Factors Affecting the Performance of Climate-Smart Agriculture Project from the Perspectives of Agriculture Extension Workers: A Case Study of Nakuru County, Kenya.

Beatrice Chepkoech[1], Atsiaya Obwina Godfrey[2]

[1]*Department of Agricultural Education and Extension, Egerton University, P.O Box 536-20115, Kenya*
[2]*Department of Agricultural Economics and Agribusiness Management, Egerton University, P.O Box 536 -20115, Kenya*

***Abstract*: This study aims to analyze the factors influencing the performance of climate-smart agriculture projects for smallholder farmers in Nakuru County, Kenya. This cross-sectional study was conducted to discover the factors behind the slow performance of climate-Smart agriculture projects in adopting, mitigating, and increasing productivity, and therefore improving the livelihoods of smallholder farmers. The research was conducted in the 11 Sub-Counties of Nakuru County, Kenya. The data were collected through a structured questionnaire survey administered to 110 agriculture extension workers. Multiple regression analysis was conducted to test the hypothesis. The results indicated that farmers' factors, project, and political factors significantly affected the performance of the agricultural projects at variation of 83.3 % (R^2 = 0.833). The study recommends that the government and all relevant stakeholders work jointly to improve the livelihoods of smallholder farmers. It is especially important to ensure that smallholder farmers are equipped with self-help capabilities and allowed to participate in climate-smart agriculture project decision-making. In addition, it is critical to examine the issues of funding disbursement, improve the political environment in which CSA projects work, and project factors.**

***Keywords*: Climate-smart agriculture, farmer factors, project factors, political factors, smallholder farmers**

I. INTRODUCTION

Agriculture plays an important role in Africa's economy with about 70% of the continent's population practicing it for their livelihoods (Adenle et al., 2019). Hence, the significance of this sector in providing employment and motivating economic growth in a developing nation such as Kenya cannot be undermined. Kenya's economy is largely agriculture-driven with the majority of the population who dwell in rural areas deriving their livelihood directly or indirectly from the agricultural sector (Eichsteller et al., 2022). About 40% of the overall workforce of which 70% of the rural workforce and about 25% of the annual workforce are from the agricultural sector (Amwata, 2020). Kenyan agriculture is endowered by small-, medium, and large-scale farming though smallholder production represents roughly 75 per cent of the total agricultural output (Birch, 2018).

The country's major agricultural export crops are tea, coffee, cut flowers, and vegetables. Smallholder production accounts for 70 per cent of the marketed farming produce, as opposed to large-scale farming, which accounts for 30 percent of traded farming food and mainly involves growing commercial crops, such as tea, coffee, maize, sugarcane, and wheat (KNBS, 2019). It is therefore quite evident that smallholder farmers feed Kenyans as they focus on producing food for local and national markets and their own families in contrast large-scale farmers who specialise in cash crops tend to produce commodities and concentrate on export crops, many of which people can't eat. Though, smallholder farmers in Kenya produce most of the nation's food crops their yields significantly lag. This has largely been contributed to climate change, their lack of the necessary resources for instance quality inputs, credit facilities, socio-economic factors of farmers, and extension services (Okeyo & Wamugi, 2018; Mati & Thomas, 2019; Evans et al, 2018). These have increasingly put smallholder farmers at the short end of the stick in the profit-driven pattern. This dependency has tied smallholder farmers to crippling debt that has sunk the farmers deeper into cyclic poverty.

Therefore, to address hunger, providing solutions on ways of maximizing smallholder farmers' productivity is important. The solutions include providing quality farm inputs on credit and delivering them within walking distance of every farm and offering a national crop insurance program (Hornum & Bolwig, 2021). Comparably, improving agricultural extension programs in a bid to keep farmers better informed about innovations and techniques to increase their yields is another solution to the improvement of smallholder crop production. According to Birch (2018) essential to improve farmers production include offering training on improved agricultural techniques, improving the efficiency of input subsidy programs provision so that more farmers receive them on time, providing market facilitation to maximize farm profits and minimize post-harvest losses, capacity building on climate-smart agriculture practices and providing climate change information. This can see farmers' production more than double in every crop production season.

Although the Kenyan agriculture sector supports the livelihood of over 70 percent of the rural population, only about 20 % of the land fall under the high and medium agricultural potential largely because it receives adequate and reliable rainfall and produces 70% of its national commercial agricultural output (Lokuruka, 2020). Despite many years of development support to the agricultural sector in the country, the production schemes have remained largely small- scale for subsistence, rain-fed, and poorly mechanized. Drought as a result of recurrent rain failures in both the highlands and the Arid and Semi-Arid Land areas is becoming very frequent and extended affecting the farmers in semi-arid and arid regions who produce about 20% of the output and 10% of the output in Kenya respectively (Kalele et al., 2021). Since agriculture in the country mainly centers on environmental factors any prolonged variations in average weather conditions can have significant impacts on production.

Productivity remains relatively low in all the regions due to climate change, poor and weak linkages between agricultural extension systems, universities and research centers poor incentives, high cost of farm inputs, and underdeveloped supporting infrastructure and institutions (Kalimba and Culas, 2020; Mutsotso et al., 2018). Sustainable development of the agricultural sector in the country will bear a significant impact on the population and will have multiplier and spillover effects on other sectors, especially industry and agribusiness (Banerjee, et al., 2019). The country's agriculture is predominantly rain-fed and therefore vulnerable to climate change particularly changes in temperature regimes and precipitation patterns, and extreme weather events will affect the performance of the agriculture sector (Ayugi et al., 2022). According to Kogo et al. (2021), unsustainable land and agricultural water management and greenhouse gas (GHG) emissions are expected to rise in 2030 unless appropriate mitigation actions are taken against climate change.

