INFLUENCE OF ENVIROMENTAL IMPACT ASSESSMENT ON THE IMPLEMENTATION OF AGRICULTURAL DEVELOPMENT PROJECTS IN LIMURU SUB-COUNTY, KIAMBU COUNTY, KENYA

BY

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DECLARATION

This research project report is my original work and has not been presented for a degree award in this or any other University.

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This research project report has been submitted for examination with the approval of the University Supervisor.

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DEDICATION

This research report is dedicated to my darling husband Mr. Christian Fewen Woyee, my Kids, Christian, Quita and Christina who have been there for me in all the struggles and exercising patient while I am away in pursuing higher education. I am also not forgetting my father, Mr. Togbah Kokpayou Varpilah and my siblings, Mbeanue and Nuneah Varpilah. Thanks to all of you for the moral and spiritual supports given to me in my struggle for higher education.

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LIST OF ACRONYMS AND ABBREVIATIONS

BLM:	Bureau of Land Management
CFC:	Chlorofluorocarbon
EIA:	Environmental Impact Assessment
GoK:	Government of Kenya
HIV/AIDS:	Acquired Immunodeficiency Syndrome
LDC:	Least Developed Countries
LRU:	Sensitivity Level Rating Unit
(NO_2):	Nitrogen dioxide
NMVOC:	Non-methane volatile organic compounds
SPSS:	Statistical Package for Social Sciences
SQRU:	Sound Quality Research Unit
UNDP:	United Nations Development Programme
VOC:	Volatile organic compounds
VRI:	Visual Resource Inventory
VRM:	Victron Remote Management

ABSTRACT

Environmental impact assessment (EIA) is a process which attempts to identify, predict and mitigate the ecological and social impacts of development proposals and activities. It also helps to assist decision-making and to attain sustainable development. The objectives of this study were to establish how air quality and climate influence the implementation of agricultural development projects; determine how visual and landscape influences the implementation of agricultural development projects; assess how socio economic factors influence the implementation of agricultural development projects; and determine how geology, geomorphology influence the implementation of agricultural development projects. This study employed a descriptive survey research design. The target population was 100 agricultural development projects in Limuru Sub-County, Kiambu County from which a sample of 90 was obtained. The researcher used purposive sampling to select 90 participants. Quantitative data collected using questionnaires was coded, entered and analyzed using descriptive statistics. The study revealed that air quality and climate change are important components of Environmental Impact Assessment which influenced implementation of agricultural development projects in Limuru Sub-County, Kiambu County. Visual and landscape were found to have a significant influence on implementation of agricultural development projects in Limuru Sub-County, Kiambu County. The findings have shown that social economic factors influenced implementation of agricultural development projects. The findings of this study have shown that geology and geomorphology are important elements of Environmental Impact Assessment that influenced implementation of agricultural development projects in Limuru Sub-County, Kiambu County. Importance of EIA was seen in that potential emissions which pollute air were considered in implementation of agricultural development projects in this area. The framework in place to manage visual resources so as to maintain scenic value of tracts of land for the future in Limuru Sub-County, Kiambu County was considered in agricultural development projects implementation as well as the measures to determine scenic quality based on land use were taken into consideration in agricultural development projects implementation. This study concluded that project managers and stakeholders were conscious of potential visual impacts and contrasts that could result from the agricultural development projects. The study also concluded that socio-economic factors are important and should be considered in any project as illustrated in this case are project managers considered agricultural development projects' potential effects on livelihoods, environment and customs of the people in Limuru Sub-County, Kiambu County. The study concluded that project managers emphasized participation by locals in agricultural development projects as well as prioritizing other social policies that support locals in implementation of agricultural projects to ensure ownership of the project and positive impact on the locals' livelihoods. A holistic approach in Environmental Impact Assessment that could influence implementation of agricultural development projects is critical. This study recommends that agricultural development project managers should ensure that the EIA process takes into account environmental issues raised when a project or plan is first discussed and that all concerns are addressed as a project gains momentum through implementation. The study also recommends that there should be a follow up to ensure that EIA reports recommendations are implemented. Future scholars should look into how to strengthen the implementation of EIA on agricultural development projects. Future scholars should also seek to establish challenges of the implementation of EIA in agricultural development projects. Scholars also need to focus their attention on the determinants of EIA in agricultural development projects.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Environmental impact assessment (EIA) is a process which attempts to identify, predict and mitigate the ecological and social impacts of development proposals and activities. It also helps to assist decision-making and to attain sustainable development. The effectiveness of EIA depends on numerous factors, midst which the quality of EIA guidelines, EIA reports and implementation and follow-up of EIA recommendations are of particular importance (Arebo, 2005).

Environmental impact assessment (EIA) is being used globally, either as a planning or management tool, in order to minimize the harmful consequences of development especially in Agricultural projects. Its emphasis is on prevention and it is hence an example of the precautionary principle (Glasson, 1995). Ensuring environmental protection and management is the primary goal of EIA (Bailey, 1997; Morrison-Saunders and Bailey, 1999). Since its introduction in the early 1970s, the role and scope of EIA are expanding continuously, although its application, practice and procedures vary from country to country (Glasson et al., 1994).

In Australia, the Intergovernmental Agreement on the Environment (IGAE, 1992) set out a schedule for EIA, recognizing and acknowledging the need for national participation in all facets of EIA and accepting the role of EIA in post-development environmental monitoring and management. This agreement forms a basis for EIA to become one of the most important and useful tools for environmental management in Australia. However, in the Australian EIA system, monitoring and auditing remain the weakest areas, requiring the attention of policy makers and EIA practitioners. As noted by Harvey (1998) in most of the EIA jurisdictions in Australia, EIA is being used as a planning tool rather than an environmental management tool.

Arebo (2005), from his study on effects of EIA on Agricultural projects in Ethiopia, suggested that improving the EIA guidelines quality, filling gaps, and finding ways of minimizing the capacity limitations and the ineffective implementation of the guidelines by development proponents are key issues which need to be addressed if the guidelines are to be effectively

applicable in practice. According to EPA Australia (1995), EIA follow-up is needed because relatively little attention is paid to the actual effects arising from project construction and operation. Without some form of systematic follow-up to decision making, EIA may become just a paper chase to secure a development permit, rather than a meaningful exercise in environmental management to bring about real environmental benefits. This paper aims to assess the EIA implementation and follow-up mechanism, with a focus on an irrigation development project in the district of Mecha, Amhara National Regional State, Ethiopia.

According to Agenda 21 (1998), Voluntarily Implementation Action Plan of the United Nations, countries can no longer afford to make decisions concerning developmental issues without taking the environment into account. Changes are needed in the institutional structures of governments in order to enable more systematic consideration of the environment when decisions are made on economic, social, fiscal, energy, agriculture, transportation, trade and other policies, as well as the implications of policies in these areas for the environment. It also describes that governments should strengthen national institutional capacity and capacity to integrate social, economic, and environmental issues at all levels of developmental decision-making and implementation.

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment. In addition there is limited local communities' involvement in participatory planning and management of the environment and natural resources. Recognizing the importance of natural resources and the environment in general, the Kenyan Government has put in place wide range of policy, institutional and legislative framework to address the major causes of environmental degradation and negative impacts on ecosystems emanating from industrial and Agricultural economic development projects. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition of the Kenya Government to conduct Environmental Impact Assessment on development Projects. EIA assesses the impacts of a Agricultural project before commencement of implementation.

1.2 Statement of the problem

Air quality and climate Change on the implementation of Agricultural development projects, a study by The NEDLAC Air Quality Study, initiated study to examine the potential socioeconomic impact of measures to reduce air pollution from combustion (2004), has confirmed the belief that investments in air quality management are investments in public health. Visual and landscape on successful implementation of Agricultural development projects,

The ratings are made in the field by trained observers who evaluate the landscape view from inventory observation points, which are either important viewpoints or points with views that are representative of the SQRU. Socio economic on successful implementation of Agricultural development projects, Barrow (1997) referred to Burdge and Vanclay (1996) as he sought to define social impacts: "Social impact consists all social and cultural consequences to human populations that alter the ways in which people live, work, play, have relations with each other, organize meet their needs and generally cope as members of a society". Geology, geomorphology on successful implementation of Agricultural development projects, Around the world, only a few countries have the long and detailed history of geological mapping by a national survey, together with records of numerous site investigations and other ground activities, which give considerable foresight and the ability to develop fairly realistic models before a foot has been set on the ground. This approach is well discussed in detail by Culshaw (2005).

