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RESOURCE ALLOCATION AND CLIMATE SMART AGRICULTURE IN LAIKIPIA COUNTY, KENYA

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ABSTRACT

Objective: The objective of this study was to determine how resource allocation influences climate-smart agriculture projects in Laikipia County, Kenya.

Theoretical Framework: Pareto Efficiency Theory states that at a certain level, it is not possible to utilize more resources to improve one party, without jeopardizing the other party. The study sought to heighten the level of food production to guarantee food security without threatening the environment.

Method: A concurrent mixed method approach that adopted the descriptive cross-sectional survey and correlational design was employed to study two World Bank-sponsored Kenya Climate Smart Agriculture projects. Stratified and Simple random sampling were employed to get a sample of 225 small-scale farmers and purposeful sampling identified four key informants. Data was collected using questionnaires and an interview guide and analyzed using descriptive, inferential, and content data analysis techniques.

Results and Discussion: The composite mean and standard deviation of the respondents' opinions on resource allocation were 3.52 and 1.143, respectively. The correlation coefficient of resource allocation and the performance of climate-smart agriculture projects was weak, with r=-0.220 and p-value p=0.000<0.05. Therefore, though resource allocation is a crucial factor in food production, judicious and effective resource allocation is critical to realizing the full potential of the projects.

Research Implications: Consequently, it is critical to have policies that promote the effective allocation of public and private goods to promote food production coupled with enhanced healthy ecology.

Originality/Value: This study contributes to the literature by providing reliable and triangulated empirical data through authentic methodology enhancing suitability for data generalisability and replicability. The relevance and value of this research is evidenced by the need to promote food security in a healthy ecology.

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ALOCAÇÃO DE RECURSOS E AGRICULTURA CLIMATICAMENTE INTELIGENTE NO CONDADO DE LAIKIPIA, QUÊNIA

RESUMO

Objetivo: O objetivo deste estudo foi determinar como a alocação de recursos influencia os projetos de agricultura climaticamente inteligente no Condado de Laikipia, Quênia.

Estrutura Teórica: A Teoria da Eficiência de Pareto afirma que, em um determinado nível, não é possível utilizar mais recursos para melhorar uma parte sem prejudicar a outra. O estudo buscou aumentar o nível de produção de alimentos para garantir a segurança alimentar sem ameaçar o meio ambiente.

Método: Uma abordagem de método misto simultâneo que adotou a pesquisa descritiva transversal e o projeto correlacional foi empregada para estudar dois projetos de agricultura inteligente climática do Quênia patrocinados pelo Banco Mundial. A amostragem aleatória estratificada e simples foi empregada para obter uma amostra de 225 pequenos agricultores e a amostragem intencional identificou quatro informantes-chave. Os dados foram coletados por meio de questionários e um guia de entrevista e analisados por meio de técnicas descritivas, inferenciais e de análise de dados de conteúdo.

Resultados e Discussão: A média composta e o desvio padrão das opiniões dos entrevistados sobre a alocação de recursos foram 3,52 e 1,143, respectivamente. O coeficiente de correlação entre a alocação de recursos e o desempenho de projetos agrícolas inteligentes em relação ao clima foi fraco, com r=-0,220 e valor p=0,000<0,05. Portanto, embora a alocação de recursos seja um fator crucial na produção de alimentos, a alocação criteriosa e eficaz de recursos é fundamental para a realização de todo o potencial dos projetos.

Implicações da Pesquisa: Consequentemente, é fundamental ter políticas que promovam a alocação eficaz de bens públicos e privados para promover a produção de alimentos aliada a uma ecologia saudável aprimorada.

Originalidade/Valor: Este estudo contribui para a literatura ao fornecer dados empíricos confiáveis e triangulados por meio de uma metodologia autêntica que aumenta a adequação para a generalização e replicabilidade dos dados. A relevância e o valor desta pesquisa são evidenciados pela necessidade de promover a segurança alimentar em uma ecologia saudável

Palavras-chave: Projetos de Agricultura Inteligente para o Clima, Planejamento de Capacidade, Projetos Agrícolas, Pequenos Agricultores, Ecologia Saudável.

ASIGNACIÓN DE RECURSOS Y AGRICULTURA CLIMÁTICAMENTE INTELIGENTE EN EL CONDADO DE LAIKIPIA, KENIA

RESUMEN

Objetivo: El objetivo de este estudio fue determinar cómo influye la asignación de recursos en los proyectos de agricultura climáticamente inteligente en el condado de Laikipia, Kenia.

Marco Teórico: La Teoría de la Eficiencia de Pareto establece que, a cierto nivel, no es posible utilizar más recursos para mejorar una parte, sin poner en peligro la otra. El estudio pretendía aumentar el nivel de producción de alimentos para garantizar la seguridad alimentaria sin poner en peligro el medio ambiente.

