

EFFECT OF ECONOMIC STIMULUS PROGRAM ON PERFORMANCE OF
IRRIGATION SCHEMES IN KENYA

BY

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A RESEARCH PROJECT PROPOSAL SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A
MASTER OF BUSINESS ADMINISTRATION (CORPORATE
MANAGEMENT) AT THE SCHOOL OF BUSINESS, KCA UNIVERSITY

September, 2018

DECLARATION

I, the undersigned declare that this is my original work and has not been presented for a degree in any other college, institution or university other than the Kenya College of Accountancy for academic credit.

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ABSTRACT

The primary objective of this study was to spell out the effect of the Economic Stimulus Program on the performance of irrigations schemes in Kenya. Agriculture remains a pillar in Kenya's Economic growth by creating a productive populace which can contribute to the economy positively. However, government's support to irrigation schemes in an effort to provide food security in the country has not seen significant improvement in this key sector. Despite government financing irrigation schemes through its ESP the situation appears to be far from salvage with food shortage being on the rise as the population continues to increase creating a significant margin that is alarming. The specific objectives of this study were: to determine the effect of financing on the performance of irrigation schemes in Kenya, to determine the effect of increasing area under irrigation on performance of irrigation schemes in Kenya and to determine the effect of capacity building on the performance of irrigation schemes in Kenya. The study employed a moderated multiple equation to test for moderating effect of political interference. The study adopted a descriptive research design which enabled the researcher to describe state of affair at the time of the study. Of the questionnaires received from respondents 540 were usable after which referencing, coding, entering, cleaning was carried out for analysis using Statistical Package for Social Sciences (SPSS Version 21.0). The data was presented in form of tables and graphs. From the findings, it was established that funding through the ESP, area under irrigation and skills for operation of the irrigation schemes positively and greatly affected the performance of irrigation schemes in Kenya. However, the study found out that political interference negatively affected performance of irrigation schemes. The study also identified the program's shortcomings and therefore proposed measures that should be put in place to avert the inefficiencies. The study recommends that the government should formulate policy on irrigation and technology that is supportive to the development and growth of small scale dry-land farming to manage extreme condition that result to food shortage that ultimately translates to hunger and loss of lives.

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DEDICATION

This piece is dedicated to the Lumumba's and Keya's for their continued support and encouragement.

ACRONYMS AND ABBREVIATIONS

ADC	Agricultural Development Corporation
ECC	Engineering Contracting Company
ESP	Economic Stimulus Program
ESP – FSP	Economic Stimulus program – Food production component
FANRPAN	The Food, Agriculture and Natural Resources Policy Analysis Network.
FAO	Food and Agriculture Organizations of the United Nations.
GDP	Gross domestic product
GOK	Government of Kenya
IFAD	International Fund for Agriculture Development
JICA	Japan International Co-operation
KARI	Kenya Agricultural Research Institute
KNBS	Kenya National Bureau of Statistics
NGO	Non-Governmental Organizations
NIB	National Irrigation Board
ODA	Office Development Assistance
PAGE	Pilot Analysis of Global Ecosystems
RWH	Rain water harvesting.
WFP	World Health Organization
WFP	World Food Program

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The global recession in 2008-2009 across the globe made governments spot the severity of the downturn and the urgency to intervene in order to avoid catastrophic collapse of the financial markets and real economy. In response to the global financial crisis, countries around the world embarked on unprecedented level of intervention. Within months the stimulus was introduced ranging from 1.4 percent of the GDP in the United Kingdom to close to 6 percent of the GDP in the United States and over 12 percent of GDP in China. Bailouts and injections of money into the financial system to ease credit flow, cutting interest rates to stimulate borrowing and investment and extra fiscal spending to shore up aggregate demand were the three major responses to the financial crisis. Governments embarked on an unprecedented level of fiscal expansion in the form of stimulus packages (International Labor organization, 2008)

The Economic Stimulus Program was adopted by the Government of Kenya to boost economic growth and led the Kenyan economy out of a recession situation brought about by economic slowdown. According to Central Bank of Kenya (2012) the Government of Kenya came up with the economic stimulus program to address the adverse effects of domestic political crisis fueled by 2007/2008 post-election violence. The disputed outcome led to loss of property and a drastic slowdown in the level of economic activities that affected investment and employment. The mantra overcoming today's challenge for a better tomorrow was the pillar stone on which the minister of finance tabled to the parliament the need for the program to boost economic growth and pave way for recovery and jumpstart the economy towards long-term growth and

development. As a result, the economic Stimulus Program was established in 2009 through the government of Kenya Manual on 11th June 2009.

1.1.1 Economic Stimulus Program

Economic stimulus is a form of financial assistance in ways of taxes, rebates and funds. Economic stimulus program is a government program coordinated by the ministry of finance which has seen several projects being implemented. The program aims at stimulating economic activities which would create employment opportunities, spur entrepreneurship and support the building blocks that anchor a healthy innovative and educated populace. Economic stimulus program was necessitated by the need to cushion earmarked subsectors of the economy from the slump occasioned by both internal and external factors including the financial crisis and the rising high prices witnessed in 2008 and 2009 in a bid to revitalize the economy and set it back on the path of medium to long-term growth. Experience on fiscal stimulus program in response to a major financial and economic crisis supports that the package prerequisite on the program to be temporal, targeted and timely. By temporal it means that the ESP should be terminated as soon as the economy recovers to guarantee that no long-term deficit is incurred that will weaken the economy sustainability, while targeted implies that ESP should be attentive to people expected to experience adversity partly because they are likely to spend bulk of their possessions and finally timely implying that ESP should encourage fresh spending quick enough to evade cut back on production that would ultimately led to layoffs (ILO, 2008). Due to the aforementioned GOK launched a Kes. 2.07 billion National ESP that aimed at rehabilitating collapsed irrigation schemes (Omondi, 2009). Agriculture sector recognizes that water is a major constrain on the accomplishment of any irrigation scheme as a result of competition with other sectors which are growing at a faster rate than agriculture. Irrigation can produce 3-4 times of what is realized

through rain fed agriculture (Odede, Hayombe, Agong & Mossberg 2013). However, the sector has to be considered in line with its influence on rural economies, livelihoods and food security particularly in the current times when diverse sectors are managing costs by laying off staff members (Van, Erisman, Vries, & Westhoek 2015)). By the year 2013 Kenya had an annual maize consumption of 42 million bags and this is expected to increase at the rate of 1 million bags per annum in line with the population growth (KNBS, 2013). Similarly, it is estimated that the GOK spends about \$40-65 million on food annually and the figure is higher on including support from Non-Governmental Organizations (Republic of Kenya, 2004)

The government of Kenya in 2009 came up with the economic stimulus Program strategy to accelerate economic growth following the global economic crisis of 2008/2009 and the effects of the post-election violence in 2008 that considerably slowed down the country's economic growth. One of the sectors considered in ESP is the Agriculture sector: Economic Stimulus program – Food production component due to its immense contribution to the Kenyan Economy. ESP – FSP was developed to address the recurrent food deficit through the production of maize and rice under irrigation in line with Kenya vision 2030 which targets to increase area under irrigation. Agriculture sector contributes 24 percent of Kenya GDP directly and another 27 percent indirectly on the same giving it significance on Kenya's economic growth. The sector is not only the driver of the Kenya economy but also the means of livelihood to a great percentage on the population. It provides income to more than 80 percent of the population. However, the sector faces several challenges that include declining productivity levels, inefficiencies in the supply chain, lack of post-harvest services, erratic rainfall that continue to dampen the agriculture output, information asymmetry as well as low value addition to most of the export

products. Kenyan vision 2030 identifies agriculture sector as one that will aid the country achieve a 10 percent annual economic growth (GOK, 2007)

The government of Kenya acknowledges that agriculture sector has great potential in ensuring food security. As a result, it has emphasized on the need of irrigation schemes to boost agricultural output to feed the nation and have surplus for export. The national irrigation board has been given the mandate to oversee the irrigation schemes operations as well as conducting research to facilitate implementation of better systems in the different irrigation schemes in the country. GOK has proposed interventions suitable for the youths and women participation in lease of agricultural land, mechanization and irrigation pegged on the fact that they constitute a greater percentage of the population in the country (Kenya Youth Agribusiness Strategy, 2017).

Economic stimulus program in the Agricultural Sector has three main components; financing, increasing area under irrigation and human resource aspect which focuses on capacity building of persons involved in the scheme. Financing is an infrastructure that provides a means of transfer of funds from the government to projects for consumption. According to WHO (2010) report, the ESP was allocated 22 billion for various inter-sectoral program among them the irrigation program. Irrigation tends to be expensive pegged on the fact that resources are limited and infrastructure should be put in place to ensure effective use of water which has been a major constrain in identifying suitable arears for irrigation projects. As a result, the initial capital outlay is huge and may require long term financial arrangement. In this regard the GOK has put in place various strategies to streamline the funding of its programs across the various sectors of interest. The roles are separated amongst various stakeholders in a bid to hold different authorities accountable for the use of funds. The first stakeholder is the ministry of agriculture at the

headquarters who reports to Treasury work plans and cash flow projections for the ESP (Office of the Deputy President, 2009)

Economic Stimulus Program would focus on the increase of area under irrigation to facilitate increase in productivity of Kenya's staple food maize (GOK, 2007). The larger the area under irrigation the more benefits in any irrigation scheme as a result of economies of scale. There is a positive correlation between the productivity and the area under irrigation. As such area under irrigation is key if high productivity is to be achieved in different irrigation program. It is necessary therefore to assure individual secure rights to individual farmers because the attachment to land is profound (Valipour&Eslamian, 2014)

Human resource comes in to play in ESP by the fact that projects are not undertaken in a vacuum. They happen in an environment which has different dynamics that can have either a positive or negative impact on performance. A study conducted by Onyango (2014) concluded that there was need for an integrated approach to promote competitive sustainable agriculture in terms of technology, provision of training and regulatory services in order to achieve food security in Kenya. The study further concluded that low agricultural output in Karachuonyo is directly attributed to a grossly understaffed Agricultural department with limited extension officers who need to sensitize farmers on the existence of subsidies. Based on the development above, the study acknowledged human resource as a real asset in achieving productivity in Agriculture.

