PROJECT MANAGEMENT PRACTICES, COMMUNITY CONSERVANCY APPROACH AND SUSTAINABILITY OF RANGELAND-BASED PROJECTS' BENEFITS IN NORTHERN KENYA

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DECLARATION

The research is my own work and has never been presented for examination of an award in another institution.

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I confirm as the supervisor that the work in this study was done by the student with my supervision.

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DEDICATION

I dedicate this endavour to my mother, Mrs. Koiyano Tarisha, and my late father, Mr. Lolongei Tarisha, for their unwavering support throughout my academic journey. Although neither of them had the opportunity to attend school, their deep commitment to ensuring that my siblings and I received a quality education has been a constant source of inspiration. Their sacrifices and encouragement continue to fuel my academic growth and personal development.

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Be blessed all

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ABBREVIATIONS AND ACRONYMS

ACIAR	Australian Center for International Agricultural Research
CBDWO	Community-Based Drinking Water Organizations
CIDPs	County Integrated Development Plans
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
DOI	Diffusion of innovation
FSIP	Food Sustainable Initiative Project
ICT	Information Communication and Technology
NACOSTI	National Commission for Science and Technology
NGOs	Non-governmental Organizations
PLS-SEM	Partial Least Squares Structural Equation Modeling
PMI	Project Management Institute
RBV	Resource Based View
SAIP	Sustainable Agricultural Intensification Programme
SPSS	Statistical Package for Social Sciences
USA	United States of America
GHE	Green House Emissions

OPERATIONAL DEFINITION OF TERMS

Project Management Practices	The utilization of procedures, methods, skills, knowledge, and expertise to achieve specific project objectives in alignment with the project acceptance criteria within defined parameters.
Project Design	This include formulating a project's objectives, framework, tasks, and deliverables, as well as establishing their definitions. Project managers conduct the design process prior to implementation to synchronize teams with project objectives.
Stakeholders Engagement	Fostering a mutual understanding and engagement in the project's decision-making process.
Laws and Regulations	These refer to the formal legal frameworks, policies, and administrative guidelines enacted by national or county governments that govern the use, management, and conservation of rangelands and natural resources.
Community Conservancy Approach	This refers to a locally-led conservation initiatives where communities collectively manage land and natural resources through legally registered conservancies. It emphasizes community ownership, benefit-sharing, governance structures and integration of traditional ecological knowledge to enhance conservation and livelihoods in rangeland ecosystems
Digital Inclusion	May refers to the equitable access to and effective use of digital technologies, tools, and resources by all stakeholders to ensure long-term viability, scalability, and resilience of project outcomes.

Sustainability of Rangeland-Based Projects' Benefits	This denotes the long-term continuation and resilience of positive outcomes—such as improved livelihoods, biodiversity conservation, and ecosystem services—resulting from rangeland-based projects. Sustainability in this context includes economic, ecological, and social dimensions, ensuring that benefits persist beyond donor or government support in the arid and semi-arid regions of Northern Kenya
Food Nutrition Security	This scenario occurs when all individuals have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary requirements and preferences for an active and healthy life.

ABSTRACT

Despite global efforts to address climate-induced challenges through transparent and accountable interventions, Community rangeland conservation projects in Kenya continue to face persistent challenges, including non-participatory and donor driven designing, limited stakeholder engagement, inadequate awareness of restoration best practices, insufficient financial resources, insufficient rangeland management policies in place, and poor coordination among key stakeholders. These constraints continue to undermine the sustainability of benefits derived from these projects to the local communities therefore fails to make any significant impact. This study examined how project management practices influence the sustainability of community rangeland conservation project benefits in Northern Kenya. Specifically, the study assessed the effects of project design, stakeholder engagement, law and regulations, and digital knowledge inclusion, and further determined the moderating role of the Community Conservancy approach. The study adopted a descriptive research design targeting households across five community conservancies in Marsabit, Isiolo, and Samburu counties. A sample of 451 respondents was selected using proportionate stratified random sampling, and 369 valid responses were obtained, representing an 81.82% response rate. Primary data were collected through structured questionnaires whose validity was verified through content, construct, and criterion checks, while reliability was confirmed using Cronbach's alpha coefficients. Prior to regression analysis, statistical assumptions, including normality, multicollinearity, linearity, and homoscedasticity, were tested to ensure model adequacy. Data were analyzed using descriptive statistics (means and standard deviations) and inferential statistics, including correlation and multiple linear regression. Qualitative responses were analyzed through content analysis. The findings revealed that project design, stakeholder engagement, legal and regulatory compliance, and digital knowledge inclusion all had positive and significant effects on the sustainability of rangeland-based project benefits. The Community Conservancy approach significantly moderated the relationship between project management practices and sustainability outcomes. The study concludes that strengthening project management practices, particularly participatory design, inclusive stakeholder engagement, and community-driven governance enhances long-term projects sustainability. It recommends improving project design processes, broadening stakeholder involvement, enforcing legal frameworks, expanding digital infrastructure, and institutionalizing conservancy-based management structures.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

This study focuses on the growing significance of sustaining benefits derived from projects across various sectors, particularly in community-based conservation projects. The concept of sustainability in project management has garnered significant acknowledgment and relevance due to heightened demands on both for-profit and non-profit entities to broaden their project performance metrics from solely economic outcomes for shareholders to sustainability outcomes for all stakeholders (Aarseth, Ahola, Aaltonen, Okland & Andersen, 2017). Silvius and Schipper (2020) assert that project managers must assume responsibility for project results, including sustainability initiatives, by proficiently executing project management procedures and judiciously utilizing resources. Consequently, managing sustainability initiatives pertains to utilizing programs to facilitate future changes.

Globally, development agencies advocate for capacity enhancement, the establishment of robust community development frameworks, and the facilitation of active involvement in project management (Haavaldsen, Laedre, Volden & Lohne, 2019). In the US, trillions of dollars have been allocated to public sector initiatives; yet, the failure rates of these projects surpass the success rates (Serrador & Pinto, 2022). In the UK, two-thirds of public projects exceeded their budgets and were not completed on schedule (Thomson & El-Haram, 2022). Consequently, it demonstrates that there is an increased necessity for project managers to concentrate on the triple constraint criteria (time, money, and quality) to evaluate the sustainability of their initiatives.

Silvius (2017) notes that project sustainability is a significant concern for numerous community-based organizations. In developing nations, numerous projects fail to

provide long-term benefits to communities. In Nigeria, Ademiluyi and Odugbesan (2021) demonstrated a deficiency in the sustainability of community water supply and sanitation programs regarding service delivery and maintenance of services. Consequently, effective solutions for the sustainability of community-based programs in developing countries like Nigeria should be grounded in a comprehensive understanding of the prevailing issues, the potential beneficial outcomes, and the determinants of sustainability.

Community development programs in Kenya are prevalent in many counties, engaging in diverse efforts across multiple sectors. According to Kaimenyi, (2019), the success rates of different community-based development projects not only depend on mobilization of resources but also, in large extent, on involvement of the local communities in the project life-cyle. Agosa (2022) attributes the failure of community-based projects in Kenya to issues concerning project design, methodologies, and the tools employed. The project possesses distinct objectives, quantifiable criteria, and established cost and timeline. Consequently, the project's constrained timeline restricts both its scope and available resources.

Community-based rangelands projects in Kenya have emerged as crucial initiatives to address the challenges facing rangeland ecosystems and pastoralist communities. Historically, Kenya's rangelands have been vital for livestock production and wildlife conservation, but they face increasing threats from land degradation, climate change, and unsustainable land use practices (Sindiga et al., 2017). Community-based approaches, involving collaboration between local communities, governmental organizations, and non-governmental organizations, aim to empower communities in rangeland management projects while promoting biodiversity conservation and sustainable livelihoods. However, despite their potential benefits, these projects often

face significant gaps in project management techniques and sustainability. Gaps include limited institutional capacity, inadequate stakeholder participation, weak governance structures, and insufficient long-term funding mechanisms, which hinder their effectiveness and long-term viability (Mwangi et al., 2016). These challenges highlight the need for improved project management strategies and enhanced sustainability measures to ensure the success and resilience of community-based rangelands projects in Kenya.

1.1.1 Project Management Practices

Project management practice entails the application of procedures, methods, skills, knowledge, and experience to achieve specific project objectives in alignment with acceptance criteria and within defined constraints (Mir & Pinnington, 2019). Ling, Low, Wang, and Lim (2022) note that project management methods encompass the planning and organizing of a company's resources to advance a specified job, event, or responsibility toward completion. Moreover, these techniques may encompass a singular project or a continuous endeavor, with managed resources including labor, funds, technology, and intellectual property. In this study, project management practices were focusing on four dimensions including; project design, stakeholders' engagement, Laws and Regulations, and digital knowledge inclusion where each dimension had a specific indicator that measure how well the practices are implemented.

Project design is the initiation stage of a project where essential features, structure, measure for success, and major deliverable of the project are planned out. The design of a project lay down the fundamental's basis and general overview of the project. Scope determinations, budget planning and quality control standards are some of the critical activities to consider while designing any project. Different studies have been

carried out on project design with different findings. Study by Hussein Ndonye (2022), indicates that inclusion of scope determination in project design activities had a significant influence on the performance of Community-Based conservation projects in Laikipia County. There is need however to understand how scope determination influences sustainability of benefits derived from various conservation projects. Budget planning on the other hand is acritical activity in project design that is aimed to control project costs through identifying all potential project expenditures, allocating funds accordingly, and tracking actual spending against the planned budget. Studies by Dobrovolskiene & Tamosiuniene, 2016 and Kudratova, S., Huang and Zhou (2018) pointed out that effective budget planning underpins project success. Lomax et al. 2022 highlighted that underfunded conservation projects often fail to achieve sustainability thus resulting to unstained benefits to the local beneficiaries. On the other hand, quality control standards are crucial in the project design stage as they ensure that the project's deliverables meet predefined criteria and quality, leading to successful outcomes. Project Management Body of Knowledge (PMBOK) emphasizes that Project design shall involve setting clear standards, regular monitoring, and thorough evaluation framework which will help in maintaining consistency and reliability throughout the project lifecycle. According to Brown et al. (2021), these standards improve project outcomes and ensure accountability.

Stakeholders in rangelands-based projects encompass individuals or groups who are directly or indirectly impacted by the project's existence, success, or failures. Involving stakeholders guarantees that project plans accurately represent the genuine needs and objectives of beneficiaries, fostering a climate of trust by amplifying stakeholder voices and acknowledging their concerns (Bell, Morse & Shah, 2019). Kerkhof, M., & Wieczorek (2023) contend that stakeholder engagement allows organizations to

proactively respond to the needs and aspirations of all individuals affected by their project activities, thereby fostering relationships, trust, confidence, and support for the project's core objectives. Thus, the active involvement of stakeholders mitigates potential risks and conflicts with stakeholder groups, including uncertainty, dissatisfaction, misalignment, disengagement, miscommunication, and resistance to change. To guarantee significant stakeholder engagement in the project, clear communication and feedback are essential; transparent communication channels foster trust and collaboration among stakeholders. The study by Wright et al. (2023) emphasizes the significance of iterative feedback loops in involving project stakeholders.

The lack of land tenure security for pastoralist communities in Northern Kenya has been a major problem, frequently brought on by a lack of legislative and policy attention. Communities may be discouraged from investing in sustainable land management projects as a result of this uncertainty. In order to solve this issue, a progressive move was taken in 2016 with the passage of the Community Land Act (CLA). By giving communities, a legal framework for managing and registering their common lands, the CLA improves the security of land tenure and gives communities more authority

digital knowledge Inclusion includes not only Internet connection but also the provision of hardware and software, pertinent content and services, and training in the digital literacy skills necessary for the optimal utilization of information and communication technology (Alamelu, 2019). Serrano-Santoyo and Rojas-Mendizabal (2021) assert that the adoption of digital knowledge is crucial in project management, given the increased challenges presented by today's technology-driven work environment, where technological tools are commonly utilized for communication, collaboration, and the implementation of project management practices.

1.1.2 Rangeland-based projects in Northern Kenya

According to the Kenya Rangelands Assessment and Monitoring Service Report by the National Drought Management Authority, NDMA (2023), Kenyan rangelands cover 80% of the country and account for 90% of all employment opportunities and 95% of household income. About three-quarter of Kenya's livestock and crop-livestock farmers and pastoralists depend on rangelands to sustain their economic livelihoods. Rangelands not only serves the people who make their livings from it, but also serves as a critical biodiversity ecosystem, hosting a diverse species of flora and fauna such as wildlife that are central to tourism, the country's principal earner of foreign exchange. In addition to these notable achievements, the Kenyan rangelands, particularly the Arid and Semi-arid Lands (ASALs), remain underdeveloped. The Range Management & Pastoralism Strategy (2021) indicates that rangelands regions are marked by significant levels of poverty and malnutrition, necessitating regular relief support. The situation has deteriorated due to the growing human population, resulting in the reduction of rangeland resources and rural-urban migration in pursuit of alternate livelihoods.

In recent decades, the productivity of Northern Kenya's rangelands has faced significant threats due to climate change and variability, particularly frequent droughts and floods, along with land degradation and biodiversity loss, jeopardizing the sustainability of these resources (Galvin, 2021). These challenges have created urgent economic and environmental issues that must be addressed to protect the well-being of communities, especially pastoralists. Therefore, immediate actions and interventions are necessary to safeguard rangeland resources and promote their sustainable use.

As in other parts of Kenya, both national and county governments are accountable for the policies, commitments, and objectives related to the advancement of rangeland management and restoration initiatives in Northern Kenya. Moreover, non-state entities

involved in rangeland restoration and management, including Civil Society Organizations, NGOs, development partners, and research institutions, play a pivotal role in supporting county and national governments by executing various rangeland restoration initiatives and aiding in the formulation of rangeland resource management policies, revising existing frameworks, and integrating restoration objectives and resources into the County Integrated Development Plans (CIDPs). To enhance rangelands resilience, a study by Robinson et al., 2022-pointed out implementation of community-based conservation programs and sustainable grazing practices can lead to a balance between ecological health and economic needs of the local communities. According to the Northern Rangelands Trust annual report, NRT 2023; rangelands-based projects established in most parts of the Northern Kenya region are generally classified under three main categories namely, traditional grazing model, grassland carbon model, and lands restoration model.

However, it is imperative to note that, far too little effort has been put into establishing sustainability mechanisms of management practices employed in running rangeland-based projects through integrating traditional grazing systems with modern models such as carbon trading and land restoration practices. This study sought to examine different rangeland-based projects implemented by Community Conservancies in Northern Kenya and determine the effects of management practices employed on sustaining the benefits gained by the local communities. Rather than focusing solely on formal management structures, a common approach in similar studies, this research adopts a more comprehensive perspective by analyzing sustainability through the lens of the tangible and intangible benefits derived by communities from these projects.

1.1.3 Community-Based Conservation in Northern Kenya

Globally, Various methodologies for conservation programs within community set up are referred with different terminologies, including community-based conservation (CBC), community-based natural resource management (CBNRM), integrated conservation and development projects (ICDPs), community-based ecotourism (CBET), and joint or collaborative management (Barrow and Murphree 2001; Hughes and Flintan 2001). Whichever the approach used or referred as, the general goal and objectives of community conservation largely remain the same.

Ideally, In Kenya, conservancies refer to institutions established on a private or communal land for governing and managing wildlife, Wildlife Conservation & Management Act (2013). Therefore, community conservancies are described as land conserved by a community for wildlife protection and other sustainable land uses aimed at improving community livelihoods.

In Northern Kenya, Community conservancies have been adopted as one of the methods to protect wildlife as more than 65% of wildlife in Kenya lives outside the protected areas (National parks and reserves). A study by Wairimu and Rene Van et al (2021), indicates that, through community-based tourism enterprises in Laikipia, communities are able to benefit from improved land and resource rights and access to incentives like improved and more sustainable grazing planning, eco-tourism and associated benefits channeled to community development projects e.g. increased access to education through establishment of infrastructure, bursary kitties and improved health facilities. The adoption of the conservancies is also expected to help the communities to develop resilient livelihoods by improving the ability of communities to mitigate, adapt to and recover from climate-induced shocks and stresses, and the ability of rangeland

ecosystems to resist and recover from drought and long-term climate stress through better management. In Northern Kenya, a number of rangelands-based projects have been initiated and implemented by different community conservancies creating a number of job opportunities, providing several social services to the local communities and safeguarded population of wildlife species. (State of conservancy report, NRT 2022). In this study, these projects have been broadly categorized as; traditional grazing systems, rangelands restoration initiatives and grassland carbon projects.

1.1.3.1 Traditional Grazing Regimes (Dedha of the Borana Ethnic Community)

Traditional grazing regime such as the Dedha Grazing system practiced in Kenya and Ethiopia by the Borana ethnic tribe; is a cultural-based rangelands governance system for land, water, pasture and livestock movement management. The grazing system relies on a careful equilibrium among livestock population, accessible water sources, and the quantity and quality of standing pasture across extensive grazing regions susceptible to severe seasonal fluctuations. The primary principle of regulating grazing patterns (wet and dry season grazing areas and drought reserves) is determined in extensive herders' assemblies, attended by elders from a specific "Dedha" (a grazing unit), which can encompass up to two administrative wards. This system is embedded on indigenous knowledge and cultural traditions, with herders relying on communal grazing lands and traditional governance institutions to manage and sustainably use the rangeland resources (Homewood et al., 2019).

Research by Oba et al. (2014) highlights the resilience of the Dedha grazing system to environmental variability and its contribution to biodiversity conservation and ecosystem services. However, challenges such as land fragmentation, population pressure, and climate change; pose a significance threat to the sustainability of

rangelands projects founded on such traditional practices in the Northern Kenya region (Homewood et al., 2019).

1.1.3.1 Rangelands Restoration Initiatives

Different rangelands restoration interventions are being implemented in Northern Kenya by communities with supports from different local and international NGOs, government agencies and development partners; all aimed to address land degradation and restore ecosystem functions through various measures, including soil conservation, re-seeding with native grass species, and water catchment management (Western et al., 2015). Studies by Said et al. (2017) have documented the effectiveness of restoration initiatives, such as terracing and reforestation in improving soil fertility, enhancing water retention, and increasing vegetation cover.

However, challenges related to funding constraints, technical capacity gaps, and limited stakeholder and community participation has been reported in the implementation of rangelands restoration projects (Western et al., 2015). Furthermore, the sustainability of restoration efforts depends on factors such as land tenure security, institutional support, and stakeholder engagement (Homewood et al., 2019).

1.1.3.3 Grasslands Carbon Projects

In recent years, Carbon credits business has largely been pushed as a nature-based solution to climate change and has gained huge attention with its discussions dominating major world conferences and conventions such as Conference of Parties (CoP) of the United Nations. As a result, different carbon credits initiatives are currently being implemented or under development in many rangelands across Africa. In Northern Kenya rangelands for instance, grasslands-based carbon project is one of such initiatives being promoted as means to enhance carbon sequestration in rangeland

ecosystems as well as an alternative income generating streams for the local pastrolist communities. Covering twenty-two community conservancies in counties of Isiolo, Samburu, Marsabit and Laikipia, Northern Rangelands Trust (NRT), boost of implementing world's largest fully validated and varied soil carbon offsetting program called Northern Kenya Rangelands Carbon Project (NKRCP) intended at conserving grasslands and improving carbon stocks by removing 50 million tons of carbon-dioxide from the atmosphere in 30 years. (Verra, 2024).

Research by Thornton et al. (2019) highlights the potential of grasslands carbon projects to generate additional income for local communities through carbon credit sales while promoting sustainable rangeland management practices. However, challenges such as complex carbon accounting methodologies, transparency, land tenure issues, and market uncertainties pose barriers to the scalability and viability of grasslands carbon initiatives in the region. A study by S. Counsell, (2023), pointed out lack of empirical evidence that NKRCP results in real, credible and permanent additional storage of carbon as well as unclear legal framework for the model therefore raising concerns of sustainability of rangelands projects under this program.

1.2 Comparative Analysis of Rangeland-based Conservation Projects Types

Different rangeland-based projects are designed in relations to different focus areas and therefore may appear differently on their aspect of management structures, visions, land use, community involvement, livelihood impact, environmental impact and sustainability approaches. The table below summarizes comparative analysis of the four types of rangeland-based projects against different aspect.