Climate change has become an obstruction to sustainable development globally. It will have an array of positive and negative impacts on the agricultural sector depending on the regions of the planet (Ayugi et al., 2022). The negative impacts are expected to be more unfavourable in developing countries, particularly those in Sub-Saharan Africa such as Kenya which has experienced increasing temperatures since the 1960's coupled with increased frequency and intensity of extreme weather events such as El Niño and La Niña (Kogo et al., 2021). Effects of the negative impacts will include declining agricultural productivity and loss of crops, livestock, fish, and investments in agriculture due to changing temperatures and precipitation regimes and increased frequency and intensity of extreme weather events (Kabubo-Mariara & Kabara, 2018). Thus, there is a dire need to deliberately advance a rigorous implementation of the identified strategies for adaptation and mitigation through climate-smart agriculture practices for sustainable agriculture. This is in a bid to minimize the effects of climate change so that development in agriculture can be encouraged.

II. LITERATURE REVIEW

Climate Smart Agriculture (CSA) is defined as agricultural practices that sustainably increase productivity and system resilience while reducing greenhouse gas emissions (Alexander, 2019). CSA helps ensure that climate change adaptation and mitigation are directly incorporated into agricultural development planning and investment strategies. CSA has been broadly promoted as the future of agriculture in Africa and as a feasible answer to climate change. Therefore, CSA has the potential to increase the productivity and resilience of hundreds of millions of smallholder farmers while reducing their vulnerability. For instance, smallholder farmers can benefit from CSA directly through the effectiveness of valuable inputs such as seeds, labour, and fertilizers which leads to food security increase, and income opportunities generation (Deb Pal & Tyagi, 2022). By protecting ecosystems and landscapes, CSA helps protect natural resources for future generations.

Kenya has and is currently scaling up climate-smart agriculture through various projects for adaptation and mitigation of climate change. The objective of the Climate Smart Agriculture projects is to increase agricultural productivity and build resilience to climate change risks in farming particularly the smallholder farming and pastoral communities (Endo, 2020). This is done by scaling up climate-smart agricultural practices, strengthening climate-smart agricultural research and seed systems, and supporting the agrometeorological, market, climate, and advisory services through projects. Agricultural projects provide farmers with important information, such as patterns in crop prices, new seed varieties, crop management, and marketing (Leahy & Alinyo, 2018), in Kenya for instance agricultural projects provide major sources of funding for most agricultural activities. They play a vital role in improving the overall economic and social welfare, livelihoods of the farmers, and the institutional environment in which they live. Currently, there are many governments and developer-funded projects that prioritize different key areas. Most of these projects primarily aim to increase yield, therefore reducing poverty.

Agriculture has been shown to demonstrate very strong links to economic growth, in various parts of Kenya with the smallholder farmers producing the majority of the nation's food crops, but still, their yields significantly lag, and one of the main factors contributing to these which has been highlighted is climate change (Amwata, 2020). Kenya has therefore devised different programs and strategies through projects to alleviate farmers risks of climate change. One of the projects that the government of Kenya has been implementing is the Kenya Climate-Smart Agriculture Project (KCSAP) which is a Government of Kenya/World Bank-supported under the State Department for Crops Development in the Ministry of Agriculture, Livestock, Fisheries, and Irrigation which plays vital in reaching out to farmers (Okumu, 2021). The project promotes five components which involve upscaling climate-smart agricultural practices, strengthening climate-smart agricultural research and (seed systems, supporting agro-weather information, market, climate, and advisory services),

project coordination and management, contingency emergency response to achieve triple wins which are sustainably increasing productivity, building resilience to climate risks and reducing/removing Greenhouse Gas Emissions (Muhumuza, 2019). This, therefore, is a strategy to improve food security, income, and livelihoods of people across the 47 counties Nakuru included.

Nakuru County is an important stakeholder in Kenya's agriculture contributing around 60% Kenya's horticulture production (Kimutai, 2019). Most of the households in Nakuru County depend on agriculture as their main economic activity however they are entangling in grind that has continued to hinder them to achieve their potential in farming year-in-year-out (D'Alessandro et al., 2021). This is because of several bottlenecks along the value chains that have continually surfeited benefits of farmers in agriculture. One of these bottlenecks is the climate change issues which have made it difficult for farmers in the parts of Nakuru County to achieve the maximum output and profits in agriculture which has led to about 36% of the county's population being be food poor (Atela et al., 2020). Besides, about a third of people in the County don't have access to healthy and nutritious food.

Further, over 60% of the livelihoods of the county's population that is either directly or indirectly employed in the agriculture sector are endangered (Gesimba & Njau, 2018). Improving the livelihoods of the thousands of people who exclusively depend on agriculture, the County Government of Nakuru, therefore, has implemented measures to increase production, and productivity as well as enhance value addition. The County have partner with the Netherlands in the field of agriculture and water management to work on climate-smart and sustainable solutions for local challenges (Patrick et al., 2020). The focus has been strongly on integrated approaches to sustainable management of landscapes and catchments for climate resilient business for example flower farming and tourism, WASH services, and eco systems for the sustainable development goals. The Non- Government Organization such as BEACON through their projects additionally promotes sustainable food systems that enhance food and nutrition security through the promotion of climate change adaptation and mitigation practices to ensure there is a sustainable transformation of vulnerable individuals and communities (Indahningrum et al., 2020). The organization engages in activities like policy formulation, knowledge dissemination, coordination and networking of CSA actions, use of drought tolerant crops, soil management practices, agroforestry/afforestation, and advocacy.

Kenya Cereals Enhancement Programme-Climate Resilient Agricultural livelihoods (KCEP-CRAL) also has been enhancing the capacity building for Climate-Resilient cereal productivity which contributes towards national food security in Nakuru County (IFAD, 2017). Italian Agency for Development Cooperation and the United Nations Environment Programme (UNEP) through a project called Transformation of Climate action through the utilization of a hybridized Clean and Sustainable Energy as a driver to climate-smart agriculture and agribusiness value chain equally play a role in promoting climate-smart agriculture resilient among farmers in Nakuru County. Clean and renewable energy are key elements to counter climate change by reducing C02 emissions and are fundamental tools to drive sustainable development and foster faster economic development (Ciaccia, 2022). In the same way, SNV's Climate Smart Agriculture program through Climate Resilient Agribusiness for Tomorrow (CRAFT) project aims to sustainably increase agricultural productivity and smallholder incomes, build resilience to climate change, and reduce greenhouse gas emissions through integrating project learnings and training in Nakuru County (Productivity and Security, 2019). Despite the vital role being played by these projects in agriculture production, the success is inclined to the role of agricultural extension workers which is a vital key in reaching out to the farmers.

