of Agricultural Cooperative society

Variable	Coeff.	Std. Error	t-value	Sig.
Constant	1.034	0.059	17.579	0.000
Coping Mechanism and Resilience Strategies	0.675	0.032	21.340	0.000
R	0.813			
R Square	0.661			
Adj. R Square	0.659			
F Stat.	455.415(0.000)			

Dependent variable: Performance of Agricultural Cooperative society

4.6 Discussion of Findings

Objective One

The Table 4.2.1 discussion in objective one, and by F-Stat. 228.800 p-value $0.000 < .05$, it showed that the null hypothesis, frequency and intensity of natural and artificial disasters does not significantly affect performance of agricultural cooperative is not true therefore, the null hypothesis is rejected. Based on this, we accepted the alternative hypothesis frequency and intensity of natural and artificial disasters have effect on performance of agricultural cooperative. The findings on frequency and intensity of natural and artificial disasters experienced by agricultural cooperative societies in Ekiti state aligns with the assertions of Lattana, Hwa, and Dong (2021) and Muhammad et al., (2022) that agriculture is the most affected sector of every nation's economy in terms of natural disasters and that it significantly impact farmers' livelihoods. Post-flood food shortages exacerbate food insecurity, corroborating that crop growth and development on agricultural land are adversely affected. The findings also affirmed the assertion of (Ezihe et al., 2020) and Mohamed et al., (2023) that artificial disaster has often left agricultural cooperatives traumatized and vulnerable as a result of loss of assets, housing, and crop harvest as it takes much longer to recover this invariably causes the soil to heat up and dry out, destroying the fertility of the land for agricultural processes.

Objective Two

The Table 4.2.2 discussion in objective two, and by F-Stat. 188.739, p-value $0.000 < .05$, it showed that the null hypothesis, direct and indirect disasters does not significantly affect performance of agricultural cooperative society is not true therefore, the null hypothesis is rejected. Based on this, we accepted the alternative hypothesis that direct and indirect disasters have effect on performance of agricultural cooperative society. The findings on direct and indirect effects of disasters on the economic and operational performance aligns with the study of Adaku (2020), Ibrahim et al., (2020) and Xi et al., (2022) who affirmed that flooding is the most common disaster in Nigeria that destroys properties, farmlands and displacing millions of people from their homes, China inclusive the threat is becoming an annual with the resultant agricultural devastation expected to intensify under future climatic circumstances. Also, the finding of objective two is in line with the assertion of Ahmadzai et al., (2023) that Sand and dust storm threaten global food security and cause additional disruptions throughout food value chains, particularly in communities where agriculture and food production account for a large share of income, employment, and food security, and nutrition.

Also, the findings of this study affirmed the research work of Okoro (2018) and Olowo (2021) who argued that Farmer/Herders conflict birthed scarcity of food production and high cost of living and that clashes are primarily driven by competition for grazing land, water sources, and crop fields. On direct and indirect effect of disaster on economic and operational performance, the findings of the research align with the study of Alhaji and Abdullahi (2021) and Mohamed et al., (2023) that bush burning are considered as destructive factor and unrestrained and careless bush burning has become a yearly occurrence throughout the dry seasons and has a negative implication on soil fertility that affects farm produce.

Objective Three

The Table 4.2.3 discussion in objective three, and by F-Stat. 455.415, p-value $0.000 < .05$, it showed that the null hypothesis, coping mechanism and resilience strategies does not significantly affect performance of agricultural cooperative society is not true therefore, the null hypothesis is rejected. Based on this, we accepted the alternative hypothesis that coping mechanism and resilience strategies have effect on performance of agricultural cooperative society. The study corroborates the findings of Adisa et al. (2022), which indicate that early harvesting of agricultural produce can mitigate crop losses to cattle herders. Additionally,

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seeking assistance from relatives and friends is the predominant coping strategy employed by crop farmers to alleviate the impacts of conflict. Notably, the belief in the efficacy of prayer in resolving disputes between farmers and herders is also emphasized. Padhan and Madheswaran (2023) similarly underscore the significance of ongoing education for cooperative societies in disaster preparedness, as it is essential to mitigate the risk of future occurrences.