In its role as an environmental management tool, EIA must implement processes for confirming the existence of forecasted impacts and controlling the harmful effects of those that do actually occur (Canada, 1992). Thus, impact studies should include a consideration of the need for and requirements of follow-up (Wlordarczyk, 2000). Initially EIA was seen by some Agricultural development project promoters as a constraint to development but this view is gradually disappearing. It can, however, be a useful constraint to unsustainable development. It is now well understood that environment and development are complementary and interdependent and EIA is a technique for ensuring that the two are mutually reinforcing. A study carried out by the Environmental Protection Agency (USA) in 1980 showed that there were significant changes to projects during the EIA process, marked improvements in environmental protection measures

and net financial benefits. The costs of EIA preparation and any delays were more than covered by savings accruing from modifications, (Wathern, 1988).

There are a number of scholars that have researched on Agricultural and Environmental related issues; such as Jie Wen (2010) who did a study on the impact of atmospheric nitrogen deposition on coastal eutrophication and on nitrogen use efficiency in Chinese agriculture. Liu Lin (2009) did a study based on practicality and necessity to assess visual impact and landscape impact separately in EIA. Studies by Ogunbameru (1986), Agwunobi (1993) and Eze (2010) reported that farmer participation in planning and project implementation enhanced greater socio-economic impacts. They concluded that training of farmers facilitated adoption of recommended practices. Erlangung and Doktorgrads (2008) studied geology geomorphic response to environmental change. No known study to the researcher that has focused on the influence of Environmental Impact Assessment on the implementation of agricultural development projects despite its importance in the process of development. Therefore, this research aimed at determining the influence of Environmental Impact Assessment on the implementation of agricultural development projects in Limuru Sub-County, Kiambu County, Kenya.

1.3 Purpose of the Study

The purpose of this study was to determine the Influence of EIA on the implementation of Agricultural development projects in Limuru Sub-County, Kiambu County, Kenya.

1.4 Objectives of the Study

This study was guided by the following objectives:

1. To establish how air quality and climate influence the implementation of Agricultural development projects
2. To determine how visual and landscape influence the implementation of Agricultural development projects
3. To assess how socio economic factors influence the implementation of Agricultural development projects
4. To determine how geology, geomorphology influence the implementation of Agricultural development projects

1.5 Research Questions

This study sought to answer the following research questions:

1. How does air quality and climate influence the implementation of Agricultural development projects?
2. How does visual and landscape influence the implementation of Agricultural development projects?
3. How do socio economic factors influence the implementation of Agricultural development projects?
4. How do geology, geomorphology influence the implementation of Agricultural development projects?

1.6 Significance of the Study

The study is expected to contribute to the generation of knowledge on the factors that influence successful implementation of Agricultural development projects In Kenya Case of Limuru Sub-County, Kiambu County. Research information also provided data to assist researchers, development practitioners, academicians, policy makers, and planners and programmes implementers as well society at large which enjoyed reduction in violence. It is hoped that the findings of this study will be useful to the ministry of education formulating policy on areas of environmental impact assessment. The findings are also expected to be useful to the Kenyan Government and all Agricultural projects funded by the World Bank as they may help to implement policies that would address the challenges faced by the society during project implementation

1.7 Limitations of the Study

This study focused on the Influence of Environmental Impact Assessment on implementation of Agricultural projects in Limuru Sub-County, Kiambu County, Kenya, Despite of the research permit and letter of recommendation from the University, few project workers could not cooperate in accordance with the researcher.

1.8 Delimitation of the Study

The study was confined to Agricultural projects in Kenya, there are many of such projects all over the country but the researcher targeted projects in Limuru Sub-County, Kiambu County.

1.9 Assumptions of the Study

The study was carried out on the basis of the following assumptions:

1. That respondents' concerns regarding air quality and climate change were raised during Environmental Impact Assessment.
2. The study assumes that agricultural development projects' activities will impact visual and landscape where those projects are implemented.
3. The study also presupposes that socio economic issues were considered during Environmental Impact Assessment.
4. The study assumes that respondents were knowledgeable geology and geomorphology issues that are considered in projects implementation.

1.10 Definition of Significant Terms used in the Study

Air quality and Climate change	The degree to which the ambient air is pollution-free, assessed by measuring a number of indicators of pollution, whereas climate change is when the average long-term weather patterns of a region are altered for an extended period of time, typically decades or longer.
Visual and landscape	Refer to the visible features of an area of land, or to an example of the genre of painting that depicts such an area of land. Landscape, in both senses, includes the physical elements of landforms such as (ice-capped) mountains, hills, water bodies such as rivers, lakes, ponds and the sea, living elements of land cover including indigenous vegetation, human elements including different forms of land use, buildings and structures, and transitory elements such as lighting and weather conditions

Socio economic Field of study that examines social and economic factors to better understand how the combination of both influences something. "Catherine studied the socioeconomic issues facing the community that she grew up in

Geology, geomorphology The scientific study of the origin and evolution of topographic and bathymetric features created by physical or chemical processes operating at or near Earth's surface. Geomorphologists seek to understand why landscapes look the way they do, to understand landform history and dynamics and to predict changes through a combination of field observations, physical experiments and numerical modeling

Environmental Impact Assessment: Environmental impact assessment (EIA) is a process which attempts to identify, predict and mitigate the ecological and social impacts of development proposals and activities.

Agricultural Projects: The performance of a project comprising of one or more farms over its entire life.

Implementation: refers to the application, operation, employment, enactment or execution of a particular function or activity.

1.11 Organization of the Study

This study is organized into five chapters;

Chapter One deal introduction, giving a background of the study while putting the topic of study in perspective. It gives the statement of the problem and the purpose of study. This chapter outlines the objectives, limitations, delimitations and the assumptions of the study.

Chapter Two, outlines the concepts of EIA on agricultural development projects; air quality, visual and landscape, socio economic and geology, geomorphology. Chapter Three consists of

research methodology which was used in the study. It covers the research design, target population, sample design, data collection, validity and reliability of data collection instruments, data analysis techniques.

Chapter Four presents data analysis, presentation and interpretation. The main objective of the study is to establish the influence of EIA in the implementation of agricultural development projects in Limuru Sub-County, Kiambu County, Kenya.

Chapter Five presents a summary of the study findings discussion, conclusions and recommendations. The findings are summarized in line with the objectives of the study which was to establish the influence of EIA on the implementation of agricultural development projects in Limuru Sub-County, Kiambu County, Kenya.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter covers the study objectives on Influence of EIA on the Implementation of Agricultural Development Projects in Kiambu County, Kenya, the influence of air quality and climate on the implementation of Agricultural development projects, Visual and landscape on the implementation of Agricultural development projects, Socio economic on the implementation of Agricultural development projects and Geology, geomorphology on the implementation of Agricultural development projects. Futhure the study reviewed Theoretical Framework on Influence of EIA on the Implementation of Agricultural Development Projects in Limuru Sub-County, Kiambu County, Kenya. The chapter finalizes with a discussion of the conceptual framework and Summary of Literature.

2.2 Concept of EIA on Agricultural Development Projects

EIA identifies potential problems and opportunities and is thus an essential part of the project cycle. Apart from the results of the environmental assessment, the economic and financial analysis helps in deciding among possible options and eliminating or reducing negative environmental effects in a cost-effective manner. Difficult decisions have to be made on how to balance costs and benefits; private and public considerations. In some cases, environmental and economic analysis leads to the abandonment of a proposed project; most times, however, a compromise is possible whereby development proceeds, but in a more environmentally sound manner (Dixon et al., 1994).

2.3 Air Quality and Climate Change Considerations in Project Implementation

The atmosphere is a complex natural gaseous system that is essential to support life on planet Earth. Stratospheric ozone depletion due to air pollution has been recognized as a threat to human health as well as to the Earth's ecosystems. Indoor air pollution and urban air quality are listed as two of the world's worst toxic pollution problems in the 2008 Blacksmith Institute World's Worst Polluted Places report (WorstPolluted.org). According to the 2014 WHO report, air pollution in 2012 caused the deaths of around 7 million people worldwide (American Heart Association, May 10, 2010) Volatile organic compounds - VOCs are a well-known outdoor air pollutant. They are categorized as either methane (CH_4) or non-methane (NMVOCs). Methane is

an extremely efficient greenhouse gas which contributes to enhance global warming. Other hydrocarbon VOCs are also significant greenhouse gases because of their role in creating ozone and prolonging the life of methane in the atmosphere. This effect varies depending on local air quality. The aromatic NMVOCs benzene, toluene and xylene are suspected carcinogens and may lead to leukemia with prolonged exposure. Butadiene is another dangerous compound often associated with industrial use. Particulates created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution. Emission Sources determine Pollutants that are released into the air from natural and human sources, from point and nonpoint sources. The number and size of emission sources in each area, along with weather conditions and topography, will determine the level of pollutants in the air within an air shed. Many pollutants undergo chemical reactions when they encounter other pollutants in the air. The products of these chemical reactions are called secondary pollutants, as opposed to primary pollutants that are emitted directly into the atmosphere. Ground-level ozone is an example of a secondary pollutant that forms when nitrogen dioxide (NO_2) and volatile organic compounds (VOCs) mix in the presence of sunlight (Daniel, Tsoulfas, Pappis, & Rachaniotis, 2004).

