

**DETERMINANTS OF FISH FARMING PROJECTS
PRODUCTION IN LURAMBI CONSTITUENCY,
KAKAMEGA COUNTY, KENYA.**

UNIVERSITY OF NAIROBI
KIKUYU LIBRARY
P. O. Box 30197
NAIROBI


BY
ADERO DOROTHY ADOYO

**A PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENT FOR THE AWARD OF DEGREE OF MASTERS
OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE
UNIVERSITY OF NAIROBI.**

2012

DECLARATION

This project report is my original work and has not been presented for any award in any other University.

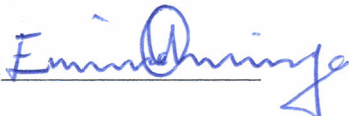
Sign 

Date 31-7-2012

Adero Dorothy Adoyo.

Registration number: L50/64999/2010.

This project report has been submitted for examination with our approval as University Supervisors.

Sign 

Date 6-8-2012

 Mr. John Mbugua

Lecturer,

Department of extra mural studies

University of Nairobi.

DEDICATION

I dedicate this study to my father Mr. Adero Nyamburi who encouraged me a lot to pursue this Course. My children Flavian and Fiona who gave me time and missed their Motherly care when I was undertaking this study. My husband Joseph Obiero who had to look for something to do over the weekend while I was away all my weekends. Lastly my housegirl Jackline Kemunto for assisting me with house chores while I was busy.

I wish them well; all I did was not in vain.

AKNOWLEDGEMENT

I appreciate the effort made by my teacher and parents who supported me in my education. My sincere thanks go to all lecturers who equipped me with the knowledge and skills to carry out this research. They include: Prof. William Toili, Dr. Raphael Njonje, Dr. Owano Alice, Dr. Stephen Luketero, Dr. Paul Odundo, and Mr. John Mbugua who took us through the procedures of a research proposal all of the University of Nairobi.

I acknowledge my father, Mr. Adero Nyamburi, My mother the late Hellen Adero who provided for basic education and all along encouraged me to do Masters Course before I am thirty years of age. My uncle Peter Owade who supported me in my undergraduate degree.

I thank my family members who gave me moral support during course. My staff mates especially Madam Weswa who encouraged me a lot, the Principle Mr. Oliver Minishi for the co-operation and encouragement. My colleagues in Business Studies and Geography Departments who supervised and administered exams to my students, while I was undertaking my exams.

My sincere gratitude also goes to World View Computer Options (Clare, Sarah & Zaitun) who provided typing, printing, Photocopying and West Fm for internet Services that contributed immensely to the production of this Project report.

Lastly I acknowledge the University of Nairobi for giving me opportunity to pursue this course of Project Planning and Management

TABLE OF CONTENT

DECLARATION.....	ii
DEDICATION	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS.....	v
LIST OF FIGURES.....	viii
LIST OF TABLES.....	ix
ABBREVIATION AND ACRONYMS	x
ABSTRACT	xi
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the study.....	1
1.2 Statement of the problem.....	4
1.3 Purpose of the study.....	6
1.4 Objectives of the study	6
1.5 Research questions.....	7
1.6 Significance of the study.....	7
1.7 Delimitations of the Study.....	9
1.8 Limitation of the study.....	9
1.9 Basic assumption of the study	10
1.10 Définition of significant terms of the study.....	10
1.11 Organization of the study	11
CHAPTER TWO: LITERATURE REVIEW	13
2.1 Introduction.....	13
2.2 Global Perspective on production performance of fish farming enterprises	13
2.3 Standards for sustainable Aquaculture	17
2.4 Technical support and production performance of fish farming enterprises.....	23
2.5 Cultured species on production performance of fish farming enterprises.....	27

2.6 Educational level and training skills on production performance	31
2.7 Financial management and production performance of fish farming enterprises	32
2.8 Theoretical framework	34
2.9 Conceptual framework.....	35
2.10 Summary of Literature review.....	36
CHAPTER THREE: RESEARCH METHODOLOGY	38
3.1 Introduction	38
3.2 Research design	38
3.3 Target population.....	38
3.4 Sample size and sampling procedures	39
3.5 Research Instruments	40
3.5.1 Pilot testing	41
3.5.2 Validity of data collection Instrument	41
3.5.3 Reliability of data collection Instrument	42
3.6 Data Collection Procedures.	42
3.7 Techniques of data analysis.....	43
3.8 Operation definition of variables.....	44
CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION RESULTS	47
4.1 Introduction.....	47
4.2 Response Return Rate.....	47
4.3 Demographic characteristics of respondents	48
4.4 Technical support of Fish farming projects on production.....	50
4.5 Financial management of Fish farming projects on production	53
4.6 Cultured species on production	56
4.7 Level of Education and training of fish farmers on production.....	59
4.8 Qualitative data analysis.....	61

CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATION.....	63
5.1 Introduction.....	63
5.2 Summary of findings	63
5.3 Discussion of findings	66
5.4 Conclusions	70
5.5 Recommendations of the study.....	71
5.6 Contribution to knowledge	72
5.7 Suggestions for further studies	73
Reference	74
APPENDICES.....	79
Appendix I: Introduction Letter.....	79
Appendix II: Transmittal Letter.....	80
Appendix III: Farmers Questionnaire.....	81
Appendix IV: Questionnaire for Officers.....	87
Appendix V: Interview Guide	89
Appendix VI: Area of Study.....	90
Appendix VII: Research Authorization.....	91
Appendix VII: Research Permit	92

LIST OF FIGURES

Figure 1: Operation Definition of Variables.....29

LIST OF TABLES

Table 3.1: Study Sample Size.....	40
Table 3.2: Actual Sample Reached.....	40
Table 4.1: Questionnaire Response Rate.....	47
Table 4.1.2: Key informant response rate.....	48
Table 4.2: Demographic Characteristics of respondents	49
Table 4.2.1: Ages of the Respondents	49
Table 4.2.2: Location of Respondents.....	50
Table 4.3: Technical support and fish farming projects on production.....	51
Table 4.3.1: Tools and Equipment provision	51
Table 4.3.2: Level of interaction with officers	52
Table 4.3.3: Seedling Production.....	53
Table 4.3.4: Technical Support against Production – Correlation.....	53
Table 4.4: Farmers that Maintained Records.....	54
Table 4.4.1: Level of Satisfaction of Cash flow	54
Table 4.4.2: Farmers that prepared Budgets.....	55
Table 4.4.3: Financial management against production correlation.....	56
Table 4.4.4: Growth rate of Species Cultured	56
Table 4.4.5: Adaptability of Species Cultured.....	57
Table 4.4.6: Market acceptability of the Species.....	57
Table 4.5: Feeding requirements of the species.....	58
Table 4.5.1: Cultured Species on Production – Correlation	59
Table 4.6: Level of education and training on fish farming	59
Table 4.6.1: Case Summaries of level of Education and Training	60
Table 4.6.2: Level of Education and Training of Fish Farmers against Production.....	60

ABBREVIATIONS AND ACRONYMS

D.F.R	:	District Focus Report
E.D.G	:	European Democratic Group
E.E.Z	:	Exclusive Economic Zones
E.S.P	:	Economic Stimulus Programme
F.A.O	:	Food and agriculture organization
G.A.A	:	Global Aquiculture Alliance
G.D.P	:	Gross Domestic Product
N.G.O	:	Non Governmental Organizations
S.S.A	:	Sub Saharan Africa
W.W.F	:	World Wildlife fund

ABSTRACT

This project report discusses determinants of fish farming projects production in Lurambi Constituency, Kakamega County. The report addresses why very many ponds became dormant after the implementation of the two phases of Economic Stimulus Project. The research methods used descriptive survey research design, the study employed probability sampling techniques that involved the use of stratified and simple random sampling. The target population was 305, 300 pond owners and 5 extension officers. The study used the following research instruments; questionnaires, interview and observations. The instruments addressed both contents and face validity. Reliability was ascertained through testing methods. The study analyzed data using frequency and percentages and also employed SPSS (X) Professional for further statistical analysis and to find correlations between the variable and production. The findings of the study were that Technical Support, Financial Management, Cultured Species and level of education and training on fish farming are key factors to put into consideration before starting projects such as fish farming. The study further found that majority of farmers were not aware of technical support that they should receive from Extension Officers since they had passive interaction with them. Therefore lack of information affected many pond operators. The funds that were also received by the Fisheries Department for carrying out the project was inadequate and that budgeting was very important to farmers. The study also revealed the cultured species least contributed to the project production as most species were adaptable and had wide market acceptability; the only important thing was feeding a requirement which was found to be complex and expensive. Based on the findings of the research, level of education and training on fish farming, financial management and technical support are highly correlated with production. Irrespective of the level of education all farmers needed training of fish farming. The study therefore recommended that there is need to train the front line extension workers to provide effective extension services, there is need to revitalize credit schemes to cater for credit facilities to farmers, there is need to breed cat fish and tilapia together to avoid too much multiplication which make feeding requirements difficult, its contribution to knowledge is that age and time is an important factor in management of this projects.

UNIVERSITY OF NAIROBI
KIKUYU LIBRARY
P. O. Box 30197
NAIROBI

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Aquaculture was first practiced in Egypt and China more than 4000 years ago. However it was relatively new in other parts of the world. It began in the USA during the 19th century and first reached commercial success later in 1960s and 1970s and was one of the fastest growing segments of USA and global economies with a growth moving at wide at a rate of 6.5% per year. Aquaculture provided the world with about 53 million tons of fish each year and over seven per cent of the animal protein people consumed. It included carp, Tilapia

(a freshwater fish found in Africa), Pangasius (a Mekong Delta catfish), Atlantic Salmon, other true fish, mollusks (e.g. oysters), crustaceans (e.g. shrimp), various other animals (e.g. turtles and frogs), and algae. Sixty per cent of aquaculture productions were from freshwater bodies and the rest was from estuaries or the sea.

Aquaculture is an important and growing source of protein for many developing nations and a substitute for wild-caught fish whose harvests had been unsustainable to the detriment of consumers relying on production and the species and ecosystems affected. Fish, both aquaculture and wild-caught, were particularly important in low-income food deficit countries whose overall consumption of animal protein was comparatively low, but whose share of fish in animal protein consumed was high (20 per cent or more). Two priorities were critical to advancing aquaculture as a global public good: investment in Africa to expand its reach and ensuring that aquaculture was environmentally and globally sustainable.

Asia supplies 89 per cent of global aquaculture production (China provides 62 per cent of the total) and employed 94 per cent of the world's fish farmers. In contrast, Africa produced just two per cent of global aquaculture and employed one per cent of global fish farmers. We were not sure of the reason that explained this dramatic difference. Wet, tropical sub-Saharan Africa could support many more inland aquaculture facilities, and Tilapia, an African native, was one obvious choice for production. In principle aquaculture could not only feed people but also reduced unsustainable inland wild-fish harvest and the killing of monkeys and other "bush meat" animals that threatened survival of the species hunted and introduced diseases to humans. Northern Africa was drier and inland aquaculture facilities were limited by the need for sustainable sources of freshwater, but facilities on the coast would readily support saltwater aquaculture. Food-challenged Somalia, for example, had the longest coastline in Africa and could support shrimp farms.

Expanding aquaculture in Africa was not a new idea. The World Bank and national development agencies have studied its potential and generally been positive.

Furthermore, although aquaculture was limited, small-scale inland wild-capture fisheries was well developed in Africa and employ over four million women and men whose expertise would contribute to aquaculture development. Prospective public and private investors would carefully evaluate specific markets, governance, and other factors relevant to financially sustainable operations, but the apparent market and clear value for Africans calls for progress.

As for the Kenyan case the fishery sector provided food, employment and incomes to a large population and earned the country over 5 million annually. Kenya's annual

fish production of 150000 metric tones valued at approximately 8 million at ex vessel price. These earnings were set to increase if the under exploited areas like aquaculture and the exclusive economics zones were fully exploited. The country was faced with a growing fish supply gap as catches from captures fisheries decline against an increasing population. The per capita fish consumption in Kenya was 3.8 kg which was fairly low compared to the average global per capita consumption of 17.1 kg/per person, per year.

The countries potential for aquaculture stands at 1.4 million hectares, capable of providing 1.1 million tones of fish worth 50 billion. This potential had not been realized due to various challenges. Fish farming had become a key segment, fish globally as an alternative to captures fisheries. UNCLOS (1982), UN fish stock agreement (1988) recognizes the changes in the fisheries industries such as emerging issues and challenges brought about by climate change and new regulation governing fisheries markets at local, regional and international levels. It introduced legislation for aquaculture development sub sector and also recognized the role of community participation in fisheries management.

During the year 2009/2010 fiscal year the government of Kenya allocated 1.12 billion to support fish farming enterprise productivity program under the economic stimulus program during which about 28000 fish ponds were to be constructed in 140 constituencies across the country. This was designed particularly for the youthful Kenyan fish farmers to start participating and practicing viable aquaculture enterprise for food production as well as job and wealth creation. The government did not properly enhance aquaculture extension systems neither did they do human resource

capacity building allowing for networking and community participation amongst fish farmers before the projects initiation.