Método: Se empleó un enfoque de método mixto concurrente que adoptó la encuesta transversal descriptiva y el diseño correlacional para estudiar dos proyectos de agricultura climáticamente inteligente en Kenia patrocinados por el Banco Mundial. Se emplearon el muestreo aleatorio estratificado y el muestreo aleatorio simple para obtener una muestra de 225 pequeños agricultores, y el muestreo intencional permitió identificar a cuatro informantes clave. Los datos se recogieron mediante cuestionarios y una guía de entrevista, y se analizaron mediante técnicas de análisis de datos descriptivos, inferenciales y de contenido.

Resultados y Discusión: La media compuesta y la desviación típica de las opiniones de los encuestados sobre la asignación de recursos fueron 3,52 y 1,143, respectivamente. El coeficiente de correlación de la asignación de recursos y el rendimiento de los proyectos de agricultura climáticamente inteligente fue débil, con r=-0,220 y un valor p=0,000<0,05. Por lo tanto, aunque la asignación de recursos es un factor crucial en la producción de alimentos, una asignación de recursos juiciosa y eficaz es fundamental para aprovechar todo el potencial de los proyectos.

Implicaciones de la Investigación: En consecuencia, es fundamental contar con políticas que promuevan la asignación eficaz de bienes públicos y privados para fomentar la producción de alimentos junto con una ecología saludable mejorada.

Originalidad/Valor: Este estudio contribuye a la literatura proporcionando datos empíricos fiables y triangulados mediante una metodología auténtica que mejora la idoneidad para la generalizabilidad y replicabilidad de los datos. La pertinencia y el valor de esta investigación se ponen de manifiesto por la necesidad de promover la seguridad alimentaria en una ecología saludable

Palabras clave: Proyectos de Agricultura Climáticamente Inteligente, Planificación de Capacidades, Proyectos Agrícolas, Pequeños Agricultores, Ecología Saludable.

1 INTRODUCTION

Food production resources are scarce but, the needs are unlimited, this makes resource allocation a challenge. A study by Chen et al. (2021) found that employing factual policies would promote efficient resource allocation. However, in developing countries resource allocation is challenged by past misgivings. Irrigation systems since the colonial era remained underdeveloped contributing to water wastage in the agriculture sector (Bjornlund et al., 2020). The ineffective water use complicates water resource allocation and, by extension limits arable land. Consequently, complicating the concept of resource allocation further.

In Kenya, with colonization, the whites forcefully acquired Laikipia County and named it White Highlands, and in the post-independence, the Whites sold the land to the Government for reallocation (Ngutu et al., 2018). In the post-colonial era, the government sold or allocated the land to its cronies from adjacent counties who were not pastoralists (Mwangi et. al., 2020). Consequently, the land tenure has changed from communal land and large ranches to multiple individual parcels of 2 to 20-acre parcels, owned by small-scale farmers (GOK, 2019). This caused bad blood between the current and former African landowners, generating endless conflicts. A study by Mwangi et al. (2020) found that ethnicity, marginalization, lack of inclusivity, livelihood, climate change, and rapid change in agricultural patterns in the post-colonial era had impacted resource allocation in the county leading to conflicts in the county during the months of drought.

Moreover, variations of resource utilization in Laikipia County over time and climate change have shrunk the resources, while at the same time expanding the demand for resources. In addition, the National and County Governments have taken control of some of the resources that were formerly community-owned. Such resources include but, are not limited to livestock health, market, security, training, and ensuring rangeland carrying capacity is observed (Ameso et al., 2018). The Water Management Authority has been managing the water resource allocation through permits in Laikipia County (Lesrima et al., 2021). The government control over resource allocation disadvantages social and ecological justice (Gupta & Lebel, 2020), and Laikipia is not exceptional. Climate variation in the county is erratic, with wet and dry seasons in each consecutive year. On one hand, during the months of drought: agro-pastoral conflicts, human-wildlife conflicts, deaths, and socio-economic disruptions escalate.

Consequently, demand for the Government's response to the crisis with relief food and security operations. On the other hand, during the months of glut, after-harvest loss is experienced due to storage facilities deficiency and preservation technology. In addition, heavy rains cause floods, destroying food, life, and livelihood (Mwangi et al., 2020). Hence, there is need to identify a factual and sustainable resource allocation solution in Laikipia County.

