

**FACTORS INFLUENCING PERFORMANCE OF COMMUNITY BASED PROJECTS:
A CASE OF FISH FARMING IN NYERI COUNTY, KENYA**

BY

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DECLARATION

This research project report is my original work and has not been presented anywhere for consideration for the award of a degree in any other University.

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DEDICATION

This research project is dedicated to my parents Mr. & Mrs. Onzere who inspired me to attain my academic potential. To my brother, Dr. Ijayo, and my sisters, Gillian, Hilda and Naomi for their patience and unfailing support; and lastly to my friend, Elma Adwa, for her encouragement.

My sincere gratitude and may God bless you all.

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ABSTRACT

Fish farming is of great social and economic significance to Kenya. When integrated with agriculture, fish farming may enhance cultivation of marginal land; recycling of crop residues as pond inputs, use of fishponds as water catchment points for irrigation, processing of crop waste into fertilizer mud and control of water supply thereby reducing floods. Under drought conditions, ponds may contain some residual moisture in bottom soils where vegetables can be produced for food and income throughout the period. In addition, fish farming can greatly enhance the income of rural people. The study aimed at establishing the factors that influence community based fish farming projects in Nyeri County, an area that is traditionally not a fish farming area. To this end, the study scrutinized the influence of financial factors on the performance of community based fish farming projects, the influence of stakeholders' skills and knowledge on the performance of fish farming community based projects, the influence of sociocultural factors on the performance of community based fish farming projects and the influence of technology innovation on the performance of community based fish farming projects in Nyeri County. The study used descriptive survey approach. The target population of the study was 407 which was made up of 43 group leaders, 359 fish farmers and 5 District Fisheries Officers (DFOs). A sample size of 83 was taken which included 43 group leaders, 35 fish farmers and 5 District Fishery Officers (DFOs). The study used a questionnaire to gather data from the 83 respondents. The data was analysed using descriptive and inferential statistics. The study established that the performance of community based projects was greatly influenced by the level of funding as most of the funding came from the member contributions which are usually limited. The skills and knowledge of the project leaders was also another factor affecting the projects' performance as the leaders are not well trained in project management and therefore lack the capacity to effectively manage the projects. Most of the members of the community are yet to embrace fish consumption and therefore local market for the harvest is still low in the area which leads to low profitability and wastage. The study also showed that the projects have not adopted the use of advanced technology as majority are still using traditional fish farming methods as well as methods of preservation. The study recommends that the Government of Kenya be more involved in the community based projects by investing more in terms of funding as well as providing advanced equipment. The project leaders should be trained more on project management in order to equip them with adequate skills to effectively manage the projects. The project leaders should also develop marketing strategies to ensure that their produce can be sold in other areas. The donors should invest more funds in the community based projects as well as introduce advanced fish farming technology that has been found effective elsewhere.

LIST OF ABBREVIATIONS AND ACRONYMS

AIFP	Aquaculture and Inland Fisheries Project
CBP	Community Based Projects
DFOs	District Fisheries Officers
EU	European Union
FAO	Food and Agriculture Organization
GoK	Government of Kenya
MT	Metric Tones
NALEP	National Agriculture and Livestock Extension Program

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Sub-Saharan Africa is among the areas where poverty is geographically concentrated, and it is so pervasive that many of the policies concerned with poverty alleviation encompass practically most of the development plans (Collier & Gunning, 1999). Ziderman (2003) asserted that small-scale, informal sector enterprises presented enormous opportunities in Sub-Saharan Africa for employment creation. The development of skills through targeted programs is essential to improving the livelihoods of disadvantaged groups, including women; training could better enable women to function well in the informal sector (Ziderman, 2003).

Some communities in Kenya have already demonstrated competence through the use of “informal networks” frequently known as “community self-help groups.” Their actions also complement efforts of various agencies to reduce poverty (Snow & Buss, 2001) and improve the lives of people in the rural areas. Community groups are popular institutions in Kenya’s rural areas which help provide services that the government may have failed to deliver. They take the form of burial groups, church mission groups, women’s groups or youth groups (Freeman et al., 2004). Kenya’s local self-help development efforts are predicated on the spirit of Harambee - a Swahili word that connotes community efforts for a common goal (Thomas, 1988). Modern self help groups’ objectives now focus more on income-generating projects rather than solely welfare activities. They are multi-purpose and combine mutual financial assistance in the form of rotating credit associations to provide the means to pursue social, educational, and economic activities (Mbugua, 1997).

These groups open new opportunities to generate, save, and invest income and assist rural people in effectively responding to dynamic socio-economic changes as individuals, families, or as a community (Kiteme, 1992). Conversely, many international development aid agencies are now embracing such informal institutions because of their role in economic development, especially in Sub-Saharan Africa. They help complement bottom-up community development and correct government failures where national policies may have stymied growth (Snow & Buss, 2001). It

is therefore important to examine the roles, functions, and pertinent issues arising from such affiliations, especially as they may promote sustainable, local development (Thomas, 1998).

1.1.1 Community based projects

The involvement of the people directly or indirectly hastens the rate of development. The need for self-help projects that enhance community development in developing countries evolved from the inability of the government to provide all the social and economic needs of the populace. The provision of the socio-economic needs directly influences the poverty level thus, leading to improved living standards. Community based organizations in their various forms are known to enhance community development by providing infrastructure and socio-economic services (Adedoyin, 2008).

There are various categories of community based organizations that purely perform social function; some are cultural in their outlook to community development and some focus on economic development. Community based organizations, associations, or groups of people, who associate purposely to achieve a common goal that will transform the economic and social life of the community in the long/short run, explore the advantages of felt needs of the people to secure their interest as a matter of helping themselves to solve their own problems (Adedoyin, 2008).

Worldwide, community based projects (C.B.P) have seen the development and industrialization of many countries like China and Japan. Kenya has incorporated these projects as a way of improving economic status of its society. This has been well articulated in the first Millennium Development Goals and in the Social and Economic pillars of vision 2030 (N.E.S.C.K, 2007) which is the country's new development blueprint covering the period 2008 to 2030. Kenya Vision 2030 aims to transform Kenya into a newly industrialized, "middle-income country providing high quality life to all its citizens by the year 2030." The Vision was based on three "pillars"; the economic, the social and the political. The Social Development Pillar promotes strong family values and an effective social safety net for all Kenyans such that they have an adequate income to maintain a dignified life. This pillar also empowers women and youth by providing them with equal opportunities to participate at all levels of society.