1.1.2 Performance of Irrigation Schemes

Irrigation projects in Kenya are driven by the desire to attain food security and eliminate hunger amongst Kenyans that will result to improved livelihood for households in Kenya. The projects

are funded by donors and the government of Kenya (National Irrigation Board, 2011). According to Clemmens and Molden (2007) performance is how well service is being delivered and the outcomes of irrigation in terms of productivity and efficiency in relation to the resources used. Malano and Burton (2001) define Performance as the systematic observation, documentation and interpretation of management of an irrigation and drainage system aimed at ensuring intended outputs and proper functioning is realized. Performance of irrigation schemes is measured by the extent to which an irrigation scheme achieved its established objectives (Gorantiwar and Smount, 2005). The primary output of an irrigation scheme is the total economic equivalence per unit of land and water used (Dlamini, 2013).

Food security is the availability of secure access to adequate quantities of safe and healthy food for growth, development for an energetic and healthy life. This can be broadly explained in four dimensions: Availability of food; this is determined by a country's local production, presence of food reliefs and food stocks as well as imports volume. Secondly, Access to food which primarily depends on purchasing power of the households, transport infrastructure, food distribution systems as well as food prices. Thirdly, food stability which might be influenced by: weather, price variations as well as economic and political factors. Lastly, food utilization in a safe and healthy manner subject to clean water, food quality and safety as well as sanitation and health. Food constitutes a major part of expenditure for the poor households and food prices can directly affect food security (Glantz, Gommers, & Ramasamy, 2009).

For this study the performance of irrigation scheme was measured to the extent which the irrigation schemes have achieved their intended objectives of increasing the output per acreage efficiently resulting to food availability to different households at affordable price as defined by Gorantiwar and Smount (2005). This will be by examining whether productivity per acreage as

increased as a result of the economic stimulus program, capacity building as well as area under irrigation.

1.1.3 Irrigation Schemes in Kenya

Irrigation is a means to enhanced agricultural output that involves artificial application of water to supplement rainfall. Irrigation projects in Kenya are inspired by the desire to attain food security and eradicate hunger amongst Kenyans that will result to enhanced livelihood for families in Kenya. The projects are funded by donors and the government of Kenya (National Irrigation Board, 2011). The Kenyan Government in 2002 pointed out irrigation as the core towards established and stabilized food supply through optimum utilization of existing resources. With the prevalence of drought related crop losses across the world due to climatic changes it has been estimated that there will be an annual average loss of 20 million metric tons of maize which translates to about \$ 7 billion per year due to drought (Doeing, 2005). In non-temperate areas maize loss was estimated to be about 19 metric tons in the early 1990 (Kostandini, Mykerezi, & Escalante 2013). In the dry areas of Egypt, Asia, South Africa and Sudan Irrigation has provided an avenue that has facilitated the increase of cultivated land thereby increasing food security and land productivity. In this regard the ministry of Agriculture policy supported development of irrigation in the Arid and Semi-Arid areas of Kenya which is about 82% of Kenya's Land. In 2009 the GOK set out to reduce dependence on the rain fed agriculture by investing in irrigation in its ESP - FSP by rehabilitating major irrigation schemes in Kenya (Republic of Kenya, 2009). Dependence on rain feed agriculture is the major contributor to frequent food shortages in the country. Public Irrigation schemes in Kenya include, GalanaKulalu, Mwea, Bura,Tana, Perkera,Ahero, Bunyula, and West Kano irrigation scheme.

GalanaKulalu irrigation scheme was introduced under the ESP to provide food security in Kenya by producing Kenya's main staple food maize. This scheme has fish, Livestock and crop production sections. This scheme is hosted by two Counties Kilifi and Tana River. It is a government development project through National Irrigation Board to enhance food security in Kenya. This is by ensuring the price of Kenya's staple food (maize) has been brought down to ensure affordability to different households in Kenya (NIB, 2016). The GalanaKulalu scheme was launched by the President of Kenya in 2014 to minimize overdependence on rain fed agriculture. This is a million-acre project expected to exploit the potential of the country's arid and semi-arid lands by doubling maize production to 40 million bags annually. (Neeliah et. al, 2014). Mwea irrigation scheme is approximately 100KM South East of Nairobi in Kirinyaga County. This Scheme is dominated by rice as the main cash crop. The scheme covers 30,350 acres with 16,000 developed for paddy production. The scheme draws water from Thamindi and Thiba Rivers. Today this scheme is under National irrigation board and farmers' organizations. Bura irrigation scheme is along the river Tana about 400 Km North West of Mombasa. This project was funded by World Bank, ODA, ECC, Netherlands and the government of Kenya. This project was started in a bid to cultivate cotton being the main cash crop, while maize and groundnuts being the main food crops of the project in an effort to benefit families in the vicinity. Currently the project irrigates 1,000 hectares failing to utilize the 3,900 hectares available in the semi-arid area due to lack of adequate water. This projected benefited in the ESP to facilitate increase in area under irrigation as well as acquire necessary capacity for day to day operations. Tana irrigation scheme was started by the colonial government. The scheme is in Tana River with a potential irrigation area of 12,000 acres with only 4,700acres being fully utilized currently. The main cash crop in the scheme is Maize. The project has seen households

in the area benefit in terms of employment creation. This scheme was revived in 2009 on being funded by Arab Bank for Economic Development in Africa and the Government of Kenya after collapsing in 1989 on Tana River changing its course. Tana has also benefited under the ESP. West Kano Irrigation Scheme is positioned in the Kano plains between Nandi escarpment and Nyabondo Plateau. The scheme has a farmland of 2230 acres of paddy fields with 900 hectares under irrigation. (NIB, 2016) The scheme draws water from Lake Victoria. This project got a grant from JICA and a subsidy from GOK to facilitate equipment acquisition to enable step-up rice production and create employment in the region (Hezron, 2015). Bura irrigation scheme was set up by the Mau Mau detainees in the pre- independence days. Hola irrigation scheme on the other end was set up after independence preceded by Tana Delta irrigation scheme at Gamba. Tana River supports hydropower generation in Kenya apart from irrigated agriculture, fisheries, Livestock production and biodiversity conservation supplying water to 17 million people (Ngugi, Bowman & Omollo 2002). Bura and Hola irrigation schemes are challenged by marginal soils, unreliable water supply and local population which is pastoral that saw no benefit in crop production, river channel mobility within flood plains as well as infrastructure issues. Water transmission distance in Bura irrigation scheme results in large canal water losses. Bura and Hola schemes collapsed in 1997 during the El-Nino rains because of mismanagement. The problem was exuberated by decline in financial support, inadequate marketing and inadequate technical know-how as well as lack of exposure of farmers to improved irrigation technologies (Avery, 2013). Perkera irrigation scheme is in Marigat township in Baringo about 100Km north of Nakuru. The scheme draws water from Perkera River which is the only permanent river in Baringo. The potential area for irrigation is 5,800 acres. However due to lack of adequate water only 1,500 acres have been utilized. The scheme started producing onions, chilies, watermelon,

pawpaw and cotton which did not prove viable at the marketing stage and thereafter the scheme shifted to maize production (NIB, 2016). Ahero Irrigation scheme is located in the Kano plains between Nandi escarpment and Nyabondo Plateau. This irrigation scheme was put in place to facilitate food security, employment creation as well as wealth creation to improve the live hoods of households in the surrounding environment. The area under irrigation stands 2,586.5 acres different from the irrigable land which is 4,176 acres. The scheme experiences high cost of electricity in pumping water for irrigation as well as acquiring inputs such as fertilizers (NIB,2016)Bunyula irrigation scheme was launched in 1968. This scheme is located in Western Province of Kenya. This scheme draws its water from river Nzoia and is situated in Bunyala which is in Busia County. The scheme's main objectives were to utilize efficiently the available land and water resource, enhancement of food security and self-sufficiency as well as boost the income generated in the area. Further, the scheme was also supposed to help in employment creation in addition to enhancing the sustainable supply of raw materials for agricultural based industries (NIB Website). This scheme has benefited immensely from the Government policy to support the development of irrigation and this has been done by providing development funds for purchase of new pumps, irrigation accessories which has helped in the expansion of the irrigation scheme (Thairu, 2006). West Kano Irrigation Scheme is located in the Kano Plains between Nandi escarpment and Nyabondo Plateau on the shores of Lake Victoria in Kisumu County. The scheme has 837 farmers who cover 2,250 acres with a total of 4,450 acres being irrigable. The main cash crop under this scheme is rice. The scheme incurs high electricity cost in pumping water for irrigation (NIB,2016).

1.2 Statement of the Problem

Despite the GOK financing irrigation schemes in Kenya in a bid to secure food security the situation seems to be far from salvage; food shortage cases are still rife in many parts of the country (Mati, 2008). Food availability and affordability has a ripple effect on the economy by its contribution towards a productive workforce. Though the GOK has recognized irrigation as one of the projects that would enable it achieve vision 2030, the sector has not provided food security sustainability owed to the fact irrigation schemes have continued to perform below their potential despite the GOK funding irrigation in its ESP adopted in 2008/2009 (Thairu, 2006)

Alex (2007) indicated that world agriculture in the 21st Century will have three major problems: feeding world growing population, need to reduce rural poverty in the World and how to respond to increased concern on managing natural resource base. Doeing, 2005 estimated an annual average loss of 20 million metric tons of maize which translated to about \$ 7 billion per year due to drought. A study by Valipour and Eslamian (2014) indicated that 46% of the cultivated areas across the globe are not fit for rain fed agriculture because of climatic changes and other meteorological conditions. Globally it is estimated that about 5% of agricultural land is irrigated with South Asia (35%) Southeast Asia (15%) and East Asia (7%) showing a high dependency on irrigation. (Sanchez, Mahajan & Wood, 2000).

Water is a scarce resource in most of the developing countries despite relatively larger agricultural demands (Matthews, Payne, Rohweder, & Murray, 2000). Irrigation generates an average income of USD 323/ha compared to the calculated gross margin of USD 147/ha for rain fed agriculture in Ethiopia. Under conservative estimates irrigation is expected to contribute 3.7 % towards Ethiopia's GDP (Hagos, Makombe&Namara, 2009). The World Bank (2006) estimated that unmitigated hydrological variability costed Ethiopia economy over one third of its

growth potential and led to over 25% increase in poverty Level. Truong (2011) following the financial crisis in 2008-2009 that had affected almost all countries resulting to decline in Vietnam's export found out that in the short run the stimulus package marginally stabilized national production and income. Drought and food shortage are a recurrent phenomenon in Kenya and the shortages have proven in the previous past that they cannot be solved by rain fed agriculture production only; a supplement is needed (Patel, 2012). A review of earlier studies on ESP have been diverse with varied focus but failing to identify the effect of the ESP on food security which is one of the sector that has been financed in the program in an effort to feed the ever-increasing population. Acknowledging the inputs and investment on irrigation as a food source alternative evaluation of irrigation schemes is of paramount importance in identifying weak points in the different schemes as well as alternatives that will be effective and achievable in improving irrigation schemes performance. The study evaluated the performance of irrigation schemes in Kenya in a bid to provide a base for the formulation of strategies for irrigation development and giving a benchmark for monitoring progress of the irrigation schemes.