Table 1.1: Comparative Analysis of Rangeland-based Conservation Projects Types

Aspect	Traditional Grazing Related Projects	Rangelands Rehabilitation Related Projects	Grasslands Carbon Related Projects
Governance Structure	Informally governed by customary institutions and traditional leaders within local communities.	Often implemented by NGOs and government agencies in collaboration with local communities.	Led by local NGOs as project developers and local communities as implementers and private sector entities as carbon offset credits marketers.
Mission, goals and objectives	Sustainable livestock production. Water and pasture sustainable use. Cultural preservation.	Restoration of degraded rangelands. Soil conservation. Improved water retention and availability.	Carbon sequestration and mitigation of greenhouse gas emissions. Source of income for communities' development programs
Land Use Management	Seasonal mobility of herds. Open access to grazing areas. Community elders structured decision making	Soil erosion control measures. Re-seeding with native grass species. Water catchment structures.	Adoption of carbon-friendly land management practices. Controlled livestock movements
Community Participation	Central role of traditional institutions. Limited external involvement. Elders-centred with limited women and youth involvements	Collaboration between government agencies, NGOs, and local communities. Majorly externally driven	Consultation with landowners and communities. Limited understanding of its methodologies by local communities
Livelihood Impact	Traditional pastoral livelihoods maintained. Cultural identity preserved.	Improved livestock productivity. Enhanced access to water and forage resources. Job creation in restoration activities.	Potential for alternative income streams (e.g., carbon credit sales). Balancing between livestock numbers and grazing zones.
Environmental Impact	Moderate impact on vegetation and soil due to extensive grazing. Possible degradation in heavily grazed areas.	Improved soil fertility. Increased vegetation cover. Enhanced water retention.	Carbon sequestration. Enhanced soil carbon storage. Reduced deforestation and land degradation.
Economic Viability	Traditional livestock production maintained. Limited market opportunities.	Initial investment costs. Potential long-term benefits from improved ecosystem services.	Revenue from carbon credit sales. Financial incentives for landowners.

		Improved Livestock production	
Monitoring and Evaluation	Traditional ecological knowledge. Informal monitoring by communities through elders.	Measurement of vegetation covers, soil erosion rates, and water availability.	Monitoring of carbon stocks, emission reductions, and project outcomes.
Sustainability	External factors interference threatening cultural preservation	Dependent on external donors. Majorly external driven. Limited local community ownership	Limited regulations policies poses threats of uncertainties. Complexity of methodologies limits participation and local ownerships
Challenges and Limitations	Limited access to veterinary services and market infrastructure. External influence and interferences	Funding constraints. Technical capacity gaps. Resistance to change in land use practices.	Complex carbon accounting methodologies. Uncertainty in carbon pricing. Land tenure issues.

This research aimed to understand the influence of project management practices (independent variables); project design, stakeholder engagement, Laws and Regulations and digital knowledge Inclusion on the sustainability (dependent variable) of rangelands-based conservation projects benefits under the above models. Community Conservancy Approach (moderating variable) determined the strength or direction of the link between independent and dependent variables.

1.2.1 Sustainability of Rangeland-based Projects Benefits

A project sustainability process guarantees that the relevant issues, objectives, and performance benchmarks are recognized and establishes a moral framework that forms the basis for the development of guidelines and rules of behavior. Together with considering the achieved results, it also holds continuing discussions and consultations with relevant parties (Toljaga-Nikolic, Todorovic & Dobrota, 2020). Marnewick (2022) observe that, to ensure that project sustainability goals are traceable and aligned with societal goals and objectives; the project sustainability management process is designed

to tailor sustainable development project goals and indicators to local conditions and priorities. Thus, the objective of developing and effectively implementing a project that can continue to produce benefits for a considerable amount of time is project sustainability. In this research, project sustainability was measured in terms of Improved Rangelands Productivity, enhanced household food security and Improved Household and Institutional Adaptive Capacity.

Cherepovitsyn, Tsvetkova, and Komendantova (2020) assert that a sustainable project must possess an organizational framework delineating roles, responsibilities, and obligations. This will streamline project management and improve its sustainability. Oke (2022) asserts that the project sustainability management process aims to tailor sustainable development project goals and indicators to local conditions and priorities, ensuring alignment and traceability of project sustainability goals with societal objectives. Therefore, the capability to manage project properly is important because it helps every part of the project run more efficiently and effectively.

Kivila, Martinsuo, and Vuorinen (2017) assert that a project is deemed sustainable when it allows for flaw rectification, accommodates additional requirements, facilitates future maintenance, and adapts to environmental changes. Chew, Conejos, and Asmone (2017) assert that project managers must establish cross-functional teams that encompass maintenance, schedule meetings focused on manageability, and implement specialized project design reviews for maintainability. Consequently, attaining project maintainability goals will enable project managers and their organizations to ascertain the project's effectiveness.

Adaptive capacity is the ability of households or social institutions to cope with the unexpected demands due to changing circumstances. Being adaptable means actively

seeking ways to improve and refine our project management approaches (Andrade & Bragança, 2019). Manewa, Siriwardena, Ross and Madanayake (2022) observe that effective communication is another crucial aspect of adaptability. As a project manager, you need to be able to communicate clearly and effectively with stakeholders, team members, and clients. This entails attentively considering their needs and concerns, remaining receptive to input, and modifying your communication style to accommodate various personalities and contexts. Thus, a sustainable project must be adaptable and capable of integrating into any evolving environment or system component.

Mathew, Gantait, and Swamy (2017) contend that community-based watershed initiatives in India neglected the disparities in ownership rights, labor division, and income between men and women. They emphasize that genuine participation of women transcends mere numerical representation, encompassing their capacity to articulate their distinct needs and values. Shukla and Sinclair (2022) assert that facilitating women's participation frequently necessitates surmounting challenges, including a prevalent deficiency in formal education among women. The significance of empowering women has been recognized in conservation initiatives across several contexts. Enhanced gender equity benefits not only women but also fosters collaboration, solidarity, and conflict resolution.

Owusu (2020) notes that the sustainability of the community-based conservation project for local management of the Afadjato and Agumatsa Conservation Area in Ghana is attained by engaging local residents in all management aspects, enabling them to comprehend achievable outcomes and thereby securing their support under diverse conditions. Robinson and Sasu (2022) note that a meticulously devised management approach, which ensures comprehensive involvement of local populations, will

improve the conservation of the area's natural resources, potentially benefiting neighboring communities in the Hohoe District of Ghana.

1.3 Statement of the Problem

Although, every project is subject to its own set of performance requirements due to their unique value, size and complexity; projects sustainability continues to be the most constraints encountered after their implementations as influenced by a wide range of factors, all linked to an organizational system such as the lack of setting of clear objectives, poor project designs and plans, numerous changes and incomplete control measures (Aksorn & Charoenngam, 2020). This particular challenge is even more pronounced in rangelands-based projects especially within community set ups. Roba and Oba (2021) indicate that land use in Kenya is generally changing; for instance, factors such as increased human population, resource-based conflicts and impact of climate change continue to exacerbate reduction of rangelands productivity different drylands regions of Kenya. Land worked by pastoralists is being subdivided among members or has been converted into community conservancies.

Although there is increasing recognition of the importance of community conservancies for integrating traditional grazing regimes, land restoration initiatives and grasslands carbon offsetting as models upon which rangelands-based projects for protecting biodiversity, managing livestock and pastures, restoring degraded landscapes, and accelerating funding access by communities are being established, many of these projects continue to face mismanagement issues resulting to inability to achieve sustainable conservation and developmental goals. Macharia and Ekaya (2023) observes that rangelands-based conservation projects in Kenya are affected by factors such as low technical capacity, over-dependent on a limited donor funding, insignificant stakeholders and community participation, lack of synergy among different

stakeholders and partners involved in these projects as well as lack of clear policies and regulations or lack of implementations and enforcement thereof. Rangelands-based conservation projects also faced with challenges related to good governance as most of them are govern by committees elected by the local communities whom in most cases are illiterate and therefore lacks the necessary leadership and management skills required to stir these projects towards stability and sustainability.

Gender equality and social inclusion is also a critical consideration in sustainably managing rangelands conservation projects. A study by Mugambi M (2022) however, observed that women were not only underrepresented in all community-based conservation programs in Maasai Mara landscape but also receives less benefits from payments of ecosystems incomes as compared to men therefore revealing a challenge on gender and social inclusion. Another study by J Mburu (2017) pointed out the imperative need of the rangelands projects to adjust to the disturbances in order to cope with changing environments and maintains their success.

Research by Gatumi (2022) on project management practices and the sustainability of food security initiatives in Kenya's Arid Lands demonstrated that project leadership, stakeholder engagement, project monitoring and evaluation, and capacity-building strategies significantly impacted the sustainability of food security projects. This research, however, only focused on food security projects creating a knowledge gap in sustainability effects of management practices on rangelands-based conservation projects. Failing to address sustainability threats facing rangeland-based projects will lead to continued degradation and potential loss of rangelands productivity affecting livelihoods of the pastoralist communities in Northern Kenya.

This research, therefore, seeks to investigate the influence of project design, stakeholder engagement, Laws and Regulations, and digital knowledge Inclusion on the sustainability of community-based rangelands conservation projects focusing on the five selected community conservancies in the counties of Isiolo, Samburu and Marsabit.

1.4 Objectives of the Study

This research was dictated by the general and specific objectives as follows.

1.4.1 General Objective

The general objective of this research was to investigate the influence of project management practices, moderating effect of Community Conservancy Approach on the sustainability of rangelands-based projects benefits in Northern Kenya.

1.4.2 Specific Objectives

The research was underpinned by the subsequent specific objectives.

i. To ascertain the influence of project design on sustainability of rangeland-based projects benefits in Northern Kenya.
ii. To establish the effect of stakeholders' engagement on sustainability of rangeland-based projects benefits in Northern Kenya
iii. To assess the influence of Laws and Regulations on sustainability of rangeland -based rangelands conservation projects benefit in in Northern Kenya.
iv. To evaluate the relevancy of digital knowledge Inclusion on sustainability of rangeland -based rangelands conservation projects benefit in in Northern Kenya.

v. To ascertain the moderating influence of Community Conservancy approach on the connection between project management practices and sustainability of rangeland-based projects benefits in in Northern Kenya.

1.5 Research Hypothesis

The research sought to test to the subsequent hypothesis;

H_{01}: Project design has no significant effect on the sustainability of rangeland-based projects benefit in Northern Kenya.

H_{02}: stakeholder engagement has no significant effect on the sustainability of rangeland-based projects benefit in Northern Kenya.

H_{03}: Laws and regulations have no significant effect on the sustainability of rangeland-based projects benefit in Northern Kenya.

H_{04}: digital knowledge Inclusion has no significant effect on sustainability of rangeland-based projects benefit in Northern Kenya.

H_{05}: Community Conservancy approach has no moderating effect on the relationship between project management practices and sustainability of rangeland-based projects benefit in Northern Kenya.

1.6 Significance of the Study

The study is significant to the relevant departments in the reference counties and local organizations in understanding how Stakeholders Engagement, budget planning, resource allocation and digital knowledge Inclusion influences adaptability and sustainability of community-based conservation projects in arid and semi-arid rangelands of Northern Kenya. The study findings will provide research-based information to help inform the relevant government agencies and policy makers when formulating policies and regulations, local organization when designing sustainable rangelands-based natural resources management projects, planning and allocating

resources and when establishing projects monitoring and evaluations standards and procedures. The study findings will also help the indigenous and local community groups, governance and management teams of community conservancies as well as other community-based users associations to understand the influence and connection of the study variables and will therefore apply this knowledge in establishing and better managing their rangelands-based conservation initiatives. The research will also add to the body of knowledge on the subject matter to scholars and provoke more research in this area by creating a research gap. In addition to academic contributions, this study will pursue a deeper understanding of the comparative analysis of rangeland management practices in the reference counties.

1.7 Scope of the Study

This research was done in five selected community conservancies namely, Biliqo Bulesa and Nakuprat Gotu conservancies located respectively in Chari and Ngare Mara wards of Isiolo County, Kalama and Sera conservancies both located in Waso Ward of Samburu County and Melako conservancy located in Longolongo ward of Marsabit County. The selection of these conservancies was purposive since there are adjust to each other forming a connected inter-county landscape and other similarities such as, shared livestock, and wildlife movements' corridors, shared natural assets for example Ewaso Nyiro River which connects all the selected conservancies, as a major water source for the pastrol communities residing in these conservancies. From the five conservancies, the study sampled and assessed households' benefits related to several rangelands-based conservation projects under three main thematic areas i.e range improvement projects, water conservation projects and livelihoods improvement projects. Additionally, the study also investigated the impact of financing models for

these projects majorly focusing on the impact of carbon financing and its influence on the sustainability of these projects.

The impact of management practices on sustainability was assessed through project design, stakeholder participation, legal compliance, and the incorporation of digital knowledge. Data was gathered utilizing household questionnaires, with respondents including the beneficiaries of various projects within the five conservancies. The research adopted a descriptive research approach. Analysis of data was done utilizing descriptive statistics and inferential statistics.

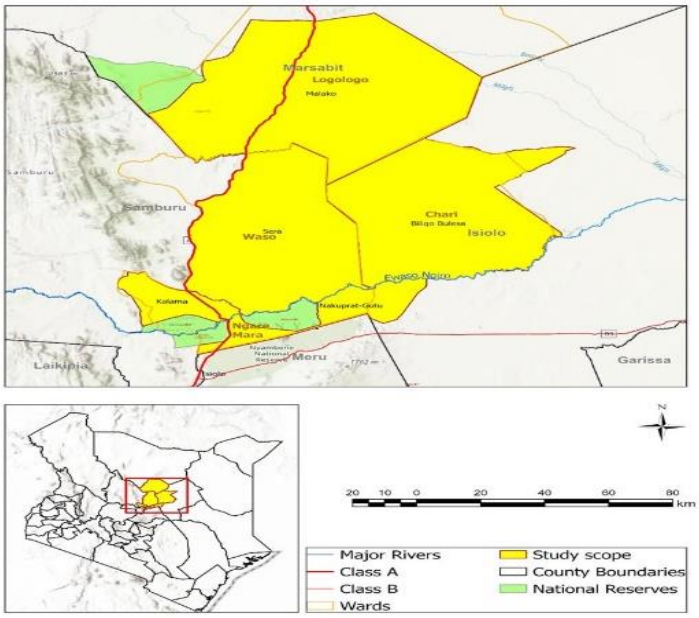

Figure 1.1: Map of the Study Area

1.8 Limitations of the Study

The research was constrained by several factors including fear of responders to disclose relevant information for the research, daily busy schedules of the respondents and possible language barrier. However, these limitations were mitigated by clearly informing the respondents the study purpose, obtaining informed consent that assures strict confidentiality of any information shared and no third-party data disclosure. The researcher will also select and engage three research assistants from the local

community who will visit the respondents and fill in the questionnaires as this will increase the respondent's openness to respond and eliminate possible language barrier. The research questionnaires were uploaded into KoboCollect application software, local research assistants were recruited and trained both on the questionnaire and application use hence increasing the effectiveness of data collection and analysis.

1.9 Organization of the Study

This research consists of five chapters. Chapter one delineates the research's background, articulates the issue statement, outlines the research objectives, formulates research hypothesis, and discusses the significance, scope, and confines of the investigation. Chapter two encompass the theoretical review, empirical review, literature summary, and identification of research gaps. Chapter three delineate the research methodology, encompassing research design, target audience, sampling and sample size, research tools, pilot study, data gathering procedures, methods of data analysis, and ethical deliberations. Chapter four encompasses research finds, discussions and analytical results for inferential, correlation and regression analysis and testing results for moderating variable while chapter five provides summary of findings, conclusion and suggestion for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section discusses the examination of theoretical literature, empirical literature, a summary of the reviewed literature, identification of research gaps, and the development of a conceptual framework.

2.2 Theoretical Review

This section addresses theories that were used in anchoring the research which include Adaptive management Theory, stakeholder theory, resilience theory, natural capital theory and technology acceptance model.

2.2.1 Adaptive Management Theory

Adaptive Management Theory (AM) is an essential framework for addressing the complexities and uncertainties inherent in natural resource management, particularly in dynamic ecosystems such as rangelands. Developed in the late 1970s by C.S. Holling, AM emphasizes a "learning-by-doing" approach, where management strategies are continuously improved through iterative decision-making, monitoring, reviewing and feedback (Holling, 1978; Walters, 1986). This approach is particularly relevant to community-based rangelands conservation projects in Northern Kenya, which are affected by ecological variability, unpredictable climatic conditions, and socio-economic challenges that complicate sustainability of management approaches employed. Adaptive Management's flexibility and responsiveness make it well-suited for managing such projects, where uncertainty is a constant challenge.

In the context of rangeland conservation, Adaptive Management allows for the adjustment of management strategies based on real-time data and changing conditions,

which is crucial for maintaining ecological balance in the face of climatic variability and land degradation (Stringer et al., 2006). The theory also emphasizes the importance of stakeholder involvement, ensuring that local communities are engaged in the decision-making process, thereby enhancing the relevance and acceptance of management strategies (Reed et al., 2006).

Moreover, Adaptive Management supports the sustainability of rangeland conservation projects by integrating socio-economic considerations with environmental goals. It encourages continuous learning and adaptation, which are vital for addressing the complex interplay between ecological health and the livelihoods of local communities (Williams, 2011). This makes AM particularly effective in ensuring that conservation efforts are not only ecologically sound but also socio-economically viable, thereby enhancing long-term sustainability.

In relation to project management practices, Adaptive Management Theory plays a critical role in enhancing the effectiveness of project design, stakeholder engagement, budget planning, and digital inclusion. A well-designed project that incorporates adaptive principles can adjust its strategies as new data and challenges arise, ensuring that the project remains relevant and effective over time. For instance, budget planning that includes adaptive management elements allows for flexibility in resource allocation, enabling the project to respond to unforeseen challenges, a crucial factor in resource-constrained environments like Northern Kenya (Lee, 1999).

Furthermore, Adaptive Management's emphasis on continuous monitoring and feedback loops is enhanced by digital inclusion, where digital tools facilitate real-time data collection and stakeholder communication. This not only improves the responsiveness of conservation strategies but also ensures that local communities are

actively involved in the adaptive process (Berkes, 2009). Adaptive capacity, therefore, moderates the link between project management practices and the sustainability of rangeland conservation projects by enabling these projects to adapt to changing conditions and emerging challenges effectively.

Adaptive Management Theory provides a robust and flexible framework for managing rangeland-based projects in Northern Kenya. By emphasizing iterative decision-making, stakeholder engagement, and continuous learning, AM ensures that conservation efforts are both ecologically sustainable and socio-economically viable. This theory serves as a critical foundation for this research, helping to explore how adaptive capacity influences the sustainability of community-based rangeland conservation projects, and guiding the development of more resilient and effective management practices.

2.2.2 Stakeholder Theory

This theory as proposed by Freeman's (1984) posits that an organization should be regarded as a collective of stakeholders, with its purpose centered on managing their interests, requirements, and perspectives. Stakeholder management is considered the responsibility of a firm's managers. Freeman (1984) defines a stakeholder as any group or individual that can be influenced by or influences the attainment of an organization's objectives. Freeman (1984) asserted that stakeholders can influence an organization’s operations, objectives, growth, and even its viability.

The PMI Standards Committee (2004) delineates project stakeholders as individuals and organizations that are actively involved in the project or whose interests may be affected by the project's implementation or its completion. Stakeholders are crucial for the successful implementation of a project, as their absence of continuous support for

the project's vision or objectives frequently leads to failure. Effective stakeholder engagement requires actively seeking input and offering assistance while collaboratively planning, strategizing, and producing innovative business solutions.

This theory is pertinent to the research as it demonstrates that stakeholder identification is an essential element of the first scoping phase and must take place prior to the formulation of an engagement plan and the commencement of consultations. Each stakeholder typically possesses distinct interests in the project, which can lead to varying priorities, disputes, and significantly enhance the complexity of the situation.

2.2.3 Resilience Theory

Resilience theory, developed by C.S. Holling in 1973, emphasizes the capacity of systems—social, ecological, and socio-ecological—to absorb shocks and still retain their fundamental structure and functions. This perspective is crucial for analyzing community-based rangelands projects, which must cope with challenges such as climate variability, land degradation, and socio-economic pressures. By focusing on adaptive capacity, resilience theory helps identify strategies that enhance the sustainability of rangelands, ensuring that they can continue to support pastoralist livelihoods and biodiversity conservation despite ongoing and future stresses. The theory encourages the development of flexible management practices and governance structures that can respond to changing conditions and uncertainties (Folke et al., 2010). Thus, applying resilience theory can guide the assessment and improvement of the resilience and sustainability of community-based rangelands projects in the study area.

2.2.4 Natural Capital Theory

Natural capital theory was postulatd by David Pearce, Anil Markandya, and Edward Barbier in 1989, this theory emphasizes the value of natural resources and ecosystems as forms of capital that provide essential services and benefits to human societies. In

the context of rangelands, natural capital includes the land, vegetation, water resources, and biodiversity that underpin pastoralist livelihoods and ecological health.

Applying natural capital theory to this study helps highlight the economic and ecological importance of maintaining healthy rangelands. It underscores the need for sustainable management practices that conserve and enhance natural capital to ensure the long-term viability of both the ecosystems and the communities that depend on them. By quantifying the benefits provided by natural capital such as grazing land for livestock, carbon sequestration, water regulation, and biodiversity conservation this theory can inform decision-making and policy development aimed at balancing ecological sustainability with socio-economic development.

Moreover, natural capital theory provides a framework for evaluating the impacts of different rangeland management practices, such as community conservancies, traditional grazing systems, rangeland rehabilitation interventions, and grassland carbon projects. It encourages the assessment of how these practices affect the stock and flow of natural capital, guiding strategies that optimize ecological benefits while supporting local livelihoods (Barbier, 2011). Thus, natural capital theory is integral to understanding and promoting the sustainability of community-based rangelands projects in Kenya.