The study sought to establish the factors that contribute to production performance of the already started fish farms in Kakamega County, Lurambi Constituency.

According to the Fisheries Development Ministry Permanent Secretary Michemi Ntiba the country had the potential of producing 11 million tones of fish worth 750 billion, thus this production had not been fully realized due to a number of factors. There was need to introduce fisheries reforms to enhance the capacity of small medium and micro enterprise among communities practicing fish farming, there was need to enhance fish campaign Kuza, Kula and Kuuza , to teach communities to farm, cook and sell fish.

From the statistics its evident that the government implemented the project by constructing 200 ponds and also went ahead to restock the ponds for farmers .Except for a few who did not meet the requirements but out of which its evident that only a few ponds harvested this shows that there was a problem with the fish farmers. The study concentrated only in Lurambi constituency, Kakamega County.

Phase I and Phase II have all showed tremendous decline in production performance by the fish farmers.

1.2 Statement of the problem

Fish farming in Kenya is an important fisheries subsector that has potential to significantly contribute to food security, poverty reduction, employment creation and

reduction of pressure on capture fisheries. It is an enterprise that could be integrated into small holder farming systems.

According to the District focus progress report (D.F.R) of 2011 Lurambi ,constituency had 200 ponds constructed out of which 200 ponds were stocked but only 98 were harvested, The estimated value of Kgs to be harvested were 60,600 but only 16,882kgs was harvested in the first phase. During the second phase of the implementation of this project 100 ponds were constructed but only 6 ponds were harvested which yielded only 1490Kgs similarly Ikolomani which is a neighbouring constituency had 200 ponds stocked and only 58 were harvested. The research concentrated only in Lurambi constituency, Kakamega County.

According to the Ministry of Fisheries Department Uvuvi newsletter (Issue No.2 June 2011) the countries potential for aquaculture stood at 1.4 million hectares , capable of providing 1.1 million tons of fish worth 50 million .This potential had not been realized due to various challenges. Because of this realization many initiatives had been put in place to tap this potential. Some of the initiatives focused on training the farmers while others on providing technical support.

Technical support was among important aspect of business projects such as of these (ESP) projects. The availability of information, tools and equipment was very important for fish farmers. Many policy makers wanted the ponds constructed in their areas, while these areas lacked suitability.

Education plays an important role in the know- how. Those who do not possess formal training must have some basic level of business knowledge and financial management training for the sake of business knowledge. They would not be ensuring

their performance rather they would be exposed to some failure in future on the other hand, government policies play a role in the projects initiated. Knowing the species to culture was very important, their growth rate, adaptability to the ponds and their dietary requirements. Many farmers were not informed about this. According to the District Focus progress report the number of ponds harvested were only 98 in first phase and only 6 in the second phase of the implementation of ESP out of 200 and 100 which were stocked respectively.

Despite the efforts by government of Kenya and other stakeholders to improve fish farming output, the results have not been encouraging. Several studies indicate that some factors are responsible for this. The factors cited were believed to determine production performance of fish farming enterprise projects in Kakamega County and have not been explored hence the research identified this gap to fill.

The research if adopted would help find out how these factors determine production performance of fish farming enterprises, with a view of making recommendations on how the fishery sub sector can be developed further to improve its performance.

1.3 Purpose of the study

The study sought to establish the determinants of fish farming projects production in Lurambi Constituency, Kakamega County.

1.4 Objectives of the study

- (i) To establish the extent to which technical support determine production of fish farming projects in Lurambi Constituency.

- (ii) To determine the extent to which financial management determine production of fish farming projects in Lurambi Constituency
- (iii) To assess whether the cultured species determine production of fish farming projects in Lurambi Constituencies.
- (iv) To evaluate the extent to which the level of education and training on fish farming determine productions of fish farming projects in Lurambi constituency

1.5 Research questions.

- (i) To what extent does technical support determine production of fish farming projects in Lurambi constituency?
- (ii) To what extent does financial management determine production of fish farming projects in Lurambi Constituency?
- (iii) To what extent does the cultured fish species determine production of fish farming enterprises in Lurambi Constituency?
- (iv) How does the level of education and training on fish farming determine production of fish farming projects in Lurambi constituency?

1.6 Significance of the study

The introduction of fish farming or aquaculture was a major step that the Ministry of Fisheries Development undertook to address the situation of dwindling fish stocks and fish catches in our natural fishing areas particularly in Lake Victoria over time.

The findings of this study would contribute both to practice and to theory. In terms of their contribution to practice, the findings would help the Ministry of Fisheries to find

out ways of improving the production performances of fish farms that were all constructed under the economics stimulus programme. This would go along to ensure the projected foreign exchange is attained, it would also find out what problem the fish farmers have experienced since the implementation of the phase I and Phase II project in the different constituencies which has made the many to pull out from the project as indicated by the statistics in the introductory chapter. This is justified because the growth in demand for fish and its products has led to unprecedented increase in pressure on lakes and this has seen the decline of various stocks like Nile perch from 1.9 million metric tones in 2001 to a merger 544000 metric tones in 2009.

According to the permanent secretary in the Ministry Professor Michemi Ntiba, this was the basis upon which the Cabinet recently approved a memo on status of Nile perch fishing and the situation applies to other species like Tilapia and catfish.

Among the key causes of the decline in fish species included the increased number of fishermen in lake has continued to rise from about 160000 in 2004 to over 200000 men 2009 there had also been increased fishing crafts from some 51592 in 2004 o over 70500 in 2009. He also sited use of illegal nets such as beach which increased from 3653 in 2007 to over 4178 in 2011 similarly globally prohibited monofilament nets rose from 2293 to 21000 over the same period this was the reason why the Ministry of Fisheries development carried out an aquaculture suitability survey in the whole country. Results indicated that the potential area for fish farming was over 1.14 million hectares if this potential was fully utilized the production from aquaculture could be increased to 1.1 million metric tones per annum.

This would increase production value to over 750 billion shillings creating in the long run an industry employing and supporting a substantial number of fish farmers, fish feed manufacturers fish, processors and trade. In terms of the theoretical value of the findings, it would be possible to understand the dynamics of an emerging agricultural industry, particularly the key variables that needed to be strengthened in order to improve food security and social sustainability.

1.7 Delimitation of the Study

The study was delimited to a sample that was only from Lurambi Constituency and not any other constituency in Kakamega County. It was also delimited to the fish farming projects started under the 2009/2010 Economic Stimulus programme.

1.8 Limitation of the study

The research concentrated in Lurambi Constituency of Kakamega County. This was because Kakamega County is very large with very many constituencies therefore time and money constraint could not allow for entire study of the whole Kakamega. Most of the fish farms were in places where roads were impassable during rainy seasons. However the researcher intended to maximize collection of information from fish farmers around the central Kakamega district in order to spend less money and limited time. The researcher intended to counter these limitations by drawing a working schedule to begin with accessible areas.

1.9 Assumption of the Study

The research assumed that the study would establish factors determining production performance of fish farming enterprises in Lurambi Constituency of Kakamega County. The study also assumed that the respondent would provide the necessary information that would guide the research study.

1.10 Definition of significant terms used in the Study

Projects	:	Any activity carried out that is income generating
Production	:	Level of output
Education	:	Usually intended to mean basic instruction in Knowledge and Skills designed to enable people to make the most of life in general; personal and broadly based.
Training	:	Implies preparation for specific occupation or skills its Narrow in conception than education. Its job oriented rather than personal.
Cultured Species	:	Different kinds of fish reared in ponds
Technical support	:	It means any assistance from the officers that lead to improved production.
Cash flow	:	The rate at which money is spent and is received by farmers.
Earnings	:	This is money received by farmers in form of Income

1.11 Organization of the study

Chapter one represents the background of the study, the statement of the problem, the purpose of the study, objectives of the study, the research questions the significance of the study, limitation and delimitation of the study and the definition of significant terms as used in the study.

Chapter two discusses literature review on determinants of productions performance of fish farming enterprises. They include Global perspective of these factors. And the Kenyan view. The determinants reviewed include Technological support or fish farming enterprise financial management and how it affects production performance cultured species and how it influence production performance and the role of education level and training on production performance.

The chapter also discusses studies of other countries such as Japan, Israel and Uganda. Theoretical framework and also conceptual framework and the knowledge gap that the study will fill.

Chapter three discusses studies or Research Methodology which includes Research design, target population, sample size and sampling procedures, data collection procedures data collection Instruments, Reliability and validity of Instruments, Pilot testing and data analysis techniques.

Chapter four presents data presentation, interpretation, analysis and discussion. The analysis is based on objectives of the study. These items include: Demographic

information of the respondents, Technical support and production performance, financial management on production performance. Cultured species and production performance and education level and training on performance.

Chapter five discusses the summary of the findings of the study, basing on the four objectives of the study, conclusion, recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of literature review dealing with secondary information on determinants of production performance of fish farming enterprises from different countries; it includes Global perspective on fish farming a case of Nigeria, case of Ghana and the Kenyan view. Fish farming in Japan, fish farming in Israel and Peruvian Amazon has been reviewed for determinants of production performance technical support objective. Financial management, cultured species of Africa, Uganda Kenya and level of education and training the theoretical frame work and the conceptual frame work.

2.2 Global Perspective of production performance of fish farming enterprises

The value of aquaculture production in the USA exceeds \$1.13 billion per year. Despite the growth of USA aquaculture, the USA trade in fisheries products is now more than \$9 million per year and is still growing. The USA captures and produces less than one third of the \$10billion worth of fisheries products it consumes each year. Cat fish account for majority of aquaculture production in the USA, tilapia and rainbow trout are distant second and third respectively.

The worldwide total earning from aquaculture products, recently surpassed 65million metric tones. China is the world's largest aquaculture producer accounting for 61% of all aquaculture products Japan is a distant second and India is third. Asian species

such as silver carps, grass carp, common carp and tilapia represent by weight the most widely produced fin fish species in the world. Aquaculture currently accounts for more than 50% of all direct consumption by people and will provide more than 50% of all direct and indirect aquatic production by 2015. The per capital consumption of finfish and shellfish in the USA is about 7.2kg per year, a total of 2.2 million metric tones. The worldwide average per capital consumption of finfish is about 17kg per year and much higher in some parts of Asia.

Japanese people demanded greater variety of fishery production of high quality with improved living standard. However, high quality species occur along our homeland and these stocks have decreased because of over fishing and water pollution. Under this condition fish farming became necessary.

In 1962, the Seto Inland fish sea farming fisheries association was established and by 1960, five operation centres were completed and began operations. At the present the tasks of fish farming are expanding but some problems remain. Through co-operative research and fish farming specialists are searching for these solutions to these problems in order to advance operations.

Fish farming in Japan is of two types; Stock requirement type and Artificial control Stock requirement type. In stock requirement type the seedlings are transferred from operation centers or hatcheries to a temporary constructed acclimation facility. This allow for seedling to adapt to environmental conditions of the receiving waters, while protected from the predators. After a period they are released into the natural waters

for growth. The planting sites are determined from the result of scientific investigation and the distribution behavior of natural stocks.

Artificial control type is usually done on small scale, some facilities or mechanical equipment are involved. The first step and are of the key points of fish farming is seedling production. Artificial seedling production techniques have been developed for important species and these techniques are applied in actual farming operation .In order to obtain more successful results of farming, evaluation of suitability of the receiving waters should include biological characteristics of the seedlings. This is the knowledge gap the study intends to fill.

Fish farming in Uganda began to develop in 1953. Rural households accessed cheap protein through subsistence farming following the government privatization. As liberation policy the fishermen sector contribution to gross domestic products had reached six percent in 1999, this increased to 8% in 2001 and has since remained steady at 7-8 % (Isayagi 2009).

Through more recent public and private partnership initiative, fish farmers are being organized into viable groups that are focusing on filling gaps especially the market chain. Accessing quality technical support services and input has been a major challenge for fish farmers in Uganda that has had limited success of fish farming enterprises. Therefore in 2004 there was an urgent need to form fish farmer's forum that could access essential services as input while addressing market and value addition. The key people involved were fish processor mainly from central Western and Eastern parts of Uganda.

In 2004-2008 WAFICOs (forum) did not greatly increase its membership mainly due to lack of technological support (unreliable information and inadequate capital investment to improve their production). Nevertheless there is need to develop marketing strategies for aquaculture development in Uganda as the Industry is continuously faced with the following challenges:

Low yield or productivity that results in inconsistent or unsustainable supply of farmer fish products to market outlets, availability of technical support and simple communication from and between the extension and fish farmers was lacking, value addition and market strategies when targeting premium markets have not been fully addressed and cost of accessing lucrative markets due to lack of finance or its poor management affects rural farmers.

Following adverse feed back from fish farming, members the association planned to offer technical support to its members through technical advice on feeds, feeding ponds and hatchery management fish transport and ponds construction. In a conference attended by fish farmers' two groups of farmers remarked that the knowledge base of the fish project trainees was much more advanced than their own and it was difficult for them to understand the changing policies under successive governments. This led to uneven support and many farmers abandoned ponds due to lack of stocking materials, limited technical guidance and excessive government regulatory regimes. The Fisheries Master Plan Study (1999) revealed that Uganda had only 4500 functioning ponds with an only a portion stocked producing 285 tones of fish annually.

