# Attitude and Culture of Farmers to Agroforestry Practices as an Adaptive Practice to Climate Variability in Southeast Nigeria

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## ABSTRACT

Spreading knowledge and creating a welcoming social atmosphere are essential components of developing an agroforestry culture that encourages farmers to try new techniques. Cultural views occasionally make it difficult to embrace agroforestry practices. This study explores the attitudes and cultural perspectives of farmers towards agroforestry practices as an adaptive strategy for climate variability. Primary data was collected from 350 registered farmers. Descriptive statistics such as mean scores and inferential statistics such as Pearson product-moment correlation were employed for data analysis. The attitude of farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability with the highest mean score was that farmers are confident with the help and support received from agriculture extension will be beneficial to their agroforestry practices (M = 4.04).The cultural factor that affects farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability was that government programmes and initiatives will assist in fostering the use of technology in agroforestry techniques and coping with climate variability while respecting regional cultural values (M = 4.07). The correlation analysis reveals a significant relationship between farmers' attitudes and their agroforestry practices. The study recommends nurturing and strengthening these attitudes, such as their ability to withstand climate fluctuations.

**Keywords:** Attitude, Culture, Agroforestry practices

## INTRODUCTION

In the Southeast Nigeria, there is significant transformations in the agricultural landscape as a result of climate variability. Incorporating agroforestry by integrating trees into agricultural systems to enhance resilience and sustainability. The successful implementation of agroforestry practices based not only on their technology but also on the perceptions of the farmers (Akter et al.,2022). Farmers' perceptions of the new agricultural practices are greatly influenced by their experiences with them. Effective adoption of agroforestry methods in the context of climate unpredictability requires an understanding of agroforestry methods, how they feel about incorporating trees into their agricultural practices and how they communicate to get pertinent information (Quandt et. al 2023). Furthermore, promoting adoption requires raising knowledge of the advantages of agroforestry techniques. It is important for farmers to understand how these practices may boost crop yield, improve soil health, reduce the risk of climate-related events like floods and droughts and protect biodiversity.

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Spreading knowledge and creating a welcoming social atmosphere are essential components of developing an agroforestry culture that encourages farmers to try out novel techniques. In the Southeast Nigeria, where agroforestry adoption is closely linked to cultural traditions, it is critical to comprehend the cultural aspects of this practices to guarantee acceptability and sustainability, the integration of trees into farming systems must be in line with regional traditions and practices (Uwaga,Nzegbule & Egu, 2022). Furthermore, farmers perspectives on climate change and their readiness to adapt through agroforestry may be influenced by cultural practices and beliefs.

Extension agents in the Ministry of Agriculture whose duties are to transfer technology agroforestry practices that play a crucial role in mitigating climate variability and creating resilient agricultural systems. They achieve it through training, developing farmer-centric extension materials and coordinating small plot adaptive techniques and field days, and providing some technical support, teamwork, and networking. In the perfect scenario, farmers may boost agricultural production, increase climate resilience, and support sustainable development. Despite the enormous benefits associated with its adoption of climate variability technology practices, getting farmers to adopt and practise climate-friendly farming technologies may prove difficult given the complexity of the socioeconomic, political, cultural, and ecological environment of West Africa and the ongoing development of the concept of climate friendly agriculture technology (Wakweya,2023).

The current practice of agroforestry has several weaknesses that limit its adoption and success. Lack of awareness and understanding of the advantages of agroforestry and may not be familiar with its concepts and methods. This can lead to inadequate design and implementation of Agroforestry systems (Zaca, et al.,2023). Overgrazing and deforestation are examples of unsustainable land management techniques that can deteriorate the soil and limit the benefits that the agroforestry system can offer. Many farmers lack the means to set up and sustain agroforestry systems such as access to land, water, and funding (Adekunle, et al., 2019). Farmers' attitudes towards the adoption and adaptation of agroforestry practices have been studied in various studies. Agroforestry is frequently perceived by farmers as a high-cost, low-profit endeavour. Farmers' inability to access markets and financial resources is a significant obstacle to the adoption of agroforestry practices (Kimaro et al., 2010).

Agroforestry is not always compatible with Nigerian farmer's conventional farming methods, which makes them less likely to adopt the practice (Ekpe and Ukpong, 2015). Cultural views may occasionally make it difficult to embrace agroforestry practices. For instance, trees have a significant cultural significance and are frequently connected to spiritual practices and beliefs in various regions of Africa. Farmers may find it challenging as a result to clear land or alter their land management practices (Vinodhini et al.2023). In other instances, farmers may be resistant to change because traditional agriculture methods and agroforestry techniques conflict. Addressing these vulnerability factors through consideration of the agroforestry practices may reduce the impact of climate change on communities. It is noteworthy that planned adaptation is an unavoidable approach in supporting agroforestry practices to provide the facilities needed to reduce the vulnerabilities of communities.

The broad objective of this study is to access the respondents' attitude, level toward agroforestry practices as an adaptive practice to climate variability in the study area; the specific objectives are to

1.Identify the agroforestry practices available in the study area

2 access the respondents culture level toward agroforestry practices as an adaptive practice to climate variability, access the respondents Attitude level toward agroforestry practices as an adaptive practice to climate variability,

The following null hypotheses guided the study:

1. There is no significant difference in Culture level across the three States
2. There is no significant difference in Attitude level across the three States.