2.2.5 Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Davis (1985), explains technology adoption based on two core perceptions: perceived usefulness and perceived ease of use. These perceptions shape users' attitudes toward a technology, which ultimately determine their willingness to use it. Recent studies affirm the continued relevance of TAM in low-resource and rural environments. For example, a

systematic review of digital innovations in African agriculture found that adoption is strongly influenced by users' perceptions of utility and usability, particularly in settings with low digital literacy and weak infrastructure (Chikuni et al., 2022). Similarly, research among smallholder farmers in Northern Ghana reported that limited skills, poor connectivity, and restricted access to digital devices significantly affect technology uptake (Boateng et al., 2023).

Evidence from pastoral and conservation landscapes further supports this view. A study in Uganda's Karamoja region showed that mobile-based livestock information systems were adopted only when users perceived them as relevant, accessible, and easy to operate within remote ecological settings (Lumu et al., 2024). Broader analyses also suggest that traditional TAM constructs may need extension in rural Africa, where infrastructure constraints, socio-economic conditions, and institutional support strongly moderate adoption behaviour (Kariuki & Muriithi, 2021). In Northern Kenya's community conservancies, digital tools such as EarthRanger, Wildlife Communication Monitoring Systems (WCoMMs), and mobile-based monitoring platforms are increasingly essential for wildlife reporting, rangeland restoration tracking, and governance. However, their uptake varies due to connectivity challenges, varying digital competencies, and limited training opportunities. Applying TAM in this context suggests that adoption will improve when community members and conservancy staff perceive these tools as directly useful for their daily conservation tasks and sufficiently easy to use despite infrastructural limitations. Thus, TAM provides a valuable theoretical lens for this study, linking digital knowledge inclusion to the effectiveness of project management practices and, ultimately, to the sustainability of rangeland conservation outcomes in Northern Kenya.

2.3 Empirical Review

This section presents a review of researches that have been previously done in regard to the research objectives. These are presented as follows;

2.3.1 Project Design and Sustainability of Projects

Project scope determination, Budget planning, and quality control standards are key indicators of project design that this study was focusing on. Effective project scope determination is crucial for defining the boundaries, objectives, and deliverables of a project. According to Purvis et al. (2021), a well-defined scope ensures that all stakeholders have a clear understanding of what the project aims to achieve, which helps in aligning efforts and managing expectations, especially in a challenges environments like rangelands of Northern Kenya.

Resource allocation, another critical aspect of project design, involves the strategic distribution of resources such as time, budget, and personnel to various project tasks. Proper resource allocation ensures that the project can be completed efficiently without unnecessary delays or cost overruns. Zhang et al. (2019) emphasize that in resource-constrained settings, such as community-based conservation projects, effective resource allocation is vital for maintaining momentum and ensuring the sustainability of project outcomes.

Quality control standards are equally important, as they establish the criteria for assessing the performance and outcomes of the project. Incorporating quality control mechanisms from the design phase helps in maintaining high standards throughout the project lifecycle. As noted by Williams et al. (2020), setting clear quality benchmarks and regularly monitoring progress against these standards are essential for achieving the desired conservation and sustainability goals. Together, these indicators—project

scope determination, resource allocation, and quality control standards form the backbone of robust project design, ensuring that conservation projects are not only well-planned but also effectively implemented and sustained

2.3.2 Stakeholders Engagement and Sustainability of Projects

The research conducted by Cvijović, Obradović, and Todorović (2021) identified four influence strategies employed by external stakeholders to affect project sustainability: collaboration, confrontation, consultation, and coercion. The findings indicate that external stakeholders employed these strategies interchangeably to influence the project and decision-makers. It also disclosed that external stakeholders were significantly driven by adverse environmental effects. However, the study used qualitative data.

Onziru and Kimutai (2022) researched the impact of stakeholder engagement on the sustainability of World Bank-funded water projects in Karamoja, Uganda. This study effort employed a descriptive research design. The research's target audience comprised the sixty-water project implemented across seven districts in the Karamoja area of Uganda. The data required to assess Stakeholders Engagement was acquired through surveys. The acquired data was evaluated by descriptive and inferential methods, including correlations and regression analysis. The responses indicated that stakeholders participated in site selection for the projects, the projects conformed to governmental development plans, consultations occurred regarding site determination, stakeholders agreed upon timelines, every construction phase was overseen by stakeholders, funding was disbursed according to progress, and regular site inspections were conducted. Nonetheless, the research was conducted in Uganda; hence, the results may not be relevant to the Kenyan environment.

Ochunga (2016) explored the impact of stakeholder engagement on the sustainability of community development initiatives executed by Plan International (PI) in Homa Bay Town Sub-County. The research employed a descriptive survey methodology. The researcher selected three individuals from each of the 51 organizations collaborating with PI, resulting in a total population of 153 individuals. The researcher submitted the questionnaire and scheduled a time to retrieve it after two days. Quantitative data were evaluated utilizing frequencies, percentages, and cross-tabulation. The Chi-square p-value was employed to assess the significance of the correlations between the independent and dependent variables. A small and insignificant negative correlation was identified between passive stakeholder participation and the sustainability of community development projects. The research concentrated on community initiatives in Homa Bay Town sub-county.

Ochieng and Nyaga (2020) studied the impact of stakeholder engagement on the sustainability of community development initiatives executed by PI in Kilifi County, Kenya. The target audience comprised 96 responders, and the research employed a census methodology. Data was gathered through the utilization of questionnaires. The analysis included descriptive statistics and multivariate regression models. The results demonstrated that all three factors—interactive participation, functional participation, and passive participation—are statistically significant in influencing the sustainability of community development programs. However, the research focused on community projects in in Kilifi County, Kenya. This study will examine if incorporation of communication, active participation and project activity support strategies in stakeholder engagement process will have an influence on the sustainability of rangelands conservation projects.

2.3.3 Laws and Regulations and Sustainability of Projects

Gichamba and Kithinji (2019) researched Influence of Environmental Regulations in the Performance of Construction Projects in Nairobi County, Kenya with the intent of determining how environmental regulations affect the performance of construction projects. The context of this study was based on the observation that most construction projects in Nairobi suffer from time and cost overruns, partly attributed to environmental compliance issues. The study used a correlational research design targeting 824 registered construction firms, from which 269 firms were sampled using stratified random sampling. Data was collected using both semi-structured questionnaires and secondary reports from the National Construction Authority and analyzed using SPSS. The findings revealed that water and waste management regulations significantly influenced project performance, while noise and vibration, and physical planning regulations had minimal to no significant impact. The study identified gaps in the integration of environmental planning into the construction process, especially regarding planning and stakeholder engagement. It recommended the adoption of thorough environmental impact assessments and better waste and vibration management strategies. The present study fills the gap by emphasizing the necessity for early integration of environmental considerations in project planning phases to minimize delays and enhance compliance with environmental requirements.

Mattar et al. (2024) researched the Impact of Change Orders Caused by Legislative Changes on Program Management in the UAE Construction Industry and addressed a unique angle by exploring the influence of legislative-induced change orders not at a single project level, but across entire construction programs. The study was motivated by the lack of literature on how program management is affected by change orders prompted by legislative changes such as environmental laws and building codes.

Adopting a mixed methods qualitative approach, the researchers engaged clients, contractors, and consultants through structured questionnaires, expert interviews, and analysis using the Relative Importance Index. Their findings showed that legislative changes significantly disrupt program timelines, cost structures, and overall quality, highlighting the need for proactive mitigation strategies. The study offered specific recommendations to help program managers respond effectively to legislative changes. The main gap identified was the absence of program-level analysis in previous studies, which the current research addressed. However, the current study builds upon this by proposing structured program-level adaptation frameworks to systematically integrate environmental compliance mechanisms from the outset of project lifecycle management.

Serrano and Fonseca (2024) examined environmental compliance from a regulatory enforcement standpoint in their study titled *License to Pollute?* A Longitudinal Analysis of Environmental Performance, Compliance, and Enforcement in 232 Licensed Projects in Brazil. The research focused on post-approval compliance in Minas Gerais, Brazil, where environmental licensing is required prior to project implementation. Using a longitudinal content analysis approach, the researchers evaluated documents such as performance reviews, sanctions, and licensing conditions. They found that despite the existence of strong legal frameworks, enforcement was weak, with 74% of projects reporting performance problems and nearly 90% receiving sanctions for non-compliance. The study highlighted a critical gap in the accountability mechanisms and the decision-making processes of environmental regulatory authorities. The current study extends this discourse by addressing the gap in proactive compliance planning during the pre-implementation phase and not merely relying on post-approval controls. It contributes by offering a more integrated, forward-looking

approach to ensure environmental compliance is embedded in project inception stages, thereby reducing the burden of enforcement and the risks of sanctions later on.

2.3.4 Digital Knowledge Inclusion and Sustainability of Projects

Li, Sun, Li, Song, and Ding (2022) studied the impact of digital technology adoption on sustainability outcomes in construction projects, focusing on the mediating function of stakeholder collaboration. Data were gathered from managers and participants of Chinese construction projects, and the PLS-SEM technique was employed to evaluate the proposed links. The findings indicate that the adoption of digital technology directly impacts economic, environmental, and social performance, while stakeholder collaboration solely influences economic and environmental performance. Furthermore, stakeholder collaboration partially mediates the association between the adoption of digital technology and both economic and environmental performance. The study concentrated on construction projects.

Otundo (2022) researched the impact of strategic technology adoption on the sustainability of community water delivery initiatives in marginalized regions of Kenya. This study utilized a descriptive research methodology. A total of 302 water project officers were evaluated. A sample of 169 responders was selected according to the Krejcie and Morgan table from 1970. The data was acquired utilizing a structured survey and a basic random sampling method. Descriptive and inferential statistical analyses were utilized in the examination. The findings indicated that strategic technology adoption practices had a favourable and equitable correlation with the sustainability of community water delivery projects in underprivileged areas in Kenya. The research concentrated on community water supply initiatives in marginalized regions of Kenya.

Ngigi, Wanyona, and Gwaya (2021) explored the impact of technology adoption on sustainable low-cost housing in Kajiado County, Kenya. The researcher employed both quantitative and qualitative methodologies; the population consisted of users and construction experts in Kenya, with a sample size of 63 respondents determined by scientific formulas. Primary and secondary data were gathered through interviews and questionnaires. The data was input into SPSS to build a data array, and descriptive statistics were utilized for data analysis. The research established that technology adoption had a favourable significant effect on the cost of housing. However, the research focused on sustainability housing projects. In this study, digital knowledge Inclusion was examined in terms of access to digital infrastructure, information sharing and digital skills.

2.3.5 Community Conservancy Approach and Sustainability of Projects

Pienaah, et al (2024) studied impact of community-led conservation models on women's nature-based livelihood outcomes in semi-arid Northern Ghana. The research concentrated on the impact of conservation efforts on women engaged in shea processing a nature-based livelihood increasingly threatened by environmental degradation and declining shea tree populations. In response to these threats, Ghana introduced the Community Resource Management Areas (CREMA), a community-led conservation approach aimed at restoring biodiversity and improving ecosystem services. The researchers utilized a mixed-methods approach, employing surveys with 517 respondents and eight focus group discussions to explore differences in the productivity between women residing within and outside CREMAs. Findings showed that women in CREMAs had significantly higher shea harvesting outcomes ($\alpha = -53.725$; $P < 0.01$), demonstrating the effectiveness of community-led conservation in promoting economic and ecological sustainability. The study identified a gap in

literature regarding how conservation efforts affect women's livelihoods in such contexts and filled it by providing empirical evidence on the socio-economic benefits of targeted, locally managed conservation models. The research also highlighted the contribution of CREMAs toward achieving SDGs such as gender equality, climate action, and life on land.

Mfossa *et al.*, (2025) researched the effect of community-led conservation approach in the preservation of the cryptic gorilla (Gorilla gorilla) population in the Ebo forest, Littoral Region-Cameroon. The research explored the role of the community conservation initiative known as 'Club des Amis des Gorilles' (CAG), established in 2012 in three villages near the Ebo forest, a biodiversity hotspot under threat from unsustainable human activities and logging. A longitudinal methodology was used, collecting data from household heads in 2013 and 2017 to assess community perceptions of CAG and its effectiveness. The study found that approximately 80% of community members were affiliated with CAG, and 92% of respondents in 2017 maintained positive views of its contributions to biodiversity conservation and household well-being. Despite this, hunting remained prevalent due to remoteness and economic reliance on bushmeat. The study addressed a gap in understanding the long-term impact of community-led conservation initiatives on both ecological outcomes and community welfare. It filled this gap by illustrating how local conservation clubs can foster community ownership and environmental stewardship, while also recommending policy incentives and stricter logging regulations to sustain conservation gains.

Irawan and Esthi (2024) examined the role of Community Conservancy approach in enhancing community participation in conservation in maximizing social capital for National Park Conservation. The research was done around Mount Merbabu National

Park (MMNP) in Indonesia, where lack of community involvement poses a weighty challenge to conservation efforts. Using a purposive sampling method, the study focused on three villages surrounding the park and applied a simple random sampling approach to select 90 responders. The researchers utilized the SEM-PLS approach to analyze the relationships among social capital, human capital, and community engagement. Results indicated that social capital, mediated by forestry extension officers, had a significant positive impact on community participation in conservation, while human capital showed no significant effect through the same mediation. The study identified a gap in how intermediary agents such as extension officers influence community engagement and addressed it by revealing the critical role of social networks, communication, and environmental awareness in mobilizing communities. This research adds to the discourse on participatory conservation by recommending the strengthening of social capital and the professional capacity of extension officers to enhance local involvement in conservation initiatives.

2.4 Summary of Reviewed Literature and Research Gaps

Table 2.1: Summary of Reviewed Literature and Research Gaps

Author(s)	Focus of the study	Research findings	Knowledge Gaps	Focus of the current study
Cvijovic, Obradovic and Todorovic (2021)	Stakeholders Engagement and project sustainability in Pakistan	The findings indicate that external stakeholders employed all four approaches interchangeably to exert influence on the project and decision-makers.	The study used qualitative data and was done in Pakistan	The utilized study both quantitative and qualitative data and was done in Marsabit, Isiolo and Samburu to bring the gap in Kenya arid counties
Onziru and Kimutai (2022)	Stakeholders Engagement on sustainability of World Bank	The stakeholders were involved in the determination of the site of the	The study was done in Uganda and therefore, the findings	The research concentrated on sustainability of rangelands-based

	Funded Water Projects in Karamoja, Uganda	projects, the projects developed adhered to government development plans,	may not be applicable in the Kenyan context	projects benefits in counties of Isiolo, Samburu and Marsabit
Ochunga (2016)	Stakeholders Engagement on sustainability of community development projects implemented by plan international in Homa bay town sub-county.	A negligible and inconsequential negative correlation existed between passive stakeholder participation and the sustainability of community development projects.	The study focused on community projects in Homa bay town sub-county	The research concentrated on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Ochieng and Nyaga (2020)	Stakeholders Engagement and sustainability of community development projects implemented by plan international in Kilifi County, Kenya	Three factors—interactive participation, functional participation, and passive participation—are statistically important in influencing the durability of community development programs.	The study focused on community projects in in Kilifi County, Kenya	The research emphasized on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Demirkesen and Ozorhon (2017)	Budgeting on project sustainability in Water for Life Project in Turkey	Inadequate implementation of planned activities and resources results in project failure.	The responders were selected utilizing simple random sampling method	A census method was used
Kiiza and Muiruri (2022)	Budget planning on sustainability of Food Sustainable Initiative Project in Rwanda	There was an agreement on how budget planning influences sustainability of the project	The study focused on Food Sustainable Initiative Project in Rwanda	The research concentrated on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Chebet and Ombaba (2019)	Effect of budgeting on project	Budgeting had a beneficial and substantial impact	The research centred on project	The research concentrated on sustainability of

	sustainability of dairy co-operative societies in Uasin Gishu County, Kenya	on the sustainability of dairy cooperatives' projects.	sustainability of dairy co-operative societies in Uasin Gishu County, Kenya	rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Mburu (2017)	Budget planning on sustainability of road construction initiatives in Nairobi City County, Kenya	Budget planning positively impacted the sustainability of road development initiatives in Nairobi City County, Kenya.	The research centered on construction projects of China Wuyi Company Limited	The research concentrated on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Wang, Zhang and Xu (2022)	Impact of efficient resource management practices on sustainable project performance	There is more possibility to employ efficient resource management strategies to foster an inventive culture that enhances sustainable project success.	The study was an empirical cross-sectional survey	The research employed descriptive research design
Amaechina and Eboh (2022)	Resource use efficiency in rice production in the lower Anambra irrigation project, Nigeria.	Rice production is profitable in the area; some resources were not efficiently being utilized	The study focused on irrigation projects in Nigeria	The research emphasized on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Riziki, Atera and Juma (2019)	Resource mobilization on sustainability of community water projects in Kakamega County	Resource mobilization was significant predictors of sustainability of community water projects	The research utilized explanatory survey design	The research employed descriptive research design
Collins and James (2018)	Resource mobilization on sustainability of women group projects in Vihiga County, Kenya	All independent variables strongly and advantageously impacted the sustainability of women's group projects.	The study focused on women group projects in Vihiga County, Kenya	The research concentrated on sustainability of rangelands-based projects benefits in counties of Isiolo,

				Samburu and Marsabit
Gholami (2023)	Adoption of digital technologies in construction projects. To address the ineptitudes of logistics processes, main contractor firms face increased pressure to adopt digital technologies.	Digital technologies have been reported to enhance the building process, including design, production, logistics, and procurement of materials and services.	The study used secondary data	The study will use primary data
Li, Sun, Li, Song and Ding (2022)	Effects of digital technology adoption on sustainability performance in construction projects	Stakeholder collaboration can directly influence only economic and environmental performance	The study concentrated on construction projects	The research emphasized on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Otundo (2022)	Strategic technology adoption practice on sustainability of community water supply projects in Marginalized Kenya	Strategic technology adoption practice has a positive and fair relationship with the sustainability of community water supply projects in marginalized Kenya	The study focused on community water supply projects in Marginalized Kenya	The study will focus on sustainability of rangelands-based projects benefits in counties of Isiolo, Samburu and Marsabit
Ngigi, Wanyona and Gwaya (2021)	Technology adoption on sustainable low-cost housing in Kajiado County, Kenya	The adoption of technology significantly positively influenced housing costs.	The research emphasized on sustainability housing projects.	The research concentrated on sustainability of rangelands-based projects benefit in counties of Isiolo, Samburu and Marsabit

Researcher (2024)

2.5 Conceptual Framework

The conceptual framework is presented diagrammatically showing the connection of the independent variables, the moderating variable and the dependent variable considered in the research as follows.

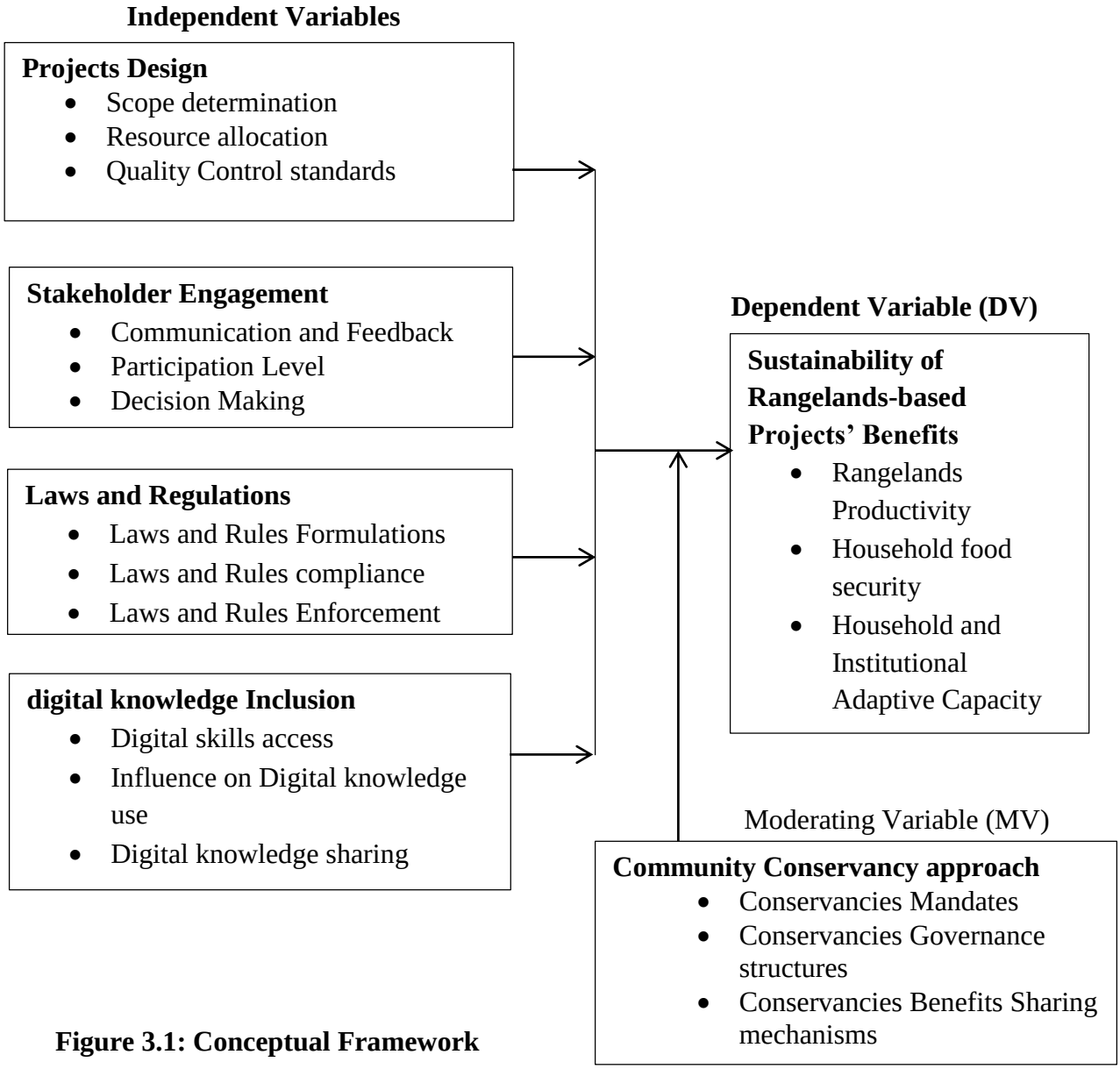

Figure 3.1: Conceptual Framework

Source: Researcher (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter addresses the research methodology, audience of interest, sampling procedure and sample size, data gathering tools, soundness and dependability of the research tools, data gathering protocol, data analysis method, and ethical issues.