Often, community's projects are not integrated into the local agricultural development plans; instead, they are considered as ancillary enterprises for raising income. This makes it difficult for

such groups to access government assistance, bank loans, or grants (Feldman, 1993). The lack of capital and the designation of community projects or initiatives as short term solutions to their problems and thus peripheral to the nation's mainstream economic development affects attempts to change the economic status of marginalized groups (Srujana, 1996). Organization is also a constraint that manifests itself as lack of records or poor bookkeeping as well as inadequate organizational and management skills (Mbugua, 1997; Srujana, 1996).

1.1.2 Fish farming in Kenya

Kenya is endowed with numerous aquatic resources with aquacultural potential. It has highly varied climatic and geographic regions, covering a part of the Indian Ocean coastline, a portion of the largest freshwater lake in Africa (Lake Victoria), and several large rivers, swamps, and other wetlands, all of which support an abundance of native aquatic species. These aquatic environments range from marine and salty waters to cold and warm fresh waters, and many can sustainably contribute to the operation of ponds for fish production.

Fish farming, which is also referred to as aquaculture, entails farming of fish and other aquatic organisms in a controlled environment. The farmed fish and organisms are deemed to be of commercial value and this is the only viable alternative source of seafood especially at this time when natural stocks of seafood are declining. Kenya has a great potential for aquaculture growth because it is endowed with climatic diversity, natural features and other resources that favour the culture of a wide variety of aquaculture species.

Aquaculture in Kenya can be categorized into three broad divisions. These are; warm fresh water aquaculture dominated by the production of various species of tilapia and the African catfish mainly under semi intensive systems using earthen ponds. Cold fresh water aquaculture involving the production of rainbow trout under intensive systems using raceways and tanks. Lastly, marine water aquaculture which is underdeveloped. Tilapine species form about 90 per cent of fish farming in Kenya. Aquaculture takes different forms, ranging from small hand-dug kitchen ponds to fairly large earth ponds. Dams are often stocked with fish and harvested periodically.

Warm water fish farming in ponds began in Kenya in the 1920s, initially using tilapia species and later including the common carp and the African catfish. In the 1960s rural fish farming was

popularized by the Kenya Government through the “Eat More Fish” campaign. As a result of this effort, tilapia farming expanded rapidly with the construction of many small ponds especially in Kenya’s Central and Western Provinces.

The government in collaboration with multilateral and bilateral development partners initiated many community based fish farming projects aimed at poverty reduction (N.A.L.E.P, 2006). The Fishery Strategic Plan (2008-2012) shows the first phase of a government project meant to create 120,000 jobs and boost food security through fish farming. Under the program, the government planned to create economic opportunities through a Sh1.1 billion stimulus package to be channeled through youth and women groups at the constituency level. The money was to be shared among 140 constituencies, translating to Shs 8 million per constituency for the construction of 200 ponds (GOK, 2010).

1.2 Statement of the Problem

Ngugi et al (2007) found that the number of productive ponds declined in the 1980s, mainly because of inadequate extension services, lack of quality fingerlings, and insufficient training for extension workers. Until the mid-1990s, fish farming in Kenya followed a pattern similar to that observed in many African countries, characterized by small ponds, subsistence-level management, and very low levels of production. Fish farming or aquaculture provides viable alternative source of fishing especially at this time when the natural stocks of fish are declining. Kenya has great potential for aquaculture growth because it is endowed with climatic diversity, natural features and other resources that favor the culture of a wide variety of fish species. However, only a small portion of these resources are utilized (Brooks, 1992).

According to FAO (2004), the fisheries sub-sector in the country has been faced with numerous challenges. These include: declining fish stocks in the natural water bodies, conflict between various users of fisheries resources, cross-border fishing and trade conflict, fish marketing, fish quality and post harvest issues, lack of a comprehensive fisheries policy and a fisheries master plan, low funding levels for the department and slow capacity building and staff motivation. These coupled with lack of proper extension services in the rural areas can adversely affect the output of the projects (FAO, 2007).

Fishing in Kenya however artisanal is an industry that makes a significant contribution to the national economy both in terms of income and employment generation. Also it is an important supplement for animal protein to majority of people in the country and therefore contributes to people's health and therefore improvement in human capital. On the other hand, fisheries sector has been observed to give a significant support to the growing tourism industry in Kenya through its supply to hotels and recreational park areas (Mwangi, 2008). Since 2001, through consistent efforts in on-farm research and training, Kenya's aquaculture production has risen to almost 1500 MT (Fisheries Statistical Bulletin, 2008).

Aqua culture is a fast growing economic activity in the greater Nyeri area. Aqua-culture in this region has the potential to produce up to 200,000 tonnes of fish. This would cushion farmers against food shortages and provide a nutritious diet. The government under the Economic stimulus program, allocated money for the set up of fish ponds in various constituencies including those in Nyeri County. Small processing plants that would serve as nerve centers for aquaculture, value addition and marketing at the constituency level, were supposed to be established. However this did not go as planned and the fish ponds were faced with a number of problems including water draining out of many fish ponds even as the region experienced heavy rains while those fish ponds with water have no fingerlings. Other fish ponds are dry or overgrown with weeds. It is in this light therefore that this study aimed at establishing the factors influencing community based fish farming projects in Nyeri County.

1.3 Purpose of the Study

The purpose of this study was to determine the factors influencing the performance of community based fish farming projects in Nyeri County.

1.4 Objectives of the Study

The objectives of the study were:

- i. To determine the influence of economic factors on the performance of community based fish farming projects in Nyeri County.
- ii. To evaluate the influence of skills and knowledge of group leaders on the performance of community based fish farming projects in Nyeri County.

- iii. To establish how socio-cultural factors influence the performance of community based fish farming projects in Nyeri County.
- iv. To evaluate the influence of technology innovation on the performance of community based fish farming projects in Nyeri County.

1.5 Research Questions

- i. How do economic factors influence the performance of community based fish farming projects in Nyeri County?
- ii. What is the influence of skills and knowledge of group leaders on the performance of community based fish farming projects in Nyeri County?
- iii. Which socio-cultural conditions influence the performance of community based fish farming projects in Nyeri County?
- iv. How does modern technology influence performance of community based fish farming projects in Nyeri County?