The process of defining resource capacity lays a foundation for resource allocation, which entails the apportionment of resources to food security projects. Governments are working on policies to ensure the operative allocation of resources (Chen et al., 2021). This study will probe how land, water, technology, farm inputs, finances, and human capital would be dispensed to promote food security projects, brunt the edge of the climate crisis, and guarantee optimal food production, distribution, and consumption. The inquiry of the basis of allocation of resources to be checked against needs, equity, set policies, performance of the sectors, and responsiveness to the community needs. This is being cognizant of the fact that food security projects and other economic activities are competing for the same resources. Which by default are scarce and fluctuating.

Judicious policies are bound to correct misgivings in the resource allocation from the pre-colonial and colonial eras by scrupulous traders and colonialists respectively. The scrupulous traders before Kenya's colonization, invested in infrastructure along their trade routes while colonialists put up social services discriminately in areas where they had interests (Bjornlund et al., 2020). To promote equity in resource allocation, policies birthed from public participation are critical. The policies are also expected to guide effective and efficient resource procurement.

2 THEORETICAL FRAMEWORK

Pareto Efficiency Theory was developed by Pareto, V. in 1896. The economic theory states that at a certain level, it is impracticable to utilize more resources to improve one party, without jeopardizing the other party, as resources are scarce (Gayer et al., 2014). Pareto efficiency denotes that resources should be utilized in the most efficient method. This implies that resource utilization must not be based on equality or impartiality but on efficiency. This study agrees with this theory as judicious resource utilization planning by the food security projects and continuous ineffective monitoring guarantees the performance of the projects in a healthy ecology.

The theory converges with this study in that resources are limited and that resources allocated for one function cannot be allocated for the other. Hence, the need to improve efficiency. Therefore, resources allocated for food production ought not negatively affect the ecology. Nonetheless, this study diverges with the theory as it alludes that to a certain level, it is not possible to utilize resources without one party making the other party worse off.

This study pursues to seek how planning of resources, leads to effective allocation, that would guarantee the performance of the food security projects without necessarily having to harm the ecology. Hence, employing: strategy, technology and innovation, and optimal resources to ensure the performance of food security projects. Hence, employing agroforestry instead of deforestation, all-weather food production instead of weather-reliant agriculture, breaking down waste into biogas instead of releasing Greenhouse gas, improving crop varieties, and improved livestock breeds to promote efficiency in food production. Consequently, ensuring unmatched performance in food security projects in a sustainable healthy ecology.

Food production resources are scarce but the needs are unlimited, this makes resource allocation a challenge. A study by Chen et al. (2021) in China measured water resource allocation for industrial and food production. The study was differentiated from this study as the methodology was quasi-experiment, and the concept focused on policy entirely in water resource allocation and the context gap that exists as China is a developed country. Furthermore, the study found that employing factual policies would promote efficient resource allocation. However, in developing countries resource allocation is challenged by past misgivings. Irrigation systems since the colonial era remained underdeveloped contributing to water wastage in the agriculture sector (Bjornlundb et al., 2020). The ineffective water use complicates water resource allocation, consequently, limiting the arable land and the vicious cycle of food insecurity is initiated.

Getting closer home in Kenya, with colonization, the whites forcefully acquired Laikipia County and named it as White Highlands, and in post-independence, the Whites sold the land to the Government for reallocation (Ngutu et al., 2018). In the post-colonial era, the government sold or allocated the land to its cronies from adjacent counties who were not pastoralists (Mwangi et al., 2020). Consequently, the land tenure has changed from communal land and large ranches to multiple individual parcels of 2 to 20-acre parcels, owned by small-scale farmers (GOK, 2019). This caused bad blood between the current and former African landowners, generating endless conflicts. A study by Mwangi et al. (2020) measured resource allocation based on natural resources and livelihood. The study was differentiated from this study by the methodology as the study adopted a trend design over twelve years. Moreover, the study found that ethnicity, marginalization, lack of inclusivity, livelihood, climate change, and rapid change in agricultural patterns in the post-colonial era had impacted resource allocation in the county leading to amongst the cattle-rustlers, farmers, pastoralists, and wildlife in the county during the drought season.

Moreover, variations of resource utilization in Laikipia County over time and climate change have shrunk the resources, while at the same time expanding the demand for resources. In addition, the National and County Governments have taken control of some of the resources that were formerly community-owned. Such resources include but, are not limited to livestock health, market, security, training, and ensuring rangeland carrying capacity is observed (Ameso et al., 2018). Water Management Authority manages water resources through permits in Laikipia County (Lesrima et al., 2021). The government control over resource allocation disadvantages social and ecological justice (Gupta & Lebel, 2020), and Laikipia is not exceptional. Climate variation in the county is erratic, with wet and dry seasons in each consecutive year. On one hand, during the months of drought: agro-pastoral conflicts, human-wildlife conflicts, deaths, and socio-economic disruptions escalate. This demands Government's response to the crisis with relief food and security operations.