Agricultural extension services reinforced the implementation of the climate-smart agriculture projects and provide feedback from farmers to these projects (Adesina & Loboguerrero, 2021). The agricultural extension services by agricultural extension workers are customarily utilized by the government and private sectors in agriculture as an approach instrument to accomplish certain project performance objectives and goals (Athukorala, 2022). They play a crucial role in boosting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth. Agricultural extension workers play a key role in agricultural development and sustainability, linking farmers to the developers of technological solutions, therefore, providing a critical support service for rural producers meeting the new challenges confronting agriculture hence leading to transformation in the global food and agricultural system (Norton & Alwang, 2020). They serve to assist farmers in adopting an attitude conducive to acceptance of technological change. With the changing climate threatening agricultural production, agricultural extension workers train and encourage farmers to adopt various climate-smart agriculture (CSA) practices. Agricultural extension workers act as facilitators and assist farmers in their decision-making and technology adaptation and bridge a knowledge gap by providing clarity on CSA terminology, components, relevant issues, and how to contextualize them under different locality conditions to farmers (Raj & Garlapati, 2020).

Despite these efforts of various projects supporting climate-smart agriculture put in place to improve livelihoods of farmers particularly smallholder in Kenya and more so Nakuru County, their contribution to the national economy is still relatively small due to many challenges encountered by these projects and as a result, many projects do not reach their full potential and fail to perform as expected. There are still a significant number of farmers that are yet to make progress, with some suffering severely in nutrition and food security as a result of climate change despite these projects. Shilomboleni (2020) reported that climate-smart agriculture policies and structural reforms have not significantly improved economic performance while poverty seems to be increasing among the population, a large

proportion of which is comprised of smallholder farmers. Literature reviews have highlighted factors such as farmers participation, environmental factors, governmental factors involving project support, and operational project factors as affecting the performance of climate-smart agriculture (Musembi, 2015; Tuchitechi & Lee, 2018; Mayo, 2018).

According to Etwire et al. (2021), farmers' participation in agricultural projects has a direct bearing on technology awareness, adoption, livelihoods, environment, nutrition, poverty the performance of the agricultural sector, and the macroeconomy. A study by Grace and Makori (2016) in Nyeri County Kenya revealed that stakeholder involvement, and project teams had the strongest positive influence on the performance of agricultural projects. Mogaka et al. (2021) pointed out that, socio-economic factors including a lack of education among farmers, lack of participation in decision-making, limited access to inorganic fertilizers, improved seeds, the lack of agricultural extension services, and chemical inputs such as herbicides and pesticides affects farmers agricultural productivity which therefore affects the implementation thus the performance of climate-smart agriculture practices. They further established that projects were not able to manage their costs, execution time, project risks and project quality were not able to not only execute their projects on time, at cost, and on schedule affecting productivity.

Nevertheless, Little research has been conducted to examine the factors leading to the slow performance of climate-smart agriculture projects in Kenya, particularly Nakuru County. Although some researchers have focused on climate-smart agriculture projects and poverty reduction through an examination of Kenya's farmers, this research uniquely examined these factors from the perspective of agricultural extension workers. Thus, this paper aims to provide a clear understanding of the factors that have contributed to the slow rate of improvement of livelihoods of farmers through climate-smart agriculture projects in Nakuru County despite extensive government efforts and private sectors, especially among smallholder farmers. This study's main research aim was to discover the reasons behind the slow performance of smart climate agriculture projects in improving farmers productivity among farmers.

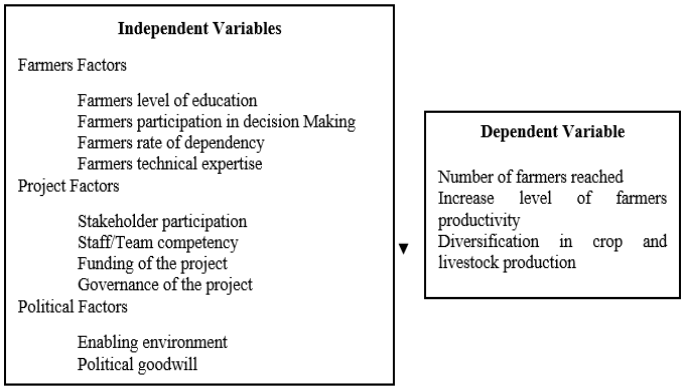

Figure 1: Conceptual framework

Authors conceptualization

III. RESEARCH METHODOLOGY

Study Area

This study was conducted in Nakuru County, Kenya. Nakuru County is in the Rift Valley, and it borders seven Counties: Laikipia to the north-east, Kericho to the West, Narok to the south-west, Kajiado to the South, Baringo to the North, Nyandarua to the East and Bomet to the West (KNBS, 2019). It covers an area of 7,495.1 square kilometers out of which 5,274 square kilometers is arable. The county is administratively divided into 11 Sub Counties that are namely: Kuresoi South, and Subukia. Kuresoi North, Njoro, Molo, Rongai, Nakuru East, Gilgil, Bahati, Nakuru West and Naivasha. The 11 Sub Counties are divided into 55 wards. The county has a wide range of agro-ecological zones ranging from tropical alpine to lower mid lands. There is a wide variation in altitude (1400-2970 m asl). Rainfall is bimodal long rains between March, April, May, and June, while short rains occur between October and November with an annual average range of 500-1900mm.The temperature range is between 9oC-27oC. Soils are volcanic and well-drained.

Sample and Sampling procedure

This study targeted government extension workers from Nakuru County including, Sub-County agricultural officers, agriculture development officers, and ward agricultural officers. All these workers are frontline staff involved in the implementation of agricultural projects directly or indirectly.