# METHODOLOGY

South Eastern Nigeria is one of the geo political Zones in Nigeria with a distinguishing quality. The region accounts for 3.2 percent of the Nigerian geographical area. It is also the geopolitical zone with the 95% homogeneous population of the Igbo- speaking people. The Zone is known as Ala-Igbo(Igbo Country) and the resident is called Ndi Igbo who have affinity for culture and language across the five State. The area has high humidity and hot temperatures which make the weather pleasant at times but also tropical. The South east is part of the rainforest zone and is located between the latitudes 040 15N and 40N and longitudes 05050 and 9030E(Ifeanyi-Obi,2013). The Ndi-Igbo population estimate to I6.381 million people (NPC, 2006) accounting for 11.7 % of the national population. In the economic sector the region although having one of the most appealing Agricultural potentials with abundant oil for food and cash crops as well as all year agricultural events, has a very high rate of unemployment rate of about 20% which surpasses the national average of 13%(National Bureau of Statistics,2016).The main occupations of the people is farming and trading. The study population consists of farmers in the three selected state in the South-Eastern zone, Nigeria. We did a multistage random sampling procedure from three states out of five (5) states in the South-Eastern Nigeria.

The study population consists of farmers in the three selected state in the South-Eastern zone, Nigeria. We did a multistage random sampling procedure from three states out of five (5) states in the South-Eastern Nigeria. A sample size of 350 registered farmers were selected through a multi-stage sampling procedure from 2850 registered farmers from the selected communities from the Ministry of Agriculture. The first stage deal with purposive sampling of two local government areas because of the prevalence of climate change impact. (Ebonyi, Izzi, Abombaise, Mbaitoli, Ikwuano, Umuahia North) from the selected three (3) states (Ebonyi, Imo Abia) respectively in the Southeast Nigeria. The stage two deal with simple random sampling for the selection of two (2) rural communities (Ishieke , Nkaleke, Iboko, Igbeagu, Amazu, Mbutu, Afara, Umunoha, Umudike, Umuahia, Old Umuahia, Ubakala) from each local government area. Stage three deal with proportionate sampling techniques for the selection of the 350 registered farmers who participated in the Agroforestry practices training from each community. According to Yamene (1967) in Glenn(1992)

The total population for South Eastern Nigeria who participated in the training was 20,000 and for the selected communities in the three three states 2,850. Then the sample size was calculated below

$$n = \frac{N}{1+ N (e)2}$$

N = The Final Population

e = Level of Significance

1 = Unity or Constant

Substituting the value from the formula

$$n = \frac{2,850}{1+2,850(0.05)2}$$ = The sample size =350

**The Population and Sample size of the Respondents**

| State | Local Govt. Area | Rural Communities | Population of the Farmers | Percentage Obtained from the population (%5) | Sample Size |
|---|---|---|---|---|---|
| Ebonyi | Ebonyi | Ishieke | 300 | 15 | 30 |
| | | Nkaleke | 350 | 17.5 | 36 |
| | Izzi | Iboko | 220 | 11 | 27 |
| | | Igbeagu | 200 | 10 | 25 |
| Imo | AboMbaise | Amuzu | 280 | 14 | 32 |

| | | | | | |
|---|---|---|---|---|---|
| | | Mbutu | 230 | 11.5 | 27 |
| | Mbaitoli | Umunoha | 150 | 7.5 | 28 |
| | | Afara | 180 | 9 | 24 |
| Abia | Ikwuano | Umudike | 300 | 15 | 29 |
| | | Umuariaga | 250 | 12.5 | 37 |
| | Umuahia North | Old Umuahia | 150 | 7.5 | 28 |
| | | Ubakala | 240 | 12 | 27 |
| | **Total** | | **2,850** | | **350** |

Source: Glenn (1992)

These percentages reflect the proportion of each community's population that was included in the sample.

Primary data was used for the study. Data for this study was collected using quantitative method. The major instrument of data collection was structured questionnaire. Objective one was measured using a multiple responses to collect different respondents opinion on the types of types of agroforestry adaptation practices, involvement parties, types of inputsand types of climate variability impact where the frequency of the responses was used to determine the large category of the responses that helps to make our decision. Objective two and three collected using Likert type scale to fine the average mean responses of the respondants on their attitude and culture toward agroforestry practices where the critical decision rule of 3.0 was taken and any decision above the critical decision rule was regarded as positive response while below the critical decision rule was regarded as negative responses. The hypotheses one and two was analysed using anova. Anova test was used to show the difference between two or more means or components through significance tests. F= MST/ MSE

Objective one was analysed using multiple response, Objective two and three collected using Likert type scale. The hypotheses one and two was analysed using anova.