3.2 Research Design

The research design outlines the overarching strategy utilized to cohesively integrate the many components, ensuring the research challenge is thoroughly addressed. Moreover, it functions as a framework for data gathering, measurement, and analysis (Omari (2015). In this research, a descriptive research design was utilized. Asenahabi (2019) argue that descriptive research aims to provide an accurate depiction of people, events, or situations. This approach allows researchers to acquire a thorough profile of the pertinent elements of the phenomena from individual, organizational, and industry viewpoints. Thus, this research methodology will facilitate the gathering of data from a diverse group of responders.

3.3 Target Population

The Northern Rangelands Trust (2023) listed 45 community conservancies as their members, 24 which are within the three counties of Isiolo, Marsabit and Samburu, from this; five conservancies were purposively selected as geographical area of the study, this purposively sampling was based on the inter-connected landscape between these conservancies other similarities such as livestock, and wildlife movements' corridors as well as shared rangeland resource assets like Ewaso Nyiro River which connects the five conservancies of Biliqo Bulesa and Nakuprat Gotu in Isiolo county, Melako in Marsabit county and Kalama and Sera in Samburu County were also considered. While

reviewing the geographical maps of these conservancies, I found out a total overlay against the ward boundaries of Chari, Ngaremara, Waso and Laisamis Wards of Isiolo, Samburu and Marsabit counties hence using wards as study units in this research is one at the same thing.

Mugenda and Mugenda (2008) defined population as the entire group from which a sample can be derived from. A well-defined population ensures accurate results, as irrelevant characteristics could have skewed research findings. Household beneficiaries of different rangeland-based projects being implemented by each of the selected conservancies were considered as the respondents. A total of 13,246 households' beneficiaries were obtained from the sub-chiefs across 92 villages within the mentioned conservancies, the household data was further validated using the 2019 Census and where discrepancies was noted, the researcher organized one-on-one verification and validations with the area sub-chiefs hence maintaining the validity of study population.

3.4 Sampling Design and Procedure

According to Ritchie, Lewis, and Elam (2019), researchers may face constraints in accessing the entire population, leading them to select a sample that can still be representative of the total population. The general rule in research is to use the largest sample to represent and generalize the whole population. This research employed both purposive and stratified sampling technique. Purposive sampling requires selection of subjects based on specific characteristics and elimination of those who do not meet the criteria. In the first stage, the researcher purposively selected five community conservancies as the target geographical area from among 24 possible sample conservancies. In the second stage, a proportionate sampling approach was applied, considering the population size of each conservancy. The Yamane formula was utilized to determine the required sample size (see Table 3.1: Sampling Frame). The study relied

on a list of 92 villages provided by local sub-chiefs, ensuring that the sample was allocated proportionally across villages. In the final stage, random sampling was employed to select households within each village, enhancing representativeness and reducing selection bias.

3.5 Sample Size and Design

Yamane formula was used to calculate the sample size from a known population of each ward unit as follows.

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

Whereby.

n=the sample size

N=the size of the population, and

e=the degree of precision

Given the cumulative size of the population of the study area as N=13,246, Margin error e=0.08 the required sample size per conservancy for the study was calculated as;

Biliqo Bulesa & Nakuprat Gotu in Isiolo

$$n = \frac{2753}{1 + 2753 * (0.08)^2}$$

n=148

Melako in Marsabit

$$n = \frac{3657}{1 + 3657 * (0.08)^2}$$

n=150

Kalama and Sera in Samburu

$$n = \frac{6836}{1 + 6836 * (0.08)^2}$$

n=153

Yamane formula allows a researcher to sample the population with a preferred level of correctness by giving idea of how large the sample size needs to be to ensure a reasonable accuracy of results (Stephanie, 2020).

Table 3.1: Sample Size Frame

County	Ward	Conservancy	Population (N)	Proportionate Sample Size
Isiolo	Chari	Biliqo Bulesa & Nakuprat Gotu	2,753	148
Marsabit	Laisamis	Melako	3,657	150
Samburu	Waso	Kalama and Sera	6,836	153
	Total		**13,246**	**451**

Source: Researcher (2024)

3.6 Data Collection Instrument

Questionnaires were used to collect primary data administered to all the sampled responders. The questionnaires were structured into sections whereby Section A gathered data on responders' bio data, Section B gathered data on Project design, Section C on Stakeholders Engagement, Section D obtained data on Laws and Regulations, Section E obtained data on Digital inclusion, Section F obtained data on Community Conservancy approach and Section F gathered data on Sustainability of rangelands-based projects' benefits. The questions utilized a Likert scale, requiring respondents to assess their level of agreement with each item. Each session included an open-ended question to gather quantitative data.

3.7 Pilot Testing

A pilot study served as a preliminary examination done by the researcher to evaluate the questionnaires' quality and identify any potential weaknesses prior to commencing the final data collection process (Kezar, 2020). Ten (10) responders were chosen to participate in the pilot study, and they were excluded from the final gathering of data. The intent of piloting the questionnaires is to assess their validity and reliability.

3.8 Validity of Research Instrument

Delgado-Rico, Carretero-Dio and Ruch (2018) provide a definition of validity as the degree to which the tool accurately measures the constructions being studied. There are

three forms of validity tests: content, criteria, and construct validity. In this research, content validity was employed to evaluate the degree to which the item sample reflects the material intended to be measured by the test. Furthermore, the University supervisor will meticulously assess the validity of the tools. Criterion validity was assessed to ascertain the predictive efficacy of one measure regarding another's outcome, whereas construct validity was evaluated to determine the validity of inferences drawn from observations or measurements, precisely if a test accurately measures the envisioned construct.

3.9 Reliability of Research Instrument

The concept of consistency is to the extent to which a tool consistently measures in the same manner when applied to the same subjects under different circumstances using the same methods (Lambert, Burlingame, Umphress & Yanchar, 2021). Reliability, as the primary component and objective, aims to evaluate the consistency of measurements. To assess the reliability of the questionnaire, the Cronbach's alpha reliability coefficient was utilized. According to Saris and Gallhofer (2022), a reliable data gathering tool should have an alpha value of 0.70 or greater. Consequently, this study will strive for a correlation coefficient of 0.7 or higher.

3.10 Data Collection Procedure

In this research study, the data collection procedure involved several sequential steps. First, the researcher developed research instruments based on the study objectives and validated through university supervisors and peer review and conducted pilot test with ten households within the research area. Research approvals were then obtained from the university, NACOSTI, and the management of the targeted community conservancies. Data collection involved structured questionnaires administered to household respondents by a group of trained enumerators. Secondary data was obtained

from conservancy reports, project documents, journals and monitoring databases. All participants gave informed consent, and confidentiality was assured. Data quality was maintained through daily review of completed tools, supervisor checks, and secure digital storage.

3.11 Data Analysis and Presentation

The research encompassed the gathering of qualitative and quantitative data. The qualitative data was examined and presented in a narrative format using a content analysis technique. However, the quantitative data was analyzed using descriptive statistics, such as mean and standard deviation, with the SPSS version 27.0. Additionally, inferential statistics, including correlation analysis and multiple regressions, were employed to establish relationships between variables. Identifying significant correlations between variables such as stakeholder engagement, budget planning, and sustainability of projects benefits can highlight areas of influence. For instance, a strong positive correlation between stakeholder engagement and sustainability projects benefits suggests that increased engagement may lead to improved project outcomes. The results were displayed in tables, pie charts, and bar graphs, as appropriate. The regression equation is formulated as follows.

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$$

Whereby Y= Sustainability of Rangelands-based Projects Benefits

β_0=Constant term

X_1= Project design

X_2= Stakeholder engagement

X_3= Laws and Regulations

X_4 = Digital inclusion

β_1, β_2, β_3 and β_4 = Coefficients

ε = Error term

In this hypothetical model, the researcher was examining the factors influencing sustainability of rangeland-based conservation project benefits (Y) with project design (X1) stakeholders' engagement (X2), laws and regulations (X3) and digital knowledge Inclusion (X4) as predictors. The coefficients $\beta 1$, $\beta 2$, $\beta 3$, and $\beta 4$ represent the strength and direction of the relationships between each predictor and project sustainability.

If all coefficients are found to be positive and statistically significant, it will imply that each predictor variable (projects design, stakeholders' engagement, laws and regulations and digital inclusion) independently contributes to project sustainability further implying sustainable benefits. Conversely, if any coefficient is found to be negative or statistically insignificant, it will therefore suggest that the corresponding factor may not significantly influence project benefits sustainability in the context of this model.

3.12 Ethical Consideration

Kenyatta University granted permission to undertake the research via the issuance of a research approval letter. The research license was gotten from the NACOSTI. Before the data collection process began, the researcher contacted local chiefs across 29 sub-locations in the five conservancies to inform on the research plan who then gave permission to conduct the research in all the villages covered by the selected conservancies. While in the field the researcher obtained free and informed consent from all the study participants and maintained confidentiality by assuring participants that the information they provided was solely utilized for academic purposes and will not be shared with any third party. Also, respondents were notified of their freedom to withdraw from study if they choose not to proceed.

Table 3.2: Operationalization of Variables

Objective	Variables	Type of Variable	Indicators	Scale	Data collection method	Data Analysis
To examine the influence of project design on sustainability of rangeland-based projects benefits in Northern Kenya.	Project design	Independent variable	Scope Determination Resource Allocation Quality control standards	Ordinal/interval	Questionnaire	Mean, standard deviation, and regression analysis
To establish the effect of stakeholders' engagement on sustainability of rangeland-based projects benefits in Northern Kenya	Stakeholder engagement	Independent variable –	Communications and Feedback Participation Level Activity support	Ordinal/interval	Questionnaire	Mean, standard deviation, and regression analysis
To assess the influence of Laws and Regulations on sustainability of rangeland -based conservation projects benefit in in Northern Kenya.	Laws and Regulations	Independent variable –	Laws and rules formulations Laws and Rules enforcements	Ordinal/interval	Questionnaire	Mean, standard deviation, and regression analysis
To evaluate the relevancy of digital knowledge Inclusion on sustainability of rangeland -based conservation projects benefit in in Northern Kenya.	digital knowledge Inclusion	Independent variable –	[1] Digital skills [2] Access to digital infrastructure [3] Information and Knowledge sharing	Ordinal/interval	Questionnaire	Mean, standard deviation, and regression analysis
To determine the moderating influence of Community Conservancy approach on the link between	Community Conservancy approach	Moderating variable	Mandates of conservancies Governance structures Benefits sharing mechanism	/interval	Questionnaire	Mean, standard deviation, and regression analysis

project management practices and sustainability of rangeland-based projects benefits in in Northern Kenya.						
	Benefits Sustainability	Dependent Variable	Improved rangelands productivity Enhanced household food security Improved household and Institutional adaptive capacity			Mean, standard deviation, and Correlation analysis Regression analysis

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter deliberates the study findings and discussion arising from the objectives. The specific objectives were to examine the influence of project design, stakeholders' engagement, laws and regulations and digital knowledge Inclusion on sustainability of rangeland -based rangelands conservation projects benefit in Northern Kenya. The research also presents findings on the moderating influence of Community Conservancy approach on the relationship between project management practices and sustainability of rangeland-based projects benefits in Northern Kenya. The subsequent sections are discussed in the chapter; response rate, reliability test results, descriptive and inferential statistics findings.

4.2 Response Rate

Table 4.1 shows the participant response numbers across the three study counties which include Isiolo, Marsabit, and Samburu. A total of 451 responders participated in the research which distributed among the three counties where 148 participants (32.82%) resided in Chari and Ngare Mara Wards of Isiolo County and monitored Biligo Bulesa and Nakuprat Gotu conservancies and 150 participants (33.26%) lived in Laisamis Ward of Marsabit County who observed Melako Conservancy and 153 participants (33.92%) resided in Waso Ward of Samburu County who monitored Kalama and Sera conservancies.

Table 4.1: Response Rate

County	Conservancies	Sample Size	Response Rate	% Response Rate
Isiolo	Biliqo Bulesa & Nakuprat Gotu	148	118	79.73%
Marsabit	Melako	150	121	80.67%
Samburu	Kalama & Sera	153	130	84.97%
Aggregate Score		**451**	**369**	**81.82%**

Source: Researcher (2025)

The research yielded an 81.82% response rate which split into 79.73% in Isiolo County and 80.67% in Marsabit County and 84.97% in Samburu County according to Table 4.1. The obtained response rates surpass the survey-based research requirement of 70% according to Saunders and Thornhill (2007) and thus qualify as acceptable and representative data. The study's high response rate ensures valid and generalizable findings because the collected data effectively represents the target population throughout all three counties.

4.3 Reliability Tests Results

The reliability test results for project design, stakeholder engagement, laws and regulations and digital knowledge Inclusion, projects benefits sustainability and Community Conservancy approach appear in Table 4.1. The reliability assessment of each construct depended on Cronbach's Alpha coefficient to evaluate item consistency within each scale. Social science research accepts Cronbach's Alpha scores above 0.7 as an indicator of reliable measurement items which demonstrate sufficient item correlation.

Table 4.2: Reliability Tests Result

Constructs	No. of Items	Alpha Score	Comments
Project design	13	.799	Reliable
Stakeholder engagement	13	.808	Reliable
Laws and Regulations	12	.849	Reliable
digital knowledge Inclusion	13	.899	Reliable
Projects' benefits Sustainability	23	.801	Reliable
Community Conservancy approach	17	.829	Reliable
Aggregate Score		**.831**	**Reliable**

Source: Researcher (2025)

Table 4.1 demonstrates that every construct achieved alpha values which exceeded the minimum requirement. The alpha scores for the constructs indicate project design at 0.799, stakeholder engagement at 0.808, laws and regulations at 0.849, digital knowledge Inclusion at 0.899, sustainability at 0.801, and Community Conservancy approach at 0.829. The combined reliability score from all constructs reached 0.831 which demonstrates strong internal consistency. The research instrument proved suitable for data collection because the variables measured the intended constructs reliably. The study findings gain both credibility and robustness through this method.

4.4 Demographic Characteristics

This section presents data on bio data of the sampled respondents in terms of gender, age, ethnicity, occupation and education level. Bernard and Ryan (2010) assert that demographic information in research is essential for both the interpretation of findings and the validity and generalizability of outcomes. The results are delineated and analyzed in table 4.3.

Table 4.3: Demographic Characteristics

Demographic variables	Category	Frequency	Percentage
Gender	Male	252	68.2
	Female	117	31.7
Age (Year)	Below 35	62	16.8
	35- 45 Years	92	24.9
	46- 55 Years	143	38.8
	Above 55 Years	72	19.5
No years of schooling	Post-Secondary Level	34	9.2
	Secondary Level	48	13.0
	Primary Level	52	14.0
	Never Went to School	232	62.8
Ethnicity	Borana	72	19.5
	Samburu	110	29.8
	Turkana	65	17.6
	Rendile	122	33.1

Source: Researcher (2025)

Table 4.3 demonstrates the demographic characteristics of participants who are in some ways involved either directly or indirectly in rangeland-based projects throughout the target counties. The research data indicates that males made up 68.2% of the participants whereas females comprised 31.7% of the total sample. The survey revealed that respondents between 46 and 55 years old made up the largest group at 38.8% while those aged 35–45 years and above 55 years and below 35 years followed with percentages of 24.9%, 19.5% and 16.8% respectively. The majority of respondents (62.8%) reported they had no experience with school education. The population with primary education made up 14.0% of the sample while secondary education participants were 13.0% and post-secondary education participants were 9.2%. The research indicates that participants in these projects mainly consist of middle-aged to older male adults who have limited formal education.

The observed demographic patterns create significant implications for how rangeland-based projects operate through participation and knowledge transfer activities. The

survey results indicate that men outnumber women which could indicate gender inequality in local community decision-making structures. This is consistent with findings by Mugambi (2022), which found out men prevalence in all demographic patterns in Maasai Mara conservancies. The high number of respondents from the 46–55 age bracket demonstrates both their experience in community leadership and possibly a lack of youth participation needed for sustainable project development. The high number of respondents without formal education creates a challenge for effective communication and capacity building and the uptake of conservation or project-related information.

The implication of these findings is that project implementers must consider tailored communication strategies and training programs to bridge the education gap and ensure inclusive participation. Materials should be simplified and potentially translated into local languages, and visual or oral methods of engagement could be prioritized over text-based materials. Further, efforts to empower women and involve younger community members should be scaled up to foster balanced representation and long-term sustainability. Understanding and addressing these demographic realities can enhance the effectiveness and relevance of rangeland-based interventions in the region.

The ethnicity data presented in Table 4.3 indicates that the respondents came from four major ethnic groups: Rendile (33.1%), Samburu (29.8%), Borana (19.5%), and Turkana (17.6%). The highest representation was from the Rendile, likely reflecting their dominant presence in the Laisamis Ward of Marsabit County, where Melako Conservancy is located. The Samburu were the second most represented group, corresponding with their concentration in Samburu County, particularly around Kalama and Sera conservancies. Borana and Turkana respondents were fewer, possibly drawn from Isiolo County and the broader region, respectively. This distribution highlights the

ethnically diverse composition of the conservancy areas and suggests that the study captured a wide range of community perspectives. Such diversity is vital for ensuring inclusivity and cultural sensitivity in conservation efforts, as different ethnic groups may have varying relationships with natural resources, conservation practices, and governance structures. The relatively lower participation of Borana and Turkana could point to potential barriers in access or involvement, which should be addressed to promote equitable engagement and benefit-sharing. Overall, the ethnic composition of respondents underscores the need for tailored conservation strategies that recognize and integrate the unique ecological knowledge, values, and expectations of each ethnic community to enhance the sustainability and effectiveness of community conservancy initiatives

4.5 Descriptive Analysis Results

This section presents the descriptive analysis of the study variables, which include project design, stakeholder engagement, laws and regulations, digital knowledge Inclusion, projects' benefits sustainability, and Community Conservancy approach. Descriptive statistics such as means and standard deviations were used to summarize the responses and provide an overview of the general trends and patterns in the data. The analysis helps to highlight the central tendencies and variability in participants' perceptions regarding each variable, thereby offering valuable insights into how these factors influence the implementation and outcomes benefits of rangeland-based projects across the study area.

4.5.1 Analysis on Project Design in Rangeland-Based Projects Benefits in Northern Kenya

This subsection presents descriptive and cross-tabulation analysis results on project design aspects in rangeland-based projects across Northern Kenya. The analysis

focuses on how clearly project objectives are designed, aligned with community needs, communicated, resource allocation, transparency, stakeholder satisfaction, and sustainability of funding streams. It also explores the relationship between awareness of funding sources and auditing practices within the projects.

Table 4.4: Crosstabulations of Source of Funding and Auditing of Rangelands Projects

		The Rangeland-based projects in our area are Audited Yes {1} No {2}		Total
		Yes	No	
I am aware of the Source of funding for rangeland-based projects Yes {1} No {2}	Yes	151	94	245
	No	83	41	124
Total		**234**	**135**	**369**

Source: Researcher (2025)

Table 4.4 displays the relationship between respondents who know where rangeland-based projects receive funding and their assessment of project auditing practices. The survey involved 369 participants where 245 respondents knew the funding origin and 124 participants were unaware. The audit status of rangeland-based projects received confirmation from 151 respondents (61.6%) who knew about the funding source yet 94 respondents (38.4%) indicated the projects were not audited. The respondents who were unaware of funding sources indicated that 83 (66.9%) projects undergo audits but 41 (33.1%) projects do not.

The research data indicates that most respondents show knowledge about their project funding origins. The audit status of projects received similar responses from community members regardless of their knowledge about funding sources. Auditing practices in rangeland-based projects maintain a high level of recognition among community

members even when they do not understand the funding sources. The higher percentage of perceived auditing among respondents who did not know the funding sources suggests possible transparency issues or limited financial oversight participation by community members.

The research demonstrates that project finance transparency and auditing processes need better communication methods. The combination of funding source education and audit process information would create trust while increasing stakeholder participation and improving project accountability throughout implementation. The improved transparency will produce better and enduring results in rangeland management practices.