1.3 Research Objectives

1.3.1 General objective

To determine the effect of Economic Stimulus Program on the performance of irrigation schemes in Kenya

1.3.2 Specific Objectives.

- i) To determine the effect of financing on the performance of irrigation schemes in Kenya

- ii) To determine the effect of increasing the area under irrigation on the performance of irrigation schemes in Kenya
- iii) To determine the effect of capacity building on the performance of irrigation schemes in Kenya
- iv) To determine the effect of political interference on the performance of irrigation schemes in Kenya.

1.4 Research Questions

- i) What is the effect of financing on the performance of irrigation schemes in Kenya?
- ii) What is the effect of increasing area under irrigation on the performance of irrigation schemes in Kenya?
- iii) What is the effect of capacity building on the performance of irrigation schemes in Kenya?
- iv) What is the effect of political interference on the performance of irrigation schemes in Kenya?

1.5 Significance of the study.

This study adds to the body of knowledge on Economic stimulus program benefits in Kenya. The study will be useful to the GOK by providing a cost benefit analysis of financing irrigation schemes in Kenya under its Economic Stimulus Program. To the NIB it provides information on areas that need improvement for it to realize maximum benefits in the different irrigation schemes in Kenya. Similarly, findings are of significance to policy makers by highlighting areas that need to be looked in to before commencing projects as well as providing useful information

to small scale farmers that practice irrigation and enable them maximize their output in farming by increasing efficiency.

1.6 Scope of the study

This study focused on the irrigation schemes managed by the national irrigation board of Kenya and have benefited from the ESP. The irrigation schemes of interest to this study wireman irrigation scheme and Bura irrigation scheme.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presents the relevant literature review on Economic Stimulus program, theoretical framework, irrigation schemes performance, government funding through the ESP program research gaps and the conceptual framework relating to this study. This gives understanding of the topic by conceptualizing similar studies within the area of interest by different scholars.

2.2 Theoretical Framework

This section presents theories relevant to the objectives of this study in line with the research question the researcher is seeking explanations. Three theories: Keynes Theory, Constraints theory and Human Capital Theory explained below have been employed in this study.

2.2.1 Keynesian Theory

Government intervention during crisis dates back to Keynes theory (Keynes, 1930). The Keynes Economic Theory is an approach that encourages government spending to keep the economy

stable and growing. Keynes advocated for increased government expenditure and low tax rates during recession to stimulate demand and pull out the economy out of recession. The theory states that during recession the economic output is strongly influenced by aggregate demand which is the total spending in the economy. The theory suggests that spending enhances aggregate output and generates more income; this is on the principal that spending by one consumer equates to income to a given worker which creates a productive cycle for economic growth. Therefore, Keynes advocated for consumption (Marginal propensity to Consume) rather than saving to effect full employment and economic growth. The productive capacity of the economy does not necessarily equal to the aggregate demand but it's rather influenced by a host of factors that are not steady thereby affecting production and employment. Generally, the theory advocates for government monetary and fiscal policies intended to stimulate business activities and offer employment opportunities in diverse locations (Keynes, 1930). Stiglitz (2009) noted that human resource and physical resources are available as they were before crisis at the time of crisis. Therefore, organization of resources is of paramount importance in acquiring output in times of crisis. Stiglitz (2009) mentioned two schools of thought that explains cause of crisis. The first one is pegged on wage rigidities and the second one is accredited to the lack of aggregate demand as foundations of market failure. Keynes posits that in times of great depression wage decline leads to demand deficiency. As a result, government involvement is essential to address the decrease in aggregate demand. Keynesians supported that policymakers need to diminish government spending soon the economy improved to hostage inflation in the long run. Therefore, this theory suggests that government intervention in various projects can see improvement in the short run and long-term as well as sustainability of different projects in different geographical areas.

2.2.2 Theory of Constraints

Goldratt and Cox (1984) defined a constraint as anything in a system that deters the system from attaining a high performance by introducing inefficiencies in the system. Theory of constraints emphasizes that every real system has at least one constrain. Goldratt and Cox (1984) suggested the theory to enable different organizations to invent simple explanations to apparently complex problems. The theory emphasizes on adapting practises in business in a way that the business copes with limitations that stand in the way of key objectives by dealing with the most important limiting factor that stands on the way to achieving objectives then steadily improving the constrain until its no-longer a limiting factor both in the short-run and in the long-run. This is tied to three core principles that aid in goal achievement: convergence, consistency and respect. Prominence is on advances that have instant impact on the bottom line by a providing a process in which to follow through. This is by improving the limiting factor towards efficiency of a process. This is achieved by prioritizing improvement activities at the most critical points selectively which maximizes the key objectives. Theory of constraints stipulates that to eliminate the constrain in the system one needs to: Identify the constraint, exploit the constraint, subordinate and synchronize to the constraint, elevate the performance of the constraint then repeat the process for continual improvement (Goldratt & Cox, 1984). This theory suggests that failure to identify the limiting factor in the irrigation schemes can have an impact on performance.

2.2.3 Human Capital Theory

This theory focuses on an organization having competitive advantage against its rivals by having human resources that cannot be imitated by its rivals in the market. This theory emphasizes on the need for human resource skills in an organization's endeavour to achieve its goals and

objectives. In the 1960s economists strained to elucidate the growth of the US economy based on land, labour, physical capital and management. The experimental work of Becker (1964) and Mincer (1975) gave birth to the Human capital theory by challenging the assumption that the growth of physical capital is paramount to economic success. The theory alludes that human resource learning capacities are of comparable value with other resources involved in the production of goods and services. According to Shaw, Park and Kim and (2013) human capital losses impacts a company's performance negatively. However, the human resource performance relationship takes the form of diminished negative relationship when the workforce is not equipped with the necessary skills to perform the job at hand. Human capital theory acknowledges that employees who invest in education and training will increase their skill level and be more productive than those that are less skilled, and that investment and training will improve productivity (Hatch and Dyer, 2004). This theory therefore implies that capacity building can have an impact on performance of irrigation schemes.

2.3 Empirical review

This section covers studies by other scholars on the impact of financing, increasing the area under irrigation and capacity building on the performance of irrigation schemes. Empirical literature presented is guided by the three research objectives of this study.

2.3.1 Financing and Performance of Irrigation Schemes

Project finance is the long-term financing of infrastructure and industrial projects which is based on the projected cash flows. One of the key determining factors in the sustainability and effectiveness of a project is the availability of funding. Financing is of two types; funds for setup and secondly funds for operations. However different projects have found it difficult to obtain funds for day to day operations which has forced many projects to constantly reinvent

themselves to qualify again for set -up funding (Webster, Altkinson, Lucas, Vaughan, & Taylor2000).

According to World Bank (2015) high and increased construction costs and poor performance of irrigation schemes expenditure calls for the need of participation of the private sector to boost financing of the expenses involved in irrigation schemes for improved performance. Projects awaiting funding but already designed affects the timeframe either positively or negatively (Schwartz, Andres and Dragoiu, 2009). According to Backeberg (2006) the fact that efficient sustainable irrigation is not only feeding the world but also contributing to the economy significantly thus necessitating the need to finance irrigation schemes accordingly and setup appropriate long-term financing mechanisms involving stakeholders beyond agriculture sector to catalyse the productivity of the schemes to boost irrigation schemes performance. Irrigation infrastructure demands large sums of money for maintenance to avoid reinvesting in rehabilitation necessitating the need to get the irrigation infrastructure right at the inception of any irrigation scheme. Coppoolse et. al(1993) noted that there is a connection between the existing technology and financial investment into a project with the two impacting the level of efficiency, capital expenditures and maintenance outlays.

Countries in the Sub-Saharan Africa have experienced food shortage due to low productivity in the agricultural sector which has resulted to low employment rate in the agricultural sector owing to high input costs worsened by the lack of adequate finance and unpredictable weather patterns in the advent of a rising population. This calls for need to increase the area under irrigation as a strategic move to improve production and generate adequate crop yields which require financing for accomplishment (Omondi,2009). According to Mutambara and Munodawafa (2014), limited access to agricultural inputs as a result of inadequate funds was a major production constrain

faced by farmers operating irrigation schemes in Zimbabwe which meant that the farmers would not fully utilize available land. This was exuberated by high inputs prices and at times the inputs were not available at the market coupled by poor coordination and distribution for key agriculture inputs by the government (FAO, IFAD and WFP, 2002).

Wade (1976) concluded that financial capital adequacy, resource allocation/adequacy affect the performance of public irrigation projects in Kenya. Projects that await funding might demand new studies, updated cost projections or even recalibrated willingness and ability to pay given the shifting resources of consumers and the turbulent prices of inputs translating to direct and perhaps irreversible effect on the impact of the project at hand. The GOK allocated Kes. 2.07 billion in favour of the food production component of the ESP program. The funds were disbursed to the implementing ministries; Ministry of water and irrigation, Ministry of Youth and sports affairs, Ministry of Regional Development and Ministry of Agriculture through their representative; National irrigation board, National youth service, Tana Delta Regional Development Authority respectively. The funds were disbursed to facilitate infrastructure development, operations and maintenance of the irrigation infrastructure and to provide farmers with seeds, fertilizers and pesticide (NIB, 2016). There was a need for Kenya to move from rain fed agriculture to irrigation for sustainable supply of Kenya stable food to household at an affordable reasonable price (Avery, 2013). In this regard the GOK invested in irrigation as spelt out in the Medium-Term Plan (MTO-II 2013-2017) where 404,685 hectares were set aside half of which is under maize production to facilitate transformation of livelihoods. Vision 2030 Program focused on small holder irrigation projects. GOK support to farmers through the ESP resulted into increase in maize output during the first quarter of 2010 with a record of 11,989,321 bags (Francis & Alex, 2011)

Cost is one of the primary measures of a project's success especially for construction projects in developing countries since public construction projects in developing countries are executed under scarce financial resource (Choge&Muturi, 2014). Choge and Muturi (2014) noted that cost related factors were significant items in influencing implementation and completion of irrigation projects. Following this review the study hypothesis that;

H₀₁ Financing of irrigation schemes has no significant effect on performance

2.3.2 Increasing area under irrigation and the performance of irrigation schemes in Kenya

Anderson (2002) concluded that the level of agricultural output under irrigation increase as the acreage under irrigation increases. In the Western United states seventeen States variation in the fraction of the total cropland under irrigation explains almost two thirds of the variation in the values of total agricultural production. Anderson (2002) further noted that increase of the area under irrigation provided avenue for crop diversification which meant a fall of one crop or one variety did not translate to almost hundred percent loss of the cycle productivity at any given period.