| **Variable** | **Category** | **Frequency** | **Percentage** |
|---|---|---|---|
| *Type of agroforestry adaptation practices | Plantain/Banana Production | 254 | 15.6 |
| | Gnetum Africana (Okazi) | 251 | 15.4 |
| | Snail Rearing | 247 | 15.2 |
| | Mushroom Production | 172 | 10.6 |
| | Bee Keeping | 163 | 10.0 |
| | Vetiver Grass Production | 141 | 8.7 |
| | Grass Cutter Domestication | 119 | 7.3 |
| | Fish Farming | 116 | 7.1 |
| | Black Soldier Fly Production | 165 | 10.1 |
| | **Total** | **1628** | **100** |
| *Involvement parties in technology transfer of agroforestry practices | Ministry of Agriculture stakeholders | 182 | 17.2 |
| | Research officers | 102 | 9.6 |
| | Extension agents | 156 | 14.7 |
| | Opinion leaders | 185 | 17.5 |
| | Women leader | 152 | 14.4 |
| | Registered farmers under Ministry of Agriculture | 121 | 11.4 |
| | General farmers | 160 | 15.1 |
| | **Total** | **1058** | **100** |
| *Type of aid/inputs/training relating to agroforestry practices | Financial and policy support | 145 | 10.9 |
| | Training and knowledge transfer | 223 | 16.8 |
| | Seeds and seedlings | 164 | 12.4 |
| | Agroforestry design and planning | 204 | 15.4 |
| | Pest and disease control | 151 | 11.4 |

| | | | |
|---|---|---|---|
| | Water management control | 138 | 10.4 |
| | Soil amendment | 139 | 10.5 |
| | Agroforestry tools and equipment | 162 | 12.2 |
| | **Total** | **1326** | **100** |
| *Type of climate variability in the area | Erratic rainfall patterns | 124 | 9.6 |
| | Increased frequency of drought | 161 | 12.5 |
| | Land degradation | 240 | 18.6 |
| | Rising temperature | 174 | 13.5 |
| | Flooding and land erosion | 189 | 14.6 |
| | Desertification and land degradation | 220 | 17.0 |
| | Increase frequency of extreme events such as storms, hailstorms, and thunderstorms | 185 | 14.3 |
| | **Total** | **1293** | **100** |

| | | | | |
|---|---|---|---|---|
| | | | | |
| | Desertification and land degradation | 220 | 17.0 | |
| | Increase frequency of extreme events such as storms, hailstorms, and thunderstorms | 185 | 14.3 | |
| | **Total** | **1293** | **100** | |

**Source: Field survey data, 2024 *Multiple responses recorded**

**Type of Farm Ownership for the Respondents**

The ownership of farm land status of the respondents ranges from rented farm lands to government farm land. Table above revealed that the largest category of the respondents based on the multiple responses recorded from the total sampled respondents 223 (22.3%) own their farm land through inheritance. These findings indicate that a majority of farmers in the study area operate on self-owned farm land. This has positive implications for their investment as it eliminates the cost of renting land, allowing for more funds to be allocated to other areas of investment. The study also reveals that the traditional land tenure system, which involves land ownership through inheritance, is still prevalent in the study area. However, while land ownership through inheritance facilitates the use of farm land as collateral for agricultural loans, it can also be a deterrent for commercial farmers who do not possess large inherited farm land. This can impact the level of investment and production capacity of agroforestry farmers in the study area. Moreover, land ownership through inheritance has implications for agricultural productivity and agroforestry practices. The fragmentation of land ownership due to inheritance also contributes to limited arable land and resource pressure, which hinders agricultural intensification and access to modern inputs (Adesida et al., 2021). Fragmented land tenure systems can also impede the adoption and success of agroforestry practices. Vihi et al. (2019) identified land tenure rights, including inheritance, as a major constraint to the adoption of agroforestry practices by farmers. Farmers who acquire land through inheritance are less likely to embrace agroforestry practices compared to those who acquire land through other means (Oyebamiji, 2022). This indicates that the lack of secure land tenure rights associated with inherited land may hinder farmers' willingness to adopt agroforestry practices. Therefore, addressing land tenure issues and providing farmers with secure land rights are crucial for promoting the adoption of agroforestry practices in southeast Nigeria.

**Crop Production Practices of the Respondents**

The crop production practices of the respondents range from land clearing for crop planting to marketing of crops. The largest category of the respondents based on the multiple responses recorded from the total sampled respondents 267 (10.6%) engages in crop sowing. These findings suggest that the majority of farmers in the study area are involved in various crop production practices such as sowing, applying fertilizers, marketing, postharvest practices, applying herbicides, crop processing, harvesting, thinning, and applying insecticides, while only a few respondents engage in practices such as weeding, land tillage, and land clearing.

Implementing various agricultural practices in crop production will enhance the technical efficiency of farmers. Moreover, the selection of agricultural practices can significantly impact the productivity and profitability of the farmers. Therefore, farmers in the southeastern region of Nigeria are employing diverse methods to improve crop production and mitigate the consequences of climate change. This discovery is consistent with the findings of Opata et al. (2022) and Igberi et al. (2022), who suggested that crop production practices employed by farmers in southeastern Nigeria encompass crop rotation, intercropping, utilization of high-quality seeds and planting materials, and minimal usage of agrochemicals. The objective of these practices is to augment their yield and adapt to the ever-changing climate conditions in the area. This observation is also congruent with the findings of Nwonu et al. (2022) and Igberi et al. (2022), who observed that farmers in southeastern Nigeria employ assorted crop production practices such as land clearance, land cultivation, sowing, application of fertilizers, application of herbicides, application of insecticides, crop processing, harvesting, thinning, weeding, marketing of agricultural products, and other postharvest techniques aimed at improving soil fertility, increasing crop output, and mitigating the consequences of climate change.