1.6 Significance of the Study

This study is significant to the government through the Ministry of Fishery as it is in a position to identify the underlying factors affecting performance of community based projects on fish farming and the way forward for the purpose of sustainability and improvement of their productivity.

The study is also of great importance to the fish farmers because they now know the challenges faced by other farmers and may therefore find appropriate measures to improve fish farming in the country. This improvement will contribute to poverty reduction in the area as the projects will result in income generation for the various households.

The study will help other researchers who will use the findings in identifying the gaps in fish farming that need to be filled. Therefore the study has formed the basis for further studies.

1.7 Delimitations of the Study

The study was carried out in Nyeri County targeting all self help community based fish farming projects. Study participants were group leaders, Division Fishery Officers (DFOs) and self help groups' farmers/beneficiaries.

1.8 Limitations of the Study

The two major limitations to the study were time and finances.

This is because the research was carried out over a period of only one month to cover fish farming projects spread across the County. As a result, the study was limited to a sample population which was considered as a representative of the population.

The researcher engaged 3 individuals to assist in the distribution and collection of the questionnaire which saved on the time spent in the field collecting the data. The researcher was able to minimize costs by ensuring that all data was collected in one trip to avoid extra travel and accommodation costs.

1.9 Basic assumptions of the Study

In the study the assumptions were that the respondents would make time to fill in the questionnaire and that they would provide accurate and honest responses. A response rate of 89% was attained meaning that the respondents were very cooperative.

1.10 Definition of significant terms

Aquaculture: This is the farming of aquatic organisms such as fish, shellfish and even plants.

Community based project: This is an undertaking by members of a community for the purpose of earning income that will help in improving the community's standard of living.

Economic resources: These are the goods or services available to individuals to enable them carry out fish farming activities. For instance finance for start-up or expansion of projects.

- Fish farming projects:** Fish farming involves raising fish commercially in tanks or enclosures, usually for consumption purposes.
- Knowledge and skills:** This refers to the information and experience that a farmer may have that enables them to successfully perform fish farming projects. For instance academic qualification, extension services and work experiences.
- Performance:** Performance refers to the accomplishment of a given task measured in fish farming projects. In this case, this could be in the form of large market share, increase in harvests and project sustainability.
- Socio-cultural aspects:** These are the larger scale forces within cultures and societies that affect the thoughts feelings and behaviors of individuals. They include: attitudes, culture change, ethnic values, family structure, religious practices that may affect fish consumption and farming.
- Technological innovation:** This is the development through which improved technologies are expanded and brought into extensive application of farming for instance better fishing nets or modern fish farming techniques.

1.11 Organization of the Study

This study is organized in five chapters. Chapter One gives the background of fish farming and community based projects. It also shows the statement of the problem as well as the objectives of the study. Chapter Two reviews the literature on Aquaculture from the global, African and Kenyan perspectives. Chapter Three describes the research methodology of the study and also shows the sample size of the research. Chapter Four presents the data analysis and provides the interpretation of the data collected. Chapter Five provides the findings of the study, the conclusion derived by the study as well as recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant literature on the factors that influence the performance of community based fish farming projects from a global, African and local perspective. It also reviews the relationship between theories and financial factors, socio-cultural factors, skills and knowledge and technological innovations that influence performance of community based fish farming projects in Nyeri County. Finally, the chapter presents a conceptual framework on which the entire study revolved.

Community based fish farming projects

Aquaculture is the farming of aquatic plants and animals. Fish culture deals with fish rearing or production in a controlled environment like ponds, tanks, reservoirs, cages or irrigational canals (Adesulu, 2004). The process comprises of a wide spectrum of culture practices and it varies from a simple fish culture in excavated earthen ponds with little or no feeding to the highly sophisticated farming systems. There are specially designed ponds, as well as cages and raceways, requiring aeration and periodic replacement of freshwater. This special agricultural process requires inputs in the form of feed, drugs and use of chemicals for the survival of the aquatic products.

World fish production rose in 1989 to over 100 million MT in total as reported catches in the 1990s (FAO, 1995). Although, this figure declined between 1990 and 1992, preliminary data for 1993 indicate that total production amounted to over 101 million MT. Of this catch, about 30% was utilized for non-food purposes, mainly for reduction to fish meal and oil. Fresh fish was the most important fish product for direct human consumption, its share of total production remaining at around 30% between 1970 and 1990 (Ikpe, 1996 & FAO, 1995).

World production from capture fisheries and aquaculture supplied about 101 million MT of food fish in 2002, providing an apparent per capita supply of 16.2 kg, with aquaculture accounting for the growth in per capital supply since 2000. Overall, fish provided more than 2.0 billion people with at least 20% of their average per capital animal protein intake. The share of fish proteins in

total world animal protein supplies grew from 14.9% in 1992 to a peak of 16% in 1996 and remained at that level (15.9%) in 2001 (FAO, 2004).

In Africa, more than 10 million people rely on fisheries as a vital entrepreneurial activity. Over 2.5 million fishers make business opportunities available for many processors, traders and micro enterprises in relevant industries. To most of them, the fishing industry is a good avenue for income generating activity. Of Africa's 800 million people, over 200 million are regular fish eaters. To them, fish is an essential aspect of their nutrition, accounting on average for 22% of their animal protein intake reaching up to 70% in some countries (N.S.P.I.S, 2005).

According to Ngugi and Onyolo (2002), warm water fish farming in ponds began in Kenya in the 1920s, initially using tilapia species and later including the common carp and the African catfish. It was thought that proper fish farming started in around 1948 nationwide (Balarin, 1985). The establishment of Sagana and Kiganjo fish culture stations in 1948 led to the interest in rural fishponds. "The Eat More Fish campaign" in 1960's by the Fisheries Department led to the rapid and extensive spread of rural fish ponds in other parts of the country where fish farming could be practiced.

However, the number of productive ponds declined in the 1970s, mainly because of inadequate extension services and training, poor yields, lack of quality fingerlings and technical knowhow on fish farming (Kagai, 1975). Until the mid 1990s, fish farming in Kenya followed a pattern similar to that observed in many African countries, characterized by small ponds, subsistence-level management, and very low levels of production. Even with unreasonably high fish imports, there remained a significant shortfall in supply to meet demand. This was in contrast to an estimated national potential of fish production of 3.2 million MT per year (A.I.F.P, 2005). The contribution of fisheries to the gross domestic product was only between 3% and 4%, yet, it occupies a very significant position in the primary sector providing direct employment for over a million people (FAO, 2004). The rapidly growing fast food industry opened up employment opportunities in the downstream value chain for handling, processing and marketing of fish (A.I.F.P, 2005).