Land remains the core asset in any agricultural production process. The larger the area under irrigation the more benefits in any irrigation scheme as a result of economies of scale. There is a positive correlation between the productivity and the area under irrigation. As such area under irrigation is key if high productivity is to be achieved in different irrigation program. It is necessary therefore to assure individual secure rights to individual farmers because the attachment to land is profound (Valipour&Eslamian, 2014)

AquaStat (2011) noted that Africa could utilize an area of about 42.5 million hectares for irrigation. However, it was found that this had not been utilized owed to weak capacities in the responsible organizations in undertaking initiatives for multipurpose water use infrastructure and irrigation schemes which highly depend on studies and evidence in presenting a convincing case on the potential of utilizing irrigable land. In 2005 Commission for Africa report emphasized on the need to double area under irrigation by 2015. However, by the year 2010 the level of public investments in irrigation remained low despite donor and government funding (FAO,2011)

Wade (1989) concluded that the degree of scattering farmers greatly affects the performance of irrigation schemes. This he explained to be a result of externalities of water use being “unidirectional” where the activities of farmers at the head of the block impose costs on farmers at the end of the block. On the other hand, where farmers are scattered the externalities are not towards a specific direction a common interest gets created within a specific irrigation scheme.

Inocencio, Kikuchi and Merrey (2005) noted that in Sub-Saharan Africa a higher performance was recorded in terms of yields, water distribution and operations within a scheme for small irrigation schemes which was a result of better management in comparison to larger irrigation schemes that did not benefit from the economies of scale. Area of Land under irrigation has an effect on the performance of irrigation schemes in Kenya (Miruri and Wanjohi, 2017)

Njagi (2009) noted that large irrigation schemes benefited on economies of scale attributable to indivisible inputs such as skilled labour, plant and machinery. He further concluded that such schemes have the capacity to attract skilled labour on key strategic areas of interest. Larger irrigation projects enjoy minimal cost per unit although they face complexities in operations as well as on resource allocation. Njagi (2009) concluded it is of more importance to make use of available resources efficiently than merely targeting on benefiting from economies of scale.

H₀₂ Increasing area under irrigation has no significant effect on the performance of irrigation scheme.

2.3.3 Capacity building and performance of irrigation schemes

World Bank (2015) noted that lack of technical expertise for designing and construction of irrigation systems, competent operation and maintenance, modernization and creativity in supply to the changing demand results in to unfavorable impact on the quality and quantity of produce yields. Deficiency in manpower skills, unsustainable leadership as well as poor site management,

hindered irrigation project completion in the United Arab Emirates. This was not different from Palestine where poor performance of irrigation schemes was as a result of limited manpower skills (Faridi& El-Sayegh, 2006). In South Africa Stevens and Van Heerden, (2006) noted that the context of agriculture development had advanced calling for the need to have the right team of professionals with suitable skills and approach to guide farmers to compete in a rapidly evolving business atmosphere. This was highlighted to facilitate not only the transmission of technical knowledge but also to support farmers to network with key players involved in agriculture innovation system for enhanced performance. According to Van, *et. al* (2015) lack of a national umbrella body that coordinates RWH for irrigation schemes posed a major challenge on the irrigation schemes in South Africa. Growth of national information and knowledge center on irrigation, forming a multi-disciplinary team of experts on all the relevant aspect of irrigation, as well as effective irrigation information center to disseminate irrigation information on a timely basis was key in realizing benefits from an irrigation scheme. Mutambara and Munodawafa (2014) noted that irrigation schemes poor performance was directly attributed to little knowledge by farmers on the basic operation and maintenance of water pumps. Most farmers lacked critical training in the preservation of institutional memory on basic skills rather than dependence on outsourcing that would improve maintenance of pumps which would enhance longevity thus prove to be sustainable in the long-term. Wade (1976) noted that the management of irrigation schemes was a key determinant of performance. The study showed that management and mobilization of resources, conflict resolution, communication and decision making significantly affected performance of irrigation schemes in Kenya. Kimani and Ruigu (2009) noted that degree of control and discipline is essential because performance is pegged on a technically determined cycle of events on acknowledging that intensive commercial irrigation is the most

complex and difficult type of enterprise in the world. Sustainability of irrigation schemes can be achieved by developing guiding principles on all aspects of irrigation planning, development and management (KNBS, 2013). Implementation and decision making of the value chain must be well laid out; Procurement of the inputs, scheme financing, production as well as harvest and post-harvest activities which require logistics details. In South West Kano training farmers and extension officers facilitated reduction of canal siltation and unauthorized water diversion. Other stakeholders were trained on agronomic activities which contributed to the irrigation schemes improved land use that resulted to increased productivity of the Kano irrigation scheme (Muya et al, 2011)

To realize the expected results ESP programme was to go hand in hand with establishment of adequate and attentive extension services, water use efficiency, land use management as well as environmental conservation. The results would be the most reliable way of stimulating irrigation schemes that remain stagnant in Kenya (Karina and Mwaniki, 2011). Poor performance at different levels in aquaculture under the ESP was a result of inadequate extension services that affected greatly pond preparation process, stocking of the fish ponds as well as harvesting and marketing. In addition, inadequate technical skills by extension staff coupled with understaffed levels with minimal practical aquaculture skill constrained commercial aquaculture (Mwangi and Thordarson, 2007). Ngugi et.al (2007) had similar observations in relation to poor performance of aquaculture in Kenya. However, the two studies focussed on aquaculture which is one aspect of irrigation. Wanjiru, Elias and Dorah (2010) noted that sophisticated exhibitors do well during trade shows regardless of their size getting a competitive edge against the naïve and inexperienced who might use thousands of dollars and countless hours and probably do more harm than good. Therefore, effective use of trade shows takes a little effort and planning. Hussin

and Omar (2011) noted that the right level of knowledge and experience, management skills are essential in facilitating a greater chance for project implementation and completion on or before the deadline. Poor performance of the aquaculture sector in Kenya was as a result of inadequate support from the government in terms of extension services that resulted to inefficiencies in pond preparation, stocking, harvesting and marketing (Mwangi and Thordarson, 2007). Ngugiet. *al* (2007) findings were consistent with the reasons for poor performance in aquaculture.

Mahan (2007) noted that human resource with diverse skills and competency can administrate and implement projects effectively. This aids in the process of adopting an open information policy system for ESP records reports and procurement. By this, members can audit themselves and in case of any irregularities cases early identification and correction would aid in addressing such matters towards achievement of the project's goal. The study hypothesis that;

H₀₃Capacity building has no significant effect on the performance of irrigation schemes.

2.3.4 Politics and performance of irrigation schemes

In the US the president and the congress influenced the bureaucracy despite having an exceedingly specific law that outlined the manner in which funds were to be allocated in the Economic Stimulus Program. Additionally, policy implementation allowances were disproportionately higher for group that supported the president during elections and were represented by the members of the senate (Carrell and Hauge, 2009). In Nigeria it is almost impossible to actualize projects within the budget due to inflation, political uncertainty as well as changes in the government (Oyewobi, Ibrahim &Ganiyu 2012). Munyiri (2013) in a study to determine he factors influencing implementation of ESP in Kitui Central noted that politics did sway the overall criteria on which funds were being disbursed to the county there by limiting the effectiveness of the funds. These findings were consistent with Nyika (2012) who noted that only

about 20% of the projects implemented in Kenya stayed on the budget due to poor implementation which was a factor of political interference. In 2017 President Uhuru Kenyatta mentioned that politicians in Kirinyaga County had meddled with the government's plan to boost Mwea irrigation scheme. He went further to clarify that interference by politician on plans relating to the scheme would not be tolerated. AquaStat (2011) concluded that politicians are generally convinced by short-term visible results for macro Level benefits, social pressure as well as requirement to address challenges that hinder growth in the productivity of national strategic crops. The study seeks to test the hypothesis that;

H₀₄ Political influence does not significantly influence the relationship between Economic Stimulus Program and performance of irrigation schemes.

2.4 Knowledge gap

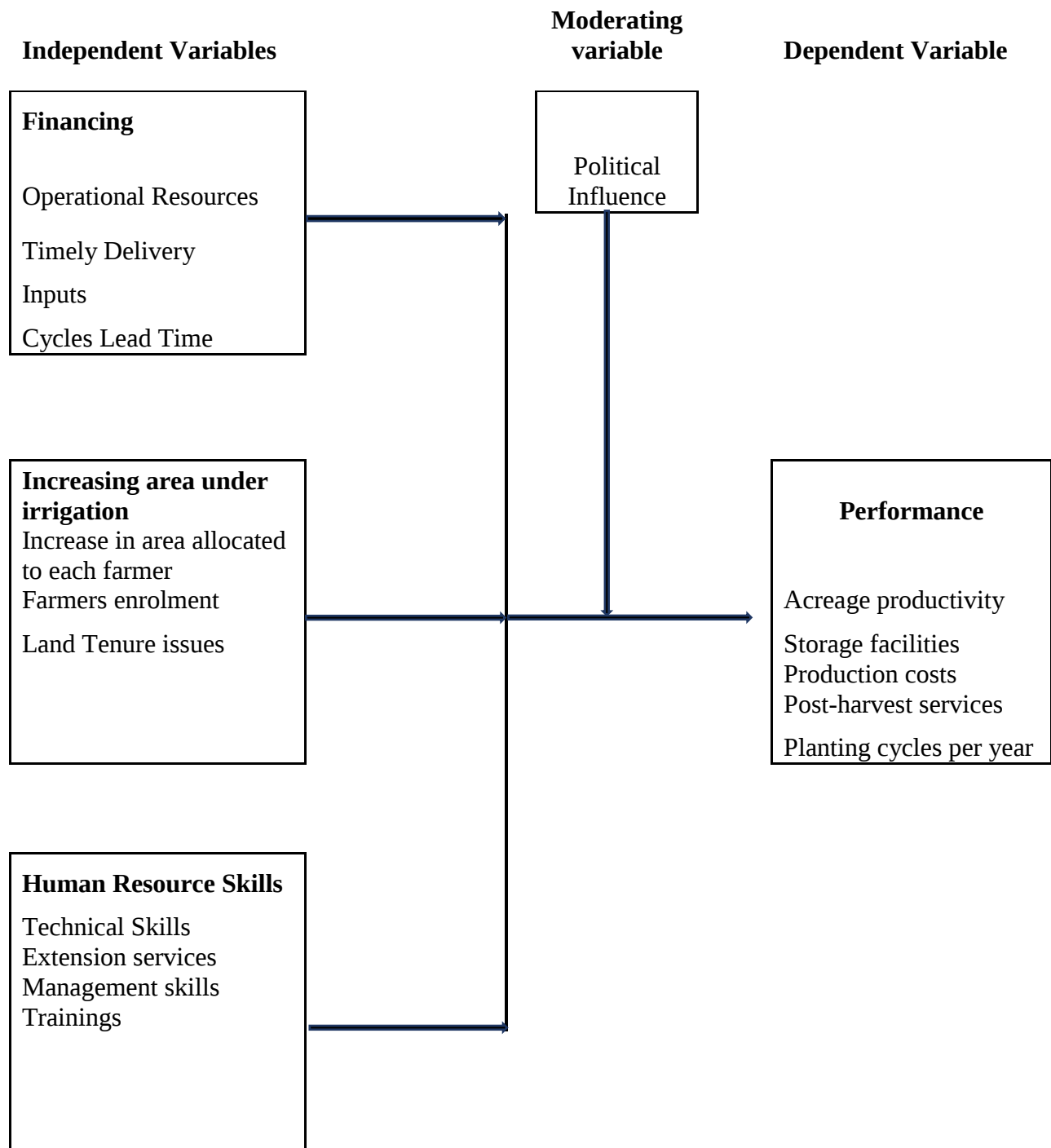
This study was informed by food shortage that is still rife despite the GOK investment in the agriculture sector to boost food security in the country. Webster *et.al* 2000 concluded that set up costs as well as day to day expense were important for any project but failed to explain how financing affects performance of projects. Anderson (2002) concluded that the level of agricultural output under irrigation increase as the acreage under irrigation increases. This study focused on output in relation to utilization of available land negating other factors that directly affect utilization of the available resources in actualizing projects. Food security is key on Kenya economy because it has a ripple effect in the economy. With a worrying trend of food shortage in the country over years, weak points to address this shortage have not been adequately addressed. Acknowledging the inputs and investment towards irrigation projects as a food source alternative as well as evaluating of irrigation schemes is core in detecting weak points as well as alternatives that will be effective and reasonable in improving irrigation schemes performance. This calls for