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The study concluded that Natural and Artificial disaster in whatever form has contributed to low performance of agricultural cooperative societies thereby leading to food shortage which has negatively halt food production with a far-reaching consequence on farmer's agricultural performance thereby leading to shortage of food. Unless coping mechanism and reliance strategy can be adopted as a result of early signal identified, cooperative farmer's performance will continue to diminish without adequate compensation

5.2 Recommendation

The study recommended the following based on the finding's outcome:

- i. Cooperatives are recognised as the most effective means for engaging with the grassroots and should offer comprehensive support to victims. The government's rehabilitation and assistance services for victims are disseminated more effectively via the cooperative.
- ii. Flood insurance expertise and prediction: this will encompass details on early alerts. It is essential to furnish flood victims with vital information and education regarding flood disasters, insurance (for crops, livestock, land, and properties), and the process of acquiring it. Enhanced cooperation extension services and education can facilitate this objective.
- iii. Interventions via community-based organisations, such as agricultural cooperatives, may serve as an effective framework for reaching the most vulnerable and impoverished households confronting an increasingly volatile and unpredictable future.

The research employed primary data to evaluate the adaptation and coping mechanisms, as well as agricultural drought resilience, specifically for smallholder livestock farming households.

REFERENCES

- 1) Abner, L. (2021). Rural Cooperatives in Disaster Risk Reduction and Management: Contributions and Challenges. *Disaster Prevention and Management: An International Journal*. <https://www.emerald.com/insight/0965-3562.htm>
- 2) Adaku, J. E. (2020). The impact of flooding on Nigeria's sustainable development goals (SDGs). *Ecosystem Health and Sustainability*, 6(1), 1-13.
- 3) Adefila, J., & Madaki, J. (2014). Roles of Farmers' Cooperatives in Agricultural Development in Sabuwa Local Government Area of Katsina State, Nigeria. *Journal of Economics and Sustainable Development*, 5(12), 80-87.
- 4) Adetunji, M. O., Owolabi, O. U., & Popoola, T. O. S. (2019). Impact of floods on agricultural production and livelihood in Southwestern Nigeria. *GeoJournal of Tourism and Geosites*, 24(3), 827-836.
- 5) Adisa, B. O., Famakinwa, M., Adeloye, K. A., & Adigun, A. O. (2022). Crop Farmers' Coping Strategies for Mitigating Conflicts with Cattle Herders: Evidence from Osun State, Nigeria. *Journal of Agricultural Tropica Et Subtropica*, 55(5), 191–201.
- 6) Ahmed, M. H., & Mesfin, H. M. (2017). The Impact of Agricultural Cooperatives Membership on the Wellbeing of Smallholder Farmers: Empirical Evidence from Eastern Ethiopia. *Journal of Agricultural and Food Economics*, 5(6), 1-20.
- 7) Ahmadi, F., Zamani, O., Mirzaei, H., & Azad, H. (2024). Exploring the Impact of Dust Storms on Pastoralists' Livelihoods in West Iran: Social, Economic, and Environmental Consequences. *Environmental Quality Management*, 33(4), 821-833.
- 8) Ahmadzai, H., Malhotra, A., & Tutundjian, S. (2023) Assessing the Impact of Sand and Dust Storm on Agriculture: Empirical Evidence from Mongolia. *PLOS ONE*, 18(2), 1-8. e0269271. <https://doi.org/10.1371/journal.pone.0269271>
- 9) Ajayi, I. E. (2023). Challenges and opportunities of agricultural cooperative societies on economic sustainability of rural dwellers in Ekiti State, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*, 41(11), 168-178.
- 10) Ajoke, O. K., & Sharafadeen, A. A. (2021). Use of Coping Strategies for Flooding among Arable Crop Farmers in Edu Local Government area of Kwara State. *Journal of Agricultural Economics, Extension and Rural Development*, 4(1), 51-62.
- 11) Alo, M. O., Adelana, J. O., & Ayeni, F. O. (2022). Impacts of Fire Incidence on Agricultural Land-Use in Ekiti State, Nigeria. *International Journal of Advances in Engineering and Management (IJAEM)*, 4(9), 429-431.
- 12) Alhaji, M. C., & Abdullahi, B. A. (2021). A Review of the Impact of Bush Burning on the Environment: Potential Effects on Soil Chemical Attributes. *International Journal of Science and Environment*, 1(1), 101-121.