Agriculture is an essential industry that generates safe, high quality and healthy food as well as substantial economic impacts for citizens. As with any industry there are associated air quality emissions related to a number of diverse activities. There are many "win-win" opportunities that increase soil and agricultural productivity while reducing atmospheric pollution. The CFA supports the development of economically feasible abatement strategies, programs and policies that will ultimately benefit the environment and agriculture. The development of any national air quality standards should take into consideration regional differences and be set to the most attainable levels. Currently, odor is difficult to measure and regulate, thus any effort to regulate odor should recognize the needs of farmers to continue, and diversify their operations. Where conflict occurs between land uses, the CFA urges the government to support farmers in introducing mitigation measures designed to abate odor issues, agriculture must be a partner in the development of any air quality policy of programs that relate to the agricultural sector. It is necessary to have the full involvement and the full buy-in of the agricultural community for the successful implementation of programs and policies in order to benefit the environment and agriculture. Climate change once pollutants are emitted into the air, the weather largely determines how well they disperse. Turbulence mixes pollutants into the surrounding air. For

example, during a hot summer day, the air near the surface can be much warmer than the air above. Sometimes large volumes of this warm air will rise to great heights. This results in vigorous mixing. Wind speed also contributes to how quickly pollutants are carried away from their original source. However, strong winds don't always disperse the pollutants. They can transport pollutants to a larger area, such as the smoke from open burning or forest fires. Sometimes the condition of the atmosphere is very still (stable) and there is very little mixing. This occurs when the air near the surface of the earth is cooler than the air above (a temperature inversion). This cooler air is heavier and will not want to move up to mix with the warmer air above. Any pollutants released near the surface will get trapped and build up in the cooler layer of air near the surface. Temperature inversions are very common in B.C., especially in mountain valleys, often forming during calm clear nights with light winds. They can even persist throughout the day during the winter World Bank (Economics of Adaptation to Climate Change, 2009).

2.4 Visual and Landscape Considerations in Project Implementation

The BLM's VRM system provides a framework for managing visual resources on BLM-administered lands. Included in this system is a mechanism for identifying visual resource values on BLM-administered lands, minimizing the impacts of surface-disturbing activities on visual resources, and maintaining the scenic value of tracts of land for the future, Within the VRI process, public lands are evaluated with regard to their scenic quality, defined as the visual appeal of a particular tract of land (BLM 1986). Scenic quality is determined systematically by (1) dividing the landscape into Scenic Quality Rating Units (SQRUs) based on conspicuous changes in physiographic or land use, and (2) ranking scenic quality within each SQRU based on the assessment of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The ratings are made in the field by trained observers who evaluate the landscape view from inventory observation points, which are either important viewpoints or points with views that are representative of the SQRU. Based on the outcome of this assessment, lands within each SQRU are assigned a scenic value rating of A (high scenic value), B (moderate scenic value), or C (low scenic value). Generally, those areas with the most variety and most harmonious composition have the highest scenic value ratings, while areas with less variety and greater levels of disturbance (Peche & Rodriguez, 2009).

2.4.1 Sensitivity Level Analysis

Visual sensitivity is defined as a measure of public concern for scenic quality (BLM 1986a). Sensitivity is determined by evaluating the types and numbers of potential viewers of a specified area (this area is referred to as a Sensitivity Level Rating Unit or SLRU), the level of public interest in the SLRU, adjacent land uses, and the presence of special areas. The Sensitivity Level Analysis (SLA) is completed in two steps: (1) delineation of SLRUs, and (2) rating visual sensitivity within each SLRU. SLRUs represent geographic areas where public sensitivity to change of the visual resources is shared among constituents. Determining the level of sensitivity requires familiarity with the tracts of lands being evaluated, and with the people who use them. Sensitivity is generally determined by BLM staff most familiar with the users of the areas, and can be supplemented by direct input from other agencies, interest groups/stakeholders, and the general public. Sensitivity levels are described as high, medium, or low within the VRI process. Scenic byways, wilderness areas, and lands adjacent to national parks are examples of lands that often have high sensitivity (Holder, 2004).

2.4.2 Visual Contrast and Visibility Factors

At a very basic level, visual impacts can be defined as changes to the scenic attributes of the landscape brought about by the introduction of visual contrasts, and the associated changes in the human visual experience of the landscape. Visual impacts on the visual experience of the landscape can be positive or negative. If viewers feel that the visual contrasts generated by a change to the visible elements of the landscape improve its visual qualities, the impact is positive. If viewers feel that the contrasts detract from the scenic quality of a landscape rather than improve it, the impacts are negative (BLM, 1986).

The concepts of visual contrast and visual impact are central to understanding how renewable energy facilities and other types of developments affect visual resources on BLM-administered lands. Visual contrast is a change in what is seen by the observer. For example, if wind turbines are introduced to a natural-appearing landscape, the tall shapes of the towers, and their white color, long vertical lines, smooth textures, blade motion, and blinking lights at night are all visual contrasts that can be seen by people and can change the scenic quality of the landscape (Hyslop, 2009).

Visual impact includes both the change to the visual qualities of the landscape resulting from the introduction of visual contrasts, and the resulting change to the human visual experience of the landscape. Continuing with the wind energy example above, the introduction of contrasts from wind turbines may change the VRI scenic quality rating of an undisturbed and highly scenic area from an A to a B; this change in scenic quality constitutes a part of the visual impact from the project. The presence of the wind facility may also change the visual experience of persons who view the project area; this constitutes another dimension of the visual impact of the facility. Some viewers may think that the addition of wind turbines improves the view, perhaps because it adds visual interest to an otherwise static view. For these people, the visual impact of the wind turbines is positive. Other viewers may feel that the wind turbines add visual clutter or block the view of mountains they enjoy looking at. For these viewers, the visual impact of the wind turbines is negative. Introduced to a natural-appearing landscape, the tall shapes of the towers, and their white color, long vertical lines, smooth textures, blade motion, and blinking lights at night are all visual contrasts that can be seen by people and can change the scenic quality of the landscape (Landscape Institute, 2002).

2.5 Socio Economic Issues in Project Implementation

Development programmes operate in a society and in a particular environment. Whenever intervention takes place, it has an impact on both individuals and communities, thereby affecting their livelihoods, environment and customs. These *social impacts* need to be addressed during the impact evaluation process. Barrow (1997) referred to Burdge and Vanclay (1996) as he sought to define social impacts: Social impact consists all social and cultural consequences to human populations that alter the ways in which people live, work, play, have relations with each other, organize meet their needs and generally cope as members of a society. Cultural impacts are closely related to social impacts and typically produce changes in norms, values and beliefs. Cultural heritages can be affected including archaeological remains, holy places and cultures. Cracknell (2000) argued that in order to determine indicators of impact, a definition for *poverty* is needed. Without this, project output indicators risk being used as definitions in themselves and put forth by the project planning officers involved. If the recipients, or the main beneficiaries, of 'development' define poverty, participation becomes more important to finding the local "measures" of standard of living. Also, he pointed out that evaluating poverty-focused projects

against the people's objectives is not always income related. Conventionally, social development, and therefore impacts dealing with the issues related to health, education and housing were related to the European post-war conception of the welfare state. According to Hall and Midgley (2004), the social policy agenda has broadened to encompass a more global concern for strengthening livelihoods. This includes poverty reduction, social protection, fighting social exclusion, promoting human rights and even the natural resources conservation that is basis of many people's livelihoods in less developed countries (LDCs).

In development cooperation, social impacts are people oriented because they are the main actors for the development. Participation; is becoming more widely accepted that unless people are actively involved in the development projects which are aimed to help them, the projects are doomed to failure. It is important that the beneficiaries participate in every stage of the project. When the project is being planned, the people should be consulted, and their priorities and needs assessed. During the construction phase the people again should be involved supplying labor but also helping with field layouts after being trained with simple surveying instruments. The *enterprise approach* is more market based and focuses on support for the individuals. The latter approach champions the private sector as a main catalyst for societal development. In LDCs, the use of social funds to encourage individual productive enterprise through micro-credit and similar schemes mirrors something of the ethic ideology of this work (Hall & Midgley, 2004).

2.6 Geology and Geomorphology Considerations in Project Implementation

The overall geo-approach was based on the development of a thorough understanding of the geological and geomorphological history of the area and adopting strategies such as staged investigation; definition of investigation objectives; investigations to answer specific questions; an emphasis on geo-mapping; establishment of reference conditions; the development of geo-models and the application of the observational method. In general, this approach is not restricted to railways. Other linear structures that can traverse wide ranging geological conditions, such as tunnels, roads and pipelines as well as projects involving extensive ground engineering (hydroelectric schemes for example), have been built efficiently using similar approaches.