Today, following the renovation of several government fish rearing facilities, the establishment of research programs to determine best practices for pond culture, and an intensive training

program for fisheries extension workers, there is renewed interest in fish farming in Kenya. Farmers in suitable areas across the country are again turning to fish farming as a way of producing high quality food, either for their families or for the market, and as a way of earning extra income. The application of appropriate techniques and good management has resulted in high yields and good income (Chandra, 2006).

A farmer considering culturing fish needs to consider a number of factors that could affect the success and profitability of the enterprise. Surveys for suitable sites or evaluations of specific sites should first identify strengths and weaknesses of physical characteristics such as the suitability of the soil, the topography of the land, and the availability of good quality water. The evaluations should consider market demands, proximity to markets, and the availability of needed inputs such as fertilizers and feeds. In addition, all existing and planned uses of the catchments area should be studied to determine how they might contribute to or interfere with the farming enterprise (Abila, 1998).

2.2 Methods of fish farming

Fish farming may range from 'backyard' subsistence ponds to large-scale industrial enterprises. Farming systems can be expressed in terms of input levels namely; Semi-intensive fish farming- this requires a moderate level of inputs and fish production is increased by the use of fertilizer and/or supplementary feeding. This means higher labour and feed costs, but higher fish yields usually more than compensate for this. Intensive fish farming involves a high level of inputs and stocking the ponds with as many fish as possible. The fish are fed supplementary feed, while natural food production plays a minor role. In this system, difficult management problems can arise caused by high fish stocking densities (increased susceptibility to diseases and dissolved oxygen shortage). The high production costs force one to fetch a high market price in order to make the fish farm economically feasible (Fakoya, 2000).

The majority of freshwater fish are raised in ponds. Water taken from a lake, river, well or other natural source is channeled into the pond. The water either passes through the pond once and then it is discharged, or it may be partially replaced so that a certain percentage of the total water in a system is retained. Pond systems that yield the highest fish production only replace water

lost through evaporation and seepage. Water flow generally reduces the production of pond systems in the tropics (Verweiji, 2001).

Fish farming ponds range in size from a few dozen square metres to several hectares (ha). Small ponds are normally used for spawning and baby fish production, while larger ponds are used for the grow-out period. Production ponds larger than 10 ha become difficult to manage and are not very popular with most producers. The kind of pond a farmer will build depends very much on local resources, equipment and conditions (Verweiji, 2001). Ponds are usually located on land with a gentle slope. They are rectangular or square-shaped, have well-finished dikes and do not collect run-off water from the surrounding watershed. It is important that sufficient water is available to fill all the ponds within a reasonable period of time and to maintain the same pond water level. Farmers should also be able to drain the pond completely when the fish are to be harvested (Verweiji, 2001).

To prevent fish theft the pond should be located as close to your home as possible. Another method to keep thieves away from your fish pond is to place bamboo poles or branches in the water, which makes netting and rod-and-line fishing impossible. Apart from theft prevention, the poles and branches provide the fish with extra natural food. This practice is called periphyton-based fish farming (Verweiji, 2001).

2.3 Influence of economic factors on performance of fish farming

Setting up a fish farm involves high initial investment and high production costs as well as economic risks. Therefore, there are some very important financial factors a prospective fish farmer should consider before embarking on a fish farming venture (Fakoya & Daramola, 2005).

A cost estimate should include the cost of land as well as capital expenditures for fish stock, pond construction, labour, production and harvesting. Feeding costs are generally the most important in the total cost of production. Therefore, plant-eating (herbivorous) or plant and animal-eating (omnivorous) fish species are preferable as they feed on natural food resources occurring in the pond. The cost of feeding these species will be relatively low. Carnivorous (predatory) fish species, on the other hand, need a high protein diet and are therefore more expensive to produce. To compensate for higher feeding costs, however, most carnivorous species fetch higher market prices (Fakoya & Daramola, 2005).

The development and wider adoption of aquaculture can be seen as a significant basis for improving household food security and other needed welfare (Ahmed and Lorica, 2002). Aquaculture has the potential to contribute to the food and nutritional status of people in at least three ways; adoption-income linkages, adoption-employment linkages and adoption-consumption linkages. The adoption-employment linkage is based on the hypothesis that the consumption and nutrition status of household members is related to the household's ability to earn income, which in turn depends on the nutritional health of the household's labour force. Aquaculture is expected to increase the marginal productivity of agricultural labour and hence result in higher incomes for both own-family and hired labour (Ahmed, 2002).

Ahmed (2002) indicates the adoption-consumption linkage may be based on the hypothesis that adopting households consume a disproportionately higher amount of fish, which is rich in micronutrients, and hence improvements in nutritional status can be achieved through adoption-consumption linkages. Adoption of aquaculture increases market supply that holds fish prices down, and hence increases the intake of micronutrient rich food i.e. fish. FAO estimates that consumption of fish is increasing steadily and will rise from 40 million tonnes in 1970 to 110 million in 2010. In a case study conducted by Schuurhuizen, Tilburg and Kambewa (2006), it was established that the competition for fish between the domestic and export market is rather unequal and the drive to sell fish overseas has resulted in reduced local availability (Schuurhuizen, 2006). The case study focused mainly on the Nile perch chain around Lake Victoria and encouraged government participation and support to local farmers in order to promote sustainability of fish stocks.

Gichira and Dickson (1997) stated that among the most recurring problems faced by entrepreneurs was lack of finances to run the projects. Several reports indicated that the sub-sector received low funding from both the government and the private sector. Where funds were given, continuous flow lacked and that generally affected the daily activities of the projects. However, Harper (1995) in his study pointed out that while lack of capital was a major setback for community based projects, a lot of resources were held up in unproductive assets or even misappropriation by the management.