Implications of Natural and Artificial Disasters on the Performance of Agricultural Cooperative Society in Ekiti State

- 13) Amadi, N. S., & Aleru, P. D. (2019). Effect of flood on agricultural production among peasant farmers in Ahoda West Local Government in River State. *Global Scientific Journal* 7(12) 1068-1078.
- 14) Amaka, N., Wanglin, M., Nazmun, R., & Alan, R. (2022). Farmer-herder conflicts and food insecurity: Evidence from rural Nigeria. *Agricultural and Resource Economics Review*, (2022)51, 391–421.
- 15) Balasubramanian, A. (2014). Types of Disaster. Unpublished Paper: Centre for Advanced Studies in Earth Science University of Mysore, 1-10.
- 16) Barnabas, B., Jibril, S. A., & Abubakar, N. B. (2021). Perceived Effects of Bush Burning on Arable Crop Production in Bauchi Local Government Area of Bauchi State, Nigeria. *African Scholar Journal of Agriculture and Agricultural Tech*, 20(1), 12-24.
- 17) Caruso, G. D. (2015). The legacy of natural disasters: The intergenerational impact of 100 years of natural disasters in Latin America. JEL classifications: D31, I00, J13., 1-54.
- 18) Dennis, T. N. & Fidelis, I. I. (2022). The Impact of the Herdsmen-Crop Farmers Conflict on the Productivity of Yam Farmers in Logo Local Government Area of Benue State. *Journal of Management and Contemporary Studies* 191-202
- 19) Dewan, T.H. 2015. Societal Effects and Vulnerability to Floods in Bangladesh and Nepal. *Weather Climate Extremes*. 7: 36-42
- 20) Ezihe, J. A. C., Agbugba, I. K., 3Eigege, S. & Etowa, E. B. (2020). Effect of Bush Burning on Farming Households in Markurdi Local Government Area of Benue State, Nigeria. *The International Journal of Agriculture, Management and Technology*, 4(1), 51-56.
- 21) Fatemeh T., Masoumeh F., Masoud Y., & Abdolazim A. (2020). How Farmers Perceive the Impact of Dust Phenomenon on Agricultural Production Activities: A Q-methodology study. *Journal of Arid Environments*, 173(1), 1-13.
- 22) FAO (2015). The Impact of Natural Hazard and Disasters on Agriculture and Food Nutrition Security: A Call for Action to Build Resilient Livelihoods. Food and Agriculture Organisation of the United Nation 1-16.
- 23) FAO. (2017). Social capital, collective action, and agricultural cooperatives: A study of farmer-led institutions in Malawi. Food and Agriculture Organization of the United Nations.
- 24) Huffman, W. E., & Just, R. E. (2010). The economic organization of agriculture. Cambridge University Press.
- 25) Ibrahim, M., Ndatsu, J. A., & Yisa, K. M. (2020). Effects of Flood on Crop Farmers in Riverine area in Niger State Nigeria. *ATBU Journal of Science, Technology and Education* 8(2) 1-12.
- 26) Kayode, S. O., Ayorinde, K., Abiodun, A., Abigail, A., & Adedayo, O. (2020). Assessment of Crop Farmers Coping Strategies to Pastoralism/Nomad Activities in Nigeria. *Journal of Open Agriculture*, 5(1), 219–226.
- 27) Lattana, S., Hwa, S. H., & Dong, H. S. (2021). The Impact of Flood Damage on Farmers, Agricultural Sector and Food Security in Laos: A Regional Case Study of Champhone District, Savannaket Province, 16(2), 151-170.
- 28) Mohamed, F. M., Abdul, S. B., Tamba, D. M., Daniel, R. G., Abdul, F. T., Chernor, A. U. B., & Sahr, L. S. (2023). The Effects of Bushfires on Farming Industry among Small-Scale Farmers in Kori Chiefdom, Moyamba District, Sierra Leone. *International Journal of Agricultural Economics*, 8(6), 279-293.
- 29) Muhammad, T. I. K., Sofia, A., Muhammad, R. Y., & Abdul, M. N. (2022). The Impact of Natural Disasters and Climate Change on Agriculture: An Empirical Analysis. *Journal of Economic Impact* 4(1), 28-38.
- 30) Nhemachena, C., Nhamo, L., Matchaya, G., Nhemachena, C. R., Muchara, B., Karuaihe, S. T. & Mpandeli, S. (2020). Climate Change Impacts on Water and Agriculture Sectors in Southern Africa: Threats and Opportunities for Sustainable Development. *Water* 2020(12), 1-17 doi:10.3390/w12102673
- 31) Norouzi, G. & Taslimi, M. (2012). The Impact of Flood Damages on Production of Iran's Agricultural Sector. *Middle-East Journal of Scientific Research*, 12(7), 921-926.
- 32) Okeleye, S. O., Olorunfemi, F. B., Sogbedji, J. M., & Aziadekey, M. (2016). Impact Assessment of Flood Disaster on livelihood of Farmers in Selected Farming Communities in Oke-Ogun Region of Oyo State, Nigeria. *International Journal of Scientific & Engineering Research*, 7(8), 2067-2083.
- 33) Okon, E. M., Falana, B. M., Solaja, S. O., Alabi, O. O., Okikiola, B. T., Awe, T. E., Adesina, B. T., Tokula, B. E., Kipchumba, A. K., & Edeme, A. B. (2021). Systematic Review of Climate Change Impact Research in Nigeria: implication for sustainable development. *Journal of Heliyon*, 7(1), 1-21.
- 34) Okoro, J. P. (2018). Herdsmen-Farmers' Conflicts: Implication on National Development (Nigeria in Perspective). Paper Presented at the 1st International Conference of Social Sciences (ICOSS'2018) held at National Open University of Nigeria. 25th June, 2018.
- 35) Okoro, C. N., Amaechi, E. C. C., Chijioke-Okoro, C. G., & Eze, C. G. (2021). Impact of Agricultural Cooperatives on Food Production among Fadama User Groups in Ugwunagbo Local Government Area, Abia State, Nigeria. *Direct Research Journal of Management and Strategic Studies*, 2, 35-41.