On the other hand, during the months of glut, after-harvest loss is experienced due to a deficiency of storage facility and preservation technology. In addition, heavy rains cause floods, destroying food, life, and livelihood (Mwangi et al., 2020). Hence, there is need to identify a factual and sustainable resource allocation solution in Laikipia County.

2.1 EMPERICAL LITERATURE

Resource allocation is an emotive factor, leading to scholars such as Adam Smith supporting the invisible hand, while Keynes advocated for the government's visible hand to avoid market failure. A study by Njora and Yilmaz (2021) noted the challenge in the government's visible hand in the resource allocation for food production. Though the study methodology and concept differentiated, the study from this study as descriptive research designs was used and the focus was on infrastructure. Overall, the study found that low public expenditure led to poor infrastructure and the dismal performance of food security projects. This was supported by Mahananda and Chittawadagi (2019) measuring food processing infrastructure in India. The study was distinguished from this study by methodology, context, and concept as it employed descriptive research design, India is more industrialized and focused on the allocation of food processing infrastructure alone.

Besides, the study found that though the Government of India had set up a food-processing fund, there was an infrastructure gap, leading to post-harvest loss.

However, technology promotes a visible and invisible hand in resource allocation. A study by Chen et al. (2023) measured the allocation of water resources for irrigation in Sanjiang Plain in China with 37 irrigation areas. Methodology, context, and concept differentiated the study as survey research design was employed, China is industrialized and the study measured water allocation alone. Besides, the study found that the optimization model promoted equity, and efficacy in soil and water utilization and reduced water pollutants. This was partly supported by Nasikh et al. (2021) who measured land utilization for agricultural production in Indonesia. Methodology, context, and content distinguished the study from this study. The study employed the survey research design, Indonesia is developed, and focused on land resources only. Besides, the study found that agricultural land resource allocation was based on farmers' capability. Therefore, the economic factor complicates resource allocation, moreover, it is further complicated by the ecological aspect, hence the need to focus on economic growth in tandem with a healthy ecology.

Over and above, the visible and invisible hand factors, other factors that come into play in resource allocation in food production are geographical and technological. The availability of resources was highlighted by a study by Luo et al. (2021) measuring agricultural water allocation, methodology context and concept differentiated the study from this study. The study employed the experiment research design and focused on water allocation to study China, an industrialized country. Besides, the study found that despite the spatial distribution of water resources having a strong relationship with food production, the variability of water quantities, and the geographical sources, affected water distribution. In addition, the availability of resources and extension services promoted the capacity of farmers to adjust. This was highlighted by a study by Awotide et al. (2022) that measured resource allocation in 32 communities in Mali. The study methodology differentiated the study from this study as it used a survey research design. Moreover, the study found that farmers with productive resources and skills adopted new technologies and this led to improved food production.

In addition, demand for resources differed based on planting structure and season patterns. Chen et al. (2020) measured land distribution in Ethiopia. The methodology and concept distinguished the study from this study, as the study employed an experiment and the study concept was land resources alone. Overall, the study found that land rentals reduced the imbalance in land distribution. Another view was highlighted by Rey et al. (2019) who investigated water resource allocation, and the performance of economic instruments. Methodology, context, and concept differentiated the study from this study as the study employed a case study, Europe is a developed continent, and measured water resources alone. Moreover, the study found, no resource allocation method is universally applicable. As a result, unique policies are needed at the regional level.

Therefore, policies prove useful in resource allocation to cushion food security projects that are marginalized due to size and demographic factors. The policies promote equitable resource allocation which is crucial for the performance of food security projects. A study by Rolston et al. (2017) measured local community participation in resource allocation decision-making. The study methodology was survey design, focused on water allocation and Ireland is a developed country, hence methodology, context, and concept differentiated the study from this study. Moreover, the study found that the bodies entrusted with water resource allocation failed to involve the willing farmers in their decision-making. This led to insufficient and unequal water allocation to the locals. Therefore, community involvement in decision-making highlights factors such as socio-cultural factors likely to be ignored under normal circumstances. A similar study by Gondo and Kolawole (2020) measured customs and policies in water access. It was distinguished from this study by methodology as it employed the survey design and multi-stage sampling and found that government institutions, controlled water resource allocation disregarding customary institutions. This denied the locals water rights and made water unaffordable. Hence, on the one hand, unsanctioned resource allocation and unregulated access to the resources may lead to a crisis. On the other hand, non-consultative regulation, through taxation limits the development of food security projects.