2.4 Influence of skills and knowledge on performance of fish farming

Human capital theory suggests that education or training raises the productivity of workers by imparting useful knowledge and skills, hence raising workers' future income by increasing their lifetime earnings. While formal education has expanded rapidly in many countries, a large portion of human capital accumulation in the forms of on-the-job training and other modes for working adults actually take place both inside and outside the workplace. Adult education development in developed countries in recent years has focused on strengthening of vocational training to meet the needs of skill development across all occupational strata in the global economy (Belanger & Tuijnman, 1997). Studies in some developing countries find that a mix of education and training is available for skill acquisition and there are multiple paths to skill development for a given occupation (Ziderman and Horn, 1995). Levin and Kelley (1994) suggest that education can improve productivity only if complementary inputs exist, which include training, contract terms, and management practices; they point out that economists and other social scientists have overestimated the payoffs resulted from increased formal education while they have ignored the complementary inputs and conditions.

Turner & Müller (2005) indicated that the literature on project success factors has largely ignored the impact of the project manager, and his or her leadership style and competence, on project success. Edwards (1998) said that the key constraint to aquaculture development is dissemination of existing knowledge, whether derived from research or indigenous technical knowledge of farmer. The limited capacity of developing country institutions in education, research and development compounds this fundamental failing. He suggested that research should follow farming systems research and extension methods in which inter-disciplinary teams work with farmers to evaluate and develop both production systems and extension methods that are appropriate to the local conditions of farmers and their resource base.

To achieve a high production of fish in the pond, regular maintenance and monitoring is vital. Daily management includes: Checking the water quality (oxygen, pH, colour, transparency, temperature, etc.), checking the pond for possible water leaks, cleaning the screen of the water inlet and outlet, observing the fish while they feed and removing aquatic weeds growing in the pond because water quality is a vital factor for good health and growth in fish (Adeniji, 2005).

Some of the most important water characteristics are described in the following paragraphs.

2.4.1 Oxygen component

Oxygen is a gas that is produced by all plants in the pond (therefore also by phytoplankton) with the help of sunlight. The more sunlight falls on the pond and the larger the quantity of phytoplankton, the higher the oxygen-production will be. The oxygen produced partly dissolves in the water and the rest escapes to the air. The oxygen level of the water varies during a 24-hour period because the production and absorption of oxygen by the plants change with light and darkness. The phytoplankton in the pond only produce oxygen when there is light (Van der Mheen, 1999).

At night they need oxygen like any other plant or animal in the pond, but because of the lack of sunlight no oxygen can be produced. Consequently, the quantity of dissolved oxygen in the water decreases after sunset. Normally, the oxygen level is at the highest at the end of the afternoon (oxygen has been produced throughout the day) and at the lowest in the early morning (oxygen has been used up throughout the night). Shortage of oxygen is the most important cause of fish death when the pond has been fertilised with manure or fed too much. A sufficiently high oxygen level is important for good fish production (Van der Mheen, 1999).

According to Saka et al. (1998), if fish are gulping for oxygen at the water surface, farmers can solve this problem by flowing extra freshwater through the pond or stirring up the water in the pond to increase the amount of dissolved oxygen. One should not feed and fertilise the pond at this moment because this is often one of the reasons for the oxygen shortage. Over-stocking of fish in the pond could be another possible cause of oxygen shortage problems. This can cause oxygen stress for the fish, which can result in disease outbreaks and mortality.

2.4.2 Water acidity, alkalinity and hardness

Water hardness is the measure of total water-soluble salts. Water that contains many salts is called 'hard' and water that contains few salts is called 'soft'. One method of ensuring hardness is to carefully examine the pond dikes. If a white line appears on the dike at the same height of the water level, this means that salts present in the water have dried on the pond dikes. Therefore the pond contains hard water. Hard water is important for good fish growth. If the water is too

soft (i.e. the amount of water soluble salts is low), the farmer can increase the hardness by adding lime to the water. In this manner, water fertility will increase, so natural food production and ultimately fish production in the pond will also increase (Olagunju, 2007).

Water suitable for fish farming should have a certain degree of acidity, indicated by the water pH-value. This should preferably range between 6.7 and 8.6. Values above or below this range inhibit good fish growth and reproduction. Phytoplankton require a pH of about 7 and zooplankton a slightly lower pH of 6.5. Sometimes the pH of the pond water can change quickly. For example, heavy rain may carry acid substances, dissolved from the soil into run-off water, into the pond. In this way, the pond water gets more acid and thus the pH-value decreases. The best way to increase the pH-value of the water again to neutral (about 7) is to add lime to the pond (Olagunju, 2007).

2.4.3 Turbidity

Turbidity is the term for the amount of dissolved, suspended dirt and other particles in the water, which give the water a brown colour. High turbidity of water can decrease fish productivity, as it will reduce light penetration into the water and thus reduce oxygen production by the water plants. Dissolved, suspended solids will also clog filters and injure fish gills (Farrington & Kidd, 2002).

A suitable method for reducing turbidity is using a silt catchment basin. This is a small reservoir at the inlet of the pond. The water flows into this reservoir and is kept there until the mud settles at the bottom. Then the clear water is let into the fish pond. Fish farmers can also clear muddy water by placing hay and/or manure in the pond and leave it there to decompose. However, this method should not be used during very hot weather because the hay will begin to rot very quickly leading to oxygen shortage in the pond (Farrington & Kidd, 2002).

2.4.4 Toxic substances

Toxic substances in the water supply of the pond can decrease fish production seriously, so farmers should investigate and control any existing or potential sources of water pollution in the vicinity of the pond. Many chemicals used in animal husbandry and crop cultivation are

poisonous to fish. Therefore, chemicals should never be used in the area around the pond, especially avoid spraying on windy days (Williams, 1997).

Overpopulation on the other hand can be controlled most economically by the small-scale subsistence farmer by stocking predatory fish together with the tilapia in the pond. These predators will eat the majority of the fingerlings and will therefore prevent overpopulation of the pond (Williams, 1997).

2.5 Influence of Socio-cultural factors on performance of fish farming

Fish has always been recognized as a cheap source of animal protein. Countries with low per capita gross domestic product tend to have a higher proportion of fish protein in their animal protein consumption. Although less developed countries are not the biggest consumers of fish, they are the most dependent on it (Kent, 1997). The share of fish protein as a proportion of total expenditure on animal protein is higher for lower income groups, and poor people consume mostly low-priced fish. This shows the importance of low-priced fish as a primary source of protein among poor households in developing countries – although in many cases this low-cost fish is derived from inland capture fisheries. When inland capture fisheries decline, aquaculture increasingly makes up for the gap and even starts to fill the increasing demands from increasing populations. This suggests that freshwater aquaculture plays a significant role in the growth in per capita fish consumption and in keeping fish prices stable and at least as likely to be on the table as meat from livestock and poultry (FAO, 1993).