2.3 Standards for Sustainable Aquaculture

Its benefits notwithstanding, aquaculture can damage ecosystems. Shrimp, for example, are commonly farmed near saltwater bodies where mangrove forests and other wetlands naturally line the water's edge. These wetlands harbor diverse biota, provide key breeding and feeding grounds, recharge groundwater, limit run-off impacting coral reefs and other marine life, and ameliorate the impact of storms on the land. Yet huge areas of mangroves were destroyed to build shrimp farms in Asia, leading to protests by local and international environmental activists and resulting in operations whose long-term sustainability is in question.

Several steps have been taken in response to these concerns. In 1995, the U.N. Food and Agriculture Organization (FAO) endorsed principles for aquaculture and in 2006 FAO adopted principles for shrimp farming, which can also be used as a check list for other species. These guidelines address farm siting, farm design, water use, production stock, feed stock, health, food safety, and social responsibility. Since then, several organizations have elaborated on these principles in standards for certifying good aquaculture practices, including Global G.A.P., Friends of the Sea (FOS), the Global Aquaculture Alliance (GAA), and the World Wildlife Fund (WWF). Global G.A.P. and the GAA are industry led, whereas FOS and WWF are independent non-profit organizations.

These different approaches may have the virtue of promoting discussion, but they also create confusion for buyers of aquaculture products and the opportunity for

commercial retailers to adopt the most convenient requirements. The WWF

"Aquaculture Dialogue" standards have been developed through a particularly painstaking public process and, while not perfect, they are the best by comparison.

Consumers will benefit from a single, widely accepted seal of approval and the WWF is the one around which to rally.

The WWF aquaculture standards apply to farms throughout the world and are most critical in developing nations where existing domestic regulation is less advanced.

However the standards are currently limited to species (e.g. shrimp and salmon) that are marketed in developed nations where sustainability certification is considered a factor in sales. It's time to move beyond this limitation and to develop and implement standards for all significant aquaculture species whether or not they are exported.

These standards can help companies and regulatory authorities in developing nations make domestic aquaculture more productive and sustainable, particularly if assistance is provided for training and implementation.

Furthermore, the opportunity for certification may promote development of export markets for a developing nation's aquaculture production and help to sustain the farms for both domestic and foreign consumption. Carp stands out in this matter because no standard has been developed and yet it is the aquaculture industry's leading product. Carp made up 38 per cent of global aquaculture production in 2008, with over 96 percent farmed in Asia -- 70.7 per cent in China, 15.7 per cent in India, and 10.2 per cent in Bangladesh, Myanmar, Viet Nam, Indonesia, and Pakistan. Carp is mostly consumed in the countries where it is farmed, but a sustainability standard could facilitate export and also advance the growth of carp aquaculture in Africa and

other developing nations. Also, a carp standard would inform national and local regulators, local communities concerned about habitat degradation and pollution, and domestic farms and processors that want to excel.

Food security is a pressing global goal in developing nations, including those in Africa, and animal proteins provide essential nutrition. Sustaining sea life is also a global goal, both for the food it provides and for many other economic and aesthetic values. Global aquaculture will serve both goals if expanded in Africa and managed sustainably wherever practiced.

Fish production in Nigeria makes immense contribution to agriculture development, recognized in Bada (2005), it contributes to about 40-50% of the noted to be protein deficient (Seki and Bonzon 2005) with no indication of attaining the recommended daily amount of 1.6 kg (FAQ 2007). The deficiency was attributed to inefficient resource, lack of technical support, mismanagement of capital resources, declines in output attributed to the kind of species bred and poverty levels.

The per capita consumption was postulated to be on the increase over time and the recent suggestion is that the demand is out stripping the supply as explained in Kpadia (2002) and Fabiyi (1985) creating a deficit which cannot be met from reliance on coastal waters which are close to depletion.

Although a number of studies have been conducted on fish production including those of Fabiyi (1985), Nwosi et al 2007, Ohajianya et al (2006) none of these has adequately addressed the production performance. Technical support needed in pond construction quality of fingerlings to be bred, feed and fertilizer, financial

management, the required level of training and skills for fish farmers have not been adequately reflected upon.

None of the studies has adequately addressed the appropriateness of the determinant or the interaction effect of the variables used in production of fish output. The broad objective of the study therefore is to ascertain the determinant of production performance of fish farming enterprises.

The second category of progressive small scale fish farmers, driven by the quest for income and profit has a more significant bearing on fish farming production and contributes directly to the rural economy through trade in farmed fish.

According to (Fabiya, 1985) when planning for commercialized aquaculture the following aspects of production must be considered very critically.

Species to be produced, production sites, production technology that is available by technical support programme and the choice of what to be produced will be graded by, market requirement of the species, production technology of the species, and resources available to produce.

The species to be produced must not only be maintainable, but also suited for the climate and be produced cost effectively. Different species require different climatic conditions to perform optimally.

It's important to know whether the species selected for production is adaptable to intended culture condition, and there is adequate knowledge of the reproductive biology, nutritional requirements, common diseases and parasites of the species. It's

also important to ascertain that the species proposed for production as being profitable produced at commercial levels by other producers.

A good species should be able to: Adaptable to culture conditions, fast growth rate from egg to market size, simple and inexpensive dietary requirement, hardiness and resistance to disease and parasites. Producers can have full control over the life cycle process and in captivity and Easy market acceptability.

Fish farming was introduced back in the 1950's as an income generating, nutrition-boosting activity, aquaculture now accounts for only for only 10 percent of Ghana's total fish production, studies estimate. Meanwhile the UN's food and agriculture Organization reports that domestic fisheries/fish farms fall up to 400 000 metric tones short of Ghanaians annual consumption requirements. The government recognizes that fish farming could help close the deficit and is trying to expand training and extension services.

According Kumah (1981), farm managers sourcing quality fish feed is one main constraint to bumping up aquaculture figures; He says subsidies for feed and domestic producers are possible solutions as all feed ingredients are available locally. Ample resources and interest in gainful farming activity. "Farmers have the money but they don't know what to do with, he said. They want to study under someone who has been successful.

Indeed in a country where most workers are farmers many subsistence- the term 'professional farmer' appears to be as much about acquiring knowledge as selling harvest. Njarim said possessing technical knowledge is what makes one a professional

farmer. According to Nana Siaw Ghanaian farmers lack exposure to efficient farming techniques.

The conditions necessary for fish farming are readily available in Kenya according to uvuvi newsletter ministry of fisheries development issue s2010. The technical feasibility of fish farming in the wide range of environmental conditions present in Kenya needs to be researched. Kenya can be divided into four climatic zones for purposes of establishing the suitability of fish farming based on water, fish species and finances.

Western Kenya, the highlands, the arid and semi arid lands of north and eastern Kenya, and the coastal are, all practice fish farming. Although the recommended limitations for enhancing farm fish production to supplement the output from capture fisheries are yet to be implemented. Culture farm trials have been undertaken with many fresh water and salt water species. Kenya has a good base on which to expand its aquaculture output.

The area around Kisumu which has a population of three million and suffers from a high level poverty rate. About 70% of the population live less than 1 \$ a day because HIV/AIDS hit so many families ,therefore fish farms were meant to improve peoples living standards.

Small scale fish farming is seen by Kenyan government as a way to boost economic prospects not just in western Kenya but throughout the country.

Initially 160 out the country's 210 constituencies were identified for government backed ponds with each pond being stocked by fingerlings and fish feed. The scheme

has run into teething problems. There was only one hatchery of any size, an American company, Dominion, from which to get supplies and could not meet the government order. Cronyism was another problem with local leaders insisting they get the ponds, even though their land was not suitable, some soon lost interest as fish farming is far from straightforward: it's a highly technical business.

The right fish feed –pellets that contain Soya sunflower oil. Cotton oil and a maranth is expensive. Feed in an eight month cycle costs & 340, which is a lot fro a small farmer already struggling to make ends meet. Apart from the expense the farmers needed know-how which was lacking.

2.4 Technical support and fish farming projects production

According to research by Nolnar (1985), fish farmers identified in selected communities were provided technical assistance in aquaculture by CARE/peru and several other non governmental organizations, his data suggest few differences in extension experience and perceptions by species cultured but there is a notable difference across the measures of farm size.

According to his findings larger operators tended to have more contact with extension and were slightly more likely to want extension contract in the future. Aquaculture in the Peruvian Amazon is enhanced by well established patterns of fish consumption and marketing in the region his purpose of research analysis was to examine the perception concerning the amount and kind of technical assistance available to fish farmer in the Peruvian Amazon as a function of the type of fish raised and the land holding of the farmers.

In 1992 CARE/Peru began effort to increase food security and raise incomes by working with families.

At each 21 villages, an initial pond was established for training and demonstration purposes. The project also provided fingerling nets, small loans for ponds construction costs and continuing technical support for aquaculture.

The Spanish non governmental Organizations Agencies Espanola de co-operation advocated for international support, the service of a technician who advises approximately 7.5 pond operators located primarily along the Iquitos –Nanta road in 1998 approximately 15 ponds achieved at least one harvest the remaining ponds were growing their first crop of fish. Aquaculture technician have provided technical assistance in pond construction and instruction in production management each organization is presently or potentially a partner with the PD/A CRSP new technology for increasing yield of current breeding techniques and expanding the period during which breeding and will provide widespread benefits for aquaculture producers in the selva (Kohler 1999).

Fish farmers were identified in selected communities who were provided technical assistance in aquaculture by CARE/PERU and several other NGOs in the Napos, Tamishinyash and Tahuayo River system which combine to form the Amazon. Structured interviews were conducted with a sample of 146 fish farmers having accomplished at least one harvest in the past two years Casley (1988) and Townsley (1996). The survey was adapted from previous researched conducted by Molnar (1960) in fine PD/ACRSP countries Honduras, Thailand, the Philippines, Rwanda and Kenya

The Peru survey, however reflected on the unique conditions and context of Amazonian and the singular relationship of river fishery in the region

Analysis done and responses tabulated to find survey questions about technical assistance and three measures of holding. From the information a number of patterns in farmer experiences and expectations for fish culture and technical assistance were identified. This research revealed that all respondent uniformly wanted more contact with the extension officers in future, therefore this is a gap

The development of effective fish farming projects requires technological input aquaculture technology refers to a wide variety of subject and fields which affect the performance of fish farming project and which must be taken into account .The need to produce alternative species for example various strains of a certain species with different economic traits and marketing niches such as various tilapia, the correct design of the fish farm should ensure cost effective operation and environmentally sound water system and water management. Using re circulation green water system the project benefits by saving electricity reducing field cost and ensuring high water quality to achieve environmental standards. When fish farming is implemented near agriculture areas the use of integrated fish farming and irrigation add numerous advantages.

Although fish farming is in progress in Japan some constraints remains, technical constraints include problems concerning seedling production, nutrition larvae disease, parasitic control and feeding. Although seedling production techniques are being developed rapidly and experience with successful culture of several species should be applicable in the future to other species. Among other problems, however

fundamental research for the advancement of technique for nutrition of larvae control disease and parasites are most important. From past studies in aquaculture disease and parasite control is significant in fish farming disease control and are more serious it's also not usual to have larvae killed during short time period in actual farming.

In aquaculture practical methods for treatment of diseases and parasites have been developed for instance chemotherapy has assisted in the treatment and prevention of fish disease. These kinds of advanced technology should be applicable to fish farming but fundamental problems such as resistance strains and human public health consideration remain as an effective method for preventing disease and mortality. It may be possible to breed resistant strains but little research has been done for this purpose.

The most significant constraint concerning the utilization of seedlings is the hypothesis that artificial recovered seedling are equal to those from actual reproduction release of seedlings, should be based on preliminary investigation on the environmental conditions of planning areas and behavior of natural organisms.

Co-operative research have establish the expected environmental conditions and observe the effects of those conditions on biological characteristics such as resistant to fluctuation, environment, physiological activity, avoidance reaction from predators ability to shrimp and curb to bury themselves at the bottom of the sediments.

Techniques for acclimating artificial produced seedling should be varied with the species and the results desired.

2.5 Cultured species and production performance of fish farming projects

The species used in aquaculture but introduced from outside the country are tilapia *rendalli* black bass and trout's, but only *Tilapia rendalli* can still be found in the natural water as it produces easily in the wild while black bass and trout need artificial propagation for recruitment. Other species introduced and cultured into Ugandan water are giants river prawn (*Macrobrochiun Rosenberg*) and the red swamp craw fish (*procambarus clarkii*) this farmer is maintained by regular importation of larvae for culture.

Oroochromis niloticus was until recently the most farmed species with its good quality growth characteristics and easy production of the sea in Uganda it was transplanted from Lake Albert to restock Lake Victoria and lake Kyoga water including shared trans boundary water bodies the draw back is the prolific reproduction and seemingly resultant stuntedness.