**Horticultural/Fruit and Vegetable Production Practices of the Respondents**

The horticultural/fruit and vegetable production practices of the respondents range from seedlings preparation to marketing of fruits and vegetables. Multiple responses were recorded and the result shows that the largest category of the respondents sampled 258 (9.7%) practiced mulching. This suggests that a larger proportion of farmers in the study area practice mulching and various other horticultural practices for fruit and vegetable production. The knowledge and experience of these farmers in horticultural fruit and vegetable cultivation practices will increase the adoption of agroforestry practices. This discovery aligns with the research conducted by Oyewole et al. (2022) who argued that farmers who possess access to agricultural knowledge through trainings, extension contact, and on-farm trial demonstrations are more inclined to embrace agroforestry practices. This discovery also aligns with the studies conducted by Uzoechi et al. (2022), Owoeye and Toluwase (2020), and Otiwa et al. (2023) who observed that involvement in horticultural practices contributes to sustainable food production, enhancement of livelihoods, and adaptation to climate change.

**Type of agroforestry adaptation practices of the Respondents**

The type of agroforestry adaptation practices of the respondents ranges from plantain and banana production to black soldier fly production. Multiple responses were recorded and the result shows that the largest category of the respondents sampled 254 (15.6%) adapt plantain/banana production. This suggests that farmers in the area are primarily adopting agroforestry practices that are less financially demanding. The involvement of farmers in various agroforestry adaptation practices in the study area is a vital aspect of adapting to climate change and addressing the challenges of food security. This finding is consistent with the findings of Ahmad et al. (2023), who argued that the adoption of agroforestry practices by farmers leads to increased agricultural sustainability, livelihood opportunities, ecological benefits, and household food security. This finding also aligns with the research of other scholars, including Okonkwo, Gbadebo, and Salaudeen (2022), who asserted that agroforestry adaptation practices contribute to improved soil fertility, enhanced local climate conditions, and reduced human impacts on natural forests, as well as the work of Otiwa et al. (2023), who added that the adaptation of agroforestry practices by farmers helps address food insecurity by combining tree cultivation with crop production, thereby reducing the risk of crop failure during adverse conditions such as drought and other natural disasters. More so, this finding aligns with the findings of Ben-Chendo et al. (2022) who noted that the adoption of agroforestry practices leads to increased income generation, the production of food crops, and the generation of non-timber forest products for farmers. Additionally, this finding aligns with the findings of Falana et al. (2022) who highlighted that agroforestry adaptation practices contribute to soil erosion control and stabilization, thus creating a stable environment.

**Involvement Parties in Technology Transfer of Agroforestry Practices**

The involvement of various parties in the technology transfer of agroforestry practices in the study area ranges from stakeholders of the ministry of agriculture to general farmers. Numerous responses were collected, and the findings reveal that the largest group of respondents, accounting for 185 (17.5%), indicated that opinion leaders are predominantly involved in the technology transfer of agroforestry practices in the study area. This

suggests that multiple parties are engaged in the technology transfer of agroforestry practices in the study area, but opinion leaders are predominantly involved. This collaboration among various parties has the potential to contribute to the transformation of the food system in the southeastern region, ensuring the achievement of both mitigation and adaptation objectives. This discovery aligns with the findings of Ben-Chendo et al. (2022), who posit that the involvement of multiple parties in the transfer of agroforestry practices and technologies facilitates the dissemination of knowledge and skills to rural farmers, thereby enabling their adoption and implementation of agroforestry strategies. Opinion leaders exhibit a higher degree of involvement in the transfer of agroforestry practices in southeast Nigeria due to their significant influence on farmers' decision-making processes and behaviors. Social networks play a critical role in instigating change within agricultural and food systems, and opinion leaders, who occupy central positions within these networks, are recognized as key agents of change (Zhang et al., 2020). This discovery suggests that the traditional selection of perceived opinion leaders as model farmers may be the most effective approach to achieving sustainable and equitable change at a large scale in agriculture within the southeastern region of Nigeria. However, this finding contrasts with the research conducted by Matous (2023), who argues that opinion leaders with high social centrality are not necessarily more effective in promoting agroforestry initiatives within their communities. These findings indicate that relying solely on perceived opinion leaders may not be the most effective strategy for promoting agricultural practices. Instead, engaging with farmers who possess strong connections and similarities within their communities may prove to be more successful in driving change and disseminating information about agroforestry innovations.

**Type of aid/inputs/training relating to agroforestry practices**

The type of aid, inputs, and training relating to agroforestry practices received by the respondents ranges from agroforestry tools and equipment to financial and policy. Multiple responses were recorded and the result shows that the largest category of the respondents sampled 223 (16.8%) received training and knowledge transfer on agroforestry practices. The respondents in the study area had access to various aids, inputs, and training related to agroforestry practices. Most of them received training and knowledge transfers in agroforestry practices. Access to trainings, knowledge transfer, and other types of aid, inputs, and training related to agroforestry practices will help develop proficiency in applying the received trainings and using the received inputs. This will have a positive impact on farmers' performance in agroforestry practices in the study area. Therefore, it is crucial for extension agents and other stakeholders in agriculture to intensify efforts in providing farmers with adequate aid, inputs, and training on agroforestry practices and their benefits. This will improve farmers' attitudes and increase adoption rates. This finding is consistent with the findings of Olugbenga and Safugha (2023) who argued that the availability of improved seeds, fertilizers, and agroforestry tree seedlings is essential for increased productivity and profitability in agroforestry farming. Additionally, this finding is supported by the findings of Owombo et al. (2023) who suggested that government support in the form of credit facilities and extension officers can facilitate easy access to agroforestry production technologies and provide necessary training and capacity building for farmers. The provision of credit facilities and improved seeds has been recommended to enhance farmers' adoption of agroforestry practices (Osadolor and Alele, 2023). Furthermore, this finding is supported by Oyewole et al. (2022) who argued that access to training, capacity building, and the employment of extension officers can address the constraints faced by agroforestry farmers and promote the adoption of agroforestry technologies.