Several sub-Saharan African countries provided information on the role of women in fish farming and the data show that women play a minor role in fish production and own or manage approximately 16 percent of the farms (Hecht, 2006). The highest proportion of women fish farmers (30 percent) is in Zambia. All countries commented, though not quantified, on the important role of women in post-harvest activities, and particularly in marketing of the product. In all countries, non-commercial fish farms are reported to play an important role in contributing towards food security, improved nutrition and rural employment. Non-commercial aquaculture plays an important role in rural livelihoods, and fish farming families in general are better nourished than non-fish farming families. Cash income from fish ponds contributes to general

household costs and living expenses and in most countries non-commercial farmers also use fish for barter and gifts.

Fish consumption varies with socio-cultural groups. Changing lifestyles throughout the population have an impact not only on the quantity of fish consumed but also the ways in which it is consumed. Longer working hours and increased female participation in the full time workforce have led to a decline in the preparation of food from basic ingredients. Lack of knowledge in how to prepare and cook fresh fish and a dislike of bones has led to a decline in the consumption of fresh whole fish among younger people in particular. Convenience and frozen foods have increased in popularity as consumers of all ages, but especially the young, devote less time to food preparation. The move towards more convenient presentations of fish has been accompanied by the expansion of the supermarkets as major sources of fish purchases (Brummett, et al., 2010).

Mbugua (2002) in his study identified project adaptability to the community as an important challenge and together with Gongera (2004) agreed that community ownership and adequate support are required for sustainability.

Shifts in consumer attitudes and preferences have been an important factor influencing the demand for fish in general. Fish has been seen as a 'healthy' product and has benefited from the trend towards reducing red meat consumption. Besides price and quality, consumers are increasingly concerned with how their food is produced. Farmed fish may arouse concerns for animal welfare as any intensive livestock production system. The environmental effects of intensive fish farming may also provoke a negative consumer response (Brummett, et al., 2010).

Fish consumption may have benefited from food scares associated with alternative sources of protein, especially red meat. Recently fish farmers have reported increases in their salmon sales to Belgium in response to the dioxin scare in pork. Fish and shellfish are generally considered to be healthy foods and hence a 'safer' alternative to intensively-reared livestock products (Brummett, et al., 2010).

2.6 Influence of modern technology on performance of fish farming

Edwards 1998, emphasises that most scientists focus on technical aspects of aquaculture, resulting in the impression that the major constraint facing aquaculture development is a shortage of technical knowledge, overshadowing the developmental and educational constraints. The key constraint to aquaculture development is dissemination of existing knowledge, whether derived from research or indigenous technical knowledge of farmer. The limited capacity of developing country institutions in education, research and development compounds this fundamental failing. Research should follow farming systems research and extension methods in which interdisciplinary teams work with farmers to evaluate and develop both production systems and extension methods that are appropriate to the local conditions of farmers and their resource base.

Today, following the renovation of several government fish rearing facilities, the establishment of research programs to determine best practices for pond culture, and an intensive training program for fisheries extension workers, there is renewed interest in fish farming in Kenya. Farmers in suitable areas across the country are again turning to fish farming as a way of producing high quality food, either for their families or for the market, and as a way of earning extra income. Because of recent locally conducted research and on-farm trials, farmers are learning that the application of appropriate techniques and good management can result in high yields and a good income (Daramola, 2008).

Most fish produced in subsistence operations are sold at the pond site. This way, farm families satisfy their needs and sell excess to neighbours. For harvests larger than 50 kg, for example in semi-intensive settings, arrangements can be made with a buyer. However, with the appropriate storage mechanism harvesting can be done regularly to satisfy the customer's needs, even if the amount they buy monthly or weekly is very little. This helps to create a niche market i.e. a market where the seller is assured of a small but regular outlet for their produce. It is advisable that small-scale producers form marketing groups, which will assure them a regular market (Daramola, 2008).

Farmers should be encouraged to invest in technology which provides an early return via improved productivity. Modern techniques include sea pens, tanks, pumping systems, computerised feeding mechanisms, work boats and automated vaccinating equipment. Costs in

investment per unit output should decline as industries grow as they have in the past. However if further expansion depends on more expensive engineering solutions to environmental constraints then unit costs will rise (Worby, 2001).

Edwards (2000) is critical of research-derived, on-station technologies which have seldom fitted the diverse and resource-limited contexts of most poor farming households. He goes further to state that most aquaculture professionals and service providers currently have a technocratic and fisheries biology worldview which focuses on maximising biological yield rather than low-cost fish, and commodities rather than communities. He advocates for more participatory, systems type approaches to identify households, to assess their needs and resources, to assess whether aquaculture is appropriate and if so, to adapt technologies in conjunction with farmers (Edwards, 2000).