The findings are a pointer to the fact that astute resource allocation by the government through policies could protect agricultural productive land from invasion by urban areas and other competing land use. This would reserve productive land for food security projects (Vliet et al., 2017). In Africa, Latin America, and parts of undeveloped Asia with large populations had challenges in allocating capital for investment in crop and livestock insurance and community awareness. In addition, the lack of meteorological information negated the performance of food security projects, as they could not plan their food production activities. Hence, they reacted to situations instead of proactively leveraging opportunities and mitigating climatic risks. In Sub-Saharan Africa, financial and physical resources; infrastructure, quality farm inputs, water, and electricity are food security drivers. Failure by the governments to allocate them equitably and sufficiently is a deterrent to the performance of food security projects and ecology conservation (Totin et al, 2018). Despite the shortfalls in policies and governance in resource allocation, policies cushion and promote effective and efficient resource allocation.

Equitable allocation of resources promotes inclusivity and access to resources by all food security projects. In Tsavo, government institutions have catalyzed equitable water resource allocation (Oremo et al., 2019). In addition, land tenure policies and access to civil education by the farmers enhance alternative income. This discouraged land fragmentation and by extension improved the performance of food security projects, by ensuring that, land allocated to each food security project was tenable (Wekesa et al., 2018). Similarly, land allocation rights determine access to credit, consequently, the performance of food security projects (Njogu et al., 2018), implying that the land tenure system is crucial for the augmentation of food security projects. Therefore, policies that influence food security projects are critical for the optimal performance of food security projects.

The government has not fully implemented policies that impact food security. In Kenya, the fiscal allocation to the agricultural sector remains at only 2% against the Maputo agreement of 2003 recommendation. Hence, lack of funding has had a detrimental effect on irrigation infrastructure, the blue economy, and support services (Akuja & Kandagor, 2019). Rugiri and Njangiru (2018) studied resource allocation for water projects in Nyeri, the methodology and concept differed from this study as it employed a descriptive survey and investigated solely water resource allocation. However, it found that resource allocation significantly influenced project performance. Therefore, there is a critical need for the government to invest resources to support production activities. This was supported by a study by Omollo et al. (2017) measured resource allocation and sugar production. The study was differentiated from this study as it employed the descriptive research design. Moreover, the study found that the need for the government to allocate sugar companies money generated by the companies and paid to local authorities for infrastructure development in cane growing areas. The dismal financing of food security projects has negatively affected food production per unit of land, due to high poverty levels, unavailability of social services, and limited complementing revenue.

Untenable resource allocation in Laikipia County is evident. This may be due to inadequate policies or insufficient capacity to enforce the policies. This has led to farmers pumping water directly from the river for irrigation. The practice drains the water from the rivers, causing the pastoralists and wildlife downstream to be devoid of the precious resource. Consequently, pastoralists and wildlife move upstream in search of the precious resource.

Hence, inter-communal and human-wildlife conflicts, and the destruction of farms and crops (Mwangi et al., 2020). In addition, before colonialism Laikipia was predominantly pastoral land, with colonialism dispensation, Laikipia was largely Crown Land as it was greatly a section of White Highlands. In the post-colonial area, the land was acquired largely by elites who later divided the land among peasants for pollical mileage, also land buying companies, cooperatives, and Government schemes such as Million Acre land, Shirika, and Haraka (Gravesen & Kioko, 2019). This led to the influx of subsistent farmers in Laikipia displacing pastoralists. Consequently, the feeling of historical injustices in resource allocation and marginalization (Akiwumi, 1999). A scenario that has contributed to unending agro-pastoral and politically instigated conflicts which are a setback to the amplification of food security projects in the County.

3 MATERIALS AND METHOD

The main objective of this study was to examine whether resource allocation promotes climate-smart agriculture projects in Laikipia County, Kenya. The research question was: To what extent does resource allocation influence climate-smart agriculture projects in Laikipia County, Kenya? The concurrent multi-methodology approach was preferred to allow the collection of quantitative and qualitative data. Hence, a cross-sectional survey and correlational design were employed. This study unit of analysis was two World Bank-sponsored Climate-Smart Agriculture dam projects namely: the Kariunga-Mutirithia-Naibor project (Segera Ward) with 300 small-scale farmers and Ndathimi Dam project (Karaba ward), with 212 small-scale farmers respectively.

The study employed Yamane's (1967) formula to calculate the required sample size. Stratified and simple random sampling was used to determine 130 small-scale farmers from the Kariunga-Mutirithia-Naibor dam water project and 91 small-scale farmers from the Ndathimi Dam water project. Also, four key informants were purposefully sampled including the County Government official, the Ministry of Agriculture, the Livestock and Fisheries officer, and the two project managers. The questionnaires assisted in soliciting information from 203 small-scale farmers. The interview guide prompted the researcher while collecting information from the four key informants and the observation guide had questions that prompted the researcher in observing the projects.