North African catfish (*Clarias gariepinus*) has recently over taken Nile tilapia as the most popular species for aquaculture in Uganda

Rural farmers have grown fond of it, there is growing regional market for this there is growing regional market for this species. Its fast growth and ability to adapt to the waters.

North Africa catfish currently contributes an estimated 60% of aquaculture production in Uganda. The most limiting aspect of the culture of catfish in Uganda is the availability of good quality and sufficient fish seed as when required by the grow out farmers.

The third most frequent species is the common carp (*Cyprinus carpio*) which was first introduced from Israel in 1941 with the aim of stocking the fingerlings in the relatively cold water of Bunyonyi in Southern Western Uganda).

The common carp did much better than Tilapia and was preferred by farmers but inability to produce sufficient quantity of fish seed, poor extension and change of focus did not favor the expansion of aquaculture.

However the red swamp craw fish has a menace as it bores through the earthen pond causing leakage and cross-pond fish mixing.

According to the department of fisheries there are two species cultured in Uganda contributing over 90% of the total aquaculture production in the country. North Africa cat fish has taken over Nile Tilapia and is now the most common culture species in the country with production in 2004 at 3859.2 tones.

Aquaculture production projection are based on fish seed production ,capacity stocking record size of stocked water bodies and number and size of farmers ponds. Aquaculture in Kenya follows a pattern similarly to many countries in this region of Africa. It is characterized by low level of ponds production that have stagnated over the past decade. When it was first introduced by the colonialists for purpose of sport fishing at the beginning of 1900 and it evolved to static water pond culture of Tilapine fish in the 1920s later supplemented by the carp and cat fish. Trout was subsequently introduced as a marine sport fish in order to produce seed for warm water and cold water species for stocks or runs dams and ponds, although it has relatively long

history dating back in 1920s no spectacular progress has been achieved in this sub sector since its introduction. Tilapine species form about 90% of farmed fish, In Kenya poly culture of the tilapia with the North African catfish (class gariepinus) is often done to control the prolific breeding of the farmer some exotic species including the common carp (cyprinus carpio) rainbow trout oncorhynchusmykiss and large mouth baas Minepterus, salmoides, have been introduced in Kenya for aquaculture purposes.

The rainbow trout introduced in Kenya during colonial rule mainly for sport fishing it has become quite important in terms of value and a kg costs 300-1200 Kenyan shillings or (US \$ 4-16) depending on where it is sold.

The common carp was introduced during the colonial period but is not favored by the market.

The introduction of genetically modified species is still very continuous but the fisheries department is exploring ways of developing genetically improved species by using the endurance strains available.

Fish are stocked in floating cages, earthen ponds and other water impoundment and left to feed for themselves. These systems are highly dependent on the natural productivity and the physical conditions of the water.

Semi- intestine systems mostly producing Nile-Tilapia have been the major contributor to aquaculture in Kenya with an average production of about 3 tones/ha contributing more than 70% of the total aquaculture production.

Earthen ponds and cages are used as holding units for fish culture. The ponds are fertilized using both chemical and organism fertilizer in varying proportions to enhance natural productivity. Polyculture of *Oreochromis Niloticus*, *Clarias gariepinus* and *Cyprinus carpio* is practiced with various combinations of species production in the system range between 1000 and 2500 kg/ha year.

Intensive aquaculture is largely used, rainbow trout culture has supported the tourism, as it is considered rather available, therefore and is supplied to hotel catering largely to tourists.

Polyculture of Tilapia culture begun through cage culture, but has not been started in ponds, However if this is done the system in ponds, will soon contribute as much as 90% of all farmed fish in Kenya by both volume and value.

In 2003 total production of the three main fish species farmed in Kenya (Nile Tilapia, rainbow trout and North African cat fish) amounted to 948 tonnes the value of production came to US \$ 2153000.

There are also few other species such as Red Belly Tilapia (*Tilapia Zillii* gold fish) *Catfish* and common carp *Cyprinus carpio*, but then production to FAO statistics.

It is important to know whether the species selected for production are adaptable, are resistant to strains, have resources available to produce and that they are not expensive. Their growth rate should be faster with market acceptability. Farmers in Kenya have lacked this knowledge.

2.6 Educational level and training skills of fish farmers Projects production

The structure and content of education and training play an important role in the management of fish farming enterprise which is one of the developments process (McCormick 1996).

African countries have with widespread support in the population invested heavily in education

The education systems have primary been geared towards general academic qualification. The type demanded by the fish farming enterprises have own specific training. All to him the development of education and sector specific vocational training relevant for development small enterprise and flexible production has been much slower. As a result the sector specific vocational training has mainly taken place at private initiative and cost Kanungo (1998) indicated that education is an important aspect sine it determines the entrepreneurial orientation in individuals.

Education may be formal or informal but all are important in fish farming as knowledge on these factors will help improve production performance of fish farming enterprises; this will help improve productivity, sales volume increase in number of ponds harvested and stock turnover rates that may lead to increase in growth of aquaculture production. .

According to Russia of European Democratic group (1997) report the performance of fisheries and aquaculture is dependent on knowledge of people working in it .This is why education, training and advisory services play such an important fundamental

role this is why the council of Europe became more involved in education and training matters concerning vital sectors.

According to Thompson and Proak (1987) general education training must prepare the entrepreneurs and other people to acknowledge good results. The recommendation Assembly (1996) on European charter for rural areas states in its guidelines on education, training research and awareness raising that human capital people with their diverse skills is the most valuable asset and therefore should have a top priority. Good educational level and formal competence will improve the status of those working in the sector. It's important in order to meet the high standard set for quality improvements and quality control in all parts of the production chain.

2.7 Financial management and production performance of fish farming Projects

Financial management involves deciding how to obtain, protect and use the resources to achieve a successful financial situation, one must coordinate these components through an organized plan and wise decision making, obtaining financial resources is the key foundation to financial planning since resources are used for financial activities.

According to Kapoor (2001) planned spending through budgeting is the key to achieving goals and future financial security, most enterprises fail within the first few years of start mainly due to financial difficulties caused by poor financial management.

A description of the production methods to be used on the fish farm should include stocking rates, feeds and feeding rates, harvesting methods and of fingerling and other materials needed for a successful operation. Expected problems which are financially associated with normal fish farming operation noted. All fish farming enterprises involve some risks not common to terrestrial farming that may affect cash flow and ability to repay debts. Estimate of financial needs requires that the business plan should include information about financial requirements and borrowing needs. The operation financial requirements fall into three categories.

Capital Investment, which include purchase of land as well as construction of ponds, building and other paramount structure. Equipment purchases-which could include generation device seine nets growing equipment

Operating expenses- include food chemicals fuel fingerlings other variables costs hired labor expenses.

The financial need contain an estimated repayment plan for any borrowed money. In new operation it may be beneficial to delay principle payments of loans

International-American Development Bank (IDB) advocates for enhancing financial literacy especially among people running small businesses to boost growth. In Uganda small businesses face more uncertain cash flow and are increasingly looking for innovative ways to manage their cash flow including debtor finance.

2.8 Theoretical Framework

From the literature reviewed, it is apparent that certain variables or factors are key to improved performance of a production unit. The harmonious interplay of these factors must be operational under scientific management principle as purported by Taylor.

According to Taylor a group of ordinary men following a scientific method would outperform the other "personal brilliant". Captain of industry, Taylor argued for consistently over sought to throw management by rule of thumb. And replace it with actual timed observation leading to one of the best practice rather than allowing personal discretion in their tasks. He believed that a spirit of hearty co-operation would ensure that the workers follow the one practice.

Under the philosophies he believed that the workload would be shared between workers and management with management performing instruction and workers performing labor each group doing what is best suited

Taylor strongest positive legacy was the concept of breaking complex task down in to a number of substances and optimistic performance of the task.

The principle includes environment principle of success and according to these Taylor was an extreme success. Application of scientific method yielded significant improvement in productivity.

This theory relates to the concept of productivity. Taylor spent greater a part of his work on the problems of achieving efficiency on the shops floor this is very important

for the government, especially in the implementation of such projects. In the application of management theory, the scientific approach requires one to develop a science for each operation to replace opinion and 'rule of thumb' determine accurately from science the correct time and the method of each job, set up a suitable organization to take all responsibility from the workers, except on actual job performance. Taylors emphasized on selecting and training of workers to improve productivity. He argued that an average worker would prefer to be given a definite task with clear cut standards. Mc Gregors theory x assumption about people are essentially description of managerial style produced by Taylors ideas, according to him efficient farmers should continue to get government support' rewarding productivity without limit. In his view output would be scientifically be determined.

2.9 Conceptual framework

The conceptual framework indicated the following variables which were measured against production of fish farming projects as the dependent variable.

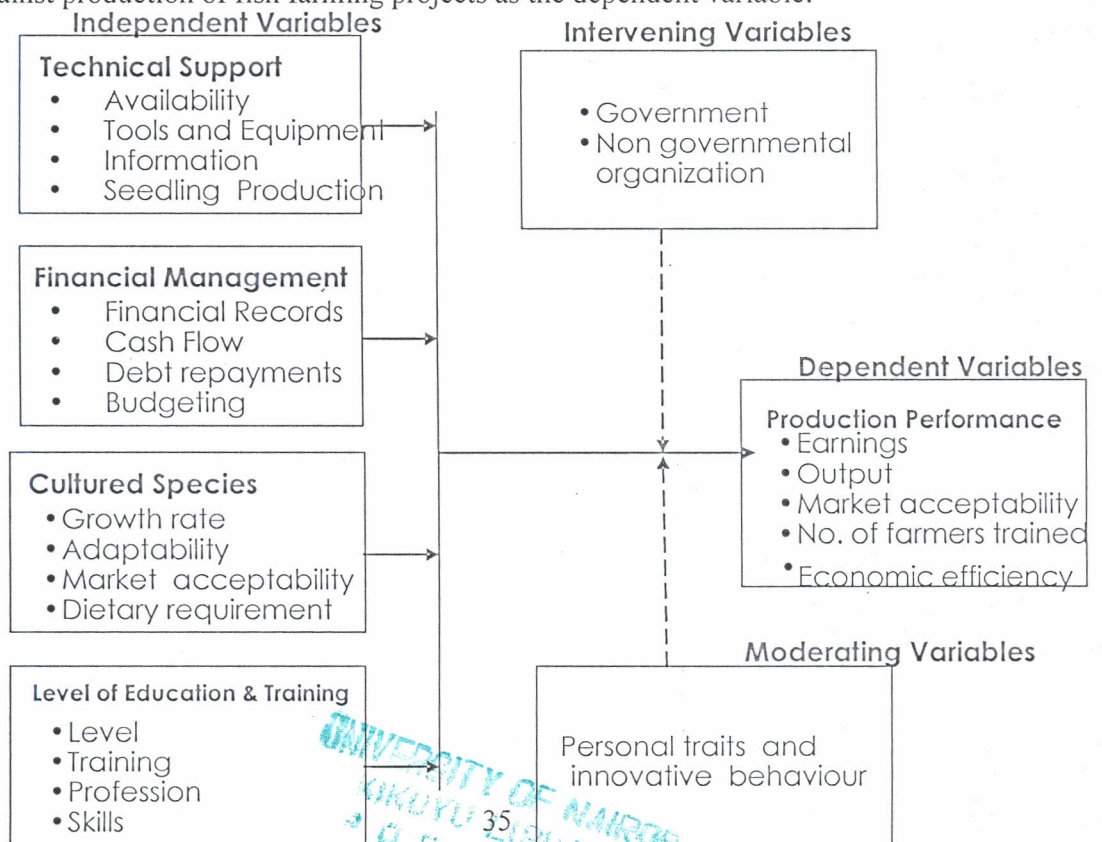


Figure 1 shows Conceptual Framework on determinant of fish farming projects production in Lurambi constituency

Figure 1 conceptual framework discusses the way the factors as independent variables relate with the dependent variable to determine production performance of fish farming projects in Lurambi Constituency of Kakamega District.

Technical support as an independent variable looks at availability, information, tools and equipment, extension services, seedling production, disease control in ponds.

Financial management deals with: Financial records, budgeting done by farmers, cash flow and debt repayment

Cultured species deals with growth rate of species bred, adaptability of species in the ponds, market acceptability and feeding requirements of the species.

Education level and training looks at academic level vocational training and skills, these will be assessed to determine how they affect production performance of fish farming enterprise in Lurambi constituency. Performance indicators are productivity, sales volume, stock turn over expansion.

2.10 Summary of Literature review

From the literature review, it is noted that fish farming enterprises are established globally and have about the same problems as experienced in Japan, Israel, and Peruvian Amazon Ghana, Uganda, Nigeria and in Kenya.

Technological assistance, financial management, cultured species and educational level and training needs of fish farmers production process and design offer specific

knowledge conducive to form expansion and increase owners flexibility. However exploring the relationship between education and production performance of fish farming enterprises in developing countries has not been achieved.

The main reason why developing countries fish farmers have complexity in management is that most farmers especially in the clusters have relatively less education. They only try this farming method as an alternative and not venture to concentrate on and divert their attention to other attractive ventures.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covered research methodology under the following topics, research designs, and target population, sample size and sampling procedures, methods of data collection, validity and reliability of Instruments, operation definition of variables and techniques of data analysis.