**Type of climate variability in the study area**

The types of climate variability witnessed by the respondents in the study area ranges from erratic rainfall patterns to increase frequency of extreme events such as storms, hailstorms, and thunderstorms. Multiple responses were also recorded here and the result shows that the largest category of the respondents sampled 240 (18.6%) reported that land degradation occurs in the study area due to climate variability. These findings indicate that farmers in the study area face various consequences of climate variability, with land degradation being particularly detrimental to their agricultural endeavors. As a result, this may stimulate an interest in agroforestry practices among farmers as a means to mitigate the impacts of climate variability in the area. This finding is consistent with the finding made by Tidy et al (2022), who assert that the majority of farmers perceive a decline in crop yield and a decrease in income derived from crop yield as the primary consequences

of climate variability. Furthermore, this finding is also in line with the research conducted by Ojo et al. (2022), whose study uncovered that land degradation tends to diminish the productivity of farmers in Nigeria. Additionally, this finding supports the work of Mba et al (2022), who posited that climate variability poses a significant challenge to food production in southeastern Nigeria, particularly with regards to rice cultivation. Lastly, this finding concurs with the findings of Chukwujekwu et al (2022), who observed that climate variability has negative impacts on the yield of horticultural crops in Anambra State in southeastern Nigeria, and acknowledged agroforestry as a sustainable practice that simultaneously achieves both mitigation and adaptation objectives, while enhancing the well-being of farmers in rural communities.

**Attitude towards Agroforestry Practices to Adapt under Climate Variability**

The result of the data analysis of the attitude of the respondents towards agroforestry practices to adapt to climate variability is presented in Table 1 and was measured using ten (10) items. Evidence on the total average mean responses from respondents regarding attitude of the respondents towards agroforestry practices to adapt to climate variability in the research area, as shown in Table 1, revealed that the responses of the respondents on the attitude of farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability with the highest mean score was that farmers are confident with the help and support received from agriculture extension will be beneficial to their agroforestry practices (M = 4.04; S.D. = 1.11), whereas the responses of the respondents on the attitude of farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability with the least mean score was that farmers in Southeast Nigeria do respect the agriculture extension workers that help them and their community in agroforestry practices and climate variability adaptation (M = 3.32; S.D. = 1.10).

The result shows that all the mean responses of the respondents to each of the ten (10) items that measure respondents' attitude towards agroforestry practices to adapt to climate variability in the study area were higher than the critical decision rule of 3.00. The average of the mean responses of the respondents to their attitude towards agroforestry practices to adapt to climate variability was 3.79, with a standard deviation of 1.11. The observed value exceeds the critical decision rule of 3.00, indicating that the farmers exhibit a favourable disposition towards agroforestry practices in order to adapt to climate variability. Consequently, the investigation has established that farmers in southeast Nigeria hold the belief that embracing agroforestry practices is advantageous for preparing for climatic variability. They opine that the transfer of technology by extension workers can enhance their agroforestry practices and aid in coping with climate change.

Additionally, they possess confidence in their ability to implement agroforestry practices to adapt to climate variability using the available technologies. Moreover, they express confidence in the assistance and support received from agricultural extension services, as it proves beneficial to their agroforestry practices. Furthermore, they firmly believe that the adoption of agroforestry methods and the transfer of climate variability adaptation technologies or practices will have a positive impact on their farms. They also display interest in participating in training courses or seminars specifically focused on agroforestry practices and climate change adaptation. The overall mean responses of the respondents to attitude, and culture towards agroforestry practices to adapt to climate variability are 3.67 with a standard deviation of 1.18. This implies that the respondents are well-informed, possess a positive disposition, comprehend the significance positive attitude and grasp the role played by culture in relation to agroforestry practices as a means of adaptation to climate variability within southeast Nigeria.

The summary of respondents' level of attitude towards agroforestry practices to adapt to climate variability is presented in Table 2 below. The mean score was categorized into 3 decision rules (low: 1.10–2.33, moderate: 2.34–3.67, and high: 3.68–5.00) for level of attitude of farmers towards agroforestry practices to adapt to climate variability. The difference in the mean score was obtained by dividing the mean rating score of 5.00 into 3 categories. (clarity to the classification of the level of responses of the respondents has been earlier provided).