4 RESULTS AND DISCUSSIONS

The study evaluated resource allocation against the Performance of Climate-Smart Agriculture Projects, as the predictor and dependent variable respectively. The assessment was conducted through, need-based, equity-driven, policy-based, performance-based, and responsive-based. Participants were entreated to register their opinion on a Likert scale weights of 1-5, where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 strongly agree. Table 1 presents the results after the analysis for frequency, percentages for each response, the item mean, and standard deviation.

Table 1

Resource Allocation and Performance of Climate Smart Agriculture Projects

Item	Statement	SD(1) F %	D(2) F %	N(3) F %	S(4) F %	SA(5) F %	TOTAL F %	M	SD
RA1	Existing production needs determine how resources are allocated	20 (9.9%)	16 (7.9%)	53 (26.1%)	71 (35.0)	43 (21.1%)	**203 100%**	**3.50**	**1.196**
RA2	Equity is a foundational factor on which resources are allocated.	11 (5.4%)	11 (5.4%)	50 (24.6%)	77 (37.9%)	54 (26.7%)	**203 100%**	**3.75**	**1.077**
RA3	Project rules and guidelines are adhered to while allocating resources.	15 (7.4%)	36 (17.7%)	52 (25.6%)	71 (35.0%)	29 (14.3%)	**203 100%**	**3.31**	**1.142**
RA4	Resources allocation is determined by the performance of different sub-projects.	12 (5.9%)	21 (10.3%)	58 (28.6%)	78 (38.4%)	34 (16.7%)	**203 100%**	**3.50**	**1.073**
RA5	Resource allocation is responsive to project members.	19 (9.4%)	21 (10.3%)	40 (19.7%)	74 (36.5%)	49 (24.1%)	**203 100%**	**3.56**	**1.227**
Composite mean and composite Standard Deviation								**3.52**	**1.143**

Results in Table 1 indicated five items designed to measure the degree of influence that resource allocation had on the Performance of Climate-Smart Agriculture Projects. A lower item mean compared to the composite mean translates to a negative opinion on the tested item, while a lower standard deviation compared to the composite standard deviation translates to respondents' convergence in opinion.

Statement RA1, existing production needs determined how resources were allocated, 20(9.9%) strongly disagreed, 16(7.9%) disagreed, 53(26.1%) were neutral, 71(35.0%) agreed, and 43(21.1%) strongly agreed, averaged to 3.50 versus 3.52 as the composite mean, meaning that resource allocation was moderately dependent on existing production needs. This supports the findings by Njora and Yilmaz (2021) that low public expenditure led to poor infrastructure that negatively affected the performance of food security projects. The item standard deviation of 1.143 versus 1.196 as composite standard deviation meant convergence of respondents' opinions. This supported the findings by Mahananda and Chittawadagi (2019) that though the Government of India had set food processing funds, there was an infrastructure gap, leading to post-harvest loss.

Statement RA2, equity was a foundational factor on which resources were allocated, 11(5.4%) strongly disagreed, 11(5.4%) disagreed, 50(24.6%) were neutral, 77(37.9%) agreed, 54(26.7) strongly agreed, averaged to 3.75 versus 3.52 as the composite mean, inferred that equity was considered in resource allocation. This supported Chen et al. (2023) who found that employing the optimization model promoted equity efficacy and equity in water allocation. Item standard deviation of 1.077 versus 1.196 as the composite standard deviation of meant respondents' converged in opinions. This supports Qian et al. (2020) who found that when comparing geographical location and financial resources as determinants of equity in the allocation of resources, geographical location was preferred.

Statement RA3, project rules, and guidelines were adhered to while allocating resources, 15(7.4%) strongly disagreed, 36(17.7%) disagreed, 52(25.6%) were neutral, 71(35.0%) agreed, and 29(14.3%) strongly agreed, averaged to 3.31 versus 3.52 as composite mean. This showed rules and guidelines were not adhered to when allocating resources. This contradicted Chen et al. (2020) who found that policy on land rentals reduced imbalance in land distribution. Item standard deviation of 1.142 versus 1.196 as composite standard deviation, highlighted that the recorded opinions had converged. This contradicted Rey et al. (2019) who found that voluntary agreements were effective in water resource allocation where markets and financial compensation were not feasible.

Statement RA4, resources allocation was determined by the performance of different sub-projects, 12(5.9%) strongly disagreed, 21(10.3%) disagreed, 58(28.6%) were neutral, 78(38.4%) agreed and 34(16.8%) strongly agreed, averaged to 3.50 versus 3.52 as composite mean, meant the performance of sub-projects did moderately determine resource allocations. This contradicted the findings by Mahananda and Chittawadagi (2019) who found that though the Government of India had set food processing funds, there was an infrastructure gap, leading to post-harvest loss. A line standard deviation of 1.073 versus 1.196 as a composite standard deviation indicated a convergence of respondents' opinions. This contradicted Omollo et al.