Around the world, only a few countries have the long and detailed history of geological mapping by a national survey, together with records of numerous site investigations and other ground

activities, which give considerable foresight and the ability to develop fairly realistic models before a foot has been set on the ground. This approach is well discussed in detail by Culshaw (2005). This approach applies where there is no subsurface data, as on many sites in remote locations, but it also equally applies where there is a mass of subsurface data, for example as described by Culshaw (2005). However, it is important to note that whatever geological (and geomorphological) observations are available, such as mapping and subsurface information, the data always has to be presented within a geological interpretation. This is where a competent geologist uses knowledge and experience to create surfaces in three dimensions (and sometimes the fourth dimension of time) that bound the data. It is the combination of geological observations and geological interpretations that go to form the Total Engineering Geological model. The significance of these distinctions should not be underestimated, especially when involved in contractual matters or litigation.

2.7 Theoretical Framework

This study was guided by rational comprehensive planning theory. The theoretical foundations of impact assessment have been subject to much greater attention in recent years. Ortolano and Shepherd (1995) touched briefly on the debates surrounding the nature of EIA, especially the dominance of the technocratic model of impact assessment and the rise of alternative views that recognize the political realities of decision-making. However, dissatisfaction with the lack of serious critiques of EIA as a process gained momentum in the late 1990s, as the influence of debates in related disciplines finally began to reach the impact assessment community. For example, referring to the first 25 years of EIA development, Lawrence (1997) observes that 'the conceptual foundation of EIA has received limited attention'. The answer, he felt, is more reflection and greater attention to coherent theory-building in EIA, to replace uncritical approaches that frequently fail to recognize the contextual implications of concepts taken from related fields.

Important sources of thinking about the theoretical basis of EIA have been the various theories and models of planning and decision-making. For example, Lawrence (2000) examined five planning theories: rationalism, pragmatism, socio-ecological idealism, political-economic mobilization, and communications and collaboration, while Leknes (2001) uses a simpler three-

fold categorization of decision-making approaches: the rational, new institutionalist and negotiation perspectives.

A common theme in all these discussions is the critique of the rationalist model of planning/decision making, and by implication of mainstream EIA, and the consequent need to explore and develop models that embrace new thinking about planning and decision making processes in their wider social, cultural, political and economic contexts (Bartlett & Kurian, 1999). The basis of the rationalist model was the adoption of a rational process to guide the choice, from a range of alternatives, of the best solution for a defined problem or need, based on an analysis of all the relevant information necessary to make that choice.

EIA has become one of the important sources of information that would inform the choice of the best solution when the decision involved project proposals. The model is characterized as having a strong technical emphasis, with planners and other professionals acting as neutral processors of information, producing independent evaluations of the alternatives, to be provided to decision makers (Lawrence, 2000). The form of EIA that emerged in the 1970s and still dominates institutionalized EIA in many countries is strongly influenced by this model.

As the basis of the rational comprehensive planning theory which dominated strategic and development planning in many Western countries in the 1960s and 1970s, this model has been the subject of significant criticism (Holden, 1998). A key theme has been the impossibility of recognizing all possible alternative solutions, from which to select the 'best' solution, so more constrained and practice-informed models of the rationalist approach emerged (such as the bounded rationality model and the incrementalist model) (Holden, 1998; Wood & Becker, 2005; Weston, 2010). However, these variants still carry the rationalist imprint, and they too have attracted criticism for their failure to recognize the political and value-based nature of decision-making (Wilkins, 2003; Richardson, 2005). This has encouraged the promotion of deliberative and collaborative approaches to planning and decision-making processes, including EIA itself: bringing stakeholders and communities into the processes, emphasizing the importance of communication as a means of negotiating consensus solutions that capture the values of those participants, and moving the professional technocrats from a controlling role to a facilitating role in the decision-making process (Wilkins, 2003; Elling, 2009).

2.8 Conceptual Framework

The Conceptual Framework gives a depiction on how the variable related to one another. The variable defined here are independent, dependent and the moderating variable. An independent variable affects and determines the effect of another variable (Mugenda, 1999). The independent variables in this study are Air quality and climate, Visual & Land Scope, Socio-Economic and Soils Geology Geomorphology. This study was guided by the following conceptual framework;

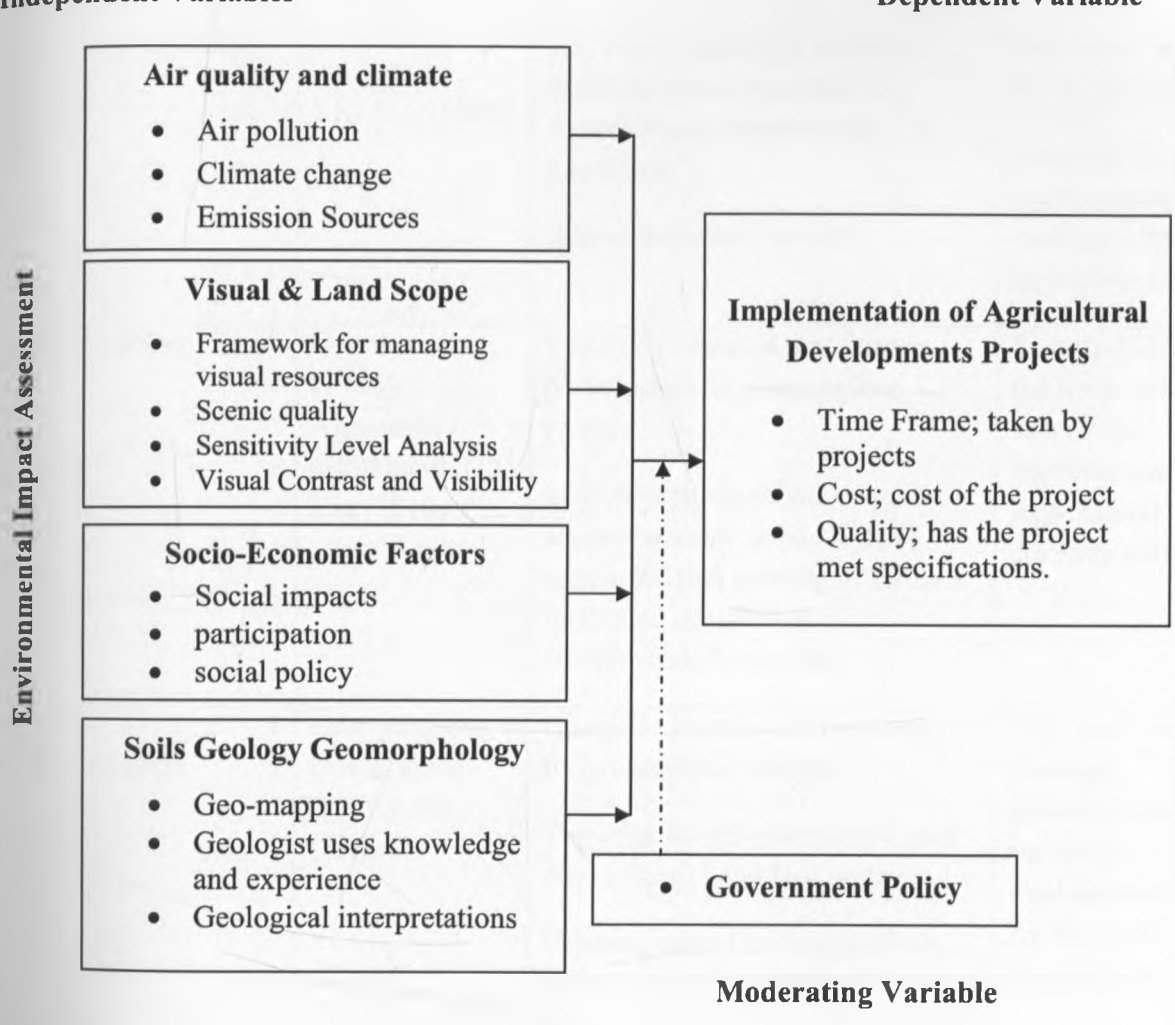

Figure 1: Conceptual Framework

Table 2. 1: Knowledge Gap

Variable	Author	Findings	Gap
Air quality and climate change	Jie Wen (2010)	The Impact of Atmospheric Nitrogen Deposition on Coastal Eutrophication and on Nitrogen Use Efficiency in Chinese Agriculture	The study will look into the Air quality and climate change on the implementation of Agricultural development projects
Visual and landscape	LIU Lin, (2009)	The study found was based on Practicality and Necessity to Assess Visual Impact and Landscape Impact Separately in EIA	This study will assess the practicality and necessity to assess visual impact and landscape impact separately in EIA
Socio economic	Ogunbameru (1986), Agwunobi (1993) and S.O. Eze (2010)	The study reported that farmer participation in planning and project Implementation enhanced greater socio-economic impacts. They concluded that training of farmers facilitated adoption of recommended practices.	This study will assess the Socio economic on successful implementation of Agricultural development projects
Geology, geomorphology	Erlangung des Doktorgrads (Dr. rer. nat. (2008)	Geology Geomorphic Response to Environmental Change: The Imprint of Deforestation and Agricultural Land Use on the Contemporary Landscape of the Pleiser H gelland, Bonn, Germany	This study will asses Geology, geomorphology on successful implementation of Agricultural development projects

2.9 Summary of Chapter

The atmosphere is a complex natural gaseous system that is essential to support life on planet Earth. Stratospheric ozone depletion due to air pollution has been recognized as a threat to human health as well as to the Earth's ecosystems. Emission Sources determine Pollutants that

are released into the air from natural and human sources, from point and nonpoint sources. The number and size of emission sources in each area, along with weather conditions and topography, will determine the level of pollutants in the air within an air shed.