the need to appraise benefits of the ESP on the performance of irrigation schemes in Kenya by providing a base for devising strategies for irrigation expansion and giving a benchmark for monitoring progress of the irrigation schemes in attaining food security in Kenya for a productive populace that can effectively engage in different economic activities.

2.5 Conceptual framework

The conceptual framework on this study was based on the notion that performance of irrigation schemes under the Economic stimulus program depends on other factors which are financing, increase of area under irrigation and capacity building within the irrigation schemes. Figure 1 shows three independent variables, one moderating variable (Political Influence) and one independent variable (Performance)

Figure 1: Conceptual framework



Source: Author, 2018.

2.6 Operationalization of variables

In this study the variables are defined on the Table 1 below.

Table 1: Operationalization Table

Variable type	Indicators	Specific measure	Measure ment scale	Question in the Questionnaire
Dependent Variable (Performance)	Food security	• Productivity per acre • Post-harvest activities • Production costs • Number of planting cycles per year	Interval	Q31 – Q37
Independent Variable (Financing)	ESP project funds awareness Ease of getting funds Adequacy in getting necessary equipment	• Farmers knowledge of the program • Conditions in receiving funds • Equipment/machinery and farm inputs • Timely receipt of funds • Funds adequacy • Cycles lead time	Interval	Q5 – Q11
Independent Variable (Increasing area under irrigation)	Utilizing irrigable land	• Increase in area under irrigation • Farmers enrolment • Land Tenure • Number of plot holders • Scattering of the holdings	Interval	Q12 – Q17
Independent Variable (Capacity Building)	Ease of carrying out day to day activities Support given to farmers towards improved yields Technical know-how in machine operation	• Ability to carry out daily activities • Trainings • Extension services • Management skills • Machinery operation • Identification of weak	Interval	Q18 – Q23

		points		
Moderating Variable (Political Influence)	Extent to which politicians influence different activities in the scheme	• Funds disbursements • Leaders' appointment. • Trainers selection • Extension officers' appointment • Support irrespective of political alignment	Interval	Q24 – Q30

Source: Author, 2018.

2.7 Literature Review summary

Performance of irrigation schemes depend on a number of factors for achievement of desired results. The literature covers the essence of ESP in a global, regional, and local perspective. Literature reviewed on these factors are: Financing on performance that has been tied to Keynesian theory, increase of area under irrigation which is explained by the constraints theory and finally the importance of capacity building on performance of irrigation schemes as explained by the human capital theory. Webster *et.al*, 2000 concluded that financing at the initial stage of a project as well as financing after implementation was core for success of any project sustainability. Wade (1976) noted that delaying finance resulted to increased cost as a result of demand for new studies, new projections as well as turbulent prices that translated to direct and perhaps irreversible costs on the projects. Anderson (2002) concluded that the level of agricultural output under irrigation increase as the acreage under irrigation increases. On the other hand, Wade 1989 explained that elimination of externalities from one farmer to another creates a common interest within the irrigation scheme which results in to better performance of an irrigation scheme. Wade concluded that this would only be achievable when there is adequate land allocated to each farmer. Mahan (2007) noted that human resource with diverse skills and competency can administrate and implement projects effectively. These findings were similar to

those of Mutambara and Munodawafa (2014) that emphasized the need to increase members capacity to better performance both in the short term and in the long run.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This presents part presents the methodology used by the researcher to uncover the effect of the Economic Stimulus Program on the performance of irrigation schemes in Kenya. Elements discussed in this chapter include: the research design employed, the population of interest and sampling technique used.

3.2 Research design

A research design is the structure outline or plan that is used to generate answers to research questions (Njeru & Orodho, 2003). According to Hall and Lavrakas (2008) a research design is a general plan or style for conducting research study to study specific testable research questions of interest. This study utilized the descriptive research design and employed a cross-sectional research method. The design was suitable for this study in determining relationship between variables which fitted the proposed study that aimed to determine relationship between variables.

3.3 Target Population and Sampling Frame

Target Population can be defined as the population of interest to the researcher. According to Kothari (2004), a population refers to all items in any field of investigation and is also known as the “universe of the researcher”. The target population consisted of public irrigation schemes in Kenya managed by the national irrigation board and benefited from the Economic stimulus program from the GOK. According to Mugenda and Mugenda (2003) a population is a set of objects possessing at least one set of features. The study targeted 3,295 farmers who are registered under Tana irrigation scheme and Bura irrigation scheme (NIB, 2016)

Lohr (2010) defined a sampling frame as the source material from which a sample is drawn. A sampling frame is a list of population from which a sample is drawn (Ormrod&Leedy 2005). It is a published list or a set of directions for identifying a population (Gall & Borg, 2007). It is also known as “Source list” from which sample is to be drawn (Kothari, 2004). It contains the names of all items of a universe (in case of finite universe only).

Table 2: Public irrigation Schemes

Irrigation scheme	Management	Level of the Scheme	Number of Households	ESP financing
GalanaKulalu Irrigation Scheme	NIB under transition to ADC	Under production (5,000 Acres) Targeted (1,000,000)	Government	YES
Mwea Irrigation scheme	Farmers organizations	Under production (26,000 acres)	7,082	NO
Bura irrigation scheme	NIB	Under Production (3,000 acres) Rehabilitation, (15% complete)	2,245	YES
Tana irrigation scheme	NIB and Farmers organizations	Under Production (5,350 acres)	1,050	YES
Perkkera irrigation scheme	Farmers organizations	Under Production (2,500 acres)	789	NO
Ahero irrigation scheme	Farmers organizations	Under production (1,740 acres)	2,000	YES
Bunyula irrigation scheme	Farmers organizations	Under production (1,734 acres)	1,400	NO

West Kano irrigation scheme.	Farmers organizations	Under production (900 acres)	887	NO

www.nib.or.ke 2016

3.4 Sample and sampling procedure

Sampling is a process of selecting a fraction of a population that will represent the entire population and will aid in getting information regarding the phenomenon of interest. It is a subsection of the population which participates in a study. Kothari (2004) describes a sample as a collection of units chosen from the universe of the researcher to represent it. Zikmund, Babin, Carr, and Griffin (2010) defines sampling as the selection of individuals from a population to yield some knowledge about the entire population, particularly for making predictions founded on statistical understanding. Mugenda and Mugenda(2003) indicate that a sample of between 10 – 30 % of the target population is considered adequate. The study employed a two-stage sampling technique. The first sample stage involved sampling irrigation schemes of interest (Cluster) and the second stage involved sampling the farmers within the sampled irrigation schemes. Of the eight-public irrigation scheme two irrigation schemes were picked. One cluster had 1,050 farmers (Tana Irrigation Scheme) and the other cluster had 2,245 farmers (Bura Irrigation scheme) (NIB, 2016). The researcher employed Yamane formula 1967 (Israel, 1992) to determine the sample size at a precision level of 5%

Yamane Formula

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

Where n is the sample size

N is the population

e is the precision level

Table 3: Sample Size

Irrigation Scheme	Population	Sample Size
Tana Irrigation Scheme	1,050	290
Bura Irrigation Scheme	2,245	340
TOTAL	3,295	630

Source: Author, 2018.

3.5Data Collection

Data collection is an organised way of gathering data which is relevant to the research questions (Arksey and O'Malley, 2005). Data was collected using questionnaires from the farmers of the two irrigation schemes. The questionnaire used Close ended questions that utilized a Likert scale of 1 to 5 where 1 represented Strongly Disagree, 2 represented Disagree, 3 represented Neutral, 4 represented Agree and 5 meant Strongly Agree. The Likert scale was preferred in scaling responses from participants because it minimized variability of the answers while pre- stipulating a set of response alternatives to intensify response rate (Jarvenpaa et. al, 2000). To avoid communication barriers amongst the different members of the irrigation schemes the researcher engaged researcher assistants that understood the language where the irrigation schemes are based to facilitate better understanding of the questions to the farmers in instances where the participant was not able to fully interpret the questions to ensure respondents fully understood the question for satisfactory feedback.

3.5.1 Validity and reliability of instrument

Validity refers to the degree to which an instrument measures what it is supposed to be measuring (Creswel and Clark 2007). It is imperative for a researcher to test the reliability of the data gathering instrument for the study outcomes to be reliable (Arksey& O'Malley, 2005). This

is about whether one can draw meaningful and useful inferences from scores on the instrument. According to Omrod and Leedy (2005) Reliability is the measure of the degree to which a research instrument yields consistent results on repeated trials. Cooper and Schindler (2008) puts it that scores have to be stable when the instrument is administered a second time. To ensure reliability the researcher administered 10 questionnaires and used split half technique to calculate reliability coefficient which gave a score of 0.9 which upheld the reliability of the instrument.