**Table 1: Attitude of the respondents towards agroforestry practices to adapt to climate variability**

| S/N | Statement | 1 | 2 | 3 | 4 | 5 | Mean | S.D. |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (Percentage) | | | | | | |
| 1. | I believe that adopting agroforestry practices are good to preparing for climatic variability. | 25 (7.1) | 18 (5.1) | 46 (13.1) | 184 (52.6) | 77 (22) | 3.77 | 1.07 |
| 2. | I think that transferring technology by extension workers can improve my agroforestry practices and assist me in coping with climate change. | 24 (6.9) | 14 (4.0) | 21 (6.0) | 227 (64.9) | 64 (18.3) | 3.84 | 1 |
| 3. | I am confident in implementing agroforestry practices to adapt the climate variability using the available technologies. | 24 (6.9) | 44 (12.6) | 29 (8.3) | 167 (47.7) | 86 (24.6) | 3.71 | 1.17 |
| 4. | I am confident with the help and support received from agriculture extension will be beneficial to my agroforestry practices. | 23 (6.6) | 14 (4.0) | 29 (8.3) | 144 (41.1) | 140 (40) | 4.04 | 1.11 |
| 5. | I believe that agricultural methods in agroforestry and climate variability adaptation technology or practices transferred to me will give good impact on my farm. | 28 (8.0) | 18 (5.1) | 60 (17.1) | 144 (41.1) | 100 (28.6) | 3.77 | 1.16 |
| 6. | I have high anticipation of using technology for agroforestry practices and coping with climatic variability. | 29 (8.3) | 17 (4.9) | 23 (6.6) | 162 (46.3) | 119 (34) | 3.93 | 1.16 |
| 7. | I think it is important to keep up with the most recent technological developments of agroforestry to adapt the climatic variability. | 21 (6.0) | 23 (6.6) | 31 (8.9) | 169 (48.3) | 106 (30.3) | 3.90 | 1.09 |
| 8. | I am interested in taking part in training courses or seminars that are expressly geared towards agroforestry practices and climate change adaptation. | 23 (6.6) | 52 (14.9) | 17 (4.9) | 161 (46.0) | 97 (27.7) | 3.73 | 1.2 |
| 9. | I am likely to seek information or guidance from other farmers or experts in the field when considering the adoption of new technologies or practices. | 23 (6.6) | 16 (4.6) | 31 (8.9) | 201 (57.4) | 79 (22.6) | 3.85 | 1.03 |
| 10. | I do respect the agriculture extension workers that help me and community in agroforestry practices and climate variability adaptation. | 34 (9.7) | 54 (15.4) | 46 (13.1) | 198 (56.6) | 18 (5.1) | 3.32 | 1.10 |
| **Total Average Mean** | | | | | | | **3.79** | **1.11** |

Source:FieldSurveyData,2024

Note: Scale 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree, S.D. = Standard deviation.

**Culture towards Agroforestry Practices to Adapt under Climate Variability**

The result of the data analysis of the culture of the respondents towards agroforestry practices to adapt to climate variability is presented in Table 2. Cultural level of the respondents was measured using ten (10) items. Evidence on the total average mean responses from respondents regarding culture of the respondents towards agroforestry practices to adapt to climate variability in the research area, as shown in Table 3, revealed that the

most cultural factor that affects farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability was that government programmes and initiatives will assist in fostering the use of technology in agroforestry techniques and coping with climate variability while respecting regional cultural values (M = 4.07; S.D. = 1.05), whereas the least cultural factor that affects farmers in Southeast Nigeria towards agroforestry practices to adapt to climate variability was that culture prevents the farmers from using all the agroforestry land as a grazing area, which is their means of adapting to climate variability (M = 3.26; S.D. = 1.22).

It was also observed that the mean ratings for all ten (10) items assessing the culture of the respondents towards agroforestry practices to adapt to climate variability in the study area were higher than the critical threshold of 3.00. The total average mean for culture of the respondents towards agroforestry practices to adapt to climate variability was 3.57, with a standard deviation of 1.22, indicating that all the listed cultural factors in Table 3 were ways in which the respondents culture influenced their agroforestry practices to adapt to climate variability in the research area. Consequently, the research concludes that the local farmers' culture facilitates the adoption of technology transfer for the dissemination of agroforestry techniques and adjustment to climate change. Moreover, this culture influences long-term investments in agroforestry, such as tree cultivation, which is based on communal rights and aids in climate adaptation.

Cultural and legal aspects related to agroforestry land use prohibit community members from cutting down trees, as this action is intended to mitigate the effects of climate change. The cultural norms prevent farmers from utilising all agroforestry land as grazing areas, which serves as their means of adapting to climate variability. Gender-specific cultural roles in farming, including cultivation and harvesting of agroforestry trees, aid in decision-making processes related to climate variability adaptation. In addition, culture restricts women's access to agroforestry fuelwood for household use due to increasing population density, thereby facilitating adaptation to climate variability. Gender-specific cultural roles in farming, including cultivation and harvesting of agroforestry trees, aid in decision-making processes related to climate variability adaptation. In addition, culture restricts women's access to agroforestry fuelwood for household use due to increasing population density, thereby facilitating adaptation to climate variability. Cultural norms have resulted in women and children in farming families typically gaining ownership of agroforestry land as a resilience measure against climate fluctuations. Cultural factors play a significant role in determining the selection and preservation of trees with social or spiritual significance in agroforestry settings, ultimately influencing their contribution to climate change mitigation. The incorporation of cultural practices in the study areas into technology transfer initiatives for agroforestry practices and climate adaptation is recommended. Furthermore, government programmes and initiatives should support the use of technology for agroforestry techniques and coping with climate variability, while also respecting regional cultural values.