The BLM's VRM system provides a framework for managing visual resources on BLM-administered lands. Included in this system is a mechanism for identifying visual resource values on BLM-administered lands, minimizing the impacts of surface-disturbing activities on visual resources, and maintaining the scenic value of tracts of land for the future, Within the VRI process, public lands are evaluated with regard to their scenic quality, defined as the visual appeal of a particular tract of land (BLM, 1986).

Development programmes operate in a society and in a particular environment. Whenever intervention takes place, it has an impact on both individuals and communities, thereby affecting their livelihoods, environment and customs. These *social impacts* need to be addressed during the impact evaluation process. Barrow (1997) referred to Burdge and Vanclay (1996) as he sought to define social impacts: Social impact consists all social and cultural consequences to human populations that alter the ways in which people live, work, play, have relations with each other, organize meet their needs and generally cope as members of a society. Around the world, only a few countries have the long and detailed history of geological mapping by a national survey, together with records of numerous site investigations and other ground activities, which give considerable foresight and the ability to develop fairly realistic models before a foot has been set on the ground.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the overall methodology used in the study. This includes the research design, population of the study, sample size, sample frame, data collection methods, research procedures and data analysis and presentation.

3.2 Research Design

Chandran (2004) describes research design as an understanding of conditions for collection and analysis of data in a way that combines their relationships with the research to the economy of procedures. Krishnaswamy (2009) suggests that research design deals with the detailing of procedures that was adopted to carry out the research study.

This study employed a descriptive survey research design. Descriptive survey research designs are used in preliminary and exploratory studies to allow researchers to gather information, summarize, present and interpret for the purpose of clarification (Orodho, 2002). Mugenda and Mugenda (1999) on the other hand give the purpose of descriptive research as determining and reporting the way things are. Borg &Gall (1989) noted that descriptive survey research is intended to produce statistical information about Influence of EIA on Successful Implementation of Agricultural Development Projects in Limuru Sub-County, Kiambu County, Kenya. The study fitted within the provisions of descriptive survey research design because the researcher collected data and reported the way things are without manipulating any variables.

3.3 Target Population

Target population is defined as all the members of a real or hypothetical set of people, events or objects to which a researcher wishes to generalize the results of the research study (Borg & Gall, 1989). The study was carried out in Kiambu County. There are several Agricultural Development Projects in the County, but the researcher targeted 100 of them out of which 30% were used for the study. The projects visited dealt in flowers, crops and animal sciences (Appendix II). According to Mugenda Mugenda (2002) a sample of more than 30% is a representative of the whole population, the researcher sample targeted 100 Agricultural

development projects, the study interviewed 3 members with the information in each project who are the project manager, Environmental agent and the Field supervisor. Based on Mugenda Mugenda (2002), 30% of the 100 Agricultural development projects were 30 projects.

3.4 Sample Size and Sampling Procedures

3.4.1 Sample Size

This study used a sample size of 90 respondents as sample size drawn from the targeted population. This formed 30% of the target population, which is in line with Mugenda Mugenda (2002), recommendation. The researcher used purposive study to get 90 respondents as it is the ease of assembling the sample.

Table 3. 1: Sampling Matrix

Category of Respondents	Population	Sample
Project managers	100	30
Project supervisors	100	30
Environmentalists	100	30
Total	**300**	**90**

3.4.2 Sampling Procedures

Sampling means selecting a given number of subjects from a defined population as representative of that population. Any statements made about the sample should also be true of the population (Orodho, 2002). Mugenda Mugenda (2002) recommends that when the target population is small (less than 1000 members), a minimum sample of 30% is adequate for research. From the 100 Agricultural Development Projects of the target population, the researcher used purposive sampling to select 90 participants; this form 30% of the targeted population, which is in line with Mugenda Mugenda (2002) recommendation. The researcher used purposive sampling in order to get 90 respondents as it is the ease of assembling the sample. It is also considered as a fair way of selecting a sample from a given population since the study targeted keen people with the information needed.

3.5 Research Instruments

The main tool of data collection for this study was a questionnaire (Appendix I).

3.5.1 Questionnaires

The questionnaires were used for data collection because it offers considerable advantages in the administration. It also presents an even stimulus potentially to large numbers of people simultaneously and provides the investigation with an easy accumulation of data. Gay (1992) maintains that questionnaires give respondents freedom to express their views or opinion and also to make suggestions. It is also anonymous. Anonymity helps to produce more candid answers than is possible in an interview. The questionnaire was divided into six sections with the first section discussing the Background Information and Section II: Air quality and climate change Influence the implementation of Agricultural development projects, Section III: How visual and landscape as an environmental impact assessment influences the implementation of Agricultural development projects, Section IV: How Socio economic influence the implementation of Agricultural development projects, Section V: Determine how Geology, geomorphology influence the implementation of Agricultural development projects, and Section VI: Implementation of Agricultural Development Projects. The questionnaire was used to collect data from all the six sections.

3.5.2 Validity of Research Instruments

Validity, according to Borg and Gall (1989) is the degree to which a test measures what it purports to measure. According to Borg and Gall (1989) content validity of an instrument is improved through expert judgment. Construct validity deals in how questions in the questionnaires are prepared in terms of being clear and not vague. As such, the researcher sought assistance of the assigned supervisor, who, as an expert in research, helps improve content validity of the instrument.

3.5.3 Reliability of Research Instruments

Mugenda and Mugenda (2003) define reliability as a measure of the degree to which a research instrument yields consistent results. Cronbach Alpha was used to test the reliability of the instrument. A Cronbach Alpha value of 0.6 and above is considered adequate reliability for

analysis. The reliability test results for this study are shown in table 3.1 hence the tool was considered reliable for the study.

Table 3. 2: Reliability Test Results

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Air Quality and Climate Change	11.0572	3.107	.438	.802
Visual and Landscape	11.9104	2.056	.701	.668
Social Economic Factors	11.1667	2.090	.581	.747
Geology and Geomorphology	11.7836	2.255	.698	.675

3.6 Data Analysis Techniques

Data was collected, examined and checked for completeness and clarity. Numerical data was collected using questionnaires were coded and entered and analyzed using descriptive statistic assisted by Statistical Package for Social Scientists (SPSS) programme 19. Frequency tables with varying percentages were used to present the findings. Results of interviews went through a critical assessment of each response and examined using thematic interpretation in accordance with the main objectives of the study and thereafter presented in narrative excerpts within the report. Stake (1995) describes this method of data analysis as a way of analyzing data by organizing it into categories on the basis of themes and concepts. Different colors represent different themes. This is known as coding. The procedure assisted in reducing and categorizing large quantity of data into more meaningful units for interpretation. Therefore the data was presented in tabular form in order to present large quantity in a meaningful for interpretation.

3.7 Ethical Issues

Participants were informed of the confidentiality in the study so to ensure respect for the dignity of participants in the study. Their confidential information was only accessed by the researcher and the supervisor. They were required to provide any identifying details and as such, transcripts and the final report did not reflect the subjects identifying information such as their names, in the case they were not comfortable with it.

3.8 Operationalization of variables

This section analyses the operational definition of variables on the challenges facing the implementation of agricultural development projects.