Implications of Natural and Artificial Disasters on the Performance of Agricultural Cooperative Society in Ekiti State

- 36) Okunlola, J. O., Oke, D. O., Adekunle, V. A. J., & Owolabi, K. E. (2018). Effects of Climate Change and Coping Strategies among Crop Farmers in South West, Nigeria. *Journal of Agroforest System*, 1(1), 1-11.
 - 37) Olowo, O. O. (2021). Socio-Cultural Effects of Fulani Herdsmen Attack on Farmers Productivity in Akure North Local Government Area of Ondo State, Nigeria *Social Science Education Journal* 5(1) 122-127.
 - 38) Onugu, C. U., & Abdulahi, T. O. (2012). The Performance of Agricultural Cooperative Societies under the National Programme on Food Security in Enugu State, Nigeria. *Review of Public Administration and Management* 1(2), 42-60.
 - 39) Onwuchekwa, C. I. (1985). *Agricultural cooperatives and the problem of transition*. Sweden, University of Stockholm.
 - 40) Opp, C., Michael, G. I, Hamidreza, A., & Mansour, A. F. (2021). Causes and Effects of Sand and Dust Storms: What Has Past Research Taught Us? A Survey. *Journal of Risk and Financial Management*, 14(326), 1-25.
 - 41) Padhan, N., & Madheswaran, S. (2023). Effectiveness of Post-Disaster Coping Strategies among the Farming Households in the Coastal Districts of Odisha, India. *Natural Hazards Research*, 3(2023), 66-75.
 - 42) Scott, H. (2007). Man-made disaster and development: The case of Iraq. *International Social Work* 50(3): 295–306.
 - 43) Shehu, A. S. (2014). The Effect of Vulnerability to Flood on Profitability of Farming Households in Kwara State, Nigeria. *Journal of Sustainable Development in Africa* 16(7) 131-141.
 - 44) Stefanski, R., & Sivakumar, M. V. K. (2009). Impacts of Sand and Dust Storms on Agriculture and Potential Agricultural Applications of a SDSWS. *IOP Conference Series: Earth and Environmental Science*.
 - 45) Tahereh, M., Mariyeh, S., Fatemeh, S., & Mohana, S. (2017). Impact of Dust Storm on Agricultural Production in Iran. *International Journal of Agricultural Science, Research and Technology in Extension and Education Systems*, 7(1), 19-26.
 - 46) Toluwase, S. O. W., & Apata, O. M. (2013). Impact of Farmers' Cooperative on Agricultural Productivity in Ekiti State, Nigeria. *Greener Journal of Agricultural Sciences*, 3(1), 063-067.
- Xi W., Zhanyan, & Huili, C. (2022). Investigating Flood Impact on Crop Production under a Comprehensive and Spatially Explicit Risk Evaluation Framework. *Journal of Agriculture*, 12(4) 1-7.



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