Purposive non-probability sampling was used, and the study targeted a total number of 110 agricultural extension officers. This involved 1 ward agricultural officer from the 55 wards of Nakuru County making a total of 55, two sub-county agricultural officers giving a total of 22, and 2 agriculture development officers from the 11 Sub-Counties giving a total of 22 respondents and 11 livestock officers from the 11 Sub-County.

Data Collection and Analysis

Data were gathered from primary and secondary sources. The secondary sources included existing scholarly literature, such as journals, research papers, websites, and books**.** A structured questionnaire survey was designed to collect primary data. The survey comprised both open-ended and closed questions using a five-point Likert scale. The questionnaire consisted of demographic characteristics of respondents, project factors, farmers factors, political factors, and general questions regarding climate-smart agriculture project performance. The study also conducted interviews with agricultural extension workers to reinforce the study. The collected data were analyzed through the Statistical Package for Social Sciences (SPSS) version 22, specifically through frequency and multiple regression analysis to predict the value of dependent variables based on the value of independent variables of the study.

Hypothesis H_0: The combined factors (farmers' factors, project factors [project governance, project team competency, stakeholder participation in project, funding of project] and

political factors) have no significant influence on, the performance of the CSA Project in Nakuru County, Kenya.

$Y= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6+ \varepsilon$
Where Y is a performance of climate-smart agriculture project, X_1 = Farmers factors, X_2 = project governance, X_3 = project team competency, X_4 = stakeholder participation in the project, X_5 = funding of project X_6 = political factors.

The dependent variable was the performance of the project which is believed to be affected by independent variables. It has been shown through literature reviews and research experience that the rate of improvement of smallholder farmers productivity in Kenya has been impeded by the slow performance of projects caused by several factors. The farmer's factors such as farmers level of education, farmers' participation in decision making, farmers' dependency ailment, and farmers technical expertise. Political factors category, including the political goodwill and good political environment. Project factors in this case included governance of the project, leadership, accountability, and monitoring and evaluation, Team competency required academic qualification, level of experience and level of knowledge, stakeholder participation, participation in planning and implementation of the project, taking responsibilities and providing feedbacks and funding availability, sources of funding and cash flow and consistent disbursement of cash.

IV. RESULTS AND DISCUSSION

Table 1: Gender of the respondent

Gender	Frequency	Percent
Male	57	51.8
Female	53	48.2
Total	110	100.0

Table 1 shows that 57 % of the respondents were male while 53 % were female. It can be concluded that the gender ratio was well-represented.

The respondents were further asked to indicate their age bracket and the results are in Table 2

Table 2: Age of the respondents

Age	Frequency	Percent
18 – 35	31	28.2
36 -60	71	64.5
over 60	8	7.3
Total	110	100.0

Table 2 depicts that most of the respondents (71 %) were aged between 36 and 60 years,31 % of them were between 18 and 35 years whereas only 8 % of them were above 60 years. It can be concluded that the majority of the agricultural extension workers are middle aged, and the minority are the elderly.

Table 3: Level of Education

Level of Education	Frequency	Percent
Certificate	17	15.5
Diploma	57	51.8
Degree	26	23.6
Masters	5	4.5
PhD	5	4.5
Total	110	100.0

The findings reveal that 57 % of the respondents had reached the diploma level, 26 % indicated that they had attained a degree, 17 % had indicated they had attained a certificate, and 5 % had attained masters and PhD levels respectively. This implied that all of them were educated even though at different levels. From this information, it was concluded that they understood the language that was utilized to collect the data thereby they provided reliable information on the subject under study.

Table 4: Marital Status of the respondents

Marital Status	Frequency	Percent
Single	8	7.3
Married	102	92.7
Total	110	100.0

The majority of the respondents 92.7 % were married, as shown in Table 4. This indicates that most agricultural extension workers were domestically settled and had stable families which could contribute positively to their office performance; at the same time, however, such employees may require additional resources to care for their families, which can also lead to low work performance if they are not able to obtain them.

The respondents also provided the number of years they were involved in agriculture in Nakuru County. Their responses were as represented in Table 5.

Table 5: Years Involved working in Nakuru County

Years working in the study area	Frequency	Percent
0 - 5	73	66.4
6 - 10	28	25.5
11 - 16	9	8.2
Total	110	100.0

The findings from table 5 indicated that the majority (73 %) had been working in the County for 5 years, followed by 28 % who have been working between 6 – 10 years, and the minority 9 % who had been working between 11 – 16 years.

The study sought to examine the performance of climate-smart agriculture projects in Nakuru County. The results were as shown in Table 6.

Table 6: Climate Smart Agricultural Projects

Statements	Mean	Std. Deviation
Positive impacts on the level of productivity among farmers have been realized from CSA projects in the County of Nakuru	3.2818	.55194
Farmers have improved the diversification of crop and livestock production	4.2091	.70852
Number of farmers reached has to increase	2.2000	.60183
Total mean score	3.2303	0.62075

The respondents agreed that there have been positive impacts on the level of productivity among farmers from the CSA projects as represented by mean score of 3.2818, farmers have also improved diversification of crop and livestock production as depicted by means score of 4.2091 and the number farmers reached through CSA practices capacity building has increased as illustrated by a mean score of 2.2.

Farmer Factors

Table 7: Farmers Factors and performance of CSA projects

Statements	Mean	Std. Dev.
Literacy levels of farmers to be reached leads to better participation in the project activities	3.142	.648
Farmers having technical expertise	4.234	.868
Farmers participation in decision making involving the implementation of CSA project policies and during activities affects the CSA projects	5.201	.978
Farmers dependency ailment affects the CSA projects	3.567	.781

From the results in Table 7 the respondents agreed that literacy levels of farmers lead to better participation in the project activities as shown by a mean of 3.142, farmers having technical expertise affects their performance and participation in CSA projects as shown by a mean of 4.234, the farmers participation in decision making involving the implementation of CSA project policies and during activities affects CSA projects as shown by 5.201 and farmers dependency ailments affects the CSA projects affects the performance of CSA projects as shown by a mean of 3.567.This implied that agricultural extension workers agreed with the statements concerning the influence of capacity to adopt CSA practices which influence CSA projects in Nakuru County.