3.6 Data Analysis

Data analysis refers to the application of reasoning to understand the data that has been gathered with the aim of determining consistent patterns and summarizing the relevant details revealed in the investigation (Zikmundet.al. 2010). The data analysis method used was descriptive statistics. The descriptive statistical tools (SPSS version 21.0 and Excel) aided interpretation of the data. Data collected using the questionnaires was cleaned, coded, entered to and analyzed using the Statistical package for Social Sciences. The study further used regression analysis. Multiple regressions were used to establish the predictive power of independent variables on the performance of irrigation schemes. Regression method was beneficial because it showcased an approximation of the coefficients of the linear equation engaging one or more independent variables.

The analytical model was as below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_i$$

Where

Y is Irrigation Schemes Performance

α constant, showing levels of performance in the absence of Economic Stimulus Program

X_1 is financing

X_2 is increase in the area under irrigation

X_3 is capacity building

ε_i is the regression error term

$\beta_1, \beta_2, \beta_3$ are the coefficient of the independent variables above

The moderated model will include an additional variable as shown below

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_i$$

Y is Irrigation schemes productivity which represents food security.

α constant, showing levels of performance in the absence of Economic Stimulus Program

X_1 is financing

X_2 is increase in the area under irrigation

X_3 is capacity building

ε_i is the regression error term

$\beta_1, \beta_2, \beta_3$ are the coefficient of the independent variables above

β_4 Political influence coefficient.

The data collected was subjected to assumptions of regression analysis: Normality, Homoscedasticity Linearity as well as Multicollinearity.

3.7 Ethics in research

In this study findings by other scholars have been adequately accredited as a basis of the study while being keen on their conclusions to avoid misinterpretation of their results. Similarly, members' participation in filing the questionnaires was voluntary and it was made clear to the participants that the data collected was exclusively for academic research.

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents an analysis of the findings obtained during the data collection. The data is broken down and examined with an aim of answering the research objectives. The chapter highlights the findings on government funding through the ESP, area under irrigation, skills for operation of the irrigation scheme, political interference, and performance of the irrigation scheme. It also presents the response rate and demographic characteristics of the respondents. The findings are presented in different themes as discussed below.

4.2 Response Rate

The study targeted 630 respondents in data collection with regard to determining the effect of economic stimulus program on performance of irrigation schemes in Kenya. Out of the 630 questionnaires issued, 571 were returned out of which 540 only were usable. This gave a successful response rate of 85%. This was commendable given the different locations of the schemes and the distribution of the respondents. According to Mugenda and Mugenda (2003) a 50% response rate is adequate, 60% is good and above 70% is rated very good. Based on these assertions, 85% response rate for this study was very good which enabled the research address the research objectives adequately.

4.3 Demographic Information

The composition of the participants was diverse in various dimensions such as; gender, age and level of education. Of all the participants who participated in data collection, 59.8% were males while 40.2% were females. This shows that the irrigation scheme is largely dominated by the male gender. Majority of the respondents were in (31-35) bracket age accounting for 45.2%. This was followed by (36-40) accounting for 32%, (26-30) constituting 11.5% and (41+) representing

11.3%. This meant that Labour force in the irrigation scheme is largely youthful consistent with the Labour intensive nature of the jobs they do. With regards to level of education, majority of the participants had attained KCSE (46.5%), followed by KCPE (48.9%) and diploma (4.6%). This shows that the respondents were literate and able to participate in the study.

4.5 The Effect of Financing on the Performance of Irrigation Schemes in Kenya

Table 4.1 Effect of Financing on the Performance of irrigation schemes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Our lead time cycles are often affected by cumbersome procurement procedures	540	2.00	4.00	3.8796	.44174
The conditions for getting money apply uniformly in the irrigation scheme	540	1.00	4.00	2.1185	.51040
The ESP has made it easy for the irrigation scheme to acquire necessary inputs for improved productivity i.e. fertilizers and seeds	540	1.00	3.00	2.1000	.38670
Funds disbursed through the ESP have facilitated day to day operations efficiency	540	1.00	4.00	1.6278	.54854
ESP has facilitated financial support on a timely basis to ensure smooth flow of the irrigation scheme cycles	540	1.00	2.00	1.5204	.50005
Through the ESP program the scheme has acquired necessary equipment and machinery for day to day operations	540	1.00	2.00	1.4389	.49671

The GOK funding program has to a great extent covered financial needs in the irrigation scheme	540	1.00	2.00	1.0630	.24312
Valid N (listwise)	540				

Financing had the greatest impact on the performance of irrigation schemes under the Economic Stimulus program. Under financing reduction of cycle times impacted on performance at a mean of 3.89 followed by improvement in the conditions of getting money at 2.11 followed closely by facilitation of quick access to inputs at a mean 2.10. However, financing under Economic stimulus program has not covered fully the needs of the irrigation scheme at a mean of 1.06

4.6 The Effect of increasing area under Irrigation on the Performance of Irrigation Schemes

Table 4.2 Effect of Increasing area under irrigation on performance of Irrigation Schemes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Land tenure issues have been solved adequately	540	2.00	4.00	3.7889	.59984
Currently holdings are adequately scattered with clear demarcation line between and amongst farmers	540	1.00	4.00	3.7741	.63660
The ESP has facilitated increase of the area under irrigation	540	1.00	4.00	2.1630	.42566
Water supply to holdings is sufficient and uniformly distributed	540	1.00	4.00	2.1259	.64385
Farmers benefit from the resources in the scheme in equal measure	540	1.00	5.00	2.0963	.49298
The number of farmers enrolled has increased in the last five years	540	1.00	4.00	1.6759	.60038
Valid N (listwise)	540				

Increasing the area under irrigation showed a positive impact on performance. Land tenure issues improvement contributed positively with a mean of 3.79 followed by scattering of holders at a

mean of 3.78 while facilitation of increase of area under irrigation contributed towards goal achievement with a mean of 2.16.

4.7 Effect of capacity building on the performance of irrigation schemes

Table 4.3 Effect of capacity building on the performance of irrigation schemes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
I have acquired the necessary skills for the day to day activities of the irrigation scheme	540	1.00	5.00	3.9148	.45601
I am able to operate pumps and other machines used on a day to day basis	540	2.00	4.00	3.9111	.40345
I have the capability to identify weak points in the system that can adversely affect productivity at any given time	540	2.00	4.00	3.8148	.53709
The irrigation scheme organizes for trainings regularly to equip farmers on technical issues in managing the irrigation scheme	540	1.00	4.00	2.3519	.64343
The extension officers visit regularly to check and advise on different areas of concern	540	2.00	3.00	2.0926	.29013
I am able to make decisions on my own to better productivity in different cycles without affecting the lead time between different activities	540	1.00	4.00	1.9593	.37822
Valid N (listwise)	540				

Capacity building under the economic stimulus program has been achieved through training in equipping members with skills for day to day operations at a mean of 3.91 followed closely by ensuring members have the capacity to operate pumps and other machines at a mean of 3.91 followed by training members on weak points identification that can adversely affect performance at a mean of 0.381. However, decision making towards performance has not yet been embraced which stood at a mean of 1.96.

4.8 Effect of Political factor on the performance of irrigation schemes.

Table 4.4 Effect of political factor on the performance of irrigation schemes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Resources are distributed to farmers equally irrespective of the politician one supports	540	2.00	4.00	3.9111	.41254
In your opinion do politicians influence appointment of farmers who participate in meetings concerning the scheme	540	1.00	3.00	2.0093	.17735
In your opinion do politicians determine the appointment of leaders in the irrigation scheme	540	2.00	2.00	2.0000	.00000
In your opinion do politicians sway the overall criteria by which funds are disbursed to the farmers	540	2.00	2.00	2.0000	.00000
In your opinion do politicians choose trainers for the irrigation scheme	540	1.00	2.00	1.9889	.10492
In your opinion do politicians determine the appointment of extension officers in the scheme	540	1.00	2.00	1.9889	.10492
In your opinion do politicians influence the amount to be used in the irrigation scheme	540	1.00	4.00	1.9370	.32192
Valid N (listwise)	540				

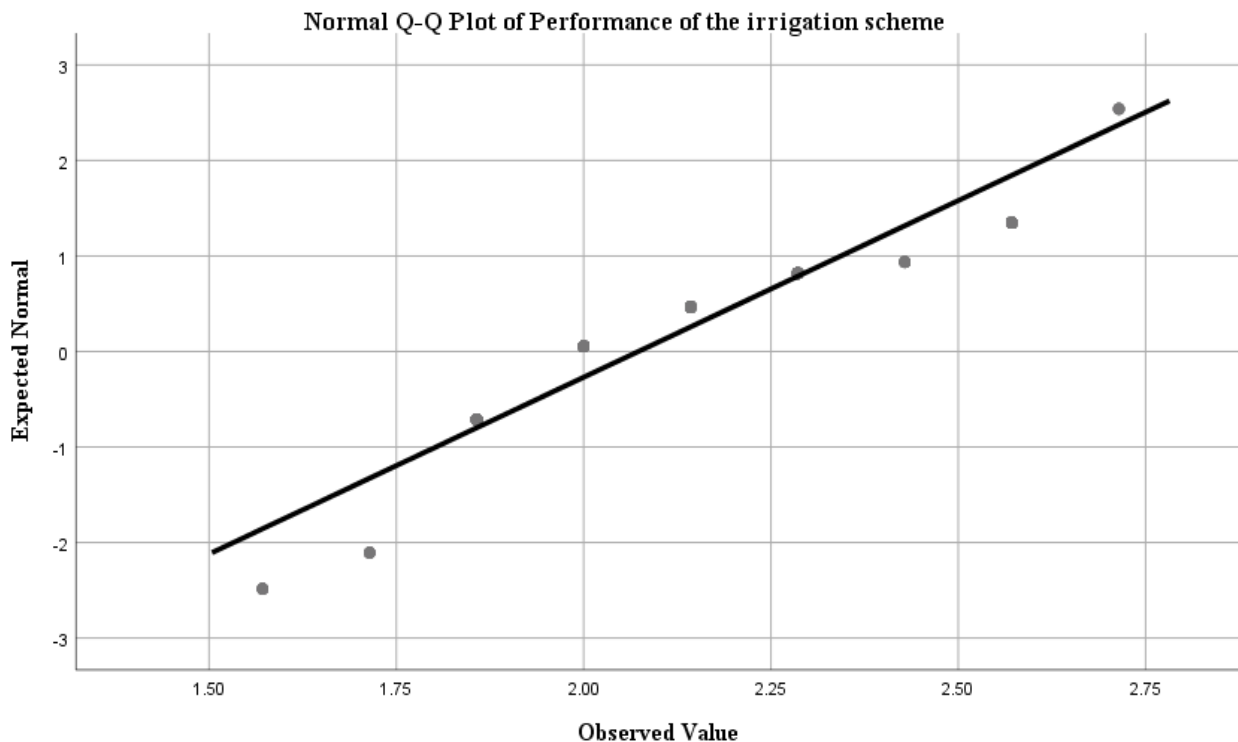
Political factor impacted negatively on the performance of irrigation schemes. The most impactful activities on politics were resource distribution, appointment of farmers who participate in meetings and leaders in the irrigation schemes at means of 3.91, 2.0 and 2.0 respectively.