Table 3. 3: Operationalization of Variables

Objectives/ Type of Variable	**Indicators**	**Measurement scale**	**Research Approach**	**Tools of Analysis**	**Type of Statistics**
To establish how Air quality and climate change as an environmental impact assessment Influence successful implementation of Agricultural development projects	Air pollution Climate change Emission Sources Amount and kind of pollutants	Ordinal	Quantitative	Mean, Percentage, Standard deviation	Descriptive
Independent Variables	Framework for managing visual resources Scenic quality Sensitivity Level Analysis Visual Contrast and Visibility Factors	Ordinal		Mean, Percentage, Standard deviation	Descriptive Inferential
To assess how Socio economic as an environmental impact assessment influence successful implementation of Agricultural development projects	Social impacts Participation social policy	Ordinal	Quantitative	Mean, Percentage, Standard deviation	Descriptive

To determine how Geology, geomorphology as an as an environmental impact assessment influence successful implementation of Agricultural development projects	Geo-mapping Geologist uses knowledge and experience Geological interpretations	Ordinal	Quantitative	Mean, Percentage, Standard deviation	Descriptive
	Dependent variable				
Successful Implementation of Agricultural Developments Projects	Time Frame; taken by projects Cost; cost of the project Quality; has the project met specifications	Ordinal	Quantitative	Mean, Percentage, Standard deviation	Descriptive

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents data analysis results, interpretation of findings and discussion. The chapter starts with demographic information and move into the four themes of the study as per the specific objectives. These include air quality influence on the implementation of agricultural development projects, socio economic factors influence on the implementation of agricultural development projects, geology and geomorphology influence on the implementation of agricultural development projects and visual and landscape influence on the implementation of agricultural development projects in Limuru Sub-County, Kiambu County, Kenya.

4.2 Questionnaire Response

A total of 90 questionnaires were distributed and 85 were collected having been filled adequately. This constituted a response rate of 85 (94%). According to Babbie (2002), a response rate of 50% and above is adequate for making conclusions hence 94% response rate was good enough for making conclusions in this study.

4.3 Demographic Information

This section presents the demographic characteristics of the respondents in the study. These include distribution of respondents by their gender, age, level of education and experience in handling agricultural development projects.

4.3.1 Distribution of Respondents by Gender

Respondents were asked to indicate their gender. The results show that majority of the respondents (64.7%) were male as compared to 35.3% who were female. This shows that more men are involved in management of agricultural development projects than their female counterparts.

Table 4. 1: Distribution of Respondents by Gender

Gender	Frequency	Percent	Cumulative Percent
Male	55	64.7	64.7
Female	30	35.3	100.0
Total	85	100.0	

4.3.2 Distribution of Respondents by their Ages

The respondents were asked to indicate their ages with the aim of establishing the age bracket. Majority of the respondents (52.9%) were aged between 26 years to 40 years while 25.9% were aged 41 to 50 years. Only 7.1% of the respondents were aged over 50 years while respondents aged between 18 to 25 years were 14.1%. The results show that management of agricultural development projects in Limuru Sub-County, Kiambu County has attracted mostly the middle aged population but has significant parts of the youth and the elderly. Table 4.2 shows the age distribution of the respondents.

Table 4. 2: Distribution of Respondents by their Age bracket

Age bracket	Frequency	Percent	Cumulative Percent
18-25 years	12	14.1	14.1
26-40 years	45	52.9	67.1
41-50 years	22	25.9	92.9
Over 50 years	6	7.1	100.0
Total	85	100.0	

4.3.3 Distribution of Respondents by their Level of Education

The respondents were asked to indicate their highest level of education. The results show that 47.6% of the respondents had undergraduate level of education while 39.3% had post graduate level of education. Respondents who had diploma level of education were 9.5% while those with primary and secondary level of education were 2.4% and 1.2% respectively. The findings show that management of agricultural development projects in Limuru Sub-County, Kiambu County was handled by people with at least basic education but many of them had high education level. Table 4.3 shows the study findings on the respondents' level of education.

Table 4. 3: Distribution of Respondents by Level of Education

Level of Education	Frequency	Percent	Cumulative Percent
Primary level	1	1.2	1.2
Secondary level	2	2.4	3.6
Diploma	8	9.5	13.1
Undergraduate	40	47.6	60.7
Post graduate	33	39.3	100.0
Total	84	100.0	

4.3.4 Distribution of Respondents' by Duration Worked in Agricultural projects

The respondents were asked to indicate the duration they had worked in their agricultural projects. The results in table 4.4 show that respondents who had worked in their projects for 1-3 years were 38.6% while those who had worked in their projects for 4-7 years were 34.3%. Respondents who had worked in their projects for 8-11 years were 14.3% while those who had worked in their projects for 12 years and above were 12.9%. These findings imply that respondents were experienced in management of agricultural development projects and therefore information that they gave for this study is more likely to be accurate and informed through experience.

Table 4. 4: Distribution of Respondents' by Duration Worked in Agricultural projects

Duration Worked	Frequency	Percent	Cumulative Percent
'1-3 years'	27	38.6	38.6
'4-7 years'	24	34.3	72.9
'8-11 years'	10	14.3	87.1
'12 years and above'	9	12.9	100.0
Total	70	100.0	

4.3.5 Distribution of Respondents by Position in their Agricultural Development Projects

The respondents were asked to indicate their position in their respective agricultural development projects. The results in table 4.5 show that respondents were distributed in three positions where 32.9% were project managers, 35.3% were project supervisors and 31.8% were environmentalists. The findings imply that information given to this study was sourced from those involved in actual implementation of agricultural development projects who have insightful information by virtual of their positions in the projects.

Table 4. 5: Distribution of Respondents by Position in Agricultural Development Projects

Position	Frequency	Percent	Cumulative Percent
Project Manager	28	32.9	32.9
Project supervisor	30	35.3	68.2
Environmentalist	27	31.8	100.0
Total	85	100.0	

4.4 Air quality and implementation of agricultural development projects

The respondents were asked to indicate their level of agreement with statements in regard to the extent to which air quality and climate change influenced implementation of agricultural development projects. They were to make choices based on a Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree. The results in table 4.6 show that respondents agreed that air pollution was considered in rollout of agricultural development projects (mean= 4.47) and potential consequences of climate change in this area as a result of implementation of agricultural development projects were assessed (mean=4.11). The respondents also agreed with the statement that potential emissions that pollute air were considered in implementation of agricultural development projects in this area (mean=4.16).

Table 4. 6: Air quality and implementation of agricultural development projects

Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total Percent	Mean	N
Air pollution was considered in rollout of agricultural development projects	0%	0%	8.2%	36.5%	55.3%	100.0%	4.47	85
Potential consequences of climate change in this area as a result of implementation of agricultural development projects were assessed	1.2%	0%	7.1%	70.6%	21.2%	100.0%	4.11	85
Potential emissions that pollute air were considered in implementation of agricultural development projects in this area	0%	2.4%	18.8%	38.8%	40.0%	100.0%	4.16	85

Correlation analysis results in table 4.7 indicated that air quality and climate change was positively correlated to implementation of agricultural development projects (R=.404, $p<.05$). This relationship was established to be statistically significant at 99% confidence level.

Table 4. 7: Air Quality and Agricultural Development Projects Correlations

		Air Quality and Climate Change	Implementation of Agricultural Development Projects
Air Quality and Climate Change	Pearson Correlation	1	.404**
	Sig. (2-tailed)		.000
	N	85	84
Implementation of Agricultural Development Projects	Pearson Correlation	.404**	1
	Sig. (2-tailed)	.000	
	N	84	84

**. Correlation is significant at the 0.01 level (2-tailed).

These study findings imply that air quality and climate change are important components of Environmental Impact Assessment which influence implementation of agricultural development projects in Limuru Sub-County, Kiambu County. The findings of this study on influence of air quality and climate change are in agreement with those of Daniel, Tsoulfas, Pappis and Rachaniotis (2004) that air pollution may cause climate change hence affecting agricultural development projects.

4.6 Visual and Landscape and Implementation of Agricultural Development Projects

Respondents were asked to indicate their level of agreement with statements regarding how visual and landscape influences implementation of agricultural development projects. They were to make choices based on a Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree. The results in table 4.8 show that respondents were undecided on whether the framework in place to manage visual resources so as to maintain scenic value of tracts of land for the future in Limuru Sub-County, Kiambu County was considered in agricultural development projects implementation (mean=3.03). Respondents were also undecided on whether the measures to determine scenic quality based on land use were taken into consideration in agricultural development projects implementation in Limuru Sub-County, Kiambu County (mean=3.74). The results also show that respondents were undecided on whether farmers' shared public sensitivity to change of visual resources in this geographic area was considered in agricultural development projects implementation (mean=3.64) and visual impacts

and contrast brought by agricultural projects that would affect the visual experience of the landscape in the area were assessed (mean=3.16).

Table 4. 8: Visual & Landscape and Implementation of Agricultural Development Projects

Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total Percent	Mean	N
The framework in place to manage visual resources so as to maintain scenic value of tracts of land for the future in this area was considered in agricultural development projects implementation	8.8%	4.4%	63.2%	22.1%	1.5%	100.0%	3.03	85
Measures to determine scenic quality based on land use were taken into consideration in agricultural development projects implementation	8.2%	5.5%	13.7%	49.3%	23.3%	100.0%	3.74	85
Farmers' shared public sensitivity to change of visual resources in this geographic area has been considered in agricultural development projects implementation	1.4%	13.7%	12.3%	64.4%	8.2%	100.0%	3.64	85
Visual impacts and contrast brought by agricultural projects that would affect the visual experience of the landscape in this area were assessed	2.9%	11.85	55.9%	25.0%	4.4%	100.0%	3.16	85

The results of correlation analysis in table 4.9 indicated that there was a strong positive correlation between visual and landscape and implementation of agricultural development projects (R=.625, p<.05). This relationship was statistically significant at 99% confidence level.