Project factors

The study further asked the respondents to indicate the extent to which they agreed with the following statements on stakeholder participation and performance of CSA projects in Kenya. The responses were rated on a five-point Likert scale where: Likert scale where 1= Not extent; 2 = Little Extent; 3= Moderate Extent; 4= Large Extent and 5= Very Large Extent.

Table 8: Stakeholders' participation

Statements	Mean	Std. Dev.
Stakeholders' involvement during CSA project implementation impacts on performance	3.909	.598
Incorporating ideas raised by stakeholders in project designing and planning enhance performance	2.391	.467
Key stakeholders are allocated some tasks in project planning	1.927	.268
There is a feedback mechanism for stakeholders on any issues regarding the CSA project being conducted	2.923	.485

From the findings, the majority of the respondents strongly agreed to a great extent that involving stakeholders during CSA project implementation impacts performance as shown by a mean score of 3.909. Most of the respondents further agreed to a great extent that incorporating ideas raised by stakeholders in project designing and planning enhances performance and allocating some tasks to stakeholders during planning enhances project performance as indicated by a mean score of 2.391 and 1.927 respectively. The respondents also agreed to a great extent that providing feedback to the stakeholders on any issues regarding the CSA project being conducted is important as shown by a mean score of 2.923.

Table 9: Funding

Statements	Mean	Std. Dev.
Lack of reliable and stable sources of funds negatively affects smooth operation of the CSA projects in the region	3.401	.621
Most of CSA projects heavily relies on donor funding	3.331	.669
The funds are available as planned through project duration	4.129	.821
CSA projects have diverse sources of funding.	2.608	.436

From the findings in Table 9, the respondents strongly agreed that most of the CSA projects heavily rely on donor funding which affects their performance, and lack of reliable and stable funds negatively affects smooth operations of the CSA projects in Nakuru County, Kenya. In addition, the respondents strongly agreed that availability of funds through the CSA project duration influences their performance. Further, the respondents strongly agreed that diverse sources of funding the CSA projects influence their performance. These results agree with the findings by Mayo (2018) who stated that a lack of reliable and stable sources of funds affects operations of agricultural projects. Heavily reliance on donor funding as the source of funds for agricultural projects might lead to a collapse of the project when the donor support is withdrawn.

The study sought to find out the governance of the CSA projects and their influence in performance in Nakuru County, Kenya. The study further asked the respondents to indicate the extent to which they agreed with the following statements on governance and performance of CSA projects in Nakuru County, Kenya. The responses were rated on a five-point Likert scale where: 1 – Strongly disagree 2 – Disagree 3 –Moderately Agree 4- Agree and 5- Strongly Agree. The findings are presented in Table 10.

Table 10: Governance

Statements	Mean	Std. Dev.
Lack of leadership and management skills have an influence on CSA projects	2.936	.489
Good governance transits to high chances of project success and bad governance transits to high chances of project failing	1.927	.279
Accountability will send a picture to stakeholders that the project is either performing or not.	2.780	.445
Regularly monitoring and evaluating CSA projects influence performance	1.423	.780

As shown in Table 10, majority of the respondents strongly agreed that a lack of leadership and management skills in CSA projects have an influence on their performance. Similarly, good governance will lead to high chances of the CSA projects success and bad governance will lead to high chances of the CSA project failure. Further, accountability will send a good picture which will increase performance of a project and regularly monitoring and evaluating CSA projects influence the performance of the project.

The respondents were requested to indicate the influence of project team competency on project performance.

Table 11: Team Competency

Statements	Mean	Std. Dev.
Staff/Team experience has a big influence on performance of CSA projects	3.818	.6451
Having highly qualified staffs/team enables CSA projects obtain high performance	4.291	.853
Team members having high level of knowledge to execute project activities successfully influence CSA	2.367	.418

From the findings, majority of the respondents strongly agreed that experience among the team involved in CSA projects influence performance to a great extent as indicated by a mean of 3.818 with a standard deviation of 0. 6451.The results also indicated that having highly qualified team members involved in CSA projects influences performance to a great extent as indicated by a mean of 4.291. The results further indicated that having team members having high level of knowledge to executive project activities successfully influence CSA projects as indicated by a mean of 2.367. The respondents explained the qualification and experience gained by team members enables the members to execute their experience effectively. Further having required knowledge leads to success of the project as it leads to executing project tasks competently leading to offering quality learning and completion of project tasks within time expected. This implied that project team competency influence CSA project performance in Nakuru County, Kenya. The findings support that of Chen & Hu (2021) who revealed that competency of a project team influences commitment of team members in executing duties, therefore, influence the performance of a project.

Table 12: Political Factors

Statements	Mean	Std. Dev.
Political goodwill is necessary for performance of the project	3.470	.626
Good political environment enhances the project performance	5.458	.942

As illustrated in Table 12, majority of the respondents strongly agreed that political goodwill is necessary for the performance of CSA project as shown by the mean score of 3.470. Further, most of the respondents agreed that a good political environment enhances the CSA project performance as indicated by a mean score of 5.458.

Regression analysis

The analysis was done to determine the link between independent variables (farmers factors, project factors, political factors) against the dependent variable, which was the performance of Climate-smart agricultural projects in Nakuru County. The results are in Table13, 14 and 15.

Table 13: Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.913[a]	.833	.829	1.64610	.508	17.717	6	103	.000

The study results in Table 13 shows that the independent variables explained 83.3 % of the variation in performance of CSA project as indicated by a coefficient of determination (R^2) value of 0.833.

Analysis of Variance was also performed to test for the significance of the whole model. The results are illustrated in Table 14.

Table 14: Analysis of variance (ANOVA)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3388.708	6	564.785	17.717	.000[b]
	Residual	3283.483	103	31.878		
	Total	6672.191	109			
a. Dependent Variable: Performance of CSA project						

The results in Table 14 revealed that the model significantly predicted performance of the CSA projects, F = 17.717; p = 0.000.