3.2 Research design

The study was conducted under the descriptive survey research design. This involved an attempt to collect data from number of population in order to determine the current status of that population with respect to one or more variables (Kombo & Tromp 2006) it involved collection of quantifiable information from a sample. This survey method was suitable in this study because it described existing phenomena by asking individuals about the perspective attitudes and values. It explained and explored status of two or more variables at a given point in time, in this study the researcher intended to survey E.S.P ponds and gather information from the farmers.

3.3 Target population

Population was defined as an entire group of individual's events or objects having a common observable characteristic. According to Mugenda and, Mugenda (1999) in order to provide an accurate and reliable description of characteristics, attitude and behavior of its members a sample of the population to be studied was sufficient. In

Lurambi constituency 200 ponds were constructed in first phase and 100 in the second phase. Farmers benefited by forming clusters out of which 199 ponds were stocked. Only 98 ponds were harvested. The research targeted a population of 300 pond operators and 5 extension officers. A total of 365

3.4 Sample size and Sampling Procedures

A sample is a subset of population in selecting a sample one should select that which provide the required information.

According to Kothari (2004) an appropriate sampling technique was used since the entire population was not manageable. The study used probability sampling technique, stratified sampling was also employed. It involved dividing the population into homogenous sub groups and then using a simple random sampling to collect the sample. The objective was to divide them into non overlapping groups called strata, the research preferred this method since this method assumes that the researcher was able to represent not only the whole group, but also the sub groups of the population. It generally gave more statistical preposition compared to simple random sampling. To select sample 10-20% was acceptable in descriptive research, Mbwesa (1999) taking the upper limit of 20% ,out of 300 pond operators,60 were selected hence quantifying as a Sample for this research.

Purposive sampling would also be employed, Deming (1990) indicated that sample design in Business Research described these techniques as important when the researcher targets respondents believed to have reliable information for the study.

This method was used to get information from the District Fisheries Department, where information was available on fish farming projects. 5. Purposely selected officers provided information on production of fish farming projects formed under Economic Stimulus Programme.

Table 3.1

Study Sample Sizes

Respondents	Population	Sample
Pond owners	300	60
Extension officer	5	5
Total	305	61

3.2 Actual Samples Reached

Respondents	Total sample	Actual Sample	Percentage (%)
Pond owners	60	57	95
Extension officer	5	5	100
Total	65	62	95

3.5 Research Instruments

The data was collected through the use of questionnaires, structured interviews and observation. Structured interviews were used to collect information from farmers who are available. Drop and collect questionnaire technique was used for farmers and officers who were not available at the time of interview. Questionnaire type used varied, it had both closed and open ended questions to enable the respondent to be free in providing the needed information that guided the research study.

Observational and attitude measurement provided first hand information that was required especially when determining the attitude of farmers and its effects on performances (Sodhi et al 1994) in the context of worker participation and employee involvement argued for building an attitude for problem prevention this two methods were suitable to provide information from fish farmers especially those whose ponds were harvested and the ones owning dormant ponds, this allowed the research to predict how they behaved in future.

It was in order to study the prevailing attitude of the fish farmers and factors which underlie the condition. This was shown why the fish farmers behave in a particular way. Verbal frequency scales can be used to enable the researcher to know whether they owned the projects or not.

3.5 1 Pilot Testing

Pilot testing was conducted to check for validity and reliability of the research instrument. It was piloted to only 5 pond owners. Ponds in Lurambi Constituency of Kakamega County. Piloting draws subjects from the target population and stimulated the procedures and protocols that have been designed for data collection.

3.52 Validity of data collection instrument

Validity refers to the degree to which a method, a test or a research tool actually measures what it's supposed to measure. Wellington, (2000), Instrument validity referred to accuracy and meaningful inferences made based on the results obtained.

The researcher produced good interview guide that was not biased. The research depended on the respondents minds set and attitudes in order to get valid data. The

content and face validity was addressed. Three independent judges from the Department were requested to assess the extent of the items in the instrument address the objectives, as well as whether the format of the instruments gave the correct impression. Their comments were taken into account in refining the instruments.

3.53 Reliability of data collection Instruments

Reliability is the judgment of the extent to which a test, a method or a tool give consistent results across a range of settings and if used by many researchers. Le compte and Preissle (1984) defines reliability and claims that no researcher studied the social sciences world could achieve total reliability. He described it as an extent to which studies could be replicated and assumed that a researcher using the same methods could obtain the same results as those of prior study. The instruments reliability was determined by the test re-test method, whereby the questionnaire was administered to 10 farmers who were in the sample before data collection. After one week the same was administered to the 10 respondents again. The reliability was ascertained by correlating the scores. It was found to be +0.9. It was particularly done to test understanding difficulty of questions and willingness of the respondents to respond.

3.6 Data Collection Procedures

First a letter was presented to the District fisheries department. After getting a permit from the National Council for science and technology and with a clearance from the university. Three sets of instruments were used to collect data. They were administered to the sampled population. Organization was made to meet the officers

in the office on a day which was suitable for them and this is when a suggestion was made to arrange for me to meet the farmers.

The first set of instruments was questionnaires which were administered to the five District Extension officers and the sixty sampled farmers.

The second instrument was interview guide which was conducted to the fish farmers after a careful sampling procedure and with a guide from the supervisors. The other information was collected through direct observation and this enabled the researcher to know and get the information that the respondents did not provide especially on the dormant ponds.

3.7 Techniques of data analysis

Data analysis refers to a variety of activities and process that a researcher administered to make certain decision regarding the data collected from the field Mbwesa (2009). In order to get meaning from data collected and be able to explain various features from raw data. It is also the process of inspecting , cleaning, transforming and modeling data with a goal of highlighting useful information that supports decision making (Rodgers and Hrovat,(1997).According to Bryman and Cramer (1997),data analysis seeks to fulfill research objectives and provide answers to research questions. The study applied both qualitative and quantitative approaches.

Quantitative data processing and analysis starts with editing the questionnaires to minimize errors, this ensures completeness and consistency followed by coding the open ended data entry, The study employed a statistical package for social sciences SPSS (XP) professional for data input, analysis and presentation of results.

The results were interpreted and placed on Frequency distribution and percentages that display systematically and meaningful report will be used to provide adequate statistical report to the findings.

Qualitative data was analyzed and interpreted by organizing data into four key areas as the objectives of this study.

3.8 Operation definition of variables

Availability can be as empirical property that can take two or more variables, in these study independent variables include technical support, financial management, species cultured and education level and training are to be tested if they are determinant of production performance of fish farming enterprises.

Operational Definition of the variables

Objective research question	Variable	Type of information	Data collection instruments	Scale	Data analysis
To what extent does technical support determine fish farming project production	Independent technical support	Tools and equipment information seedling production extension services disease control	Questionnaire	Ordinal scale	Descriptive analysis
	Dependent	Extension services provided	Questionnaire	Ordinal scale	Description analysis
To what extent does financial management determine fish farming projects production	Independent financial management	Financial records. Cash flow Debt repayment Budgeting	Questionnaire	Ordinal scale	Descriptive analysis
	Dependent	Revolving funds	Questionnaire	Ordinal scale	Descriptive analysis
To what extent does cultural species bred determine fish farming projects production	Independent cultural species	Growth rate of species Adaptability Market acceptability	Questionnaire	Ordinal scale	Descriptive analysis

		Dietary requirement			
	Dependent	Market acceptability	Questionnaire	Ordinal scale	Descriptive analysis
How does the level of education and training on fish farming determine production of fish farming projects	Independent Education level and training on fish farming	Level Training Profession	Questionnaire	Ordinal scale	Descriptive analysis
	Dependent	Number of farmers trained on fish farming	Questionnaire	Ordinal scale	Descriptive analysis

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter presents data analysis, presentation and interpretation of results based on response rate of study, demographic characteristics of the respondents, and technical support indicators by the farmers, financial management indicators by the farmers, cultured species factors and educational level and training on fish farming. This data was collected by the researcher and assistants who is one of the field officers who directly administered questionnaires to the respondents. The response rate is as illustrated.

4.2 Response return rate

This section shows the response rate of respondents who were targeted during the study. Quantitative data was sourced through administration of questionnaires with farmers as subjects who practice fish farming (aquaculture) in Lurambi Constituency under economic stimulus programmes.

Table 4.1: Questionnaire response Rate

Category	Sample	Returned	Percentage
Farmers	60	57	95
Extension officers	2	5	100
Total	65	62	95

Table 4.1 shows that 60 farmers were targeted for the study and questionnaires were administered to them and 57 responses were obtained; this means that a 95% percentage of the respondent sampled answered the questions administered. This was achieved by the researcher and the research assistants administering the questionnaire and one extension officer. The response rate is illustrated using table 4.1

Table 4.1.1: Key informant response rate

Category	Sample	Response	Percentage
Farmers	10	10	100
Extension officer	1	1	100
Total	11	11	100

Table 4.1.1 shows that the farmers interviewed and the extension officer from Lutonyi fish farm all responded to the questions thus a response of 100% was achieved. There was in depth interview responses and opinions insights were based on categories of responses. Overall (95%) response rate was realized from farmers to whom questionnaires were administered and (100%) was achieved from key informants in this study. The researcher analyzed the data based on this response rate as it was considered to depict a true picture of the study and variables after interacting with study population.

4.3 Demographic characteristics of respondents

The respondents were asked questions on gender, Age and location to ascertain their demographic characteristics and the findings are illustrated in table 4.2

Table 4.2: Demographic characteristics of the respondents

	Frequency	Percentage	Cumulative Percent
Gender			
Male	50	87.7	87.7
Female	7	12.3	100.0
Total	57	100	

Table 4.2 shows that out of 57 respondents 50 (87.7%) were males and 7 (12.3%) were females this shows that there were more males than female respondents and the interpretation is that many females shy away from practicing fish farming.

In a bid to know the ages of the respondents who provided information. The responses were as follows:

Table 4.2.1: Ages of the Respondents

Age	Frequency	Percentage	Cumulative Percent
20 - 30	2	3.7	3.7
30 - 40	5	5.6	9.3
40 -50	16	29.6	38.9
50 and above	34	61.1	100.0
Total	57	100	

Table 4.2.1 shows that respondents between 20-30 years of age were only two comprising of (3.7%). Ages 30-40 comprising of (5.6%) between the ages of 40-50 were (29.6%) and majority of the respondents were above 50 years 34 (61.1%).The table shows that farmers of all ages participated with majority of the participants

belonging to age 50 years, and above and minority being between ages 20-30 years.

These findings were subjected to further statistical analysis.

In a bid to know how the farmers had participated in this project from different locations in Lurambi Constituency.

Table 4.2.2: Location of the respondents

Location	No. of respondents	Percent	Cumulative percentage
North Butsotso	28	49.1	49.1
Bukhungu	16	28.1	77.2
Bunyala East	3	5.3	82.4
Nambacha	4	7.0	89.4
Bunyala Central	5	8.8	98.2
Bunyala North	1	1.8	100.0
Total	57	100	100

Table 4.2.2. shows that North Butsotso Location had a majority of participants with 28 farmers being respondents comprising of (49.1%) this was followed by Bukhungu Location followed with 16 (28.1%) ,Bunyala Central with 5 (8.8%), Nambacha had 4 (7%), Bunyala East had 3 (5.3%) and Bunyala North had1(1.8%).The result showed that Bunyala North respondents were very un co-operative as it had the highest number of dormant ponds and therefore feared disclosing so much information.

4.4 Technical Support and fish farming projects production

The study sought to find out how technical support determined fish farming projects production using several indicators. Farmers were asked about the availability of technical support for fishing in their areas.

Table 4.3: Technical support availability

Category	Frequency	Percent	Cumulative Percentage
Fish farmers	Yes	7	12.3
	No	50	87.7
Total	57	100	

Table 4.3 shows that out of 57 respondents only 7 farmers are aware of availability of technical support provided for fish farming this is only (12.3%).The rest are incompletely unaware as most of the responses were NO.

This shows that the respondents were not provided with technical support before the implementation of the project in all phases.

The study also sought to know whether the farmers were provided with tools and equipments for use in their ponds.

Table 4.3.1: Table of Tools and Equipment Provisions

Category	Frequency	Percent	Cumulative Percentage
Tools and Equipments Provision	Yes	0	0
	No	57	100
Total	57	100	100

Table 4.3.1.shows the provision of tools and equipments provided to fish farmers for pond management. Out of 57 farmers who responded which is (100%) said No tools are provided for pond management. This showed that the projects were started but no

tools and equipment were provided for pond management which I found was necessary to keep the ponds clean fresh and free of predators.

The study wanted to establish if the farmers had interacted the extension officers during the implementation of the two phases of the fish farming projects and the findings were as shown in table 4.3.1.