Table 4. 9: Visual & Landscape and Agricultural Development Projects Correlations

		Implementation of Agricultural Development Projects	Visual and Landscape
Implementation of Agricultural Development Projects	Pearson Correlation	1	.625**
	Sig. (2-tailed)		.000
	N	84	66
Visual and Landscape	Pearson Correlation	.625**	1
	Sig. (2-tailed)	.000	
	N	66	67

**. Correlation is significant at the 0.01 level (2-tailed).

According to the study findings, although respondents were not sure how visual and landscape influenced agricultural development projects in Limuru Sub-County, Kiambu County correlation analysis results show there was a strong positive relationship between the two variables. This implies that visual and landscape had a significant influence on implementation of agricultural development projects in Limuru Sub-County, Kiambu County.

4.7 Socio Economic Factors and Implementation of Agricultural Development Projects

The respondents were asked to indicate their level of agreement with statements in regard to how socio-economic factors influence the implementation of Agricultural development projects. They were to make choices based a Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree. The results shown in table 4.10 indicate that the respondents agreed with the statements that agricultural development projects' potential effects on livelihoods, environment and customs of the people in Limuru Sub-County, Kiambu County were considered (social impacts) (mean=4.20), participation by locals in agricultural development projects were emphasized (mean=4.11) and social policies that support locals were prioritized in implementation of agricultural projects (mean=4.05).

Table 4. 10: Socio-economic factors and Implementation of Agricultural Development Projects

Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total Percent	Mean	N
Agricultural development projects' potential effects on livelihoods, environment and customs of the people in this area were considered (social impacts)	0%	9.4%	7.1%	37.6%	45.9%	100.0%	4.20	85
Participation by locals in agricultural development projects were emphasized	0%	8.2%	9.4%	45.9%	36.5%	100.0%	4.11	85
Social policies that support locals were prioritized in implementation of agricultural projects	0%	0%	17.6%	60.0%	22.4%	100.0%	4.05	85

Correlation analysis results in table 4.11 indicate that there was a positive correlation between social economic factors and implementation of agricultural development projects in Limuru Sub-County, Kiambu County (R=.541, $p<.05$). This relationship was found to be statistically significant at 99% confidence level.

Table 4. 11: Socio-economic factors and Agricultural Development Projects Correlations

		Implementation of Agricultural Development Projects	Social Economic Factors
Implementation of Agricultural Development Projects	Pearson Correlation	1	.541**
	Sig. (2-tailed)		.000
	N	84	84
Social Economic Factors	Pearson Correlation	.541**	1
	Sig. (2-tailed)	.000	
	N	84	85

**. Correlation is significant at the 0.01 level (2-tailed).

These findings imply that social economic factors in implementation of agricultural development projects. The findings agree with those of Barrow (1997) who asserted that social impacts need to be addressed during the impact evaluation process. Social impact consists all social and cultural consequences to human populations that alter the ways in which people live, work, play, have relations with each other, organize meet their needs and generally cope as members of a society.

4.8 Geology, Geomorphology and Implementation of Agricultural Development Projects

Respondents were asked to indicate their level of agreement with statements in regard to how geology and geomorphology influence the implementation of Agricultural development projects. They were to make choices based on a Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree. The results shown in table 4.12 indicate that the respondents were undecided on the statements that geo-mapping was taken into consideration in implementation of agricultural development projects in Limuru Sub-County, Kiambu County (mean=3.55), geologists knowledge and experience were utilized in making decisions for implementation of agricultural development projects (mean=3.55) and geological observations and geological interpretations were used to form Total Engineering Geological models in implementation of agricultural development projects in the area (mean=3.41).

Table 4. 12: Geology, geomorphology and implementation of Agricultural development projects

Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Total Percent	Mean	N
Geo-mapping was taken into consideration in implementation of agricultural development projects in this area	0%	17.4%	18.8%	55.1%	8.7%	100.0%	3.55	69
Geologists knowledge and experience were utilized in making decisions for implementation of agricultural development projects	1.4%	8.7%	43.5%	26.1%	20.3%	100.0%	3.55	69
Geological observations and geological interpretations were used to form Total Engineering Geological models in implementation of agricultural development projects in this area	0%	8.7%	46.4%	40.6%	4.3%	100.0%	3.41	69

Correlation analysis results in table 4.13 show that geology and geomorphology had a positive correlation with implementation of agricultural development projects in Limuru Sub-County, Kiambu County (R=.535). This relationship was revealed to be statistically significant at 99% confidence level.

Table 4. 13: Geology and Agricultural Development Projects Correlations

		Implementation of Agricultural Development Projects	Geology and Geomorphology
Implementation of Agricultural Development Projects	Pearson Correlation	1	.535**
	Sig. (2-tailed)		.000
	N	84	68
Geology and Geomorphology	Pearson Correlation	.535**	1
	Sig. (2-tailed)	.000	
	N	68	69

**. Correlation is significant at the 0.01 level (2-tailed).

The findings of this study imply that geology and geomorphology were important elements of Environmental Impact Assessment that influenced implementation of agricultural development projects in Limuru Sub-County, Kiambu County. These findings are contrary to Culshaw (2005) observations that only in a few countries that geology and geomorphology affects implementation of development projects.

4.9 Implementation of Agricultural Development Projects

The respondents were asked to indicate the extent that implementation of agricultural development projects was successful in terms of time frame, cost and quality. They were to make choices based on a Likert scale where: 1= Not at all, 2= Little extent, 3= Moderate extent, 4= Great extent, 5= Very great extent. The results shown in table 4.14 indicate that time frame taken by agricultural development projects was as scheduled to a moderate extent (mean=3.53) and cost of the agricultural development projects was within budget to a moderate extent (mean=3.81). The results also have shown that quality of the agricultural development projects was adequate to a great extent (mean=4.11).

Table 4. 14: Implementation of Agricultural Development Projects

Statements	Not at all	Little Extent	Moderate Extent	Great Extent	Very Great Extent	Total Percent	Mean	N
The agricultural development projects were within scheduled time	1.2%	1.2%	57.6%	23.5%	16.5%	100.0%	3.53	69
The agricultural development projects were within budget	0%	10.7%	38.1%	10.7%	40.5%	100.0%	3.81	69
The agricultural development projects met specification	0%	9.5%	8.3%	44.0%	38.1%	100.0%	4.11	69

Correlation analysis results shown in table 4.15 indicate that implementation of agricultural development projects was correlated to air quality and climate change (R=.404, $p<.05$), visual and landscape (R=.625, $p<.05$), social economic factors (R=.541, $p<.05$), geology and

geomorphology (R=.535, $p<.05$). These relationships were found to be statistically significant at 99% confidence level.

Table 4. 15: Implementation of Agricultural Development Projects Correlations

		Implementation of Agricultural Development Projects	Air Quality and Climate Change	Visual and Landscape	Social Economic Factors	Geology and Geomorphology
Implementation of Agricultural Development Projects	Pearson Correlation	1	.404**	.625**	.541**	.535**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	84	84	66	84	68
Air Quality and Climate Change	Pearson Correlation	.404**	1	.551**	.289**	.277*
	Sig. (2-tailed)	.000		.000	.007	.021
	N	84	85	67	85	69
Visual and Landscape	Pearson Correlation	.625**	.551**	1	.470**	.669**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	66	67	67	67	67
Social Economic Factors	Pearson Correlation	.541**	.289**	.470**	1	.633**
	Sig. (2-tailed)	.000	.007	.000		.000
	N	84	85	67	85	69
Geology and Geomorphology	Pearson Correlation	.535**	.277*	.669**	.633**	1
	Sig. (2-tailed)	.000	.021	.000	.000	
	N	68	69	67	69	69

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The findings of this study imply that visual and landscape, social economic factors, geology and geomorphology and air quality and climate change influence implementation of agricultural development projects in that order. These findings agree with Arebo (2005) who emphasized on follow up and strengthening of EIA guidelines to help in implementation of agricultural development projects.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study findings, conclusions and recommendations. It also makes suggestions for further research. The findings are summarized in line with the objectives.

5.2 Summary of Findings

The summary of the study findings were presented based on the four objectives of the study. They included influence of air quality on implementation of agricultural development projects, influence of visual and landscape on implementation of agricultural development projects, influence of socio economic factors on implementation of agricultural development projects and influence of geology and geomorphology on implementation of agricultural development projects.