Table 15: Model Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.986	.177		.465	.243
	Farmers factors	.685	.069	.887	1.234	.022
	Project Governance	.835	.601	.601	2.708	.032
	Project team competency	.380	.294	.101	1.295	.019
	Stakeholders' participation	.058	.463	.665	3.926	.037
	Funding of project	.707	.671	.705	9.005	.000
	Political factors	.045	.275	.345	2.603	.005
a. Dependent Variable: Performance of CSA projects						

$Y= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6+ \varepsilon$
Where Y is performance of climate smart agriculture project, X_1 = Farmers factors, X_2 = project governance, X_3 = project team competency, X_4 = stakeholder participation in project, X_5 = funding of project X_6 = political factors.

The results in Table 15 revealed that farmer factors, project governance, project team competency, stakeholder participation in project, funding of project, and political factors, significantly predicted performance of climate-smart agricultural project in Nakuru County, Kenya at 5% level of significance. This was indicated by significant p-values (p = 0.022,0 0.032, 0.019, 0.037, 0.000, 0.005 respectively). The null hypothesis that the combined factors (farmer factors, project governance, project team competency, stakeholder participation in project, funding of project and political factors) have no significant influence on performance of CSA Projects in Nakuru County, Kenya was rejected.

The model from Table 6 was as follows:

$Y= 0.986 + 0.685X_1 + 0.835X_2 + 0.380X_3 + 0.058X_4 + 0.707X_5 + 0.045X_6+ \varepsilon$

As illustrated from the results in Table 15, it was revealed that if all independent variables would be held constant at zero, the performance of climate-smart agriculture project in Nakuru County would be 0.986. A unit increase in farmers' level of education, participation in a project and farmers having technical expertise would lead to 0.685 increase in the performance of climate-smart agricultural project in Nakuru County, Kenya. Further, the study depicted that if all other variables would be held constant, the unit change in project governance, project team competency, stakeholders' participation, project funding, and political factors would lead to an increase in the performance of climate-smart agricultural project by 0.835, 0.380, 0.058, 0.707 and 0.045 respectively.

Findings indicate that the Project factors [project governance, project team competency, stakeholder participation in project, funding of project] determines the performance of the CSA Projects. Involvement of stakeholders in a climate-smart project enables analysis of needs and measurable goals, the operation processes reviews, financial analysis, identifying users, and identifying schedules and deliverables. This result is similar to study findings by Nederhand & Klijn (2019) who found that stakeholder's participation in the projects influences the outcomes of the project. In this, they explained that involving the stakeholders and assigning the duties and providing them with feedbacks on the progress of the projects make them own the project and enhances the contributions of them in running and managing the projects. Correspondingly frequent project monitoring and evaluation is essential to track all the project activities and enable effective running of the project (Phiri, 2015). It ensures adequate planning, practical implementation mechanism, performance indicators, and baseline data within the projects process therefore smooth running of the projects. Monitoring and evaluating resources in a project further help in identifying capacity gaps within the projects M&E processes and resources (Waithera & Wanyoike, 2015).

The study similarly found that political factors and funding were having an influence on the performance of the projects. Political factors determine the vulnerability of farmers, communities as well as their capacity to adapt to climate-smart practices will influence the performance of the project. The presence of political support is a major facilitator while the absence of political support undermines funding, deployment and training of project staff, and provision of materials to be used in a project (Larsen et al., 2016). This agrees with the findings by Hussain et al. (2018) who found that environment under which projects take place should influence performance of the projects. For a project to be successful, it requires funds. Fundings in terms of cash flow, availability of funds, and disbursement influence of the availability of human resources, materials, and running of the climate-smart agriculture projects. In addition, these findings concur with that of Kavale & Kalola, (2017) who found that availability of funds during the full project implementation phase, ensures that the project is completed in a timely manner and improves the project's performance.

Governance of the projects and staff competency were found to influence the performance of climate smart agriculture. For

instance, having a project manager that has strong leadership skills, the climate-smart agricultural projects performance can be governance well, monitored, controlled, and managed with high quality. Also, availability of personal with high experience and qualification lead to better performance of quality, time, cost, productivity, and safety of projects climate-smart agricultural projects. On the other hand, low experience and qualification of project team may lack management skills and less attention is paid to contractor's plan, cost control, overall site management and resource allocation. Nyangwara & Datche (2015) agree with the result findings and posits that having project staffs who are competent and governing the projects are very important because it affects project performance. The quality of leadership and the qualification of the project team affects strongly and directly on performance of the projects.

The results indicated a strong relationship between farmers factors and performance of climate smart agricultural projects $p = 0.022$ in Nakuru County, this confirms a study by Etwire et al. (2013) who found that the level of education which involves the technical expertise, training on agricultural practices, management of resource, level of knowledge and skills in crop and livestock production enables farmers to utilize technologies and innovation being supported by the projects, therefore, influence implementation since illiteracy level of the farmer hinders the management of the ventures. According to Iddrisu (2015) education is expected to positively influence a farmer's ability to source and translate information including information on available agricultural projects and the benefits of participating in such projects. Educated farmers are more likely to participate in agricultural projects to put into practice the knowledge they may have acquired in school, therefore, affects taking in of what the project supports and hence influencing the performance of the projects (Kassie et al., 2013). Additionally, findings on participation of farmers in decision-making and dependency ailments confirm the findings by Hailu et al. (2020) who found the same results.

V. CONCLUSION

From the findings, the study concludes that the factors [farmers, project, and political] influences the performance of climate-smart agriculture project. The regression coefficients of the study show that farmers factors, project governance, project team competency, stakeholder participation in project, funding of project, and political factors have a significant influence on performance of climate-smart agricultural projects. This implies that improving farmers level of education and technical expertise with participation in climate-smart project, stakeholder participation, funding, political environment and goodwill, competency of the team involved in climate-smart agriculture projects would increase the levels of performance of climate-smart agricultural projects, therefore, more farmers are reached out and are able to receive knowledge and skills of CSA practices that will lead diversification of crop and livestock production. This will in turn improve the productivity of the farmers in the region.