Table 4.3.2: Level of interaction with officers

Category	Respondents	Frequency	Percentage
Level of interaction with officers	Passive	48	84
	Active	9	16
Total		57	100

When asked about the level of interaction with extension officers, Table 4.3.2. shows their responses. Out of 57 farmers 48 farmers said it was passive thus comprises of (84.2%) and 9 (16%) alluded to the fact that it was active. These findings showed that there were few farmers who interacted with the extension officers and therefore most of them missed a lot of information on pond disease control, feeding requirement and training on management.

The fourth indicator was seedling production which many farmers when asked about the quality of fingerlings provided to them at the beginning out of 57 farmers who responded 100%. Confirmed that the seedlings were of good quality as shown in table 4.3.3.

Table 4.3.3: Seedling Production

Category	Frequency	Response	Percentage
Seedling / Fingerling	Good quality	57	100
	Poor quality	None	
Total		57	100

Table 4.3.4: Technical Support against Production

5 farmers without technical support had output that reduced with 10 kgs, 18 farmers reduced by 12 kgs, then 10 farmers by 12 kgs and 14 farmers by 20 kgs. The table belows shows their Correlations.

		Technical Support	Production
Technical Support	Pearson Correlation	1	.986(**)
	Sig. (1-tailed)	.	.000
	N	57	57
Production	Pearson Correlation	.986(**)	1
	Sig. (1-tailed)	.000	.
	N	57	57

** Correlation is significant at the 0.01 level (1-tailed).

Table 4.3.4. shows that there is positive correlation of technical support with production and is highly correlated with + 0.9.

4.5 Financial Management and Fish Farming project production.

The study sought to know if the farmers maintained financial records and the response rate was and follows:

Table 4.4: Financial Management and Fish Farming project production.

Category	Frequency	Percentage	Cumulative Percentage
Farmers that maintained records			
Yes	30	49	85.9
No	27	45	100
Total	57		

Table 4.4. shows that 30 kept records and 27 did not, they only kept incomplete records with only the amount they have invested other records missing.

The second indicator on financial management by farmers was cash flow. The study sought to know the level cash flow of the ESP project. The results indicated that (84.2%) percentage of farmers was dissatisfied out of 57 – 48 farmers were dissatisfied as shown in table 4.4.1.

Table 4.4.1: Level of satisfaction of cash flow

Category	Frequency	Percentage
Level of satisfaction of cash flow		
Very satisfied	2	3.5
Dissatisfied	51	89.4
Satisfied	4	7.0
Total	57	100

When asked to comment on the allocation of funds for the project, majority of farmers explained that it was inadequate. The results showed that the allocation of funds for this project may not have involved the farmers so that they could estimate the expenses to be incurred.

The study also sought to know whether farmers incurred debts of restocking ponds and feeding requirements and whether they are able to pay back from income. Out of 57 farmers 47 (82.5%) incurred debts of which many were not able to pay back. The rest 24% did not budget when asked how budgeting helps them. Majority of the farmers explained that it helped them to know their expenditure.

Another indicator of financial management was to find out so whether farmers prepared budgets the response rate as shown in table 4.4.2.

Table 4.4.2: Number of farmers that prepared Budgets

Category	Frequency	Percentage
Yes	13	27
No	42	73
Total	57	100

The study showed that majority of farmers budgeted for the projects out of 57, 32 prepared budgets (56 %) Which the rest (24%) did not budget when asked how budgeting helps them. Many gave positive responses that it helped to know expenditure and calculate profits.

Table 4.4.3: Financial Management against Production

25 farmers that did not budget their funds, their earnings reduced by 5,000/=, 12 farmers by 3,000/=, and 20 farmers by 10,000/=

Correlations

			Financial Management	Production
Spearman's	Financial Management	Correlation Coefficient	1.000	1.000(**)
		Sig. (1-tailed)	.	.
		N	57	57
	Production	Correlation Coefficient	1.000(**)	1.000
		Sig. (1-tailed)	.	.
		N	57	57

** Correlation is significant at the 0.01 level (1-tailed).

Table 4.4.3 shows that there is positive correlation of financial management with production and is highly correlated with +1.

4.6 Cultured Species on Fish Farming Projects Production

The study sought to find out whether the growth rate of species cultured by the fish farmers determined their production. The table below shows how the farmers responded.

Table 4.4.4: Growth rate of species cultured

Indicator		Frequency	Percentage
Growth rate of species	Slow	35	61.4
	Fast	5	8.8
	Moderate	17	29.8
Total		57	100

Table 4.4.4. shows that out of 57 farmers that responded 35 farmers (61.4%) said that the growth rate of species was slow, 5 (8.8%) indicated that the growth rate was fast and 17 (29.8%) indicated that the growth rate was moderate. When asked about the

number of times the farmers have harvested many indicated that they have only harvested once, others twice but with a reduced income.

The study in an attempt to know the adaptability of the species cultured, the findings of the respondents were as shown in table 4.4.5.

Table 4.4.5: Adaptability of species cultured

Category	Frequency	Percentage
Adaptability of species - Yes	57	100
No	0	0
Total	57	100

The findings on the adaptability of the fish species to the different ponds is as follows: All Cultured species adapted to the conditions of the ponds and the results showed that out of 57 farmers 57 (100%) showed that the species adapted well to the ponds and they included Tilapia and Cat fish.

Table 4.4.6: Market Acceptability of the Species

Category	Frequency	Percentage
Farmers - Yes	54	94.7
No	3	5.3
Total	57	100

When asked about market acceptability of the species cultured in the ponds, farmers responded positively. Out of 57 farmers 54 farmers (94.7%). Indicated that the species cultured which is common Tilapia have wide market acceptability. This shows

that the fingerlings provided are those which provide a wide market and that out of 57 farmers, 54 farmers which comprise (94.7%) indicated that they had problem of feeding the species cultured as they multiplied faster and therefore making the feeding requirements complex and expensive as shown in table 4.5.

Table 4.5: Feeding requirements of the species

Indicator	Frequency	Percentage	Cumulative Percentage
Feeding requirements			
Simple and cheap	3	5.3	5.3
Complex and expensive	54	94.7	100
Total	57	100	

Only three farmers accepted that the feeding requirements were simple and cheap. This is only 3 (5.3%), the rest 54 (94.7%) allude to the fact that it was complex and expensive due to the fast multiplication of the fingerlings.

Table 4.5.1: Cultured Species on Production

20 farmers established that they had the same production after harvesting twice, (800 kgs) 17 farmers confirmed the same production (500 kgs) 13 farmers had reduced kgs from the previous harvest (200 kgs), 17 farmers did not weigh their fish after harvesting since they only sold to the locals.

Correlations

		Cultured Species	Production
Cultured species	Pearson Correlation	1	.341
	Sig. (1-tailed)	.	.204
	N	57	57
Production	Pearson Correlation	.341	1
	Sig. (1-tailed)	.204	.
	N	57	57

Table 4.5 shows that there is a weak positive correlation of cultured species with production + 0.3

4.7 Level of education and training of fish farming on production

In order to determine the level of education at four distinct levels and number of farmers trained, the respondents gave the following information.

Table 4.6: Level of education and training on fish farming.

Level of Education	Frequency	Percentage
Primary	5	8.8
O'Level	35	61.4
Diploma	13	22.8
Degree	4	7
No of farmers trained		
No	48	84.2
Yes	9	15.8

Table 4.6 shows that Primary 5 (8.8%), O'level 35 (61.4%), Diploma 13 (22.8%) and degree 4 (7%). Out of 57 respondents, the findings of the study were majority of participants are 'O' level which comprises (61.4%). This people have no other

alternative jobs, therefore concentrate on the management of these projects to earn a living. Diploma and Degree holders have alternative jobs and therefore take this project as part-time. The study therefore concluded that time is an important factor. To ascertain the level of education, the respondents were further asked if they were able to read and write and 54 (94.7%) were able to read and write this showed that when majority of the farmers were provided with training and skills they could be able to internalize information because of their level of literacy.

Out of 57 farmers only 9 have attended training those that are usually invited for seminars.

Only one had profession as only few colleges offered this courses – out of 57 at least 10 (17.5%) had acquired skills during seminars.

Table 4.6.1: Case Summaries (a)

	Primary	O level	Diploma	Degree
Total	8.80	61.40	22.80	7.00
Production Kg	7	25	13	5

a Limited to first 100 cases.

Table 4.6.2: Level of Education and Training on Production

		Level of Education & Training on Fish Farming	Production
Technical Support	Pearson Correlation	1	.986(**)
	Sig. (1-tailed)	.	.000
	N	57	57
Production	Pearson Correlation	.986(**)	1
	Sig. (1-tailed)	.000	.
	N	57	57

** Correlation is significant at the 0.01 level (1-tailed).

Table 4.6.2 shows the correlation of the level of education and training on production, and after further statistical analysis with SPSS (XP) professional, it was found to be a positive correlation of +0.9, hence the study concluded that there is a high positive correlation with the level of education and training on production +0.9.

4.8 Qualitative data analysis

Qualitative data analysis was based on the key informant interview administered to the ten farmers and one officer. The extension officer from Lutonyi fish farm which is the department of fisheries in Kakamega pointed out that the area has a good potential for fish farming and that the farmers needed appropriate training since fish farming is a highly technical business. Their comment on technical support availability to farmers was based on the challenges they faced in reaching the farmers. They mentioned lack of transportation facilities, few extension officers in the office while the areas to be covered were very large. They cited many ponds which have become dormant as others kept on stagnating their production. For instance, in Phase 1 ponds, out of 200 ponds constructed 110 are dormant representing (55%). In the second phase which is still in progress already 30 are dormant (30%). This dormancy was at an alarming rate.

The farmers interviewed gave responses which showed that they were not aware of existence of economic stimulus project. Out of 10 farmers interviewed 8 (80%) confirmed that they are only aware of the C.D.F projects for schools and dispensaries and that they thought it is a donor funding aid for the poor.

Most of the farmers say they learnt about it from the neighboring constituencies.

All farmers interviewed eluded to the fact that they did not participate in the identification of the project for the area. Out of 10, 10 (100%) did not participate and therefore lack of community participation may have failed the projects.

A few farmers had made innovations such as digging trenches around the ponds to prevent flooding, a few used old mats to close outlets preventing fish from getting outside the pond and predators from coming in. many farmers did not keep records therefore financial management by farmers was wanting, pond management, feed requirement and disease control made many farmers to abandon projects.

The species reared in ponds was adaptable and had good market acceptability but the feeding requirement was complex and expensive as they multiplied very fast.

Most farmers felt that the training was not done and that a few farmers who benefited are those called for the seminars. However, they concluded that a lot can still be done to salvage the ponds which have not become dormant.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter covers a summary of findings of the study as well as discussions and conclusions based on these findings. The chapter also has recommendations based on these findings.

5.2 Summary of findings

All the sampled respondents included 60 farmers and 5 extension officers. Out of that 57 farmers participated by returning the questionnaire and all the 5 officers participated. There were more males than females that participated. The mean age of farmers was with majority of farmers participating from North Butso location and 1 farmer from Bunyala North.

The study established that all farmers were literate and had some formal education. Thus making them to understand the concept of pond aquiculture. Awareness of the technical support provided to them is low 12.3% as most farmers are not provided with information there is low level/passive interaction with the extension officers. Farmers do not know how to control disease in ponds; hence experience losses as a result of these. Farmers are not provided with tools and equipment which can enable them to maintain ponds for example what can be used to clean ponds nets which can be used to prevent predators and any allow water to pass through.

Financial management by farmers was also noted to be average (49.1%) as most farmers were found to have kept records. Extension officers kept records of the farmers they have visited and also home district progress Report on the same.

The study also found out that the amount allocated for this project was not done adequate the allocation was in bits, and therefore in terms of cash flow the projects have not been doing well. The farmers were only given fingerlings for restocking and feeds at the beginning of phase 1, but with time they had to find for themselves and that is why others whose ponds became dormant did not restock as the feeding requirement became expensive and complex as from the findings. (94.7%) that is 54 out of 57 respondents only three were farmers able to practice polyculture and therefore were able to get feeds from other sources.

The study also indicated that most farmers incurred debts for feeding the fish in ponds and other requirements. It was found that out that 47 out of 57 (82.5%) incurred debts of which many were not able to pay back since the fish takes long to harvest and the debts are short term liabilities which need to be paid immediately. Some farmers also incurred huge losses hence were not able to pay back completely.

In terms of budgeting many farmers tried nearly half of them budgeted, this is in line with the findings of Kapoor (2011) that explains that planned spending through budgeting is the key to achieving goals and future financial security. In his research he explained that most projects fail within the first few years of start, due to financial difficulties caused by poor financial management.

Most farmers had acquired some level of literacy and therefore were able to internalize any form of training. When sampled 48 (84.2%) of farmers had not attended any training on fish farming, only 9 (15.8%) had and usually attend training from different regions those that usually attend the seminars.

The findings also revealed that only one farmers (1.8%) had professional skills acquired through training course in Moi University, Chepkoilel Campus and was able to apply the knowledge the others had no knowledge of colleges that offer such courses and only relied on skills acquired from others who attended such seminars.

In terms of skills acquisition at least 10 farmers (17.5%) had acquired skills during seminars and it was expected that they disseminate the same skills to other farmers in their regions.