2.7 Conceptual Framework

Figure 1 presents the conceptual framework on which the study is based

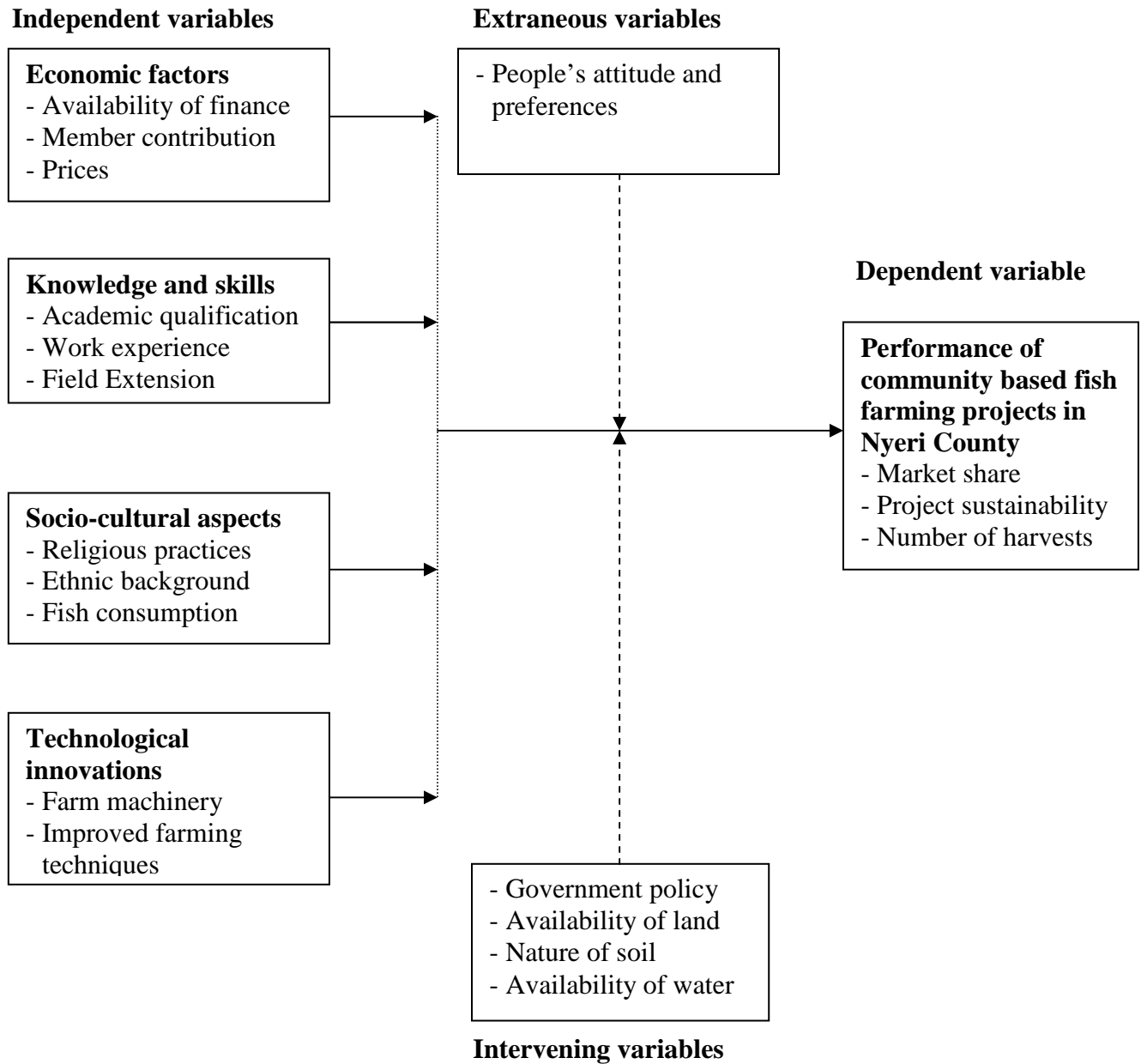


Figure 1: Conceptual Framework

The conceptual framework assumed that performance of fish farming projects differ from one group to another depending on financing, fish prices, academic qualification and availability of extension officers, socio-cultural aspects of the community and improved technological innovations.

2.8 Chapter Summary and Research Gap

This chapter has reviewed the existing literature on fish farming from the global, African and Kenyan perspectives. It has also presented a number of relevant studies done to support the study and also a conceptual frame work. The review of the literature indicated that fish farming is currently spreading fast all over the world. It is considered a good source of food for the world population and a means for poverty alleviation. However, the practice is faced with challenges such as financial constraints, inaccessibility of appropriate technology and knowledge.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research design, target population, sample and sampling procedure, research instruments, data collection and data analysis procedure. It also presents the operationalization of the dependent and independent variables.

3.2 Research design

The research used descriptive survey approach. According to Ngechu (2004), descriptive studies are more formalized and typically structured with clearly stated investigative questions. It serves a variety of research objective such as descriptions of phenomenon or characteristics associated with a subject population, estimates of proportions of a population that have these characteristics and discovery of associations among different variables.

3.3 Target population

According to (Mugenda and Mugenda, 2003), the target population is the entire set of units for which the survey data is to be used to make inferences. The region has 43 fish farming self help groups spread across the County. The study targeted group leaders and fish farmers in community self help groups in the area. Key informants like District Fisheries Officers (DFOs) were also included.

Table 3.1: Target population

	Population
Group leaders	43
Fish farmers	359
DFOs	5
Total	407

3.4 Sampling Procedure and Sample Size

The study interviewed as broad a base of people as possible and endeavored to represent a well-balanced cross-section of society. In the sampling process in this survey, both men and women who are involved in fish farming were interviewed. The sampling method used was probability sampling, where each population element is given a known non-zero chance of selection. According to Cooper & Schindler (2003) the following questions should be borne in mind when using simple random sampling: What is the relevant population – in this case it was anyone who is involved in fish farming; What are the parameters of interest - in this study this was the length of time they have been running their fish farms, technical knowledge of fish farming, support from government (if applicable), access to markets, profile of their customers, sustainability of their enterprises and the income they derive from fish farming.

According to Kothari (2004) a representative sample is one which is at least 10% of the population is able to give 30 or more representatives of the population. A sample of 35 fish farmers were taken through a simple random method. The study therefore used a sample size of 83 respondents.

According to Mugenda and Mugenda (2003), when the population is small, there is no point of sampling if time and resources allow and this increases reliability. The research therefore conducted a census of all the group leaders and DFOs in the County.

Table 3.2: Sampling frame

	Population	Percentage	Sample
Group leaders	43	100%	43
DFOs	5	100%	5
Fish farmers	359	10%	35
Total	407		83

3.5 Research Instrument

The study used both primary and secondary data. Primary data was collected using self-administered questionnaires while secondary data was collected by reading through the ministry published reports, brochures, journals and periodicals. The questionnaire consisted of open-

ended and close ended questions. This was used to gain a better understanding and enabled a more insightful interpretation of the results from the study.

3.6 Validity of the Research Instrument

Validity indicates the degree to which the instrument measures the constructs under investigation (Mugenda and Mugenda, 2003). This study used content validity because it measured the degree to which the sample of the items represents the content that the test was designed to measure. Validity was ensured by discussing the instrument with an expert in the subject and with my supervisor.

3.7 Reliability of the Research Instrument

Reliability is the degree of consistency (Mugenda and Mugenda, 1999). A pilot study was conducted by the researcher administering the guide to 5 fish farmers from the neighbouring Muranga County. From this pilot study the researcher was able to detect questions that needed editing and those with ambiguities. The final questionnaire was then printed and dispatched to the field for data collection with the help of research assistants.