(2017) who found there was a need for the government to allocate taxes from sugar companies to develop and maintain infrastructure development in cane-growing areas.

Statement RA5, resource allocation was responsive to project members, 19(9.4%) strongly disagreed, 21(10.3%) disagreed, 40(19.7%) were neutral, 74(36.5%) agreed and 49(24.1%) strongly agreed, averaged to 3.56 versus 3.52 as composite mean showed that resource allocation for food security projects was responsive to their farming needs. This supported the finding by Rugiri and Njangiru (2018) who found that resource allocation was responsive to the farmers' need for production and influenced project performance. A line standard deviation of 1.227 versus 1.143 as a composite standard deviation showed that the opinions were divergent. This contradicted the findings by Nasikh et al. (2021) who found that resource allocation was based on farmers' capability and not demands.

During the interview with key informants, they had this to say.

> Resources at the Kariunga-Mutirithia-Naibor Dam Project and Ndathimi Dam project were effectively allocated. However, there never lacked dissenting voices as during the drought season water was required in greater demand and during drought water was scarce, above all, resources allocated as insecurity ranges was an effort in futility. (Respondent A)

> There was no single model by which resources are allocated at the Kariunga-Mutirithia-Naibor Dam Project and Ndathimi Dam project. Firstly, the project was the initiative of the County government and the development partner who identified the need and started the project. Secondly, the performance of the specific sub-projects determines resource allocation as some members had more resources and responsibilities than others. Therefore, there was a need to empower some farmers with training and credit to realize their potential. Thirdly, rules and regulations support resource allocation. Finally, insecurity, droughts, and lack of infrastructure threatened the projects. (Respondent B)

The researcher observed that resources had to be allocated based on the individual farmers' capacity to guarantee the project's sustainability. Hence, a commensurate amount of water was allocated to farmers with less land. In addition, though the project was responsive to their voice, stakeholder analysis was critical to determine their power and influence.

The interview and observation confirmed that members' responsiveness was critical in resource allocation at the Kariunga-Mutirithia-Naibor Dam Project and the Ndathimi Dam Project. However, the area was not secure for sustainable and productive projects due to the cattle rustling culture in the area. Hence, security was a priority in the area.

4.1 CORRELATION ANALYSIS BETWEEN RESOURCE ALLOCATION AND PERFORMANCE OF CLIMATE SMART AGRICULTURE PROJECTS ANALYSIS

To examine resource allocation's relationship with the Performance of Climate-Smart Agriculture Projects, Pearson's Correlation Coefficient was adopted to evaluate the association at a 0.05 level of significance. The values of correlational analysis range from negative one to positive one. Where positive one and negative one infer perfect-positive and perfect-negative correlation respectively, while zero implies no correlation. The modular values 0.001 to 0.250, 0.251 to 0.500, and 0.501 to 0.750 imply weak, moderately strong, and very strong correlations respectively. Table 2 details the correlation results.

Table 2

Correlation Analysis between Resource Allocation and Performance of Climate Smart Agriculture Projects Correlations

Variables		Resource Allocation	Performance of Climate Smart Agriculture Projects
Resource Allocation	Pearson Correlation	1	-0.220**
	Sig. (2-tailed)		0.002
	n	203	203
Performance of Climate Smart Agriculture Projects	Pearson Correlation	0.220**	1
	Sig. (2-tailed)	0.002	
	n	203	203

**Correlation was significant at 0.05 level of significant (2-tailed)

The results shown in Table 2 indicate a correlation coefficient of (r= -0.220) with a P-value of (p=0.002<0.05) for resource allocation and Performance of Climate Smart Agriculture Projects. Hence, the null hypothesis H0: resource allocation has no significant relationship with the Performance of Climate Smart Agriculture Projects was rejected. This supported the findings by Rugiri and Njangiru (2018) that resource allocation influenced food production projects' performance. Therefore, there was imperative need to allocate adequate resources to all food security projects to realize the full potential of such projects.

4.2 REGRESSION ANALYSIS OF RESOURCE ALLOCATION AND PERFORMANCE OF CLIMATE SMART AGRICULTURE PROJECTS

Demonstrating how capacity planning significantly predicted Performance of Climate Smart Agriculture Projects was the justification of employing the simple regression model.

4.2.1 Regression model

The following statistical model was used to test the null hypothesis.

Performance of Climate Smart Agriculture Projects = resource allocation

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon \qquad (1)$$

where:

Y = Performance of Climate Smart Agriculture Projects

X_1 = resource allocation

β_0 = Constant term

β_1 = Beta coefficient

ε = Error term

Table 3 presented the regression results.