The study also established some Non-governmental organizations such as USAID, Dominion firms which produces fingerlings that have come in handy to help the farmers manage their projects.

The farmers also have tried to be innovative in the way they control hazards such as flooding in the ponds, diseases and control of predators such as snakes. They had dug trenches around the ponds to ensure it was raised using sacks with soils.

Knowledge about budgeting except that they did not take it seriously out of 57 farmers 32 (56%) understood the need to prepare budgets while the rest 15 did not prepare or have any records but confirmed that it was necessary.

On the cultured species many farmers confirmed that the species adapted well to the conditions of the pond and that they multiplied very fast only how to feed them was a problem. The findings of the study also elicited that 35 farmers (61.4%) confirmed that the growth rate of the species was slow. 5 (8.8%) indicated that the growth rate was fast. But the extension officer who was also research assistance pronounced that it depended on the feeding habits by the farmer. If you don't feed the fish in the ponds they don't grow hence harvesting is delayed.

The study also found that most farmers bred the Tilapia species which is very common and is widely accepted in the market. 54 farmers (94.7%) indicated that the species cultured was eaten by majority of people. Some farmers who restocked their ponds with only catfish complained that most people do not eat and had therefore to combine the two in one fish pond.

Majority of farmers had acquired some level of education according to research findings primary 8.8%, O level 61.4%, Diploma 22.8% degree 7%.

They have also sprayed the area around ponds with oils as so many snakes go in ponds to eat the fish at night. They have also made sure no water from outside gets in the ponds from the rivers.

5.3 Discussion of findings

The conditions necessary for fish farming are readily available in Kenya, this is in line with the findings of Ministry of Fisheries Department Survey on the potentiality for aquaculture Uvuvi Newsletter issue No. 6 (2009) the findings that majority of

farmers have established that the species bred were adaptable to the pond culture. The technical feasibility of fish farming in the wide range of environmental conditions present in Kenya needed to be researched. Fish farmers established that the majority are not aware of technical support provided for them by fish farmers. A few farmers met with the extension officers when the project was being implemented and have met again to receive any information, therefore majority have had passive interaction with extension officers on pond management and this exposes them to the danger of lack of know-how. Technical support is very important as fish farming is highly technical business as confirmed by researcher in the Peruvian Amazon Nolnar (1985) according to his findings farmers needed more contact with extension officers for improved production.

Many farmers do not keep records according to findings of this study (49.1%) of farmers maintained records. Records are important since they guide farmers on expenditures and how to calculate incomes. It was established that (82.5%) of farmers incurred debts from other people and institutions. Micro credit institutions are willing to offer credit to the farmers but their repayments terms are not affordable by the production cycles of the farmers. There is need to have a successful linkage of the farmers to micro credit scheme and this should take into account the farmers' ability to generate a constant flow of income, and fish farming enterprises to fulfill the repayment schedules. The project failed to link successfully the farmers to micro credit schemes.

Farmers were dissatisfied with the cash flow or the ESP projects since the allocation was made in bits, the most serious challenge to any project is being in adequate funding. This is in agreement with Hardwork (1997) who explains that the basic economic problem is that of allocating scarce resources among competing once.

For most of the farmers who responded, their expected earnings were much lower than the earnings they received.

Concerning the feeding requirements which most farmers 54 out of 57 (94.7%) established that it was complex and expensive but equally this species have a wide market acceptability. Rural farmers have grown fond of this Tilapia and there is growing regional market. Its therefore advisable catfish that has fast growth and ability to feed on anything available at house hold level be bred together.

The study established that many farmers only bred one species in the pond, Tilapia but they had no reason for this when asked. However it is advisable that they combine different species will catfish to eat the others and reduce the rate of multiplication which makes feeding them to become very expensive this is in line with research findings of USA dominion fingerling suppliers (2007).

After analysis of the data in a bid to explain how the level of education and training determine fish farming projects production the study found out that majority of the farmers had formal education thus the farmers understood clearly the concept of aquaculture or fish farming as an entrepreneurial activity. The number of farmers that had attended training on fish farming was established to be only (15.8%) while those

with no training comprised of (84.2%). According to Fowler and Rock (2010) lack of training can impact negatively on growth of projects. However, if farmers were trained on pond management and feeding of species and disease control measures the performance in terms of production per pond would greatly be increased. The findings also revealed that only one farmer from Bukhungu Location had professional skills acquired from undertaking a course in aquaculture at Moi University and was able to apply the same skills in his pond management however he was still faced with teething problems. These findings agree with Paul (1987) that little understanding and decision making concerning projects where possible and taking part in its growth and development can help manage it to completion. Other farmers were completely not aware of colleges or institutions where such courses are offered.

A few farmers 10 out of 57 which is (17.5%) had acquired skills on fish farming by attending seminars organized by the extension officers but the difference was insignificant. Farmers established that the same people kept on attending the seminars as regional representatives therefore the skills was not imparted to all fish farmers as was expected.

The finding of this study would contribute to both theory and practice if adopted. In terms of theoretical contribution it would help the government to understand the dynamics of the changing agricultural industry and the variables which need to be strengthened, and have been discussed to help improve the fish farming projects that were all started under the Economic Stimulus Programme (E.S.P). To practice it would help the ministry of fisheries to find out ways of improving the fish farming

projects production to ensure the projected foreign exchange is attained. It will help the extension officers understand the problems the farmers have experienced since the implementation of phase I and phase II of ESP with a view to strengthening the variables which are within their means.

5.4 Conclusions

After a thorough scrutiny of the summaries of findings under every sub theme, a systematic presentation of informed conclusions was made on every finding in order to create a basis for valid recommendation for effective policy action meant to improve the fish farming projects production in Lurambi Constituency. Informed by the summary of the findings of the farmers personal characteristics and demographic data, the study concluded that most farmers are males and therefore fish farming in Lurambi constituency is dominated by male gender, thus there was need to put in place strategies that would encourage more females to participate effectively in such projects.

The findings also indicated that the majority of farmers who were actively involved in these projects are 50 years and above and the lowest are between the ages of 20-30, the study therefore concluded that those who have retired (retirees) participate actively to earn a living from these projects, thus age was a factor.

The study concluded that farmers needed information through interactions with extension officers.

The findings indicated that there was inadequate allocation of funds for this projects, and therefore concluded that fish farmers needed more funds.

The study concluded that all the cultured species had wide market acceptability, and that all species adapted to the pond culture. The only problem was feeding requirements that were complex and expensive.

The findings also concluded that the level of education and training on fish farming was highly correlated to production since 'O' levels or people with no alternative jobs participated actively in this projects hence should be given opportunities. It also concluded that irrespective of the level of education all fish farmers needed training on fish farming.

5.5 Recommendations of the study

- There is need to avail technical support and simple communication from and between the extension officers and fish farmer, there training of front line extension workers is necessary. There is need for the government to enhance aquaculture extension systems through physical and human resource capacity building. In cases where the finance is not adequate to allow all farmers to attend seminars, the selected farmers need to enhance networking and community participation amongst fish farmers. The Government through the fisheries department should conduct farm trials in order to establish the effectiveness of extension services in identified aquaculture areas in the country.

- There is need for revitalization of loan schemes to cater for credit facilities to farmers.
- Earthen ponds and cages should be used as holding units for fish cultured; Species such as tilapia should be bred with Catfish to avoid too much multiplication as Catfish will eat the small sized fish.
- There is need to consider those who have no alternative jobs for this projects since time is a very important factor in management of this projects.
- There is need to introduce fisheries reforms to enhance the capacity of small medium and minor enterprises amongst communities practicing fish farming.

5.6 Contribution to knowledge

In a bid to investigate the determinants of fish farming projects production in Lurambi constituency, the study made the following contributions to knowledge that existed

Table 5.6: The study contribution to knowledge.

Research question	Contribution to knowledge
To what extent does technical support determine fish farming projects production	Technical support is important in determining fish farming projects production. The most important of this aspect is interaction with extension officers to provide information to the fish farmers on pond management. Seminars should be conducted to all farmers not only a few selected as information may not reach all of them.

To what extent does financial management determine fish farming projects production	An important aspect of financial management is budgeting which is key to future financial security. The study contributed to the knowledge that farmers should plough back their incomes to enable the projects to operate without financial constraints.
To what extent does the cultured species determine fish farming projects production	The study found out that it does not matter the species cultured provided it was adaptable and had market acceptability. The study contributed to the knowledge that tilapia species could be bred together with the catfish to avoid too much multiplication which made feeding requirements difficult. The practice of policulture should be encouraged..
To what extent does the level of education and training determine fish farming projects production.	The study contributed to the knowledge that 'O'levels and people with no other alternative jobs spend good time in the management of the projects hence needed to be given opportunities. In terms of training, time was also found to be an important factor as the same people had the time for training.

5.7 Suggestions for further studies

This study should be replicated in other constituencies in Kenya to assess the status of fish farming projects started under the Economic stimulus programmers and to encourage youthful Kenyan farmers to start practicing viable aquaculture for improved food production as well as job and wealth creation. Comparative study should be done on farmers who practice these projects as their private enterprises.

REFERENCES

- Belson W.R (1981) *The design and understanding of Survey Question*,
Aldershot. England
- Cole, G.A (2004). *Management Theory and Practice* (6th edition). London Thomson
learning.
- Validity and Reliability*. Retrieved April 17th 2009 from
<http://academic.luzerne.edu/kdroms/staff/valrel>.
- Community capacity building initiative –Kenya (2005) Empowering communities for
Prosperity.
- Community Capacity initiative Nairobi.
- Cooper, H.M (1984). *The integrative research review. A systematic approach*
Beverly Hills C.A Sage.
- Deming, W.E (1990). *Sample Research in Business Research*: New York, John Wiley
and
sons publishers
- D.F.R, (2011) *Report for Kakamega District*.
- EURO FISH Magazine 2/2008:97 *Technical Assistance for Food Safety Systems*.
- European Democratic Group (1997). Journal Education of Entrepreneurs*
- FAO (2000) *Fish Farming Production Statistics*. FAO/GIEWS Food outlook.
<http://www.fao.org.fishfarm/OIS> press
- Fabiyi, S.A (1985) *Principles and Practice of Pond Aquaculture*. Uganda Fisheries
Society

Food and Agriculture Organization, FAO(2004). FAOSTAT *Fish Farming Statistics*.

www.fao.org. 2006 FAOSTAT website

Fish farming Handbook (1980) Avi publishing company

GLOBEFISH website (<http://www.globefish.org/dynamisk.phf?id=4402>)

Government of Kenya (2007) Vision 2030, The Popular Version – Kenya

Government of Kenya (1992) Sessional Paper No. 207 Kenya National Development Plan

Nairobi Government Press.

[http://www.seagrant.unconn.edu/seafood.htm/sea food](http://www.seagrant.unconn.edu/seafood.htm/sea%20food).

Integrated Research Services, INC

Irene K. M, Standard Newspaper 22nd November 2011 : The countries potential for aquaculture

Kanungo, R.N (1998). *Enterprenuership and innovation* (3rd edition)

Kerlinger, F.N (1996). *Foundation of Behavioral Research*. New York: Holt, Renhart and Winston.

Kenya Literature Bureau (K.L.B) 2008. Secondary Business Studies, Form Two students book (New edition).

Kenya Vision 2030 (2007). *The government printer*, Nairobi PP 4-5- 25.

Kibwa Thomas, (2005), *Kenya Development Path, the case for service sector led development discussion paper by IPAR*.

Kimunya M.S (2005), *Efficiency and Efficiency of Kenya CDF theory and evidence*. Journal

of economic literature

Kothari, C.R, (1978) Quantitative methods and Techniques (2nd Edition) New Delhi:

New Age International (P) limited PP. 100-102

Kothari C. (1990) Research Methodology. New Delhi, Wilby Easter

Kothari, C. r (2004) *Research Methodology: Methods and techniques* 2nd.

New Age International (P) Ltd publishers.

Kombo, D.K and Tromps, D.L.A (2006). *Proposal and Thesis Writing*.

An Introduction. Nairobi. Paulines publications Africa

Krieger, R.E (1997). *Aquaculture engineering. A Handbook for Fish Farmers*

Leedy, P.D (1993) Practical Research Planning and Design (5th Edition)

New York Macmillan Publishing Company.

Livingstone Ian (1981); *Rural Development Incomes and Employment in Kenya, overseas*

Development Group, Nairobi. International Development Research centre.

Mbwesa, J.K (2006) *Introduction to Management Research. Nairobi*

Mugenda O.M and Mugenda, A.G (1999). *Research Methods: Quantitative and Qualitative Approaches*, Nairobi: Act press.

Mingala, J (2002) Handbook on Data Analysis and using SPSSIO Nairobi: Expert Training and Consultants.

Ministry of Livestock and Fisheries (May 2005): Journal: Republic of Kenya

Nadan, H (2007). *Fundamentals of Enterprenuership*. New Delhi, Prentice Hall

Nwosi, FO; NNO Ogumo; D.O Ohajianya. Factors influencing output of fish in IMO state

Nigeria . International Journal of Agriculture and Rural Development. 2007
Retrieved

27th March 2012. <http://www.who.org/nut/welcome.htm>.