5.2.1 Air quality and Implementation of Agricultural Development Projects

The researcher sought to address the first objective that looked at the influence of air quality on the implementation of Agricultural development projects in Limuru Sub-County, Kiambu County. The results have shown that air quality and climate change significantly influenced the implementation of Agricultural development projects in Kiambu County. We can therefore infer that air quality and climate change considerations are vital in implementation of Agricultural development projects.

5.2.2 Visual & Landscape and Implementation of Agricultural Development Projects

The second objective of this study was to assess how visual and landscape influenced the implementation of agricultural development projects in Limuru Sub-County, Kiambu County. The results indicated that visual sensitivity which is defined as a measure of public concern for scenic quality influences the implementation of agricultural development projects in Kiambu County.

5.2.3 Socio economic factors and Implementation of Agricultural Development Projects

The third objective of this study was to assess how socio economic factors influenced the implementation of agricultural development projects in Limuru Sub-County, Kiambu County.

The findings of the study have shown that geology and geomorphology had significant influence on implementation of agricultural development projects. We can therefore infer that geological mapping by a national survey is very important for successful implementation of agricultural development projects.

5.2.4 Geology & Geomorphology and Implementation of Agricultural Development Projects

The fourth objective of the study was to establish how geology and geomorphology influenced the implementation of agricultural development projects in Limuru Sub-County, Kiambu County. The findings of the study have shown that although around the world, only a few countries have the long and detailed history of geological mapping by a national survey, geology and geomorphology significantly influenced agricultural development projects implementation in Kiambu County. We can therefore infer that geological mapping by a national survey is very important for successful implementation of Agricultural development projects.

5.3 Conclusion

The findings of the study revealed that the influence of EIA on the implementation of agricultural development projects in Kiambu County has illustrated successes as well as challenges. Both have provided critical lessons for the implementation of agricultural development projects and results as envisaged in the full moderation of agricultural practices in Kenya.

In relation to the first objective that examined air quality influence the implementation of agricultural development projects in Kiambu County, the study noted air pollution was considered in rollout of agricultural development projects and potential consequences of climate change in this area as a result of implementation of agricultural development projects were assessed in Kiambu County. Importance of EIA was also seen in that potential emissions which pollute air were considered in implementation of agricultural development projects in this area.

The framework in place to manage visual resources so as to maintain scenic value of tracts of land for the future in Limuru Sub-County, Kiambu County was considered in agricultural development projects implementation as well as the measures to determine scenic quality based on land use were taken into consideration in agricultural development projects implementation.

This shows that project managers and stakeholders were conscious of potential visual impacts and contrasts that could result from the agricultural development projects. This made them consider farmers' shared public sensitivity to change of visual resources in this geographic area in agricultural development projects implementation and visual impacts and contrast brought by agricultural projects that would affect the visual experience of the landscape in the area.

Socio-economic factors are important to consider in any project as shown by this case where project managers considered agricultural development projects' potential effects on livelihoods, environment and customs of the people in Limuru Sub-County, Kiambu County. The project managers also emphasized participation by locals in agricultural development projects as well as prioritizing other social policies that support locals in implementation of agricultural projects to ensure ownership of the project and positive impact on the locals' livelihoods.

By the fact that geo-mapping was taken into consideration in implementation of agricultural development projects in Limuru Sub-County, Kiambu County shows the importance of a holistic approach in Environmental Impact Assessment that could influence implementation of agricultural development projects. The use of geologists knowledge and experience in making decisions for implementation of agricultural development projects and use of geological observations and geological interpretations to form Total Engineering Geological models in implementation of agricultural development projects in the area serves to show that a comprehensive Environmental Impact Assessment is critical for successful implementation of agricultural development projects.

5.4 Recommendations of the Study

The researcher has the following recommendations to make with regard to implementation of EIA on some Agricultural development projects.

1. Agricultural development project managers should ensure that the EIA process takes into account environmental issues raised when a project or plan is first discussed and that all concerns are addressed as a project gains momentum through implementation.

2. It is also essential that an environmental assessment is carried out to determine significant impacts early in the project cycle so that recommendations can be built into the design and cost-benefit analysis without causing major delays or increased design costs.

3. Once implementation has commenced, the EIA should lead to a mechanism whereby adequate monitoring is undertaken to realize environmental management goals.

4. An important output from the EIA process should be the delineation of enabling mechanisms for effective management.

5. There should be a follow up to ensure that EIA reports recommendations are implemented.

5.5 Suggestions for Further Research

Future scholars should look into the following:

1. How to strengthen the implementation of EIA on agricultural development projects.

2. Seek to establish challenges of the implementation of EIA in agricultural development projects.

3. Scholars also need to focus their attention on the determinants of EIA in agricultural development projects.

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APPENDICES

Appendix I: Questionnaire Project Managers, Supervisors and Environmentalists

Instructions

Kindly take a few minutes to respond to this questionnaire. Information supplied is purely for academic research purposes and will be treated with utmost confidentiality.

Part I: Background Information

1) What is your gender? (tick one)

   Male [ ] Female[ ]

2) Please indicate your age in years _____

   18 – 25 Yrs [ ] 26 – 40 yrs [ ] 41 – 50 yrs [ ] Over 51 yrs [ ]

3) Which of the following positions best describe you?

   Project manager [ ]

   Project supervisor [ ]

   Environmentalist [ ]

4) What is your highest level of education?

   No formal education [ ] Primary level [ ]

   Secondary level [ ] Diploma [ ]

   Undergraduate [ ] Post Graduate [ ]

5) How long have you been in this project? _____

Part II: Air Quality and Climate Change

6) What is your level of agreement with the following statements in regard to the extent to which air quality and climate influence the implementation of Agricultural development projects? Make your choices based on the statement in the Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree.

Statements	1	2	3	4	5
Air pollution was considered in rollout of agricultural development projects					
Potential consequences of climate change in this area as a result of implementation of agricultural development projects were assessed					
Potential emissions that pollute air were considered in implementation of agricultural development projects in this area					

Part III: Visual and Landscape

7) What is your level of agreement with the following statements regarding how visual and landscape influences the implementation of Agricultural development projects? Make your choices based on the statement in the Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree.

Statements	1	2	3	4	5
The framework in place to manage visual resources so as to maintain scenic value of tracts of land for the future in this area was considered in agricultural development projects implementation					
Measures to determine scenic quality based on land use were taken into consideration in agricultural development projects implementation					
Farmers' shared public sensitivity to change of visual resources in this geographic area has been considered in agricultural development projects implementation					
Visual impacts and contrast brought by agricultural projects that would affect the visual experience of the landscape in this area were assessed					

Part IV: Socio Economic Factors

8) What is your level of agreement with the following statements in regard to how socio-economic factors influence the implementation of Agricultural development projects? Make your choices based on the statement in the Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree.

Statements	1	2	3	4	5
Agricultural development projects' potential effects on livelihoods, environment and customs of the people in this area were considered (social impacts)					
Participation by locals in agricultural development projects were emphasized					
Social policies that support locals were prioritized in implementation of agricultural projects					

Part V: Geology and geomorphology

9) What is your level of agreement with the following statements in regard to how geology and geomorphology influence the implementation of Agricultural development projects? Make your choices based on the statement in the Likert scale where: 1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree.

Statements	1	2	3	4	5
Geo-mapping was taken into consideration in implementation of agricultural development projects in this area					
Geologists knowledge and experience were utilized in making decisions for implementation of agricultural development projects					
Geological observations and geological interpretations were used to form Total Engineering Geological models in implementation of agricultural development projects in this area					

Part VI: Implementation of Agricultural Development Projects

10) To what extent was the implementation of Agricultural development projects successful in terms of time frame, cost and quality? Make your choices based on the statement in the Likert scale where: 1= Not at all, 2= Little extent, 3= Moderate extent, 4= Great extent, 5= Very great extent.

Statement	1	2	3	4	5
Agricultural development projects were completed within the scheduled time					
The agricultural development projects were within budget					
The agricultural development projects met specifications					

Thank you

Appendix II: List of Agricultural Projects Visited

1. Black Petals Limited
2. Fairy Flowers
3. Limuru Agricultural College
4. Maramba Tea Factory
5. Kenya Agricultural Research Institute (Limuru)
6. Ministry of Agriculture (Limuru)
7. Limuru Agriculture Youth Centre
8. Kiambethu Tea Farm
9. Kawamwaki Farm
10. Tigoni Tea Farm

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TO WHOM IT MAY CONCERN

RE: MBAKAI VARPILAH– REG NO L50/68955/2013

The above named is a student at the University of Nairobi, College of Education and External Studies, School of Continuing and Distance Education, Department of Extra-Mural Studies pursuing Master of Arts in Project Planning and Management.

She is proceeding for research entitled **"influence of environmental impact assessment on the implementation of agricultural development projects in Limuru, Kiambu County Kenya".**

Any assistance given to her will be appreciated.

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