Table 4.5 presents the descriptive statistics on various aspects of project design in rangeland-based projects across Northern Kenya. The table summarizes respondents' perceptions using mean scores and standard deviations for key indicators such as clarity of project objectives, alignment with community needs, resource allocation, transparency, stakeholder satisfaction, financial reporting, and risk management.

Table 4.5: Analysis on Project Design in Rangelands Based Projects Benefits in Northern Kenya

	Mean	Std. Deviation
The objectives and outcomes of the rangeland's projects are usually made clear and easy to understand	2.7724	1.34617
The projects objectives are well aligned with the community's existing Needs, Practices and Values	2.8130	1.38322
The Roles and Responsibilities of the people leading the Projects are well-defined	2.8103	1.37990
Adequate resources are allocated to projects and availed on time to effectively run the projects	2.9295	1.40667
The institutions handling rangeland-based projects are transparent in resource sharing mechanism	2.8428	1.37809
The community and other stakeholders are satisfied with how these projects are designed	2.8076	1.39227
Rangeland-based projects are sustainably and sufficiently funded	2.9187	1.39639
The Audited Financial Reports are shared to the community during AGMs	3.5420	1.40031
Donor Agreements and Compliance requirements are publicly shared to the community	3.7507	1.30536
Risks of the rangeland-based projects are identified and mitigation plan developed before commencing activities	3.7317	1.28794
Rangeland-based Projects are designed to support continuous learning and improvement to meet future demands	3.7290	1.30102
Aggregate Score	**3.1498**	**1.36158**

Source: Researcher (2025)

The results indicated diverse levels of agreement on different aspects of project design in rangeland-based projects in Northern Kenya. The study found that the statement on whether the objectives and outcomes of rangeland projects are usually made clear and easy to understand recorded a mean score of 2.7724 with a standard deviation of 1.34617. This suggests that most responders neither agreed nor strongly affirmed clarity in project objectives. The findings further revealed that the alignment of project objectives with the community's existing needs, practices, and values had a mean score

of 2.8130 (SD = 1.38322), implying limited confidence in contextual relevance. Additionally, the roles and responsibilities of the people leading the projects were found to be only moderately well-defined, with a mean of 2.8103 (SD = 1.37990).

The research also established that adequate resource allocation and timely availability recorded a mean of 2.9295 (SD = 1.40667), reflecting a slightly more positive perception but still below average. Transparency in resource-sharing mechanisms within the institutions handling rangeland projects had a mean of 2.8428 (SD = 1.37809). The study found that community satisfaction with how projects are designed stood at a mean of 2.8076 (SD = 1.39227), while sustainable and sufficient funding of the projects scored a mean of 2.9187 (SD = 1.39639). On the other hand, the results indicated relatively higher agreement in statements related to financial accountability and project sustainability mechanisms. For instance, the sharing of audited financial reports during AGMs had a mean score of 3.5420 (SD = 1.40031), while donor agreement transparency scored even higher at 3.7507 (SD = 1.30536). Additionally, identification of risks and preparation of mitigation plans before project commencement had a mean of 3.7317 (SD = 1.28794), and the design of projects to support continuous learning had a mean of 3.7290 (SD = 1.30102).

The findings suggest that although there are strengths in accountability and future-oriented planning, there are still critical gaps in core project design components such as clear objectives, community alignment, and resource sufficiency. These aspects are fundamental in promoting ownership and long-term engagement by local stakeholders. The study established that the inconsistent perceptions, reflected in the relatively high standard deviation values, may be attributed to differences in levels of participation, information access, or demographic diversity among respondents across the region.

Furthermore, clearly defining the project boundaries and deliverables ensures that stakeholders are guided effectively and efforts remain aligned. Efficient allocation of financial and human resources was found to be essential for achieving project milestones without delays. Moreover, having predefined quality benchmarks and consistent monitoring throughout the project cycle was seen as crucial for maintaining high standards and achieving long-term conservation goals. The results underscore the importance of refining project design strategies to promote better integration with community priorities and ensure effective implementation.

The study by Purvis et al. (2021) state that proper scope determination creates mutual understanding and shared accountability as fundamental elements for achieving success in distant and disadvantaged locations. Strategic resource allocation stands as a vital factor for maintaining results in environments with limited resources according to Zhang et al. (2019). The impact and sustainability of these initiatives become stronger when project design elements focus on participatory planning and implement real-time feedback systems and continuous training for local leaders. The positive perception of accountability and learning systems indicates specific areas where project implementors can develop their work. Community-based conservation efforts will reach higher efficiency levels and gain better trust and longer duration by building new initiatives from existing strengths that include transparent reporting and proactive risk planning but also resolve identified design gaps. The authors of Williams et al. (2020) support the implementation of quality control measures at project initiation to generate meaningful lasting outcomes in conservation work.

4.5.2 Analysis on stakeholders' Engagement in Rangeland-Based Projects in Northern Kenya

A bar chart shows the extent of community involvement during different stages of rangeland-based projects based on data from 369 participants.

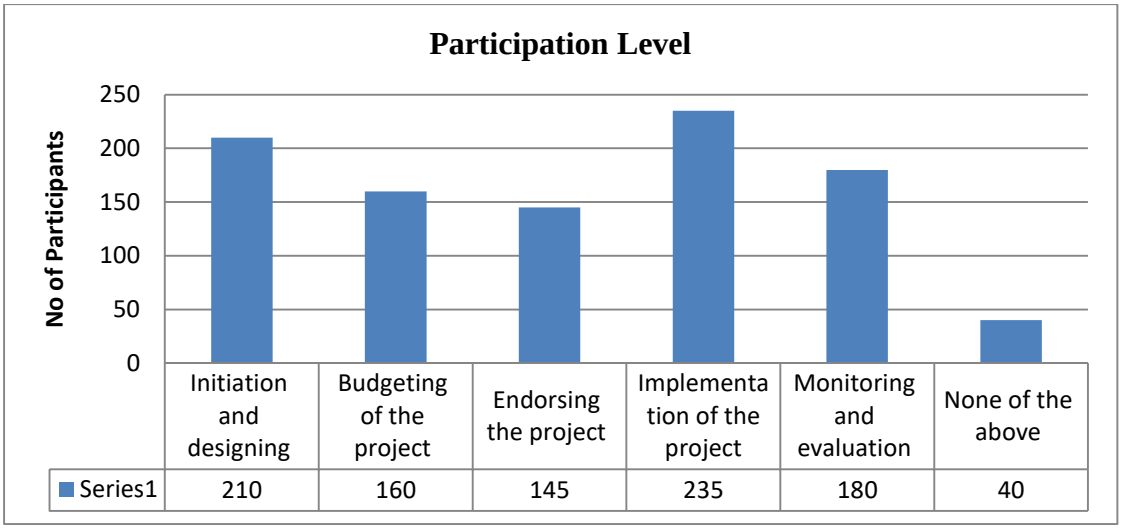

Figure 4.1: Participation Level

The bar chart illustrates the number of respondents involved in various stages of rangeland-based projects out of a total of 369. The data shows that the majority of respondents, specifically 235, participated most during the implementation stage of the projects. This suggests that the community tends to be most actively engaged during the execution phase where activities are more visible and practical. Initiation and designing of the projects attracted the second-highest level of participation, with 210 respondents involved. This implies that many community members take part in shaping the objectives and plans of the projects, which is crucial for ensuring local relevance and ownership. Monitoring and evaluation followed with 180 respondents, indicating a relatively good level of involvement in assessing the progress and performance of the projects.

Budgeting and endorsing the projects had lower levels of participation, with 160 and 145 respondents respectively. This shows that fewer individuals are involved in the financial planning and formal approval stages, potentially limiting community influence over critical funding decisions and overall accountability. The lowest level of participation was recorded in project closure, where only 40 respondents reported involvement. This indicates a gap in community engagement at the final stage of the project, which may affect sustainability and learning from completed initiatives. Additionally, 40 respondents indicated that they did not participate in any stage of the projects. This points to a segment of the population that remains excluded from the entire project cycle, highlighting the need for more inclusive and participatory strategies to ensure that all community members have the opportunity to contribute meaningfully to rangeland-based project development and outcomes.

Table 4.6 presents an analysis of stakeholders' engagement in rangeland-based projects in Northern Kenya. The table provides the mean and standard deviation values for various statements related to the nature and quality of stakeholder involvement. The analysis covers key aspects such as communication, inclusivity, decision-making, and feedback mechanisms, reflecting the perceptions of respondents regarding the extent and effectiveness of engagement practices in these community-based projects.

Table 4.6: Analysis of Stakeholders Engagement

	Mean	Std. Dev
Stakeholders receive frequent updates for all rangeland-based projects	3.9810	1.23234
Lack of effective communications hinders stakeholder participations	3.8076	1.33243
Projects documents are clearly communicated to all stakeholders and is easily accessible	3.6911	1.35211
There is an open policy for beneficiaries to share ideas and give feedback on the rangeland-based projects	3.6802	1.35961
There are sufficient opportunities for stakeholders to share information and knowledge rangeland-based projects	4.0163	1.22019
Improving information and knowledge exchange would lead to more inclusive stakeholder participation	3.7534	1.36390
The community are involved in selection of the rangeland activities to be implemented	3.5827	1.37300
There has been a change in the extent to which the community is engaged with community	3.5827	1.38286
Long-term experience in rangeland management improves decision-making abilities.	3.8943	1.27569
Your opinions are always considered during stakeholders' engagements	3.6260	1.31504
There is increasing involvement of women, youth and PWD in decision making	3.7805	1.33027
Stakeholder engagement informs changes in the decision-making Power and processes of a project	3.6883	1.31996
Aggregate Score	**3.7570**	**1.32145**

Source: Researcher (2025)

The data presented in Table 4.6 reflects various dimensions of stakeholder engagement in rangeland-based projects. Respondents generally concurred that they receive frequent updates on rangeland-based projects, as indicated by a high mean score of 3.9810 and a standard deviation of 1.23234, suggesting moderately consistent views across the sample. There was also a outstanding agreement that lack of effective communication hinders stakeholder participation, with a mean of 3.8076 and a slightly higher variability (standard deviation = 1.33243), showing diverse experiences regarding communication challenges. The clarity and accessibility of project

documents received a mean score of 3.6911, indicating moderate agreement, though with a relatively high standard deviation (1.35211), suggesting differing access experiences among stakeholders.

Respondents agreed that there is an open policy for beneficiaries to share ideas and give feedback (mean = 3.6802), although variability remained high (SD = 1.35961). The highest-rated item was the presence of sufficient opportunities for stakeholders to share information and knowledge, with a mean of 4.0163 and the lowest variability (SD = 1.22019), indicating strong and consistent agreement. Similarly, improving information exchange to enhance inclusiveness received positive support (mean = 3.7534). Community involvement in activity selection scored lower (mean = 3.5827), and responses were highly variable (SD > 1.37), indicating mixed perceptions. Long-term experience in rangeland management was viewed positively for improving decision-making (mean = 3.8943), while the inclusion of women's, youths, and PWD's voices in decision-making received moderate agreement (mean = 3.7805). The overall aggregate mean score of 3.7570 reflects a moderately high level of stakeholder engagement, with consistent views shown by a variation of 1.32145.

These findings align with Cvijović, Obradović, and Todorović (2021), who emphasized that stakeholder influence through collaboration, consultation, and even confrontation can significantly impact project decisions and outcomes. Their research suggests that stakeholder motivations, especially those tied to environmental concerns, are key to sustaining engagement. This complements the current results, where respondents strongly agreed on the importance of frequent updates and shared knowledge in fostering inclusive and effective participation in rangeland projects.

Similarly, the study by Onziru and Kimutai (2022) in Uganda supports the present findings by highlighting how stakeholder consultation and involvement across all project stages, including site selection and monitoring, enhances sustainability. Although their context differs, the principle that engagement supports accountability and alignment with community needs remains relevant. Moreover, Ochieng and Nyaga (2020) also confirmed that both interactive and functional participation significantly affect project sustainability. This strengthens the argument that involving stakeholders not just as recipients but as contributors through feedback, decision-making, and knowledge exchange is essential for the long-term success of community-based rangeland conservation efforts.

4.5.3 Analysis on Laws and Regulations in Rangeland-Based Projects Benefits in Northern Kenya

The survey participants evaluated rangeland-based project laws and regulations in Northern Kenya through Table 4.7. According to the listed mean scores and standard deviations the table presents information about the statements which address legal frameworks and institutional authority together with community engagement in policy formulation alongside implementation of penalties and rule enforcement mechanisms. The gained information enables assessments of both effectiveness and inclusivity among legal structures for rangeland conservation management.

Table 4.7: Analysis on Laws and Regulations

	Mean	Std. Dev
There is adequate and sufficient Laws that are used in establishing and governing rangelands projects	2.6043	1.33334
I am aware of the laws that are used to manage rangeland resources/projects	2.6829	1.24445
The rangeland laws are efficient in the management of rangelands projects	2.6829	1.30624
The community effectively engaged during the development of the rangeland laws and policy	2.6911	1.29041
The authority of institutions on community members has increased and the rules are respected by all community members	2.6721	1.30771
The penalties-imposed form enough deterrent to break the rules	2.6043	1.31900
The enforcement of rules is effective	2.6504	1.29579
Punishment is applied to all rule breakers fairly with no exception	2.5908	1.29297
There is transparency and fairness in the implementation of Rangeland laws and policies	2.6179	1.32403
The laws are promptly enforced	2.5664	1.29655
The laws provide for punishment for violators	2.5935	1.32803
There has been a change in the enforcement of rules	2.6829	1.28738
Aggregate Score	**2.6366**	**1.30215**

Source: Researcher (2025)

Table 4.7 demonstrates that responders generally had neutral to slightly negative views on the effectiveness and adequacy of laws and regulations governing rangeland-based projects in Northern Kenya. The statement on the adequacy and sufficiency of laws employed in establishing and governing rangeland projects had a mean of 2.6043 with a standard deviation of 1.33334, suggesting a general disagreement or uncertainty among respondents about the presence of adequate legal frameworks. Similarly, the awareness of laws managing rangeland resources scored a slightly higher mean of 2.6829 and a variation of 1.24445, implying moderate awareness but with notable variant in responses. The efficiency of these laws in managing rangeland projects recorded a mean of 2.6829 and a variance of 1.30624, implying that respondents viewed the legal instruments as moderately inefficient or inconsistently applied.

Community engagement during the development of rangeland laws and policies scored a mean of 2.6911 and a variation of 1.29041, reflecting limited participation by community members. Institutional authority and the degree to which rules are respected had a mean of 2.6721 with a variation of 1.30771, showing moderate agreement on the influence of institutions. The deterrence effect of penalties received a mean of 2.6043 and a variance of 1.31900, suggesting that penalties are not perceived as strong enough to discourage violations. Regarding enforcement, effectiveness was rated at 2.6504 with a variation of 1.29579, and fairness in punishment scored 2.5908 with a deviation of 1.29297, both pointing to perceived inefficiencies and possible bias in law enforcement. Transparency and fairness in implementation received a mean of 2.6179, while prompt enforcement and provisions for punishment scored 2.5664 and 2.5935 respectively, indicating perceived weaknesses in execution. A slightly higher mean of 2.6829 was reported for changes in enforcement, suggesting that some improvements may have occurred, although respondents still viewed the changes as inadequate overall.

These findings are consistent with Cvijović, Obradović, and Todorović (2021), who noted that sustainable management of shared resources like rangelands depends significantly on inclusive legal frameworks and clear communication. Their study emphasized the role of stakeholder collaboration and legal authority in environmental management. However, their research primarily focused on influence strategies and used qualitative data, limiting direct comparisons to this study's quantitative findings.

Onziru and Kimutai (2022) found that effective stakeholder engagement and adherence to government development plans were central to the sustainability of World Bank-funded water projects in Uganda. Their findings underscore the importance of

incorporating community views and ensuring transparent enforcement mechanisms elements that appear to be lacking in Northern Kenya, as shown by the low mean scores in this study. Although the Ugandan context differs, the implication remains that clear legal frameworks and effective implementation are essential for the success of community-based projects.

Ochunga (2016) and Ochieng and Nyaga (2020) both highlighted that passive or limited stakeholder engagement undermines the sustainability of community development projects. Their studies emphasized that sustainability is not only about policy presence but also about how well policies are enforced, how inclusive their formulation process is, and whether community members trust and respect the legal framework. This is echoed in the current study's low scores related to fairness, transparency, and enforcement, suggesting that laws governing rangeland projects may lack legitimacy and acceptance among local stakeholders, thereby hampering effective management and conservation efforts.

4.5.4 Analysis on digital knowledge Inclusion in Rangeland-based Projects Benefits in Northern Kenya

Figure 4.5 illustrates the distribution of digital tools utilized by respondents to access information on rangeland-based conservation projects in the past 12 months. Respondents were allowed to select multiple options, reflecting the variety of channels they may have used.

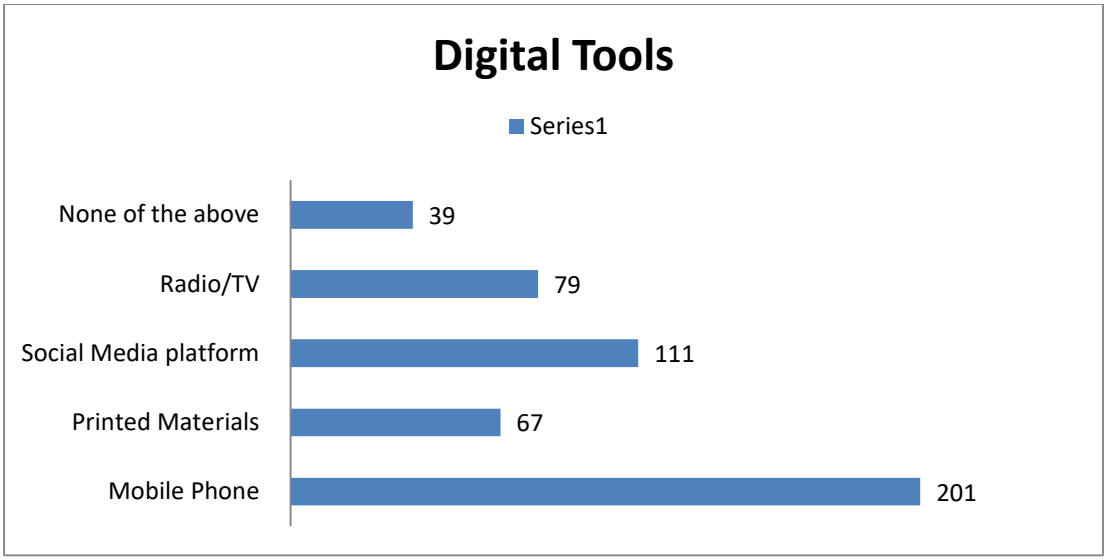

Figure 4.2: Digital Tools Usage

The findings show that mobile phones were the most commonly used tool for accessing project information, with 54.5% of the respondent's indicating usage. This highlights the widespread accessibility and reliance on mobile technology, likely due to its convenience and penetration in both urban and rural settings. Social media platforms were also significantly utilized, with 30.1% of respondents accessing project-related information through platforms such as Facebook, WhatsApp, or X, formerly Twitter. This suggests growing digital engagement and the potential of social media as an outreach tool. Radio/TV was reported by 21.4% of the respondents, reflecting the ongoing relevance of traditional media, especially in areas with limited internet access. Only 18.2% of respondents used printed materials, indicating a lower preference possibly due to issues like accessibility, cost, or delays in distribution. Interestingly, 10.6% of respondents selected None of the Above, implying a digital or informational gap where a segment of the population did not access project information through any of the listed channels in the past year. These findings underscore the importance of prioritizing mobile and digital platforms in the dissemination of project information while recognizing the continuing role of traditional media for inclusive reach.

The data from Table 4.8 describes how survey participants view elements that shape digital knowledge Inclusion for rangeland-based conservation initiatives. Research results used a Likert scale type of analysis. Higher mean scores show greater respondent agreement for the presented statements.

Table 4.8: Descriptive Analysis on Digital Knowledge Inclusion

	Mean	**Std. Dev**
I can access and purchase a digital tool such smartphones in the accessories nearest shop	2.6260	1.31297
There is reliable network signal coverage in our household	3.6287	1.30648
I can use information online to help make better decisions on rangelands projects	2.7642	1.26887
Being part of a community group enhances digital knowledge access	3.7561	1.33926
Gender roles influence the ability to utilize digital resources in your community.	3.7967	1.34705
Age improves the understanding and application of digital knowledge in rangelands projects	2.7209	1.29825
Higher education levels enhance the ability to apply digital knowledge in effectively managing rangeland projects.	3.7236	1.36713
Occupation influences the use of digital knowledge resources.	2.6341	1.31630
I often use digital platforms like social media to share and receive rangelands project information	2.6450	1.28800
I can use digital tools to learn new ideas for better management rangelands projects	2.6558	1.29934
Cultural practices influence my approach to digital information sharing	3.5989	1.29657
Religious beliefs influence how digital knowledge is use and shared	2.6206	1.30726
Aggregate Score	**3.0976**	**1.31229**

Source: Researcher (2025)

The data presented in Table 4.9 illustrates how respondents perceive digital knowledge Inclusion and adoption within the context of rangeland conservation projects. The statement on accessibility and purchase of digital tools such as smartphones from nearby shops recorded a mean of 2.6260 with a variance of 1.31297, suggesting limited but present access among responders. Household network signal coverage

demonstrated a relatively higher mean of 3.6287 and a variation of 1.30648, indicating that most respondents enjoy reliable internet access, although variation still exists. The ability to use online information for making informed decisions on rangeland projects recorded a mean of 2.7642 and a variation of 1.26887, reflecting a moderate capacity in digital information usage for decision-making. Respondents agreed more strongly with the idea that being part of a community group enhances access to digital knowledge, as shown by a high mean of 3.7561 and a variance of 1.33926.