The summary of respondents' level of culture towards agroforestry practices to adapt to climate variability is presented in Table 4 below. The mean score was categorised into 3 decision rules (low: 1.10–2.33, moderate: 2.34–3.67, and high: 3.68–5.00) for level of culture of farmers towards agroforestry practices to adapt to climate variability. The difference in the mean score was obtained by dividing the mean rating score of 5.00 into 3 categories. For clarity purpose there are four runs between the rating scale of 1 through 5 and dividing these 4 runs by 3 gave an interval value of 1.33, as such adding 1+1.33 gives 2.33 which is the boundary of the first category and adding 1.33 to 2.33 gives 3.67 which is that boundary of the second category and adding 1.33 to 3.67 gives 5 which is the boundary of the category.

The result of this study on the cultural aspects of farmers in Southeast Nigeria with regards to their adoption of agroforestry practices under climate variability are congruent with the study conducted by Wienhold and Goulao (2023). These researchers indicate that farmers' embrace of agroforestry practices is influenced by their cultural embeddedness, social relations, historical memory, and formal and informal institutions. It is worth noting that farmers' perception of agroforestry and their decision to either implement or remove it are influenced by these factors, as well as their practical capabilities. The findings of this study also align with the work conducted by Enoch and Francis (2022), which reveals that socio-cultural factors, such as social and cultural conditions, local culture and wisdom, and social and cultural norms, have an impact on women's engagement in agroforestry. Similarly, the findings of this study are in line with the observations made by

Falkowski and Stewart (2021), who assert that the local culture and inherited wisdom of farmers influence their land management practices, encompassing plant maintenance, harvesting, and breeding activities.

Gonçalves et al. (2021) found that culture does influence agroforestry practices as indigenous agroforestry is fundamental to indigenous culture, strengthening spiritual practices and the relationship with nature and this gives support to the finding of this study. These findings underscore the significance of comprehending the specific needs, interests, and traditions of various populations when formulating agricultural interventions and policies that promote agroforestry. All in all, culture plays a pivotal role in shaping agroforestry practices and necessitates consideration for the achievement of sustainable and effective implementation.

**Table 3: Culture of the respondents towards agroforestry practices to adapt to climate variability**

| S/N | Statement | 1 | 2 | 3 | 4 | 5 | Mean | S.D. |
|---|---|---|---|---|---|---|---|---|
| | | Frequency (Percentage) | | | | | | |
| 1. | The culture of local farmers helps embracing technology transfer to spread agroforestry techniques and adjust to climate change. | 36 (10.3) | 28 (8) | 42 (12) | 107 (30.6) | 137 (39.1) | 3.80 | 1.31 |
| 2. | The culture of the farmers affects the long-term investment on agroforestry such as growing trees where tenure is based on communal rights to help in climate variability adaptation. | 47 (13.4) | 25 (7.1) | 75 (21.4) | 160 (45.7) | 43 (12.3) | 3.36 | 1.2 |
| 3. | The culture and law relating to agroforestry land use forbids the community members from cutting down trees which are intended to reduce the effects of climate change. | 60 (17.1) | 25 (7.1) | 35 (10) | 161 (46) | 69 (19.7) | 3.44 | 1.35 |
| 4. | The culture prevents the farmers from using all the agroforestry land as a grazing area which is their means of adapting to climate variability. | 43 (12.3) | 65 (18.6) | 32 (9.1) | 178 (50.9) | 32 (9.1) | 3.26 | 1.22 |
| 5. | The cultural roles that male and female farmers hold in cultivating, and harvesting agroforestry trees help them in the decisions to adapt to climatic variability. | 50 (14.3) | 29 (8.3) | 46 (13.1) | 191 (54.6) | 34 (9.7) | 3.37 | 1.21 |
| 6. | The culture prevents the women in accessing agroforestry fuelwood for household use due to growing population density there by adapting to climate variability. | 43 (12.3) | 55 (15.7) | 37 (10.6) | 127 (36.3) | 88 (25.1) | 3.46 | 1.34 |
| 7. | In line with cultural norms, women and children in farming families have typically gained ownership of agroforestry land as a resilience measure against climate fluctuations. | 45 (12.9) | 17 (4.9) | 38 (10.9) | 175 (50) | 75 (21.4) | 3.62 | 1.24 |
| 8. | Cultural factors play a significant role in determining the selection and preservation of trees in agroforestry settings with social or spiritual significance, ultimately influencing their contribution to mitigating climate | 31 (8.9) | 24 (6.9) | 39 (11.1) | 164 (46.9) | 92 (26.3) | 3.75 | 1.18 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | change. | | | | | | | |
| 9. | Cultural practices in my areas should be incorporated into technology transfer initiatives for agroforestry practices and climate variability adaptation. | 34 (9.7) | 13 (3.7) | 59 (16.9) | 194 (55.4) | 50 (14.3) | 3.61 | 1.09 |
| 10. | The government programs and initiatives will assist in fostering the use of technology to agroforestry techniques and coping with climate variability while respecting regional cultural values. | 23 (6.6) | 5 (1.4) | 28 (8) | 163 (46.6) | 131 (37.4) | 4.07 | 1.05 |
| **Total Average Mean** | | | | | | | **3.57** | **1.22** |

Source:FieldSurveyData,2024
Note: Scale 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree, S.D. = Standard deviation.