4.9 Regression analysis

The data was subjected to assumptions of regression discussed below with no major violations observed

Normality Test: An assessment of the normality of data is a prerequisite for any statistical tests because normal data is an underlying assumption in statistical tests. This study used graphical normality test method to test for the normality of the sample data. A visual inspection of the normal Q-Q Plot showed that the points plotted fall approximately on a straight line which satisfied the normality assumption of linear regression.

Figure 4.1 Normal Q-Q Plot

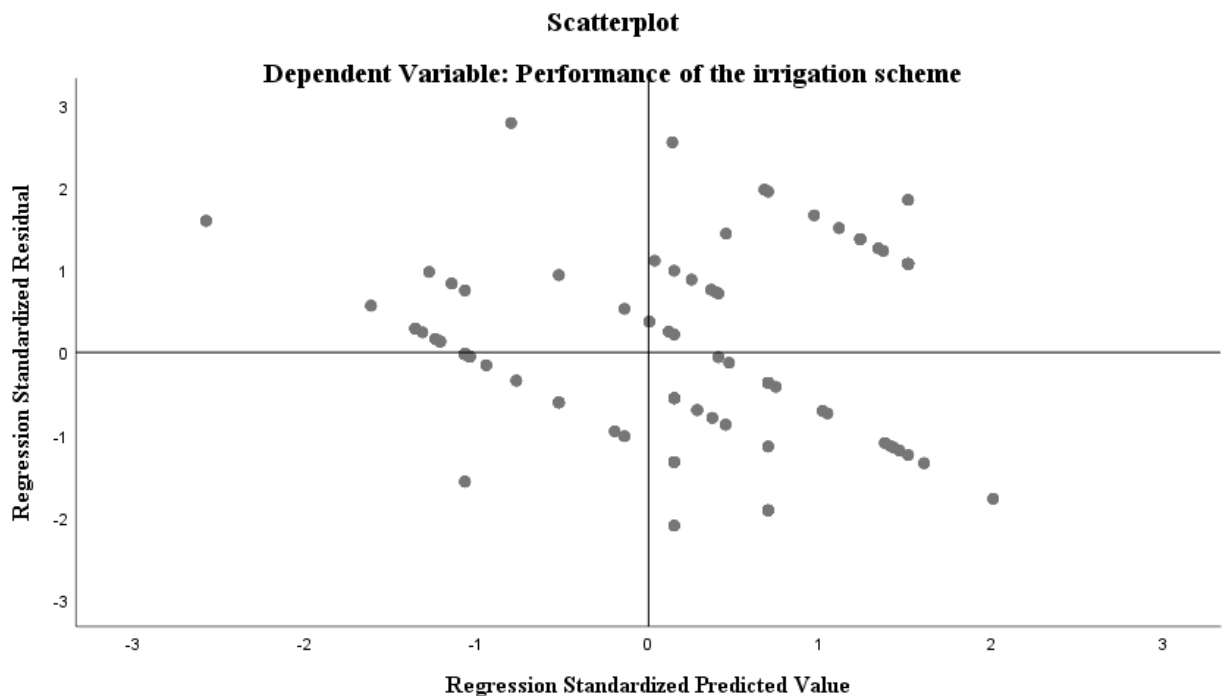


Source: Author, 2018.

Homoscedasticity&Linearity: The assumption of homoscedasticity and linearity are central to linear regression models. Homoscedasticity means that the variance around the regression line is the same for all values of the predictor/independent variables. Linearity on the other hand

refers to the linear relationship between the outcome variable and the independent variables. This study used a scatter plot to examine homoscedasticity and linearity of the data. A visual examination of the scatter plot below shows that residuals are randomly scattered providing a relatively even distribution. This implies that the linearity and homoscedasticity assumptions are not violated by the data. The scatter plot also shows that most of the standardized residuals fall within ± 3 , which further supports the normality assumption.

Figure4.2: Scatterplot



Source: Author, 2018.

The descending straight lines pattern is because our dependent variable only holds values 1 through 5. Therefore, each predicted value and its residual always add up to 1, 2 and so on.

Multicollinearity: A limitation of logistic regression is that it is sensitive to variables that have very high correlations with each other. Variables that are highly collinear often produce very

large standard errors and inflated regression estimates. Therefore, the collinearity between the independent variables in the model had to be observed. A standard procedure that allows for this is the calculation of tolerance for each variable. The tolerance statistic is the calculation of the variance of each of the independent variables in the model not explained by all of the other independent variables in the model. A higher tolerance value suggests low levels of collinearity. Menard (2010) suggests that a tolerance of less than 0.2 is alarming. From the results in Table 4.8, none of the tolerance values is less than the threshold of 0.2, an indication that the multicollinearity assumption is not violated by the data.

The study tested the research hypothesis below

H₀₁ Financing of irrigation schemes has no significant effect on performance

H₀₂ Increasing area under irrigation has no significant effect on the performance of irrigation scheme.

H₀₃ Capacity building has no significant effect on the performance of irrigation schemes

H₀₄ Political influence does not significantly influence the relationship between Economic Stimulus Program and performance of irrigation schemes.

The research hypothesis were taken bases on the analytical model below

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$$

Resulting from the multiple regression analysis the following tables were generated: ANOVA, Model Summary and coefficients table

Table 4.5: ANOVA

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	21.198	4	5.299	156.053	.000 ^b
	Residual	18.168	535	.034		
	Total	39.366	539			

a. Dependent Variable: Performance of the irrigation scheme

b. Predictors: (Constant), Political interference , Government funding through Economic Stimulus Program, Skills for operation of the irrigation scheme, Area under irrigation

Source: Author, 2018.

This study intended to establish the combined effect of four key variables (government funding through the ESP, area under irrigation, skills for operation of the irrigation scheme and political interference) on performance of the irrigation scheme in Kenya. Table 4.5 above shows the sig value = 0.000, hence the model predicted by Economic Stimulus program was significant in predicting changes in performance of the irrigation schemes.

Table 4.6: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.734 ^a	.538	.535	.18428
<i>a. Predictors: (Constant), Political interference , Government funding through Economic Stimulus Program, Skills for operation of the irrigation scheme, Area under irrigation</i>				

Source: Author, 2018.

The results of regression analysis in Table 4.6 indicated significant influences of the four predictor variables on the performance of irrigation schemes in Kenya. The coefficient of determination (R-squared) of 0.538 shows that 53.8% of the total variations in performance of irrigation schemes can be explained by the four predictor variables in this study that is (government funding through the ESP, area under irrigation, skills for operation of the irrigation scheme and political interference). The adjusted R-squared of 0.535 indicates that the four predictor variables in the absence of the constant value explain the change in performance of irrigation schemes by 53.5%. The remaining percentage (46.5%) is explained by the factors excluded in the multiple regression model under investigation in this study. The standard error of estimate (0.18428) shows the average deviation of the independent variables from the line of best fit.

Table 4.7: Regression Coefficients

Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.224	.240		.933	.351		
	Government funding through Economic Stimulus Program	.759	.041	.596	18.406	.000	.822	1.216
	Area under irrigation	.147	.033	.165	4.396	.000	.616	1.624
	Skills for operation of the irrigation scheme	.172	.041	.139	4.160	.000	.778	1.286
	Political interference	-.240	.095	-.084	-2.528	.012	.781	1.281

a. Dependent Variable: Performance of the irrigation scheme

Source: Author, 2018.

The multiple regression's results in Table 4.7 indicates that all the four predictor variables influencing performance of irrigation schemes under investigation in this study that is government funding through ESP (X1: $\beta_1 = 0.759$, $P < 0.001$), area under irrigation (X2: $\beta_2 = 0.147$, $P < 0.001$) and skills for operation of the irrigation scheme (X3: $\beta_3 = 0.172$, $P < 0.001$) are significant and positively influences the performance of irrigation schemes in Kenya. However, the influence of political interference in a combined relationship was found to be statistically insignificant. The constant in this model (β_0) is positively and significantly related to performance of the irrigation scheme ($\beta_0 = 0.224$, $P < 0.001$)

The value of the constant ($\beta_0 = 0.224$, $P < 0.001$) indicates that performance of irrigation schemes in Kenya will always exist at a certain minimum even without the four predictor variables under investigation in this study. The coefficient of X1 that is ($\beta_1 = 0.759$, $P < 0.001$) indicates that a unit increase in government funding through ESP index leads to an increase in performance of irrigation scheme's index by 0.759 which is statistically significant ($P < 0.001$).

Similarly, the coefficient of X2 ($\beta_2 = 0.147$, $P < 0.001$) shows that a unit increase in area under irrigation index leads to an increase in irrigation scheme's performance index by 0.147 which is also statistically significant ($P < 0.001$). Lastly the coefficient of X3 ($\beta_3 = 0.172$, $P < 0.001$) indicates that a unit increase in skills for operation of the irrigation scheme index leads to an increase in irrigation's scheme performance index by 0.172 which is statistically significant ($P < 0.001$). The influence of political interference in a combined relationship was found to be statistically insignificant.

In summary, it therefore follows that, this study found statistical and significant evidence that the government funding through the ESP, area under irrigation, skills for operation of the irrigation scheme impact positively and significantly influences the performance of irrigation schemes in Kenya.

4.8 Correlation Analysis

The results in Table 4.8 given by the Spearman's Rho (R) and its corresponding P-value show the coefficient of determination of relationship between dependent variable and independent variables as well as coefficient of determination of relationship among the independent variables.