Influence of gender roles on the ability to use digital resources had the highest mean of 3.7967 and a variation of 1.34705, indicating a significant perception that gender dynamics impact digital engagement. The effect of age on understanding and applying digital knowledge had a moderate mean of 2.7209 and variance of 1.29825. A relatively strong agreement was found on the role of higher education in enhancing digital knowledge application in rangeland projects, with a mean of 3.7236 and a variation of 1.36713. Influence of occupation on digital resource use showed a mean of 2.6341 and variation of 1.31630, indicating moderate influence. Utilization of digital platforms like social media to share rangeland information had a mean of 2.6450 and variation of 1.28800, while use of digital tools for learning new management ideas scored a mean of 2.6558. Cultural practices had a relatively high mean of 3.5989, implying they considerably shape the approach to digital information sharing, whereas religious beliefs demonstrated a lower mean of 2.6206. The cumulative mean score stood at 3.0976 with a standard deviation of 1.31229, reflecting an overall moderately positive perception of digital knowledge Inclusion.

These findings are aligned with previous studies on the influence of digital technology in sustainable project implementation. Research by Li, Sun, Li, Song and Ding in 2022

on construction projects in China found that digital adoption had a significant effect on project sustainability, especially when stakeholder collaboration was incorporated. Similarly, the present study highlights the importance of community groups and education, suggesting that social integration and knowledge levels play a role in how digital tools are adopted and used in community-based projects. Although the studies differ in scope, with one focusing on construction and the other on rangeland projects, the core insight that collaborative and informed environments foster digital effectiveness remains relevant.

Moreover, the study by Otundo in 2022 supports the findings by showing that strategic technology adoption positively influences sustainability in community-based water supply projects in marginalized areas. This is mirrored in the current study, where community influence and cultural alignment are seen as key enablers of digital knowledge access. Likewise, the research by Ngigi, Wanyona and Gwaya in 2021 emphasized that digital tools and skills enhance the sustainability of low-cost housing projects. In this context, the role of education, social networks, and cultural practices evident in the current study supports the broader understanding that digital knowledge Inclusion critical to achieving sustainable outcomes in local development initiatives, including rangeland conservation.

4.5.5 Analysis on Community Conservancy Approach

This section presents an analysis of community members' perspectives on the Community Conservancy approach, particularly focusing on conservancy registration status, awareness of the legal framework guiding conservancy operations, and perceptions of inclusivity, transparency, fairness, and institutional recognition. Understanding the extent to which community members are aware of the legal basis for

conservancy operations and how they perceive the conservancy's role in rangeland management and community inclusion is critical in evaluating the effectiveness of community-led conservation initiatives. Tables 4.9 and 4.10 provide detailed insights into these dimensions

Table 4.9: Cross-tabulation of Conservancy Registration and Law Awareness

		Are you aware of the law in which the Conservancy operations is based on? [1] Yes [2] No		Total
		Yes	**No**	
Is the Conservancy registered? [1] Yes [2] No	Yes	73	175	248
	No	8	47	55
	Do not Know	20	46	66
Total		**101**	**268**	**369**

Source: Researcher (2025)

The cross-tabulation presented in Table 4.9 provides insights into the relationship between conservancy registration status and community members' awareness of the legal framework governing conservancy operations. Out of 369 respondents, 248 (67.2%) indicated that the conservancies are registered, 55 (14.9%) stated it is not, and 66 (17.9%) were unsure. Among those who believed the conservancy is registered, 73 (29.4%) were aware of the legal framework, while a larger portion, 175 (70.6%), lacked this awareness. This suggests that although many respondents recognize the conservancy as a registered entity, a significant number are not informed about the legal foundation under which it operates.

For the 55 respondents who believed the conservancy is not registered, only 8 (14.5%) were aware of the law guiding conservancy operations, while 47 (85.5%) were not. This trend continues among those who were uncertain about the conservancy's registration, with only 20 (30.3%) aware of the relevant law and 46 (69.7%) not aware. These

findings highlight a general lack of legal awareness among the community, irrespective of their perception of the conservancy's registration status. Overall, only 101 out of 369 respondents (27.4%) indicated awareness of the law, with the majority, 268 (72.6%), being unaware. This lack of awareness puts conservancy operations under risk of regulatory framework and points out a need to ensure conservancies are registered and recognized by law and improve indigenous people and local communities' awareness on the legal framework governing conservancy operations. The data indicate a need for improved legal sensitization and education among community members to enhance their understanding of the institutional and legal frameworks that underpin conservancy operations. Without such awareness, community engagement in conservation governance and compliance with conservancy regulations may be hindered, potentially undermining the legitimacy and effectiveness of community conservation initiatives.

This study findings are consistent with a court ruling [2025] KEELC 99 (KLR) where residents of Chari and Merti wards of Isiolo county complained that Northern Rangelands Trust had established and supported operation of Biliqo Bulesa and Cherab community wildlife conservancies in unregistered community land in Isiolo County without express consent, approval, authority, or mandate from them and the community at large.

Table 4.10: Analysis on Community Conservancy Approach

	Mean	Std. Dev
The Conservancy is recognized by the County Government	3.7236	1.31443
The Conservancy is recognized by the National Government	3.7073	1.32122
The Conservancy adequately addresses the needs of the community in the management of rangelands	2.6748	1.32388
There has been a change in the land tenure system because of conservancy creation	2.6640	1.33140
There has been a change in the conservancy leadership structure	2.7100	1.32490
The Conservancy is transparent in decision making	2.6694	1.30182
The Conservancy adequately involves the community members in decision making	2.6829	1.35725
The Conservancy is fair to all community members	2.5989	1.31529
Is inclusive and accommodate women, youth and PWDs-in leadership and decision making	2.6233	1.31323
Rangelands projects are beneficial to the community in this Village	2.6585	1.29482
The Conservancy provides equitable access to resources for all groups	2.6829	1.31246
The rangelands projects benefits are sustainable over long term	2.8103	1.41106
Rangelands projects benefit to the community outweighs the challenges	2.6504	1.35525
Cumulative Score	**2.8351**	**1.32900**

Source: Researcher (2025)

Based on the findings from Table 4.10, the highest mean scores were recorded for the recognition of the conservancy by the County Government (M = 3.7236, SD = 1.31443) and the National Government (M = 3.7073, SD = 1.32122), indicating that community members moderately agree that their conservancy is an institution formally acknowledged by the two levels of government. These scores suggest a relatively strong institutional presence or support. Conversely, lower mean values were noted in aspects of inclusivity, fairness, and community involvement. For instance, the statement "The Conservancy is fair to all community members" had a low mean of 2.5989 (SD = 1.31529), suggesting a general perception of inequity among members. Similarly, the

conservancy's inclusivity in accommodating women, youth, and persons with disabilities (PWDs) scored a mean of 2.6233 (SD = 1.31323), reflecting limited inclusiveness in leadership and decision-making processes.

Further interpretation reveals that community members expressed moderate dissatisfaction with the transparency and inclusiveness of decision-making in conservancy operations. The item “The Conservancy is transparent in decision making” scored a mean of 2.6694 (SD = 1.30182), while “The Conservancy adequately involves the community members in decision making” received a mean of 2.6829 (SD = 1.35725). These results underscore a perception of limited community engagement in critical governance processes. Regarding the benefits derived from conservancy initiatives, respondents gave modest scores to the sustainability of rangeland projects (M = 2.8103, SD = 1.41106) and whether such projects outweigh challenges (M = 2.6504, SD = 1.35525). The aggregate score for all the items was 2.8351 (SD = 1.32900), suggesting an overall lukewarm perception of the effectiveness and inclusivity of the Community Conservancy approach within the sampled village.

These findings are consistent with the research by Pienaah et al. (2024), which revealed that community-led conservation models such as CREMA in Ghana significantly improved livelihood outcomes for women through structured, inclusive participation and decision-making. The positive effects on shea productivity indicate the potential of community conservation to generate tangible economic benefits when community needs are prioritized. The relatively low scores in the current study regarding transparency, inclusivity, and fairness may signal a gap in the implementation of participatory principles, which are central to successful community conservation efforts. Furthermore, the Ghanaian model demonstrated effectiveness by targeting

specific socio-economic groups (women) and addressing sustainability goals, which may be underdeveloped or less structured in the current context.

The study by Mfossa et al. (2025) in the Ebo Forest, Cameroon, reinforces these observations by showing how long-term involvement in local conservation clubs like CAG contributed to increased environmental awareness and community welfare, despite challenges such as hunting and economic dependency on bushmeat. The high levels of community affiliation and positive perception of CAG illustrate the importance of fostering local ownership and integrating socio-economic dimensions into conservation. The relatively low scores in this study's context regarding fairness, access to resources, and benefit sustainability may reflect the absence of such strong community structures or insufficient policy support. This suggests that enhancing transparency, equity, and inclusivity in conservancy operations could improve both ecological and social outcomes.

Similarly, Irawan and Esthi (2024) emphasized the importance of social capital and intermediary actors like forestry extension officers in strengthening community participation in conservation efforts. Their findings showed that community engagement is more likely when trust, communication, and social networks are leveraged. The limited community involvement reported in the current findings highlights the need for structured engagement mechanisms and professional facilitation. By improving social cohesion and building trust through inclusive practices, Community Conservancy approach es can be more effective in delivering sustainable outcomes for all stakeholders.

4.5.6 Sustainability of Rangelands-Based Projects Benefits

This section presents a detailed examination of sustainability of community-based rangelands conservation projects, with a focus on governance structures, inclusivity,

and perceived project benefits. Table 4.11 provides an overview of the respondents' feedback on the sustainability of community-based rangelands conservation projects.

Table 4.11: Sustainability of Rangelands-Based Projects Benefits

	Mean	Std. Dev
The rangelands-based projects have resulted to benefits in pasture availability across all seasons	3.5745	1.18894
Rangeland management projects have resulted to carbon sinking and benefits	2.3659	1.17215
There has been increase in water sources and improvement in water quality	2.4336	1.15229
The productivity of the rangelands has generally improved	2.3686	1.08332
Our household income has improved due to projects benefits	2.5176	1.15172
Our household has Trust in institutions supporting different projects	2.3469	1.14872
Community members look out for the welfare of one another	2.4201	1.09581
Our household adaptive measures on drought have resulted to improved livestock qualities	2.3496	1.03197
Aggregate Score	**2.5471**	**1.12811**

Source: Researcher (2025)

The highest-rated statement was that the rangelands-based projects have resulted in benefits in pasture availability across all seasons, which recorded a mean of 3.5745 with a variation of 1.18894. This implies that most responders moderately agreed that pasture availability has improved due to the interventions. In contrast, the statement that rangeland management projects have resulted in carbon sinking and benefits had a mean of 2.3659 and a variation of 1.17215, suggesting low agreement and suggesting that ecological outcomes such as carbon sequestration are less visible or understood among the community members.

The mean score for the increase in water sources and improvement in water quality was 2.4336 (variation of 1.15229), showing minimal observed improvements. The statement on the general improvement in rangeland productivity scored a mean of 2.3686 with a variance of 1.08332, indicating that many respondents did not observe

significant productivity gains. The economic aspect of sustainability, such as enhancement in household income due to project benefits, recorded a mean of 2.5176 and a variance of 1.15172, suggesting that financial impacts have been limited. Social indicators also scored low, with trust in institutions supporting projects scoring a mean of 2.3469 and variance of 1.14872, and community welfare concern scoring a mean of 2.4201 with a variation of 1.09581. Furthermore, the household's adaptive measures on drought and their impact on livestock qualities recorded a mean of 2.3496 and a variation of 1.03197. The overall aggregate mean score was 2.5471 with a variation of 1.12811, which reflects general dissatisfaction with the sustainability outcomes of the projects.

These findings are congruent with prior research that highlighted the limited success of community-based conservation efforts where institutional trust and economic returns are low. A study by Pienaar et al. (2024) on Ghana's CREMA model reported that sustainability was strongly linked to effective local governance, equitable benefit sharing, and community trust in the institutions involved. The low mean scores on trust in institutions and household-level benefits in the current study suggest that similar governance mechanisms may be weak or underdeveloped in the Kenyan context, limiting the perceived sustainability of the projects.

Similarly, Njoroge and Otieno (2023) observed that sustainability in community-driven conservation is highly dependent on tangible social and economic outcomes. In their study, higher levels of satisfaction were linked to improved household income, social cohesion, and enhanced access to natural resources. The findings from this study, particularly the low scores in household income, water quality, and livestock improvement, indicate that the community may not be realizing significant returns from

the conservation efforts. This calls for a re-evaluation of the implementation approach to ensure that benefits are not only ecological but also social and economic, thereby enhancing overall sustainability. The evidence from the reviewed literature supports the conclusion that without improved governance, benefit sharing, and community involvement, sustainability of rangelands conservation projects may remain elusive.

Table 4.12 presents the findings on household food access based on the Household Food Insecurity Access Scale (HFIAS) for the past four weeks. The results show that most households had some concerns related to food access, although at relatively low frequencies.

Table 4.12: Household Food Nutrition Security

	Mean	**Std. Dev**
During the preceding four weeks, did you experience concern regarding insufficient food supply?	1.2087	.40691
In the past four weeks, were you or any member of your household unable to consume certain preferred foods due to a lack of resources?	1.1870	.42381
In the preceding four weeks, did you or any member of your household have to consume a restricted variety of foods due to insufficient resources?	1.2358	.45590
In the past four weeks, did you or any member of your household consume foods that were undesirable because to insufficient finances to acquire alternative options?	1.1599	.40232
In the past four weeks, did you or any member of your household have to consume a lesser meal than required due to insufficient food availability?	1.2195	.44606
In the past four weeks, did you or any other household member have to have fewer meals each day due to insufficient food availability?	1.1924	.42777
In the past four weeks, did your household experience a complete lack of food due to insufficient finances to obtain it?	1.2168	.44434
In the preceding four weeks, did you or any member of your household retire for the night feeling hungry due to insufficient food availability?	1.2005	.43351
In the preceding four weeks, did you or any member of your household go a full day and night without eating food due to insufficient provisions?	1.1734	.41343
Have you received any trainings on alternative livelihoods	1.1599	.40232
Aggregate Score	**1.1954**	**.42564**

Source: Researcher (2025)

The statement with the highest mean was whether the household had to eat restricted kinds of foods due to lack of resources, which recorded a mean of 1.2358 with a variation of 0.45590. This suggests that a moderate number of households reported dietary restrictions due to financial limitations. Closely following was the response to whether the household had to eat a smaller meal than needed due to insufficient food, with a mean of 1.2195 and variance of 0.44606. Similarly, the absence of food in the household due to lack of resources had a mean of 1.2168 and standard deviation of 0.44434, indicating that this was also a relatively frequent occurrence.

Worrying about having enough food scored a mean of 1.2087 and variation of 0.40691, reflecting general food insecurity anxiety among households. The need to eat fewer meals per day had a mean of 1.1924 and a variation of 0.42777. Slightly lower were the means for sleeping hungry (1.2005) and inability to eat preferred foods (1.1870), suggesting these were reported but at somewhat lesser levels. The least reported experience was going a whole day and night without food, with a mean of 1.1734 and variance of 0.41343. Lastly, the training on alternative livelihoods recorded a mean of 1.1599 with a variation of 0.40232, suggesting that fewer respondents had received such training. The aggregate mean was 1.1954 with a variance of 0.42564, pointing to low-to-moderate food insecurity across the sampled households.

These findings align with prior studies indicating that food insecurity remains a challenge in arid and semi-arid regions, often due to seasonal variability and limited livelihood options. For instance, Makau and Mutua (2022) found that households in pastoral communities of Northern Kenya regularly adopt coping strategies such as eating fewer meals or relying on non-preferred foods during drought periods. The

findings from the current study reflect similar patterns, with respondents indicating dietary compromises due to resource constraints.

Additionally, a study by Wekesa et al. (2023) highlighted the importance of training in alternative livelihoods in improving food access in rural Kenyan counties. Their findings suggested that access to trainings on climate-smart agriculture and small-scale enterprises significantly improved household resilience and nutritional outcomes. However, in the current study, the relatively low mean score for training uptake may explain the persistence of food insecurity. This indicates a potential gap in capacity-building interventions, which if addressed, could contribute significantly to enhancing household food and nutrition security in the region. These results underscore the need for integrated programming that not only addresses immediate food needs but also builds long-term adaptive capacity through skills development and diversified income sources.

4.6 Inferential Analysis

This section demonstrates an inferential investigation that determines the dependencies between research variables. The main function of inferential analysis consists of extracting population-level conclusions from sample data through testing hypotheses and assessing statistical associations.

4.6.1 Correlation Analysis

This subsection presents the results of correlation analysis, which was conducted to examine the strength and direction of the connection between the independent variables and the dependent variable; sustainability of community-based rangelands conservation projects. The Pearson Product Moment Correlation Coefficient was utilized to assess the linear connection between variables. The correlation coefficients range from -1 to

+1, whereas values closer to +1 signify a strong favourable link, values closer to -1 implying a robust negative relationship, and values around zero suggest no linear relationship.

Table 4.13: Correlations

		Project Design	Stakeholders Engagement	Laws & Regulations	Digital knowledge Inclusion	Community Conservancy approach	Sustainability of Projects Benefits
Project Design	Pearson Corr.	1					
	Sig.(2-tailed)						.
Stakeholders Engagement	Pearson Corr.	.007	1				
	Sig.(2-tailed)	.891					.
Laws Regulations	Pearson Corr.	.055	-.009	1			.
	Sig.(2-tailed)	.291	.862				
digital knowledge Inclusion	Pearson Corr.	.273**	-.140**	.721**	1		
	Sig.(2-tailed)	.800	.707	.100			
Community Conservancy approach	Pearson Corr.	.564	.756*	.695	.678**	1	
	Sig.(2-tailed)	.201	.116	.303	.302		
Sustainability of Projects	Pearson Corr.	.504	.726*	.655	.758**	.548**	1
	Sig.(2-tailed)	.000	.001	.003	.000	.001	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Source: Researcher (2025)

Table 4.13 presents the results of the Pearson correlation analysis conducted to assess the relationships between various independent variables and the sustainability of community-based rangelands conservation projects. From the findings, project design had a moderately strong and positive correlation with the sustainability of projects ($r = 0.504$, $p = 0.000$). This suugests that improvements in project design are linked with enhanced project sustainability. Similarly, stakeholders' engagement was found to have a statistically significant and strong positive connection with sustainability ($r = 0.726$, $p = 0.001$), suggesting that increased involvement of stakeholders contributes positively to project outcomes.

Additionally, laws and regulations were positively correlated with sustainability ($r = 0.655$, $p = 0.003$), implying that effective legal frameworks may enhance the longevity and impact of rangeland conservation efforts. digital knowledge Inclusion showed the strongest significant positive correlation with project sustainability ($r = 0.758$, $p = 0.000$), which suggests that integrating digital tools and technologies could considerably enhance project effectiveness and continuity. Additionally, the Community Conservancy approach demonstrated a significant positive relationship with project sustainability ($r = 0.548$, $p = 0.001$), indicating that community-driven practices and approaches are essential for ensuring long-term conservation efforts.

Regarding the interrelationships among the independent variables, a significant positive correlation was noted between digital knowledge Inclusion and laws and regulations ($r = 0.721$, $p < 0.01$), indicating that regulatory environments might support or enhance the use of digital technologies in project implementation. Also, a positive correlation was observed between stakeholders' engagement and Community Conservancy approach ($r = 0.756$, $p < 0.05$), suggesting that collaborative stakeholder efforts are often aligned with community-based strategies.

4.6.2 Regression Analysis

This section presents the results of the regression analysis done to ascertain the influence of key independent variables project design, stakeholder engagement, laws and regulations, digital knowledge Inclusion, and Community Conservancy approach on the dependent variable, sustainability of community-based rangelands conservation projects. The regression analysis helps to quantify the strength and direction of the relationship between these predictors and the sustainability outcomes, while also identifying the most significant contributors to project success. The analysis further aids

in understanding how variations in the independent variables impact the viability of the conservation initiatives.

Table 4.14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.710[a]	.504	.501	.73648

a. Predictors: (Constant), digital knowledge Inclusion, Stakeholders Engagement, Project Design, Laws & Regulations

Source: Researcher (2025)

The model summary in Table 4.14 provides an overview of the strength and explanatory power of the regression model used to examine the link between the independent variables—digital knowledge Inclusion, stakeholder engagement, project design, and laws and regulations—and the sustainability of community-based rangelands conservation projects. The value of R is 0.710, indicating a robust favorable correlation between the combined independent variables and the dependent variable (project sustainability). The R Square value is 0.504, which means that approximately 50.4% of the variation in the sustainability of the projects can be ascribed to the four predictors in the model. This suggests that the model has moderate explanatory power.