Ogumo N.N.O: Ohajianya, FO Nwosi 2010: Performance of Small Scale Fish Farm operators in Resource use. Imo state, Nigeria.

Orende W. N, Daily Nation : 24 November 2011: Fisheries Reforms Pg. 7.

Performance target (2006). *Ministry of Livestock and Fisheries Development*.

Republic of Kenya.

Rodgers, M and Hrovat K (1997). *Data analysis and presentation techniques*. Ohio, USA:

Nasa Levis Research Center.

The Economic Stimulus Project Act No. of 2009/2010. Pg 49-50

The Revised Constituency Development Fund Act (2007) No.10 of 2007 pages 190-200.

The National Poverty Eeradication Plan (1999)

Thompson and Croak (1987) Education on entrepreneurial practices

Uvuvi Newsletter (Issue no.2 June 2011). Journal for Ministry of Fisheries Department.

AU publishers

USFDA's Fish and fish farming Hazard and control guidance 4 Edition

Uvuvi Newsletter Issue No.3 June (2011). Ministry of Fisheries Development

Wellington, J (2000). *Educational Research. Contemporary Approaches.*

London, UK Continuum Ltd.

Walker K (2010) The Prevention Research Improving Participation in after School Programme 2010

APPENDICES

APPENDIX 1: INTRODUCTION LETTER

ADERO DOROTHY ADOYO,

P.O. BOX 90,

KAKAMEGA,

15 /03/2012

THE
DISTRICT FISHERIES DEPARTMENT
KAKAMEGA DISTRICT
LUTONYI FISH FARM.
KAKAMEGA.

RE: REQUEST TO CARRY OUT ARESEARCH IN YOUR AREA

I am a student at the University of Nairobi pursuing a master's degree in Project planning and management .A s part of my course I am required to carry out research on determinants of production performance of fish farming enterprises Projects started under the Economic Stimulus Programme

I also have the pleasure to inform you that you are one of the respondents in this research. The researcher will maintain strict confidentiality and the identity of the participant will not be linked to the information received by the researcher.

Thank you in advance.

Yours faithfully,

Adero Dorothy Adoyo.

APPENDIX II

TRANSMITTAL LETTER.

ADERO DOROTHY ADOYO.

P.O. BOX, 90.

KAKAMEGA.

TEL.0711 771 710

To

ALL RESPONDENTS

Dear Sir/Madam.

RE: REQUEST TO COMPLETE A RESEARCH QUESTIONNAIRE

I am a student pursuing a masters of Arts degree in project planning and management at the University of Nairobi. As a partial of fulfillment of the award of the degree, am expected to carry out a research study. My virtue of study is Determinants of fish farming projects production in Lurambi constituency Kakamega County.

I am kindly requesting you to complete this research questionnaire to enable me to complete my study. The information you shall give will not be used against the stated purpose nor will it be accessed by any other person but me, kindly be honest and cooperate in providing the information.

I highly appreciate and thank you in advance for giving you invaluable time to complete the questionnaire.

Yours faithfully,

Adero Dorothy.

APPENDIX III

FARMERS QUESTIONNAIRE

The purpose of this questionnaire is to collect information about determinants of production performance of fish farming enterprises programme in Lurambi Constituency.

This will help in identifying possible solution to the problems faced. The answers you give will be important and therefore try to answer all the questions. The information filled in the questionnaire will be treated with confidentiality.

PART A

By use of a tick indicate the right Information as it applies to you.

A. PERSONAL DATA

1. Gender

Male Female

2. Age 20-30 30-40 40-50 50 and above

3. Name of your location

B. TECHNICAL SUPPORT INDICATORS

1. Are you aware of availability of technical support for fish farming in your area?

Yes No

2. If yes give examples

3. What tools and equipment are availed to you for pond maintenance?

Name any if there is.

5. Do extension officers provide information on pond disease control?

Yes

No

6. What is your level of interaction with extension officers?

a) Active

b) Passive

c) Not active

d) Do not know

7. Do you think pond size relate to production of fish

Yes

No

8. How do you deal with natural hazards that affect
production? _____

9. Is there a relationship between feed requirement and the amount of kgs yielded in a
pond?

Yes

No

10. Have you been trained by extension officers on pond management

Yes

No

C. FINANCIAL MANAGEMENT INDICATORS

1. Do you maintain any farm records?

Yes

No

2. What is your level of satisfaction in term of cash flow of the E.S.P project?

a) Very satisfied

b) Dissatisfied

c) Satisfied

d) Very dissatisfied

3. Do you incur debts of restocking ponds and feeding requirements?

Yes

No

4. If yes are you able to pay back from your income

Yes

No

5. Do you often budget for all that you need in operating these ponds

Yes

No

6. How does this budgeting help you?

7. Comment on the allocation of funds to the projects?

- a) Adequate
- b) Inadequate
- c) Allocation in bits

8. How much money do you require to manage your pond successfully throughout the month?

9. What is your total earnings from the sale of fish during this month?

10. What is the expected earnings?

D. CULTURED SPECIES FACTORS

1. What is the growth rate of species cultured?

- Slow
- Fast
- Moderate
- Don't know

2. Comment on the adaptability of species cultured.

3. What is the feeding requirement of these species bred?

- a) Simple and cheap
- b) Complex and expensive

4. Do people like the species bred in the market?

Yes No

5. What was the quality of fingerlings at the time of restocking?

6. How much quantity of feed in kg do you need for a pond size like yours? _____

7. Do you culture one species in a pond or many at ago- what reason do you have for these?

8. What was your sale during first harvest? _____

9. How many kgs of fish was harvested? _____

10. Comment on the suitability of the project in your area looking at the output from the fingerlings stocked and market acceptability.

E. EDUCATION LEVEL TRAINING AND ON FISH FARMING INDICATORS

1. What is the highest level of education you have attained?

- a) Primary
- b) O level
- c) Diploma
- d) Degree

2. Is there any training you have attended on fish farming?

Yes No

3. What profession/skills do you possess in fish farming? _____

4. How often do you interact with extension officers to gain skills on pond aquaculture?

- a. Active
- b. Passive
- c. Don't know

5. How have you been trained on management of these projects?

APPENDIX IV

QUESTIONNAIRE FOR OFFICERS

Instruction: Please tick the appropriate box or fill in the spaces provided with appropriate information required.

1. What are the challenges faced in the implementation of E.S.P projects in Lurambi Constituency?

i) _____

ii) _____

iii) _____

2. Please suggest ways to improve the implementation of ESP projects such as this of fish farming.

i) _____

ii) _____

iii) _____

3. Are your systems of monitoring and evaluation of projects appropriate?

Yes

No

4. How often is it conducted

a) Monthly

b) Quarterly

c) Yearly

5. How can monitoring and evaluation be improved to meet challenges of fish farmers in your area.

6. What are the challenges facing Monitoring and evaluation of projects.

7. Do you appreciate the role played by extension officers in improving farmers technical support?

Yes

No

If No, comment briefly

8. How can you rate the production by farmers in your Area?

i) Good

ii) Bad

iii) Improving

iv) Stagnating

9. How many ponds are dormant in this Constituency?

10. How can you rate the performance of fish farming in this Constituency?

a) Good

b) Bad

c) Improving

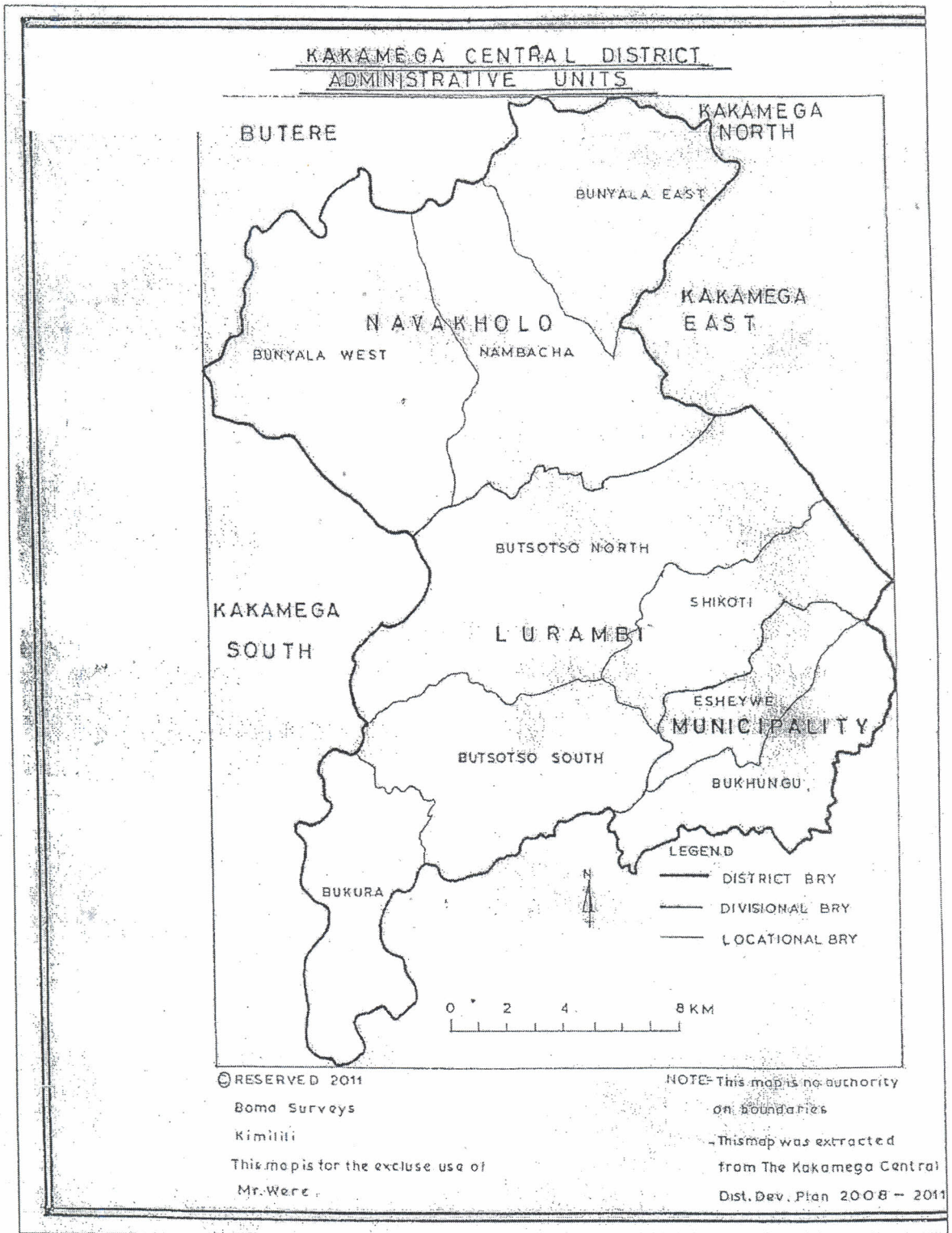
d) stagnating

APPENDIX V

INTERVIEW GUIDE

1. Are you aware of the existence of economic stimulus programme in your constituency?
2. If, yes how did you come to learn about it?
3. Did you or people you know participate in the identification /location of this project?
4. What innovations have you made to improve on this project?
5. What is your feeling about Technical support offered on this E.S.P programme?
6. What do you think is the contribution of financial management to the performance of fish farming enterprises?
7. Comment on the market acceptability of fish species reared in your fish ponds
8. What is your opinion on training of fish farmers?
9. Do you think there is any relationship between the level of education and performance of fish farmers?
10. How can fish farmers be assisted to improve their production performance?

APPENDIX VI



APPENDIX VII

RESEARCH AUTHORIZATION

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349
254-020-310571, 2213123, 2219420
Fax: 254-020-318245, 318249
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RCD/14/012/1022

Date: 19th July 2012

Dorothy Adoyo Adero
University of Nairobi
P.O.Box 30197-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Determinants of fish farming projects production in Lurambi Constituency, Kakamega County,*" I am pleased to inform you that you have been authorized to undertake research in Kakamega Central District for a period ending 30th September, 2012.

You are advised to report to the District Commissioner and the District Education Officer, Kakamega Central District before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

A handwritten signature in black ink, appearing to read 'M. K. Rugutt'.

DR. M. K. RUGUTT, Ph.D, HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioner
The District Education Officer
Kakamega Central District.

"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development."

APPENDIX VIII

RESEARCH PERMIT

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Dorothy Adoyo Adero
of (Address) University of Nairobi
P.O.Box 30197-00100, Nairobi.
has been permitted to conduct research in

Location:
District
Province


Kakamega Central
Western

on the topic: Determinants of fish farming
projects production in Lurambi Constituency,
Kakamega County.

for a period ending: 30th September, 2012.

PAGE 3

Research Permit No. NCST/RCD/14/012/1022
Date of issue 19th July, 2012
Fee received KSH. 1,000



Applicant's Signature
Secretary
National Council for
Science & Technology