Table 4.8: Correlation Analysis

Correlations`						
		Performance of the irrigation scheme	Government funding through Economic Stimulus Program	Area under irrigation	Skills for operation of the irrigation scheme	Political interference
Performance of the irrigation scheme	Correlation Coefficient	1.000				
	Sig. (2-tailed)	.				
Government funding through Economic Stimulus Program	Correlation Coefficient	.747**	1.000			
	Sig. (2-tailed)	.000	.			
Area under irrigation	Correlation Coefficient	.629**	.622**	1.000		
	Sig. (2-tailed)	.000	.000	.		
Skills for operation of the irrigation scheme	Correlation Coefficient	.526**	.448**	.509**	1.000	
	Sig. (2-tailed)	.000	.000	.000	.	
Political interference	Correlation Coefficient	-.103*	-.029	.240**	-.027	1.000
	Sig. (2-tailed)	.017	.499	.000	.534	.
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Source: Author, 2018.

4.9 Government funding through Economic Stimulus Program

The study established that government funding through ESP has a positive and significant influence on the performance of irrigation schemes ($r = 0.747^{**}$, $P = 0.000$). The research findings were in agreement with literature reviewed where; Wade (1976) found out that financial capital adequacy, resource allocation/adequacy affect the performance of public irrigation projects in Kenya. This is also in line with Keynesian theory that advocated for increase in expenditure to boost aggregate demand. This implies that as the irrigations schemes get government funding, there is a significant positive change in the performance of the irrigation scheme.

4.10 Area under irrigation

The study sought to examine the extent to which ESP has affected the area under irrigation and the subsequent effect on performance of irrigation schemes in Kenya. The study found a positive and significant relationship of area under irrigation on the performance of irrigation schemes in Kenya ($r = 0.629^{**}$, $p = 0.000$). This is in line with the theory of constraints that emphasized on the importance of reducing the limiting factor to an extent that it no longer stands in the way to achievement of goals and objectives. This implies that ESP has positively impacted the area under irrigation and land tenure security which has had a positive impact on the performance of irrigation schemes in Kenya under the Economic Stimulus Program.

4.11 Skills for operation of the irrigation scheme

With regard to skills for operation of the irrigation scheme, the bivariate correlations analysis established that there is a positive and significant influence of skills for operation of the irrigation scheme on performance of irrigation schemes in Kenya ($r = 0.526^{**}$, $P = 0.000$). The literature identified skills for operation as one of the key factors positively influencing performance of irrigation schemes. The findings of this study support this observation. This is

anchored by the human capital theory that emphasized on capacity building for effective performance

4.12 Political interference on the performance of irrigation schemes

This study failed to find any significant influence of political interference on the performance of irrigation schemes in Kenya ($r = -0.103$, $P = 0.017$). However, political interference impacted on the performance of the irrigation schemes negatively.

The findings in this study found that compared to the other three variables influencing performance of irrigation schemes in Kenya, government funding has significant influence on performance of irrigation schemes. Area under irrigation and skills for operation of the irrigation scheme come second and third respectively.

The analysis gave the below fitted model:

$$Y = 0.224 + 0.759X_1 + 0.147X_2 + 0.172X_3 - 0.240X_4$$

Y is Irrigation schemes performance

0.224 constant, showing levels of performance in the absence of Economic Stimulus Program

X_1 is financing

X_2 is increase in the area under irrigation

X_3 is capacity building

X_4 is political interference

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter concludes the discussion made in this report and presents a number of propositions which should be implemented to ensure optimum gain from the Economic Stimulus Program.

5.2 Summary

As already discussed, agriculture remains a key pillar in Kenya's economic growth by enhancing food security, creating employment opportunities and improving nutritional status of the general populace. Irrigation has become essential to agricultural production since it enhances productivity and is not rain dependent. The Government of Kenya therefore adopted Economic Stimulus Program to boost economic growth and one of the key areas that was targeted by this program is agricultural sector food component that addressed the need to embrace irrigation rather than dependence on rain feed agriculture. The study sought to determine the effect of funding through the ESP, area under irrigation, skills for operation of the irrigation scheme, political interference on the performance of irrigation schemes in Kenya.

5.3 Economic Stimulus Program and the performance of Irrigation Schemes in Kenya

The initial specific objective in this study was to determine the effect of Economic Stimulus Program on the performance of Irrigation Schemes in Kenya. The study established the existence of a significant positive relationship ($p\text{-value} = 0.000$, $\beta_1 = 0.759$) between Financing and performance of public irrigation schemes in Kenya. The relationship between financing and performance was informed to a great extent by the following variables: Lead time cycles that affect procurement procedures (Mean score = 3.87) this was followed by conditions of getting money and ease of acquiring necessary inputs with a mean score of = 2.1. These results were

consistent with Backeberg (2006) who noted that financing was of paramount importance in ensuring the success of any project.

5.4 Conclusions

The study found out that government funding through ESP positively and greatly affects the performance of irrigation schemes in Kenya. It was observed that the uniformity of the conditions for getting money greatly affects the performance of irrigation schemes. The participants also indicated that through the ESP, the schemes have acquired necessary equipment and machinery for day to day operations which has greatly impacted on their performance. The study again deduced that ESP has made it easy for the irrigation schemes to acquire necessary inputs for improved productivity and that positively affects the performance of the schemes. The respondents also indicated that ESP has facilitated financial support on a timely basis to ensure smooth flow of the irrigation scheme cycles.

The study deduced that ESP has facilitated increase of the area under irrigation which has greatly improved the performance of the irrigation schemes in Kenya. The study found that the number of farmers enrolled had increased due to ESP which has in turn led to increased productivity in the schemes. Respondents also indicated that land tenure issues have been solved adequately and that has encouraged farmers to invest more in the schemes leading to increased productivity. The study further deduced that water supply to holdings is relatively sufficient and uniformly distributed thus positively affecting performance of the irrigation schemes.

The participants indicated that politicians sway the overall criteria by which funds are disbursed to the farmers and also determine the appointment of leaders in the irrigation scheme which negatively affects the performance of irrigation schemes.

5.5 Recommendations

The study has shown that Economic Stimulus Program has had a positive effect on the performance of irrigations schemes in Kenya. While embracing these gains, it is important to put measures in place to avert the inefficiencies that have been experienced and achieve full potential of the program. As aforementioned, this study proposes several measures that should be given priority; they include;

The study recommends that the government should formulate policy on irrigation and technology that is supportive to the development and growth of small scale dry-land farming. The policy should provide incentives that promote small scale dry-land farming establishments. These would include access to the market, access to credit, transport and the general provision of the required infrastructural facilities that could help in enhancing sustainable irrigation of small scale dry-land farming in most of the arid and semi-arid lands. Secondly, the study recommends adoption of measures which will arrest the cost related factors. The study also recommends that the adoption of modern technology of irrigation such as drip and sprinkler irrigation system that increases water use efficiency. This will eventually improve the performance of schemes as well as enhancing the work efficiency.

5.6 Recommendations for future study.

The researcher recommends a study on both private and public irrigation schemes for comparison and benchmarking to identify weak points in the two categories of schemes that would be maximized to increase efficiency that would positively impact on the productivity of irrigation schemes.

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APPENDIX I

QUESTIONNAIRE

Instructions

Please fill the empty spaces or tick (✓) where applicable

SECTION A: Demographic Information

1. Please indicate your gender. ☐ Male ☐ Female
2. What is your highest level of education? ☐ Masters & Above ☐ Degree ☐ Diploma
☐ K.C.S.E ☐ K.C.P. E ☐ Other
3. What is your age bracket ☐ 25 Year and below
26 – 30 Years ☐
☐ 31 – 35 Years
☐ 36 – 40 Years
☐ 41 years and above
4. How long have you been a member of the irrigation scheme?
☐ 0 – 5 years ☐ 6 – 10 Years ☐ Over 10 Years

SECTION B: Government funding through the Economic Stimulus Program

Please indicate your level of agreement using the below key

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree 5- Strongly Agree

		1	2	3	4	5
5	The GOK funding program has to a great extent covered financial needs in the irrigation scheme					
6	The conditions for getting money apply uniformly in the irrigation scheme					
7	Through the ESP program the scheme has acquired necessary equipment and machinery for day to day operations					

8	The ESP has made it easy for the irrigation scheme to acquire necessary inputs for improved productivity i.e. fertilizers and seeds					
9	ESP has facilitated financial support on a timely basis to ensure smooth flow of the irrigation scheme cycles					
10	Funds disbursed through the ESP have facilitated day to day operations efficiency					
11	Our lead time cycles are often affected by cumbersome procurement procedures					

SECTION C: Area under irrigation

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree 5- Strongly Agree

		1	2	3	4	5
12	The ESP has facilitated increase of the area under irrigation					
13	The number of farmers enrolled has increased in the last five years					
14	Land tenure issues have been solved adequately					
15	Currently holdings are adequately scattered with clear demarcation line between and amongst farmers					
16	Water supply to holdings is sufficient and uniformly distributed					
17	Farmers benefit from the resources in the scheme in equal measure					

SECTION D: Skills for operation of the irrigation scheme

Please indicate your level of agreement using the below key

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree 5- Strongly Agree

		1	2	3	4	5
18	I have acquired the necessary skills for the day to day activities of the irrigation scheme					
19	The irrigation scheme organizes for trainings regularly to equip farmers on technical issues in managing the irrigation scheme					
20	The extension officers visit regularly to check and advise on different areas of concern					
21	I am able to operate pumps and other machines used on a day to day basis					
22	I have the capability to identify weak points in the system that can adversely affect productivity at any given time					
23	I am able to make decisions on my own to better productivity in different cycles without affecting the lead time between different activities					

SECTION E: Political interference

		1	2	3	4	5
24	In your opinion do politicians sway the overall criteria by which funds are disbursed to the farmers					
25	In your opinion do politicians determine the appointment of leaders in the irrigation scheme					
26	Resources are distributed to farmers equally irrespective of the politician one supports					
27	In your opinion do politicians influence the amount to be used in the irrigation scheme					

28	In your opinion do politicians influence appointment of farmers who participate in meetings concerning the scheme					
29	In your opinion do politicians determine the appointment of extension officers in the scheme					
30	In your opinion do politicians choose trainers for the irrigation scheme					

SECTION F: Performance of the irrigation scheme

		1	2	3	4	5
31	Productivity per acre has improved significantly over the last five (5) years.					
32	The scheme organizes for adequate storage facilities after harvesting which has reduced loss					
33	Production cost per acre has gone down in the last five (5) years.					
34	Planting cycles per year have increased in the last five (5) years					
35	In the last five years (5) the scheme has produced sufficient quantity to meet output target.					
36	Produce of the last five years has been free from disease which has proved safe and healthy for human consumption					
37	For the last five (5) years produce processing, storage, packaging and transportation have been carried out without fail.					