Table 4.15 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.396	4	.599	1.104	.000[b]
	Residual	197.433	364	.542		
	Total	**199.829**	**368**			

a. Dependent Variable: Sustainability of projects

b. Predictors: (Constant), digital knowledge Inclusion, Stakeholders Engagement, Project Design, Laws & Regulations

Source: Researcher (2025)

The F-statistic is 1.104, assessing the adequacy of the entire regression model for the data. The significance value (Sig.) is recorded as 0.000, which is beneath the standard threshold of 0.05. This suggests that the regression model is statistically significant, meaning that the set of predictors; digital knowledge Inclusion, stakeholder

engagement, project design, and laws and regulations jointly contribute to the prediction of project sustainability.

Table 4.16: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.892	.496		9.863	.000
	Project Design	.179	.095	.105	1.892	.000
	Stakeholders Engagement	.062	.093	.035	.666	.006
	Laws & Regulations	.030	.123	.019	.239	.001
	Digital Inclusion	.029	.136	.017	.212	.002

a. Dependent Variable: Sustainability of Projects

Source: Researcher (2025)

Resulting Multiple Regression Equation $Y = 4.892 + 0.179X_1 + 0.062X_2 + 0.030X_3 + 0.029X_4 + \varepsilon$

The coefficients presented in Table 4.16 reflect the results of a multiple linear regression analysis conducted to determine the effect of four independent variables on the dependent variable, Sustainability of Project Benefits (denoted as Y). The independent variables include Project Design (X_1), Stakeholders Engagement (X_2), Laws and Regulations (X_3), and digital knowledge Inclusion (X_4). The unstandardized coefficients demonstrate the projected change in the dependent variable for a one-unit change in each predictor, holding other variables constant. The resulting regression equation is: $Y = 4.892 + 0.179X_1 + 0.062X_2 + 0.030X_3 + 0.029X_4 + \varepsilon$, Where: Y = Sustainability of project benefits and ε = Error term

The constant term (intercept) has a coefficient of 4.892 with a standard error of 0.496, and is statistically significant at $p < 0.001$. This implies that when all independent variables are held at zero, the baseline level of project sustainability is significantly above zero. This finding also suggests that other unmeasured factors beyond project design, stakeholder engagement, legal frameworks, and digital inclusion play a role in

shaping sustainability outcomes, reinforcing the complexity of sustainability in rangeland-based projects. The regression analysis results in Table 4.17 show that the constant term has a coefficient of 4.892 with a standard error of 0.496, and it is statistically significant at $p < 0.001$. This suggests that when all the independent variables (Project Design, Stakeholders Engagement, Laws and Regulations, and Digital Inclusion) are held constant, the baseline level of project benefits sustainability is significantly above zero. This implies that factors not included in the model may still play a substantial role in influencing the sustainability of rangeland-based projects, reinforcing the idea that sustainability is multifaceted and dependent on a broad range of contextual elements.

Regarding Project Design, the unstandardized coefficient is 0.179, and the standardized Beta coefficient is 0.105, with a t-value of 1.892 and a statistically significant p-value of 0.000. This means that a one-unit rise in the quality of project design reflected in elements such as scope definition, resource allocation, and quality standards control results in a 0.179 unit increase in project benefits sustainability, holding other factors constant. The standardized Beta indicates that Project Design has the strongest relative effect among the four predictors. This finding is congruent to Purvis et al. (2021), who argue that a well-defined scope fosters alignment among stakeholders. Zhang et al. (2019) highlight that effective resource allocation is especially critical in resource-scarce environments, and Williams et al. (2020) underscore the importance of quality control for maintaining project standards. The current study affirms that robust project design contributes positively and significantly to sustainability outcomes in rangeland conservation initiatives

The unstandardized coefficient for Stakeholders Engagement is 0.062, with a standardized Beta of 0.035, a t-value of 0.666, and a statistically significant p-value of 0.006. While the effect size is relatively modest, the positive and significant coefficient suggests that improvements in stakeholder engagement practices such as inclusive consultations, participatory planning, and continuous communication enhance project sustainability. These results align with Ochieng and Nyaga (2020), who found that active participation positively influences the sustainability of community projects. Similarly, Onziru and Kimutai (2022) observed that joint planning efforts improved outcomes in World Bank-supported initiatives in Uganda. Even though Ochunga (2016) found that passive participation had little effect, the current findings highlight the value of active engagement and local ownership, especially in the context of community-based rangelands conservation.

The coefficient for Laws and Regulations is 0.030, with a Beta of 0.019, and a p-value of 0.001. This indicates a statistically significant, though relatively small, positive effect on project sustainability. Compliance with legal and regulatory frameworks appears to contribute to sustainable project outcomes, but to a lesser extent compared to project design. Gichamba and Kithinji (2019) reported similar findings, noting that specific regulations—particularly those related to waste and water management enhanced project performance. Mattar et al. (2024) also found that legislative requirements impact project timelines and costs, while Serrano and Fonseca (2024) cautioned that the mere existence of regulations is insufficient without effective enforcement. These insights underscore the need for early integration of regulatory considerations into project planning and implementation.

The unstandardized coefficient for digital knowledge Inclusion is 0.029, with a standardized Beta of 0.017, and a p-value of 0.002. While the effect is statistically significant, its magnitude is small, suggesting a modest but positive role in enhancing sustainability. Improved access to digital tools, ICT infrastructure, and technical skills can support more efficient and transparent project management, data-driven decision-making, and knowledge sharing. These findings are in line with Li et al. (2022), who found that digital adoption improved project outcomes through enhanced stakeholder collaboration. Otundo (2022) similarly identified a link between strategic technology use and water project sustainability in remote Kenyan regions, while Ngigi, Wanyona, and Gwaya (2021) emphasized the value of digital solutions in supporting affordable and sustainable housing. In the rangeland conservation context, digital knowledge Inclusion represents an emerging but important factor in building adaptive capacity and long-term viability.

All four independent variables Project Design, Stakeholders Engagement, Laws and Regulations, and Digital Inclusion have statistically significant positive effects on the sustainability of project benefits. Among them, Project Design emerges as the most influential predictor. While the other three factors show more modest impacts, their significance suggests that they should not be overlooked in policy or project planning. The findings highlight the multifaceted and interconnected nature of sustainability in rangelands conservation and reinforce the need for integrated approaches that combine technical, institutional, and community-driven elements.

4.6.3 Testing of the Moderating Effects of Community Conservancy approach

The moderating effect of the Community Conservancy approach on the link between project management practices and project's sustainability was assessed through a regression interaction model. The results are presented in Table 4.17.

Table 4.17: Model Summary of the Interaction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782[a]	.612	.595	.73137

a. Predictors: (Constant), Interaction, Project Management Practices

Source: Researcher (2025)

The results indicate that when the interaction term between project management practices and Community Conservancy approach is included in the model, the coefficient of determination (R Square) increases to 0.612, which implies that approximately 61.2% of the variation in the sustainability of projects can be explained by the combined influence of project management practices and the moderating effect of the Community Conservancy approach.

The Adjusted R Square value of 0.595 adjusts for the number of predictors in the model and still demonstrates a strong explanatory power. The R value of 0.782 also signifies a strong positive correlation between the predictors (including the moderator) and the dependent variable. These results provide empirical support for the assertion that the Community Conservancy approach significantly moderates the connection between project management practices and sustainability of conservation projects. This implies that where community conservation principles are integrated; such as community ownership, participatory planning, local knowledge inclusion, and benefit-sharing mechanisms the effectiveness of project design, stakeholder engagement, regulatory compliance, and digital adoption practices is amplified in contributing to sustainable project outcomes.

Table 4.18 presents the results of the ANOVA test for the regression model examining the moderating effect of Community Conservancy approach on the connection between project management practices and project's sustainability.

Table 4.18: Interaction ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.054	2	2.027	3.790	.023[b]
	Residual	195.775	366	.535		
	Total	**199.829**	**368**			

a. Dependent Variable: Sustainability of Projects Benefits
b. Predictors: (Constant), Interaction, Project Management Practices

Source: Researcher (2025)

The ANOVA results indicate that the regression model including project management practices and the interaction with Community Conservancy approach significantly explains variations in the sustainability of projects. This suggests that Community Conservancy approach significantly moderates the connections between project management practices and sustainability.

Table 4.19: Interaction Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.925	.443		11.127	.000
	Project Management Practices	.217	.155	.079	1.401	.005
	Interaction	.158	.121	.154	2.731	.007

a. Dependent Variable: Sustainability of Projects

Source: Researcher (2025)

The results presented in Table 4.16 reveal that project management practices have a statistically significant positive influence on the sustainability of rangeland-based projects in Northern Kenya. Specifically, project design (B = 0.105, p = .000) exhibited the strongest effect, followed by stakeholder engagement (B = 0.035, p = .006), laws and regulations (B = 0.019, p = .001), and digital knowledge Inclusion (B = 0.017, p = .002). These findings indicate that effective planning, inclusive engagement, adherence

to regulations, and integration of digital solutions are crucial drivers of project sustainability. All variables had p-values less than 0.05, suggesting that each independently contributes to improving project outcomes in the absence of a moderating variable.

When the Community Conservancy approach was introduced as a moderating variable in Table 4.18, the model revealed an increase in the effect of project management practices on sustainability (B = 0.079), along with a positive and meaningful interaction term (B = 0.154). This shows that the Community Conservancy approach enhances the connection between project management practices and project sustainability. The increased coefficient implies that the community's involvement and support contribute significantly to the effectiveness of project implementation strategies, particularly in managing and conserving rangeland resources for long-term use.

Consequently, the null hypothesis (H05), asserting that the Community Conservancy method exerts no moderating influence on the link between project management practices and the sustainability of rangeland-based projects, is rejected. The positive and significant interaction term indicates that incorporating community conservation efforts strengthens the impact of project management practices. Therefore, it is concluded that community conservation plays a crucial moderating role and should be integrated into project design and execution frameworks to enhance sustainability outcomes in rangeland-based projects across Northern Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses a summary of the key research findings, draws conclusions from the goal of the study, and offers recommendations grounded in the results. The purpose of this chapter is to consolidate the insights gathered throughout the study and relate them to the research problem, objectives, and hypothesis. It also outlines areas for future research and highlights implications for policy and practice. The study examined the effect of project management practices on the sustainability of rangeland-based projects in Northern Kenya, with a focus on project design, stakeholder engagement, laws and regulations, and digital knowledge Inclusion, and tested the moderating role of the Community Conservancy approach in enhancing sustainability outcomes.

5.2 Summary of the Findings

The study found that while community members in Northern Kenya were generally aware of their project funding origins, there was a noticeable disconnect between this knowledge and their understanding or recognition of project auditing practices. This indicates a potential gap in transparency and stakeholder engagement in financial oversight. Despite limited clarity in project objectives and partial alignment with community needs, some aspects such as financial accountability and sustainability mechanisms were relatively well-regarded. However, the overall perception suggests a need to strengthen communication on funding sources, enhance clarity of project goals, and improve the participatory nature of project design to build trust and accountability. Stakeholder engagement was most prominent during the implementation stage of rangeland-based projects, followed by moderate involvement in initiation and monitoring phases. However, fewer respondents were involved in budgeting, project

endorsement, and closure, with some community members not participating at all. This revealed a lack of comprehensive involvement across the project lifecycle. While frequent updates and knowledge-sharing opportunities were appreciated, challenges remained in communication consistency, inclusivity in decision-making, and clarity of projects documents. Although there were efforts to include marginalized groups, mixed responses suggested variability in experiences. Overall, stakeholder engagement was moderately strong but highlighted the need for more inclusive, transparent, and continuous participation mechanisms.

The research found that community perceptions of the legal and institutional frameworks governing rangeland-based projects in Northern Kenya were generally neutral to negative. Respondents expressed uncertainty about the adequacy and effectiveness of existing laws, as well as limited awareness and inconsistent enforcement. Community involvement in the formulation of laws and policies was minimal, and penalties for non-compliance were perceived as weak deterrents. Institutional authority was recognized to some extent, but enforcement was often viewed as delayed or unfair. These findings suggest that legal frameworks need strengthening in terms of inclusivity, awareness creation, and consistency in implementation to ensure effective governance of rangeland resources.

Mobile phones emerged as the primary medium for accessing project information, indicating their importance in facilitating communication and knowledge dissemination in both urban and rural areas. Social media platforms also played a notable role, showing growing digital engagement among stakeholders. Traditional media, particularly radio and television, remained relevant, especially in areas with poor internet connectivity. The low usage of printed materials and the number of respondents who did not access any form of project information highlight existing informational

and digital gaps. These insights emphasize the need to prioritize mobile and digital platforms while ensuring inclusivity by accommodating various communication preferences and access levels.

5.3 Conclusions

The study established that project management practices significantly influence the sustainability of rangeland-based projects benefits in Northern Kenya. It was found that well-structured project design, incorporating proper scope, resource allocation, and quality control plays a critical role in ensuring sustainable outcomes. This aligns with the view that clear planning and resource allocation enhance project implementation and longevity.

Stakeholder engagement also emerged as an important contributor to sustainability. The findings highlight the value of involving communities and other stakeholders through mechanisms such as consultation, communication, and shared decision-making. These strategies foster local ownership and accountability, which are essential for the success of conservation initiatives in rangeland contexts.

Furthermore, compliance with relevant laws and regulations was shown to contribute to project sustainability, though its effect was relatively modest. This emphasizes the need to embed regulatory awareness and enforcement mechanisms in project plans from the outset, especially in sectors where policy alignment influences environmental and operational outcomes.

The study also identified digital knowledge Inclusion as a supportive factor in sustainability, highlighting the role of digital tools, infrastructure, and skills in enhancing project planning, monitoring, and collaboration. Although its impact was

less pronounced, technology remains a useful enabler for data-driven decision-making and improved service delivery.

The Community Conservancy approach was found to significantly moderate the relationship between project management practices and project benefits sustainability. This means that when conservation is integrated with community-based principles such as local participation, indigenous knowledge, shared benefits, and community stewardship the overall effectiveness of rangeland-based projects management practices is enhanced. These results support the argument that sustainability in rangeland conservation is strengthened when local communities are engaged not just as beneficiaries but as active participants and custodians.

5.4 Recommendations for the Study

Conservation projects planners and implementing agencies should invest in strengthening project design by clearly defining the project scope, allocating sufficient resources, and embedding quality control measures from the onset. Comprehensive planning frameworks that align project goals with community needs and environmental sustainability standards should be developed to ensure long-term project success.

It is recommended that project implementers adopt inclusive engagement strategies that go beyond mere consultation. This includes regular communication, feedback mechanisms, participatory planning sessions, and capacity-building initiatives for local communities. Active stakeholder involvement fosters ownership, trust, and commitment, all of which are critical for sustained project outcomes.

Government agencies and conservation project stakeholders should prioritize compliance with existing legal and regulatory frameworks. There is a need for early

integration of regulatory requirements into the planning stages of projects. Strengthening institutional capacity for monitoring, enforcement, and interpretation of environmental laws will also enhance project compliance and sustainability.

Investment should be made in digital infrastructure, training, and access to relevant technologies, especially in rural and marginalized regions. Project managers should integrate digital tools in monitoring, data collection, communication, and reporting processes. These technologies can enhance transparency, responsiveness, and efficiency in project implementation.

The findings highlight the moderating role of the Community Conservancy approach . Therefore, it is recommended that future projects systematically embed community conservation principles such as participatory governance, benefit-sharing, incorporation of indigenous knowledge, and long-term stewardship agreements. This will not only strengthen the effectiveness of project management practices but also promote local ownership and sustainability.

5.5 Suggestions for Further Study

Future research could explore other project management dimensions such as risk management, resource mobilization, monitoring and evaluation, and leadership practices to determine their influence on the sustainability of conservation projects. A longitudinal study design is recommended to assess the sustainability of rangeland conservation projects over an extended period. This would help capture the long-term effects of project management practices and community involvement. Researchers should consider conducting comparative studies between different counties or regions in Kenya to assess how varying ecological, socio-economic, and governance contexts influence project sustainability outcomes. Further studies can focus specifically on how

internal community factors—such as leadership structures, cultural practices, and local conflict dynamics—moderate or mediate the relationship between project inputs and sustainability. Future studies should delve deeper into how specific technological innovations (e.g., remote sensing, mobile platforms, and GIS tools) affect the planning, implementation, and sustainability of conservation initiatives, particularly in remote and underserved areas.

REFERENCES

Aarseth, W., Ahola, T., Aaltonen, K., Okland, A., & Andersen, B. (2017). Project sustainability strategies: A systematic literature review. *International journal of project management*, *35*(6), 1071-1083.

Agosa, R. O. (2022). *Influence of community mobilization on sustainability of community-based development projects in Uriri constituency Migori county, Kenya* (Doctoral dissertation, University of Nairobi).

Aksorn, P., & Charoenngam, C. (2020). Sustainability factors affecting local infrastructure project: The case of water resource, water supply, and local market projects in Thai communities. *Facilities*, *33*(1/2), 119-143.

Alamelu, K. (2019). Digital inclusion-a conceptual framework. *International Journal of Advanced Research in Management and Social Sciences*, *2*(12), 228-248.

Amaechina Ebele, C., & Eboh Eric, C. (2022). Resource use efficiency in rice production in the lower Anambra irrigation project, Nigeria. *Journal of development and agricultural economics*, 9(8), 234-242

Andrade, J. B., & Bragança, L. (2019). Assessing buildings' adaptability at early design stages. In *IOP Conference Series: Earth and Environmental Science* (Vol. 225, No. 1, p. 012012). IOP Publishing.

Asenahabi, B. M. (2019). Basics of research design: A guide to selecting appropriate research design. *International Journal of Contemporary Applied Research*, *6*(5), 76-89.

Bell, S., Morse, S., & Shah, R. A. (2019). Understanding Stakeholders Engagement in research as part of sustainable development. *Journal of Environmental Management*, *101*, 13-22

Chebet, M., & Ombaba, K. (2019). *Effect of budgeting on project sustainability of dairy co-operative societies in Uasin Gishu County, Kenya* (Master's Project, Kabarak University)

Cherepovitsyn, A., Tsvetkova, A., & Komendantova, N. (2020). Approaches to assessing the strategic sustainability of high-risk offshore oil and gas projects. *Journal of Marine Science and Engineering*, *8*(12), 995

Chew, M. Y., Conejos, S., & Asmone, A. S. (2017). Developing a research framework for the green maintainability of buildings. *Facilities*, *35*(1/2), 39-63.

Collins, O. D. E. N. Y. O., & James, R. (2018). Influence of resource mobilization on sustainability of women group projects in Vihiga County, Kenya. *International Journal of Economics, Business and Management Research*, *2*(04).

corporate social responsibility projects funded by Safaricom Company in Kenya. *The Strategic Journal of Business & Change Management,* 9 (2), 36-57

Cvijovic, J., Obradovic, V., & Todorovic, M. (2021). Stakeholder Management and Project Sustainability—A Throw of the Dice. *Sustainability*, *13*(17), 9513

Delgado-Rico, E., Carretero-Dios, H., & Ruch, W. (2018). Content validity evidence in test development: An applied perspective. *International Journal of Clinical and Health Psychology España*, *12*(3), 449-460.

Dobrovolskiene, N., & Tamosiuniene, R. (2016). Sustainability-oriented financial resource allocation in a project portfolio through multi-criteria decision-making. *Sustainability*, *8*(5), 485

Gatumi, N. J. (2022). *Project management practices and sustainability of food security projects in counties within Arid Lands, Kenya* (Doctoral Dissertation, Kenyatta University).

Gholami, Y. (2023). *Investigating Adoption of Digital Technologies in Construction Projects* (Doctoral dissertation, Linköping University Electronic Press).

Gichamba, S., & Kithinji, C. (2019). Influence of environmental regulations in the performance of construction projects in Nairobi County, Kenya. *International Academic Journal of Information Sciences and Project Management, 3*(4), 184–209.

Giezen, M., Bertolini, L., & Salet, W. (2015). Adaptive capacity within a mega project: A case study on planning and decision-making in the face of complexity. *European Planning Studies*, *23*(5), 999-1018

Haavaldsen, T., Lædre, O., Volden, G. H., & Lohne, J. (2019). On the concept of sustainability–assessing the sustainability of large public infrastructure investment projects. *International Journal of Sustainable Engineering*, *7*(1), 2-12.

Hamilton, C. (2022). Emerging research institutions' technology transfer supply chain networks' sustainability: Budget resource planning tool development. *IEEE Engineering Management Review*, *45*(4), 39-52.

Influence of Project Resources Management and Performance of Sustainable Agricultural Intensification and Food Security Project (SAIP) in Nigeria.

Jimenez-Rivero, A., & Garcia-Navarro, J. (2022). Indicators to measure the management performance of end-of-life gypsum: from deconstruction to production of recycled gypsum. *Waste and Biomass Valorization*, *7*, 913-927.