VI. RECOMMENDATIONS

This study recommends that the farmers should participate in decision- making involving the implementation of CSA project policies and during activities that affects the CSA project. It is important that farmers are also empowered through training to increase their expertise which will improve the performance of the CSA project. The study also recommends that the stakeholder should be involved during CSA project implementation, assign some tasks designing and planning, and provided feedback. Funding sources also should be enhanced for instance finding an alternative source of funding like fundraising so that cash flow and there is an alternative if the donor funder withdraws from sponsoring the projects, therefore, it ensures continuity. The study further recommends that the team involved in CSA project should have required knowledge, qualify, and should have enough experience to run the project. The organization running the projects should sponsor some of their employees to improve their academic qualifications to enable them to handle more complex projects to install confidence in the donors. It is very vital to monitor and evaluate the project regularly to allow track the project activities and allow for effective execution of the project activities. Good political environment should be created to ensure smooth running of the CSA project this involves devising policies by the government in the region and national government that favours the running of the projects.

ACKNOWLEDGEMENTS

The authors are grateful for the cooperation of all agricultural officers in Nakuru, and dedicated enumerators' support during data collection. The views expressed herein are solely for the authors and not of the affiliated institution.

REFERENCES

[1] Adenle, A. A., Wedig, K. & Azadi, H. (2019). Sustainable agriculture and food security in Africa: The role of innovative technologies and international organizations. Technology in Society. Elsevier, 58, pp. 101143.
[2] Adesina, O. S. & Loboguerrero, A. M. (2021). Enhancing Food Security Through Climate-Smart Agriculture and Sustainable Policy in Nigeria. Springer.
[3] Alexander, S. (2019). What climate-smart agriculture means to members of the Global Alliance for climate-smart agriculture. Future of Food. Journal on Food, Agriculture and Society, 7(1), pp. 21–30.
[4] Amwata, D. A. (2020). Situational analysis study for the agriculture sector in Kenya. CGIAR Research Program on Climate Change. Agriculture and Food Security.
[5] Atela, J., Randa, T., Akala, H., & Tonui, C. (2020). The sustainable energy access & climate action plan (SEACAP).
[6] Athukorala, W. (2022). Analysing Agriculture Extension Programmes. Using Randomised Control Experiments in Agricultural Policy Analysis. Springer, pp. 363–389.
[7] Ayugi, B., Eresanya, E. O., Onyango, A. O., Ogou, F. K., Okoro, E. C., Okoye, C. O., ... & Ongoma, V. (2022). Review of meteorological drought in Africa: historical trends, impacts, mitigation measures, and prospects. Pure and Applied Geophysics. Springer, pp. 1–22.
[8] Banerjee, A., Niehaus, P. & Suri, T. (2019). Universal basic income in the developing world. Annual Review of Economics. Annual Reviews, 11, pp. 959–983.
[9] Birch, I. (2018). Agricultural productivity in Kenya: barriers and opportunities IDS.