Table 3

Regression Analysis on Resource Allocation and Performance of Climate Smart Agriculture Projects

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.220[a]	0.048	0.044	0.51094

ANOVA						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig**
1	**Regression**	2.663	1	2.663	10.199	0.002[b]
	Residual	52.474	201	0.261		
	Total	55.136	202			

Regression Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	3.370	0.175		19.236	0.000
	Resource Allocation	-0.155	0.049	-0.220	-3.194	0.002

Predictors: (constant), Resource Allocation
Dependent Variable: Performance of Climate Smart Agriculture Projects

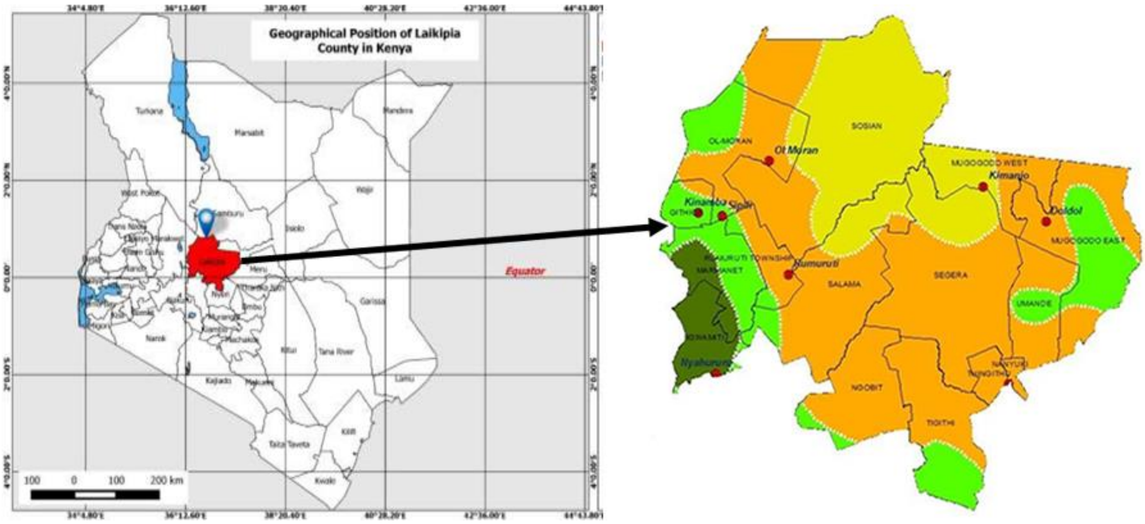
Table 3 presents the model summary, it indicates the presence of a negative correlation coefficient (r=-0.220), linking resource allocation and Performance of Climate Smart Agriculture Projects. The coefficient of determination R2 = 0.048, translated to 4.8% of total variations in the performance of small-scale food security projects farmers' was explained by resource allocation. The weak relationship supported the study by Luo, Zhang, Liu, Pan, and Guo (2021) that found that variability of water in terms of quantities and geographical sources, affected how water was distributed, while demand patterns differed based on planting structure.

Table 3 presents the ANOVA results, indicating that F statistics (1,201) = 0.199 was consequential at P-value 0.002 < 0.05. This implied predictor coefficient was at minimum not equal to zero and the regression model allowed prediction of the Performance of Climate Smart Agriculture Projects by resource allocation. This supported the study by Awotide et al. (2022) who found that skilled farmers allocated resources with efficacy.

The constant term's coefficient of (βo =3.370; P < 0.05), and resource allocation ($\beta 1$ = -0.155, P-value 0.002 < 0.05) were statistically negatively consequential. The accrued regression model was Y=3.370+(-0.155X1), indicating a unit of Performance of Climate Smart Agriculture Projects was negatively converted by 0.155 units. This supported Margareta et al. (2021) who found that bio-physical factors and finances were some of the external factors that influenced resource allocation. In the case of this study, insecurity and drought played a great role in resource allocation.

Figure 1

Map of Kenya and Laikipia County where the study was conducted



Source: (GOK., 2017).

5 CONCLUSIONS

Resource allocation was fundamental for the performance of climate-smart agriculture projects. However, resource allocation should be emphasized at national, county, and project levels. In addition, multi-stakeholder involvement would be critical in resource allocation, appreciating factors such as equity, inclusivity, and public needs responsiveness. Also, historical injustices and communities' cultural and economic activities should be respected in resource allocation. Resource allocation to agricultural projects is a complicated phenomenon as many factors come into play such as drought, resource scarcity, competing factors, conflicts that may escalate to insecurity, political factors, and socio-economic factors. The scarcity of resources may spur conflicts between human and human-wildlife resulting in ineffective food security projects. Therefore, there is a need for the government to put in place soft and hard infrastructure that would guarantee effective resource allocation in food security projects.

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