Kaimenyi, M. D. (2019). *Factors influencing sustainability of community-based county projects in Kenya: A case of Isiolo North Sub County, Isiolo County* (Doctoral dissertation, UoN).

Kerkhof, M., & Wieczorek, A. (2023). Learning and Stakeholders Engagement in transition processes towards sustainability: Methodological considerations. *Technological forecasting and social change*, *72*(6), 733-747

Kezar, A. (2020). The importance of pilot studies: Beginning the hermeneutic circle. *Research in Higher Education*, *41*, 385-400.

Kiiza, W., & Muiruri, P. M. (2022). Influence of Project Planning Process on Performance of Food Sustainable Initiative Project in Rwanda. *Global Scientific Journal,* 10(3), 912 – 929

Kivila, J., Martinsuo, M., & Vuorinen, L. (2017). Sustainable project management through project control in infrastructure projects. *International Journal of Project Management*, *35*(6), 1167-1183.

Kudratova, S., Huang, X., & Zhou, X. (2018). Sustainable project selection: Optimal project selection considering sustainability under reinvestment strategy. *Journal of Cleaner Production*, *203*, 469-481.

Lambert, M. J., Burlingame, G. M., Umphress, V., & Yanchar, S. C. (2021). The reliability and validity of the Outcome Questionnaire. *Clinical Psychology & Psychotherapy: An International Journal of Theory and Practice*, *3*(4), 249-258.

Li, Y., Sun, H., Li, D., Song, J., & Ding, R. (2022). Effects of digital technology adoption on sustainability performance in construction projects: The mediating role of stakeholder collaboration. *Journal of Management in Engineering*, *38*(3), 04022016.

Ling, F. Y. Y., Low, S. P., Wang, S. Q., & Lim, H. H. (2022). Key project management practices affecting Singaporean firms' project performance in China. *International Journal of project management*, *27*(1), 59-71.

Macharia, P. N., & Ekaya, W. N. (2023). The impact of rangeland condition and trend to the grazing resources of a semi-arid environment in Kenya. *Journal of Human Ecology*, *17*(2), 143-147.

Madrigal-Ballestero, R., & Naranjo, M. A. (2020). Adaptive capacity, drought and the sustainability of community-based drinking water organizations in Costa Rica. *Journal of Water and Climate Change*, *6*(4), 831-847.

Manewa, A., Siriwardena, M., Ross, A., & Madanayake, U. (2022). Adaptable buildings for sustainable built environment. *Built Environment Project and Asset Management*, *6*(2).

Marnewick, C. (2022). Information system project's sustainability capability levels. *International Journal of Project Management*, *35*(6), 1151-1166.

Mathew, R., Gantait, A., & Swamy, G. A. (2017). Community-Based Conservation for Sustainable Forest Management-Probing the Indian Projections and Selected International Paradigms. *Tourism: Theory and Practice*, *15*(1), 83-107.

Mattar, Y., Alzaim, M. A., AlAli, M., Alkhatib, I., & Beheiry, S. (2024). The impact of change orders caused by legislative changes on program management in the UAE construction industry. *Buildings*, *14*(5), 1294. https://doi.org/10.3390/buildings14051294

Mburu, S. N. (2017). *Influence of budget planning on sustainability of road construction projects in Nairobi City County, Kenya: A case of China Wuyi Company Limited* (Doctoral dissertation, MUA).

Mir, F. A., & Pinnington, A. H. (2019). Exploring the value of project management: linking project management performance and project success. *International journal of project management*, *32*(2), 202-217

Ngigi, M. A. K., Wanyona, G., & Gwaya, A. (2021). Influence of Technology Adoption on Sustainable Low-Cost Housing in Kajiado County, Kenya. *International journal of engineering research & technology,* 10(9), 304 – 310

Ochieng, A. I., & Nyaga, J. (2020). Stakeholders Engagement and sustainability of community development projects implemented by plan international in Kilifi County, Kenya. *International Journal of Management and Leadership Studies,* 4(1), 6 – 9

Ochunga, F. O. (2016). *Influence of Stakeholders Engagement on sustainability of community development projects implemented by plan international in Homa bay town sub-county* (Doctoral dissertation, University of Nairobi).

Oke, A. E. (2022). Participants' Satisfaction: A Measure of Project Success. In *Measures of Sustainable Construction Projects Performance* (pp. 33-40). Emerald Publishing Limited.

Omair, A. (2015). Selecting the appropriate study design for your research: Descriptive study designs. *Journal of health specialties*, *3*(3), 153 – 164

Onziru, B., & Kimutai, G. (2022). Stakeholders Engagement and Sustainability of World Bank Funded Water Projects in Karamoja, Uganda. *The International Journal of Business & Management*, *10*(1).

Otundo, R. M. (2022). Strategic Technology Adoption Practice and Sustainability of Community Water Supply Projects in Marginalized Kenya. *Strategic Technology Adoption Practice and Sustainability of Community Water Supply Projects in Marginalized Kenya (November 26, 2022)*.

Owusu, E. H. (2020). Community-based conservation in Ghana: a case of local management of the Afadjato and Agumatsa Conservation Area in Ghana. Natural resources in Ghana. New York. Nova Science Publishers Inc.

Ritchie, J., Lewis, J., & Elam, G. (2019). Designing and selecting samples. *Qualitative research methods*, 5(2), 77 – 108

Riziki, K. O., Atera, F. T., & Juma, D. (2019). Influence of resource mobilization on sustainability of community water projects in Kakamega County. *The Strategic Journal of Business and Change Management, 6*(2), 1776-1787.

Roba, H. G., & Oba, G. (2021). Efficacy of integrating herder knowledge and ecological methods for monitoring rangeland degradation in northern Kenya. *Human Ecology*, *37*, 589-612.

Robinson, L. W., & Sasu, K. A. (2022). The role of values in a community-based conservation initiative in northern Ghana. *Environmental Values*, *22*(5), 647-6664

Saris, W. E., & Gallhofer, I. N. (2022). *Design, evaluation, and analysis of questionnaires for survey research*. John Wiley & Sons.

Serrador, P., & Pinto, J. K. (2022). Does Agile work? —A quantitative analysis of agile project success. *International journal of project management*, *33*(5), 1040-1051

Serrano-Santoyo, A., & Rojas-Mendizabal, V. (2021). Exploring a complex framework for digital knowledge Inclusion interventions. *Procedia computer science*, *121*, 212-217

Serrano, A. M., & Fonseca, A. (2024). License to pollute? A longitudinal analysis of environmental performance, compliance, and enforcement in 232 licensed projects in Brazil. *Journal of Cleaner Production, 434*, 139977. https://doi.org/10.1016/j.jclepro.2023.139977

Shukla, S. R., & Sinclair, A. J. (2022). Strategies for self-organization: Learning from a village-level community-based conservation initiative in India. *Human Ecology*, *38*, 205-215.

Silvius, A. G., & Schipper, R. (2020). A conceptual model for exploring the relationship between sustainability and project success. *Procedia Computer Science*, *64*, 334-342.

Silvius, G. (2017). Sustainability as a new school of thought in project management. *Journal of cleaner production*, *166*, 1479-1493

Slaghuis, S. S., Strating, M. M., Bal, R. A., & Nieboer, A. P. (2021). A framework and a measurement instrument for sustainability of work practices in long-term care. *BMC health services research*, *11*, 1-13.

Thesari, S. S., Lizot, M., & Trojan, F. (2021). Municipal public budget planning with sustainable and human development goals integrated in a multi-criteria approach. *Sustainability*, *13*(19), 10921

Thomson, C., & El-Haram, M. (2022). Potential and implications of sustainability action plans: Lessons from the Greater Middlehaven Regeneration Project. *Built Environment Project and Asset Management*, *4*(1), 108-122.

Toljaga-Nikolić, D., Todorovic, M., & Dobrota, M., (2020). Project management and sustainability: Playing trick or treating with the planet. *Sustainability*, *12*(20), 8619.

Uslu, A., Erul, E., Santos, J. A. C., Obradovic, S., & Custodio Santos, M. (2023). Determinants of Residents' Support for Sustainable Tourism Development: An Empirical Study in Midyat, Turkey. *Sustainability*, *15*(13), 10013.

Wabwoba, M. S. N., & Wakhungu, J. W. (2022). Factors affecting sustainability of community food security projects in Kiambu County, Kenya. *Agriculture & Food Security*, *2*(1), 1-5.

Waindi, W., Kitheka, S., & Ogolla, P. (2022). Project management practices and sustainability of corporate social responsibility projects funded by Safaricom Company in Kenya. The Strategic Journal of Business & Change Management, 9 (2), 36-57.

Wang, Y., Zhang, S., & Xu, S. (2022). Impact of Efficient Resource Management Practices on Sustainable Project Performance: Moderating Role of Innovative Culture-Evidence from Oil and Gas Firms. *Frontiers in Psychology*, *13*, 938247.

Yusuf, F. A. (2023). Effect of value creation and adaptive capacity to transformation, with organizational performance as an intervening variable. *Journal of Management Information and Decision Science*, 26(2), 8 – 14

Zhao, L., Tian, L., Cai, T., Claggett, B., & Wei, L. J. (2013). Effectively selecting a target population for a future comparative study. *Journal of the American Statistical Association*, *108*(502), 527-539.

APPENDICES

Appendix I: Cover Letter

Dear Sir/Madam

Re: Request for Participation in academic Research Study

You're invited to take part in academic research titled ***"Project Management Practices, Community Conservancy approach, and Sustainability of Rangelands-based Projects' Benefits in Northern Kenya."*** Your expertise and experience in this field makes you a valuable potential respondent for this study.

I kindly request your participation in this study by answering truthfully and honestly, the questions provided in the questionnaire items. Your insights will contribute significantly to advancing our understanding of sustainability of benefits derived from Community-based Rangelands conservation projects in the counties of Isiolo, Marsabit and Samburu.

Rest assured that all information provided will be treated with utmost confidentiality and used solely for academic purposes. Your participation is voluntary, and you have the right to withdraw at any time without consequences.

Your assistance in facilitating this study is highly valued, and I sincerely appreciate your time and cooperation.

Appendix II: Questionnaire

Section A: Bio Dta

1. Gender: **[1]** Male [**2]** Female
2. Indicate your age in years…….
3. Indicate your education level…….

Section B: Projects Design

The following table contains statements regarding the influence of projects designs on the

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Scope Determination	1	2	3	4	5
Indicate your level of agreement to the following statements regarding scope determination					
1. The objectives and outcomes of the rangeland's projects are usually made clear and easy to understand					
2. The projects objectives are well aligned with the community's existing Needs, Practices and Values					
3. The Roles and Responsibilities of the people leading the Projects are well-defined					
4. The community and other stakeholders are satisfied with how these projects are designed					
Resource Allocation					
1. I am aware of the Source of funding for rangeland-based projects Yes {1} No {2}	1	2			
Indicate your level of agreement to the following statements regarding stakeholder communication and feedback	1	2	3	4	5
2. Adequate resources are allocated to projects and availed on time to effectively run the projects					
3. The institutions handling rangeland-based projects are transparent in resource sharing mechanism					

4. Rangeland-based projects are sustainably and sufficiently funded					
Statements regarding Quality Control Standards					
Indicate your level of agreement to the following statements regarding Quality Control Standards	1	2	3	4	5
1. The Rangeland-based projects in our area are Audited Yes {1} No {2}	1	2			
2. If yes, The Audited Financial Reports are shared to the community during AGMs					
3. Donor Agreements and Compliance requirements are publicly shared to the community					
4. Risks of the rangeland-based projects are identified and mitigation plan developed before commencing activities					
5. Rangeland-based Projects are designed to support continuous learning and improvement to meet future demands					

Section C: Stakeholders Engagement

The following table contains statements regarding the influence of Stakeholders Engagement on sustainability of rangelands-based projects benefits in Northern Kenya.

Key

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Communication and Feedback					
Indicate your level of agreement to the following statements regarding stakeholder communication and feedback	1	2	3	4	5
1. Stakeholders receive frequent updates for all rangeland-based projects					
2. Lack of effective communications hinders stakeholder participations					
3. Projects documents are clearly communicated to all stakeholders and is easily accessible					

4. There is an open policy for beneficiaries to share ideas and give feedback on the rangeland-based projects					
Participation Level					
Which among these stages did you participate the most in the rangeland-based projects *(select all that applies) [1] Initiation and designing [2] Budgeting of the project [3] Endorsing the project [4] Implementation of the project [5] Monitoring and evaluation [6] Project closure [7] None of the above*					
Indicate your level of agreement to the following statements regarding stakeholder participation level	1	2	3	4	5
1. There are sufficient opportunities for stakeholders to share information and knowledge rangeland-based projects					
2. Improving information and knowledge exchange would lead to more inclusive stakeholder participation					
3. The community are involved in selection of the rangeland activities to be implemented					
4. There has been a change in the extent to which the community is engaged with community					
Decision Making					
Indicate your level of agreement to the following statements regarding stakeholder Decision Making	1	2	3	4	5
1. Long-term experience in rangeland management improves decision-making abilities.					
2. Your opinions are always considered during stakeholders' engagements					
3. There is increasing involvement of women, youth and PWD in decision making					
4. Stakeholder engagement informs changes in the decision-making Power and processes of a project					

Section D: Laws and Regulations

The following table contains statements regarding the influence of Laws and Regulations on sustainability of rangelands-based projects benefits in Northern Kenya.

Key

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Laws and Rules Formulations					
Indicate your level of agreement to the following statements regarding Laws and Regulations formulations	1	2	3	4	5
1. There is adequate and sufficient Laws that are used in establishing and governing rangelands projects					
2. I am aware of the laws that are used to manage rangeland resources/projects					
3. The rangeland laws are efficient in the management of rangelands projects					
4. The community effectively engaged during the development of the rangeland laws and policy					
Laws and Rules Compliance					
Indicate your level of agreement to the following statements regarding Laws and Rules Compliance	1	2	3	4	5
1. The authority of institutions on community members has increased and the rules are respected by all community members					
2. The penalties-imposed form enough deterrent to break the rules					
3. The enforcement of rules is effective					
4. Punishment is applied to all rule breakers fairly with no exception					
Laws and Rules Enforcement					
Indicate your level of agreement to the following statements regarding stakeholder Laws and Rules Enforcement	1	2	3	4	5
1. There is transparency and fairness in the implementation of Rangeland laws and policies					
2. The laws are promptly enforced					
3. The laws provide for punishment for violators					
4. There has been a change in the enforcement of rules					

Section E: Digital Inclusion

The following table contains statements regarding Digital Knowledge Inclusion on the sustainability of rangelands-based projects benefits in Northern Kenya. Key:

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Digital Skills Access					
From which of the following digital tools have you used to access projects information in the last 12 months *(Select all that applies) [1] Mobile Phone [2] Printed Materials [3] Social Media platform [4] Radio/TV [5] None of the above*					
Indicate your level of agreement to the following statements regarding Digital Skills Access	1	2	3	4	5
1. I can access and purchase a digital tool such smartphones in the accessories nearest shop					
2. There is reliable network signal coverage in our household					
3. I can use information online to help make better decisions on rangelands projects					
4. Being part of a community group enhances digital knowledge access					
Influence of Digital knowledge use					
Indicate your level of agreement to the following statements regarding the influence of Digital Knowledge Use	1	2	3	4	5
1. Gender roles influence the ability to utilize digital resources in your community.					
2. Age improves the understanding and application of digital knowledge in rangelands projects					
3. Higher education levels enhance the ability to apply digital knowledge in effectively managing rangeland projects.					
4. Occupation influences the use of digital knowledge resources.					
Digital knowledge sharing					
Indicate your level of agreement to the following statements regarding Digital Knowledge Sharing	1	2	3	4	5
1. I often use digital platforms like social media to share and receive rangelands project information					
2. I can use digital tools to learn new ideas for better management rangelands projects					
3. Cultural practices influence your approach to digital information sharing					
4. Religious beliefs influence how digital knowledge is use and shared					

Section F: Community Conservancy Approach

The following table contains statements regarding the moderating influence of community conservancy approach on the relationship between project management practices and sustainability of rangelands-based projects benefits in Northern Kenya.

Key:

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Mandates and Recognition					
1. Is the Conservancy registered? [1] Yes [2] No					
2. Are you aware of the law in which the Conservancy operations is based on? [1] Yes [2] No					
3. What is the aim/objective of the Conservancy-(**Select all that apply)** [1] Wildlife conservation [2] Livestock management [3] Land management [4] Water management [5] Grazing management [6] Build peace and conflict resolution [6] Land ownership and rights [7] Forest and tree cover management					
Indicate your level of agreement to the following statements regarding Conservancy Mandates and Recognitions	1	2	3	4	5
1. The Conservancy is recognized by the County Government					
2. The Conservancy is recognized by the National Government					
3. The Conservancy adequately addresses the needs of the community in the management of rangelands					
4. There has been a change in the land tenure system because of conservancy creation					
Governance Structure					
Indicate your level of agreement to the following statements regarding Conservancy Governance Structure	1	2	3	4	5
1. There has been a change in the conservancy Leadership structure					
2. The Conservancy is transparent in decision making					
3. The Conservancy adequately involves the community members in decision making					

4. The Conservancy is fair to all community members					
5. Is inclusive and accommodate women, youth and PWDs-in leadership and decision making					
Benefits Sharing Mechanism					
Indicate your level of agreement to the following statements regarding Conservancy Benefits Sharing Mechanism	1	2	3	4	5
1. Rangelands projects are beneficial to the community in this Village					
2. The Conservancy provides equitable access to resources for all groups					
3. To what extent do you agree that rangelands projects benefits are sustainable over long term?					
4. Do you think rangelands projects benefits to the community outweighs the challenges					
What challenges of sustainability do you think conservancy benefits sharing mechanism face (*select all that applies)* *[1] Lack of transparency [2] Lacks projects maintenance [3] Resources mismanagement [4] External shocks eg climate change [4] Short-term benefits*					

Section F: Sustainability of Projects Benefits

The following table contains statements regarding the sustainability of rangeland-based projects benefits in Northern Kenya. Key:

$1 = \text{Strongly Disagree}, 2 = \text{Disagree}, 3 = \text{Neutral}, 4 = \text{Agree}, 5 = \text{Strongly Agree}$

Improved Rangelands Productivity					
Indicate your level of agreement to the following statements regarding benefits of an improved rangelands productivity	1	2	3	4	5
1. The rangelands-based projects have resulted to benefits in pasture availability across all seasons					
2. Rangeland management projects have resulted to carbon sinking and benefits					
3. There has been increase in water sources and improvement in water quality					

4. The productivity of the rangelands has generally improved					
Enhanced Household Food Nutrition Security					
The following statements regarding Household Food Insecurity Accessible Scale (HFIAS) for measurement of households' food access, please respond either 1=Yes or 2=No				1	2
1. During the preceding four weeks, did you experience concern regarding insufficient food supply?					
2. In the past four weeks, were you or any member of your household unable to consume certain preferred foods due to a lack of resources?					
3. In the preceding four weeks, did you or any member of your household have to consume a restricted variety of foods due to insufficient resources?					
4. In the past four weeks, did you or any member of your household consume foods that were undesirable because to insufficient finances to acquire alternative options?					
5. In the past four weeks, did you or any member of your household have to consume a lesser meal than required due to insufficient food availability?					
6. In the past four weeks, did you or any other household member have to have fewer meals each day due to insufficient food availability?					
7. In the past four weeks, did your household experience a complete lack of food due to insufficient finances to obtain it?					
8. In the preceding four weeks, did you or any member of your household retire for the night feeling hungry due to insufficient food availability?					
9. In the preceding four weeks, did you or any member of your household go a full day and night without eating food due to insufficient provisions?					
Enhanced household and Institutional adaptive Capacity					
1. Have you received any trainings on alternative livelihoods [1=Yes] [2=No]	**1**	**2**			
Indicate your level of agreement to the following statements regarding enhanced households and institutional adaptive capacity	**1**	**2**	**3**	**4**	**5**
2. Our household income has improved due to projects benefits					
3. Our household has Trust in institutions supporting different projects					
4. Community members look out for the welfare of one another					
5. Our household adaptive measures on drought have resulted to improved livestock qualities					

Appendix III: KU Research Authorization Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D53/OL/CTY/26906/2018

DATE: 22nd November, 2024

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR SOSAITA PAUL LOLONGEI - REG. NO. D53/OL/CTY/26906/2018

I write to introduce **Soita paul Lolongei** who is a Postgraduate Student of this University. The student is registered for M.B.A degree programme in the **Department of Management Science.**

Sosaita intends to conduct research for a M.B.A Project Proposal entitled, **"Project Management Practices, and Adaptive Capacity and Sustainability of Community Based Rangelands Conservation projects in Northern Kenya."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELIUD NJAGI
EXECUTIVE DEAN, GRADUATE SCHOOL
AM/k

Appendix IV: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **392598**

Date of Issue: **03/February/2025**

RESEARCH LICENSE

This is to Certify that Mr.. Sosaita Lolongei Paul of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Isiolo, Marsabit, Samburu on the topic: PROJECT MANAGEMENT PRACTICES, ADAPTIVE CAPACITY AND SUSTAINABILITY OF COMMUNITY BASED RANGELAND CONSERVATION PROJECTS' BENEFITS IN NORTHERN KENYA for the period ending : 03/February/2026.

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