[10] Chen, L. & Hu, P. (2021). Project management competency and project performance of Dam projects in China. Journal of Entrepreneurship & Project Management, 5(2).
[11] Ciaccia, F. (2022). Technology Innovation in the Energy Sector and Climate Change. The Role of Governments and Policies," in Interdisciplinary Approaches to Climate Change for Sustainable Growth. Springer, pp. 159–179.
[12] D'Alessandro, C., Molina, P. B., Dekeyser, K., & Rampa, F. (2021). The case of Nakuru County, Kenya.
[13] Deb Pal, B. & Tyagi, N. K. (2022). Scaling up climate-smart agriculture in South Asia: Synthesis report. Intl Food Policy Res Inst.
[14] Eichsteller, M., Njagi, T. & Nyukuri, E. (2022). The role of agriculture in poverty escapes in Kenya–Developing a capabilities approach in the context of climate change. World Development. Elsevier, 149, p. 105705.
[15] Endo, K. (2020). Kenya-National Climate Smart Agriculture Project: Environmental Assessment: Pest Management Plan on Locust Control Contingency Emergency Recovery Implementation Plan. World Bank Group.
[16] Etwire, P. M. et al. (2013). Factors Influencing Farmer's Participation in Agricultural Projects The case of the Agricultural Value Chain Mentorship. Project in the Northern Region of Ghana. The International Institute for Science, Technology and Education.
[17] Etwire, P. M., Martey, E., & Goldsmith, P. (2021). Factors that drive peer dissemination of agricultural information: evidence from northern Ghana. Development in Practice, 31(5), 606-618.
[18] Evans, A. A., Florence, N. O. & Eucabeth, B. O. M. (2018). Production and marketing of rice in Kenya: Challenges and opportunities. Journal of Development and Agricultural Economics, 10(3), pp. 64–70.
[19] Gesimba, P., & Njau, J. (2018). An Assessment of Climate Change Adaptation Strategies by Smallholder Agribusinesses in Mau Ranges, Nakuru County. St Paul's university.
[20] Hailu, M. et al. (2020). Understanding factors affecting the performance of agricultural extension system in Ethiopia Ethiop. J. Agric. Sci., 30(4), pp. 237–263.
[21] Hornum, S. T. & Bolwig, S. (2021). A functional analysis of the role of input suppliers in an agricultural innovation system: The case of small-scale irrigation in Kenya. Agricultural Systems. Elsevier, 193, p. 103219.
[22] Hussain, S. et al. (2018). Structural equation model for evaluating factors affecting quality of social infrastructure projects. Sustainability. MDPI, 10(5), p. 1415.
[23] Iddrisu, A. (2015). The effects of input-credit project on output and income of farmers in the municipality of the northern region.
[24] IFAD (2017). Kenya Cereal Enhancement Programme-Climate Resilient Agricultural Livelihoods Window (KCEP-CRAL): Project Summary (June). Available at: https://www.ifad.org/documents/38711644/40046455/KCEP_CRAL_Supervision Report.
[25] Indahningrum, R. putri et al. (2020). Applied Microbiology and Biotechnology, 2507(1), pp.19.Availableat:https://doi.org/10.1016/j.solener.2019.02.027%0Ahttps://www.golder.com/insights/block-caving-a-viable-alternative/%0A???
[26] Kabubo-Mariara, J., & Kabara, M. (2018). Climate change and food security in Kenya," in Agricultural Adaptation to Climate Change in Africa. Routledge, pp. 55–80.
[27] Kalele, D. N. et al. (2021). Climate change impacts and relevance of smallholder farmers' response in arid and semi-arid lands in Kenya. Scientific African. Elsevier, 12, p. e00814.
[28] Kalimba, U. B. and Culas, R. J. (2020). Climate Change and Farmers' Adaptation: Extension and Capacity Building of Smallholder Farmers in Sub-Saharan Africa," in Global Climate Change and Environmental Policy. Springer, pp. 379–410.
[29] Kassie, M. et al. (2013). Adoption of interrelated sustainable agricultural practices in smallholder systems: Evidence from rural Tanzania, Technological forecasting, and social change. Elsevier, 80(3), pp. 525–540.
[30] Kavale, S. & Kalola, J. (2017). Factors affecting successful implementation of government funded projects in technical institutions in Garissa County. International Journal of Sciences: Basic and Applied Research.
[31] Kimutai, K. E. (2019). Factors affecting tax compliance in the agricultural sector in Kenya: a case of horticultural farmers in Naivasha, Nakuru County. KESRA/JKUAT-Unpublished research project.
[32] Kogo, B. K., Kumar, L. & Koech, R. (2021). Climate change and variability in Kenya: a review of impacts on agriculture and food security. Environment, Development and Sustainability. Springer, 23(1), pp. 23–43.
[33] Larsen, J. K. et al. (2016). Factors affecting schedule delay, cost overrun, and quality level in public construction projects. Journal of management in engineering. American Society of Civil Engineers, 32(1), p. 4015032.
[34] Leahy, T. & Alinyo, F. (2018). Leading farmer projects and rural food security, Uganda, in Food Security for Rural Africa. Routledge, pp. 129–145.
[35] Lokuruka, M. N. (2020). Food and nutrition security in east Africa (Kenya, Uganda, and Tanzania): Status, challenges, and prospects. Food security in Africa. Intech Open London, UK.
[36] Mati, B. M. & Thomas, M. K. (2019). Overview of sugar industry in Kenya and prospects for production at the coast. Agricultural Sciences. Scientific Research Publishing, 10(11), pp. 1477–1485.
[37] Mayo, S. H. (2018). Factors Influencing Performance of Agricultural Projects: A Case of Bura Irrigation and Settlement, Tana River County, Kenya.
[38] Mogaka, B. O., Bett, H. K., & Karanja Ng'ang'a, S. (2021). Socioeconomic factors influencing the choice of climate-smart soil practices among farmers in western Kenya. Journal of Agriculture and Food Research, 5, 100168.
[39] Muhumuza, K. A. (2019). International Funding Mechanisms for Kenya's Big Four: The Case of Food Security. United States International University-Africa.
[40] Musembi, F. P. (2015) "No Title."
[41] Mutsotso, R. B., Sichangi, A. W. & Makokha, G. O. (2018). Spatial-temporal drought characterization in Kenya from 1987 to 2016." Advances in Remote Sensing.
[42] Nederhand, J., & Klijn, E. H. (2019). Stakeholder involvement in public–private partnerships: Its influence on the innovative character of projects and on project performance," Administration & Society. SAGE Publications Sage CA: Los Angeles, CA, 51(8), pp. 1200–1226.
[43] Norton, G. W., & Alwang, J. (2020). Changes in Agricultural Extension and Implications for Farmer Adoption of New Practices. Applied Economic Perspectives and Policy. Wiley Online Library, 42(1), pp. 8–20.
[44] Nyangwara, P. O. & Datche, E. (2015). Factors Affecting the Performance of Construction Projects: A Survey of Construction Projects in the Coastal Region of Kenya. International Journal of Scientific and Research Publications, 5(10), pp. 1–43.
[45] Okeyo, B., & Wamugi, S. M. (2018). Climate Change Effects and the Resulting Adaptation Strategies of Smallholder Farmers in Three Different Ecological Zones (Kilifi, Embu and Budalangi) in Kenya. Journal of Environment and Earth Science, www. iiste. org ISSN, pp. 2224–3216.
[46] Okumu, B. (2021). CCAFS impact assessment of national policy engagement in Kenya and livelihood impact of uptake of climate-smart agriculture technologies and practices-2021." CGIAR Reseach Program on Climate Change. Agriculture and Food Security.
[47] Patrick, E. M., Koge, J., Zwarts, E., Wesonga, J. M., Atela, J. O., Tonui, C., ... & Koomen, I. (2020). Climate-resilient horticulture for sustainable county development in Kenya. Wageningen Centre for Development Innovation.
[48] Phiri, B. (2015). Influence of monitoring and evaluation on project performance: A Case of African Virtual University, Kenya. University of Nairobi.
[49] Productivity, A., & Security, F. (2019). Climate Resilient Agribusiness for Tomorrow Promoting Climate Resilient Food Systems for Increased Agricultural Productivity and Food Security.

[50] Raj, S., & Garlapati, S. (2020). Extension and advisory services for climate-smart agriculture," in Global climate change: Resilient and smart agriculture. Springer, pp. 273–299.
[51] Shilomboleni, H. (2020). Political economy challenges for climate smart agriculture in Africa. Agriculture and Human Values. Springer, 37(4), pp. 1195–1206.
[52] Tuchitechi, H., & Lee, M. (2018). Factors Affecting the Performance of Agricultural Project from the Perspectives of Agriculture Extension Workers-A Case Study of Malawi," Journal of Agricultural Extension & Community Development, 25(2), pp. 111–120. doi: 10.12653/jecd.2018.25.2.0111.
[53] Waithera, S. L. & Wanyoike, D. M. (2015). Influence of project monitoring and evaluation on performance of youth funded agribusiness projects in Bahati Sub-County, Nakuru, Kenya," International Journal of Economics, Commerce and Management, 3(11), p. 375.