**Post Hoc Comparisons**

**Anova Test For Culture**

Hypothesis: There is no significant difference in CULTURE level across the three States

The ANOVA results indicate a **significant difference** in culture levels across the three states (Abia, Ebonyi, and Imo). This is evident from the highly significant F-statistic ($F = 54.053$, $p < .001$). We reject the null hypothesis that there is no difference in culture levels among the states.

| **ANOVA** | | | | | |
|---|---|---|---|---|---|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 7396.149 | 2 | 3698.074 | 54.053 | .000 |
| Within Groups | 23740.220 | 347 | 68.416 | | |
| Total | 31136.369 | 349 | | | |

To determine which specific states, differ in knowledge levels, we look at the post hoc tests. The results show that Ebonyi has the highest mean knowledge level (35.42). Abia has a middle-range mean knowledge level (32.59). Imo has the lowest mean knowledge level (29.31). There is significant difference in knowledge between Imo (Mean=29.31) and Abia (Mean=32.59). Also, significant difference exists in knowledge exist between Imo (Mean=29.31) and Ebonyi (Mean=35.42). Similarly, there is significant difference in knowledge between Imo (Mean=29.31) and Ebonyi (Mean=35.42).

The implication of the ANOVA results is that knowledge levels differ significantly among Abia, Ebonyi, and Imo states. Specifically, Ebonyi has a significantly higher knowledge level compared to both Abia and Imo, while Abia has a significantly higher knowledge level compared to Imo.

**Post Hoc Tests**

| States | N | Mean Culture |
|---|---|---|
| Imo | 84 | 28.9286a |
| Abia | 165 | 35.6182b |
| Ebonyi | 101 | 41.6238c |

**Mean scores with different letters down the column at significant at 0.05 leve**

**ANOVA for attitude across states**

There is no significant difference in attitude across the States.

The ANOVA test results show a statistically significant difference in attitude scores between the three states ($F(2, 347) = 37.492$, $p = .000$). This means that we can reject the null hypothesis that the mean attitude scores are equal across all states.

The table shows that the mean attitude score in Abia (38.8970) is significantly different from the mean attitude scores in both Imo (32.4286) and Ebonyi (42.3960). The mean attitude score in Ebonyi is also significantly different from the mean attitude score in Imo.

| **ANOVA** | | | | | |
|---|---|---|---|---|---|
| **Attitude** | | | | | |
| | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| Between Groups | 4648.090 | 2 | 2324.045 | 37.492 | .000 |
| Within Groups | 21509.978 | 347 | 61.988 | | |
| Total | 26158.069 | 349 | | | |

**Post Hoc Tests**

The ANOVA test results provide evidence that there is a statistically significant difference in attitude scores between the three states. Post-hoc tests reveal that the mean attitude score in Abia is significantly different from the mean attitude scores in both Imo and Ebonyi. The mean attitude score in Ebonyi is also significantly different from the mean attitude score in Imo.

| States | N | Mean attitude |
|---|---|---|
| Imo | 84 | 32.4286a |
| Abia | 165 | 38.8970b |
| Ebonyi | 101 | 42.3960c |

**Mean scores with different letters down the column are significant at 0.05 level**

**Limitations of the study**

Limitations I encountered in studying Farmer's Attitudes and Culture towards Agroforestry as an Adaptive practice to climate variability. Logistics during the collection of data was another serious challenge like poor road network, language barrier and security concerns was having a little effect on reaching all the representees sample so we have to transport them to a safer area (Ajayi et al, 2011). Some farmers view agroforestry as less important because of its association of tree planting with land tenure conflicts or superstitions about tree spirit. There is a methodological limitation about the way farmers interpret survey questions because of Language barrier and we have to search for an interpreter to avoid bias.

**Practical Implication**

This study provides empirical evidence to relevant stakeholders such as the ministry of agriculture, extension units, extension organizations, researchers, and policymakers regarding the levels and the degree of relationship between, attitude, and culture, towards the adoption of technology transfer. The findings can guide policy makers in formulating policies related to farmers' culture, and attitude towards technology adoption. Prior to this study, there was a lack of empirical and theoretical evidence relating to these variables, leading to ambiguity among policy-making bodies.

Farmers attitude may change as a result of seasonal weather, extreme climate (Nair,2012)

## CONCLUSION AND RECOMMENDATIONS

The study examines the attitudes and culture of farmers in Southeast Nigeria towards agroforestry practices for climate adaptation. It found that farmers are generally positive about agroforestry, which is likely to increase their participation and acceptance of information related to climate adaptation. However, there is also a moderate level of cultural influence on farmers' adoption of agroforestry practices. This highlights the significant role of cultural factors in farmers' communities in shaping their perception and decision-making regarding agroforestry practices.

The study recommends nurturing and strengthening these attitudes, highlighting the advantages of agroforestry, such as its ability to withstand climate fluctuations, improve soil fertility, and increase biodiversity. Interventions should be culturally considerate and tailored to local circumstances, aiming to amalgamate traditional wisdom with contemporary methodologies.

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