3.8 Data Analysis and presentation

The research was both quantitative and qualitative in nature. Once the data was collected it was checked for completeness and readiness for analysis. The data from the field was first coded according to the themes researched on the research. The qualitative data was analyzed using descriptive statistics such as mean, standard deviation and percentages. Inferential statistics such as correlation were used. Data presentation was done by the use of percentages and frequency tables.

3.9 Operationalization of variables

Table 3.3: Operationalization of Dependent and Independent variables

Objective	Variable	Indicator(s)	Measurement	Scale	Data collecting method	Data Analysis
To establish the influence of economic factors on the performance of community based fish farming projects in Nyeri County	<u>Independent variable</u> Economic factors	-Availability of finance -Members contribution -Favorable fish prices	-Sources of finance available -Current fish prices -Cost of production	Ordinal	Questionnaire	Descriptive statistics
To evaluate the influence of skills and knowledge on the performance of community based fish farming projects in Nyeri County	<u>Independent variable</u> Skills and knowledge	-Academic qualifications -Worker experience -Field extension services	-Academic qualifications -Fish farming training -Previous experience in fish farming	Ordinal	Questionnaire	Descriptive statistics
To determine the influence of sociocultural factors on the performance of community based fish farming projects in Nyeri County	<u>Independent variable</u> Sociocultural factors	-Religious practices -Ethnic background -Fish consumption	-Fish eating habits -Stable food for the region -Participation of women	Ordinal	Questionnaire	Descriptive statistics
To evaluate the influence of technology innovation on performance of community based fish farming projects in Nyeri County	<u>Independent variable</u> Technology innovation	-Farm Machinery -Improved farming methods	-Availability of fish preservation -Integrated farming -Preferred fishing methods	Ordinal	Questionnaire	Descriptive statistics
Performance of community based fish farming projects in Nyeri County	<u>Dependent variables</u> Fish farming projects	-Market share -Project sustainability	-Number of harvests -Amount of revenue collected	Ordinal	Questionnaire	Descriptive statistics

3.10 Chapter Summary

This chapter has looked at the research design of the study, the target population and outlined the sampling frame of the project. It has also discussed the validity, reliability and data analysis and presentation as well as presented the operationalization of variables table.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents findings of the data analyzed and interpreted in line with the study objectives. The findings are presented in the form of tables showing frequencies and percentages.

4.2 Response Rate

Table 4.1 presents the response rate of the target population.

Table 4.1: Response Rate

	Frequency	Percentage
Respondents	74	89
Non respondents	9	11
Total	83	100

The study targeted 83 respondents who included project beneficiaries and the managing team. A total of 74 questionnaires were returned giving a response rate of 89%. Majority of the respondents to whom the questionnaire was administered provided a response.

4.3 Demographic Information

In order to capture the general information of the respondents, issues such as age, gender and level of education were sought.

4.3.1 Gender of the respondents

Table 4.2 presents the gender of the respondents.

Table 4.2: Gender representations of the respondents

Gender	Frequency	Percentage
Male	21	29
Female	53	71
Total	74	100

Majority of the individuals involved in community based projects are women making up 71% of the respondents.

4.3.2 Category of respondents

Table 4.3 presents the number of respondents in each target group.

Table 4.3 Category of respondents

Category	Frequency	Percentage
DFOs	5	7
Group leaders	38	51
Fish farmers	31	42
Total	74	100

Majority (51%) of the respondents were group leaders, 42% of the respondents were farmers while district fisheries officers (DFOs) formed 7%.

4.3.3 Age of the respondents

Table 4.4 presents the age brackets of the respondents involved in the community based projects.

Table 4.4: Age of the respondents

Age	Frequency	Percentage
20 – 29 years	9	12
30 – 39 years	35	47
40 – 49 years	22	30
Above 50 years	8	11
Total	74	100

59% of the respondents were below 40 years. This therefore means that young members of the community are the ones mostly involved in the community based projects.

4.3.4 Level of education

Table 4.5 presents the level of education attained by the respondents.

Table 4.5: Level of education

Education level	Frequency	Percentage
Primary level	13	18
Secondary level	34	46
Tertiary level	20	27
University level	7	9
Total	74	100

Only 36% of the respondents had attained higher education i.e. college and university education. This shows that majority of the people involved in community based projects are those who have secondary school level of education.

4.4 Economic Factors

The following sections indicate the various economic factors that affect the performance of community based projects.

4.4.1 Sources of funds for the community based projects

Table 4.6 presents the various sources of funding used to start and sustain the community based projects.

Table 4.6: Sources of funds for the community based projects

Source of funding	Frequency	Percentage
Members contribution	60	81
Loan from bank	19	26
Ploughing back profit	42	57
Donor fund	8	11
Government grants	6	8

The Government's investment in the community based projects is very minimal having provided only 8% of funding to these projects. Own member contributions make up for majority of the project funding. This is done through providing funds from their savings, applying for loans from banks as well as ploughing back the profits from the projects.

4.4.2 Amount of capital for community based projects

Table 4.7 shows the range of initial capital investment made for the community based projects.

Table 4.7: Capital range

Project Capital (Kshs)	Frequency	Percentage
10,000 – 25,000	5	7
26,000 – 50,000	22	30
50,000 – 100,000	29	39
Above 100,000	18	24
Total	74	100

76% of the community based projects had a capital outlay of Kshs 100,000 and below therefore implying that most of the projects are small scale. This could be attributed to the economic status of people involved in the community based projects.

4.4.3 Challenges faced in project funding

Table 4.8 presents the funding challenges faced in the implementation and sustenance of the community based projects.

Table 4.8: Funding challenges

Funding challenges	Frequency	Percentage
Limited members contribution	53	72
High interest rate for loans	33	45
Lack of donor funding	24	33
Lack of managers' accountability	17	23

The main challenge faced in obtaining funds for the community based projects is provision of funds by the members. This is mainly due to their financial status as well as the high interest rates charged on the bank loans.

4.4.4 Influence of limited funding on community based projects

Table 4.9 shows other effects that funding has on the performance of community based projects.

Table 4.9: Effect of limited funding

Project funding	Frequency	Percentage
Hinder growth and profitability	36	49
Lead to stalling of projects	26	35
Innovative use of resources	12	16
Total	74	100

From the responses provided, majority of the respondents felt that lack of funding mainly led to hindrance of growth of the projects hence reduced profitability and eventually resulting in stalling of the projects.

4.5 Knowledge and skills

The following sections provide an analysis of the data collected with regard to the knowledge and skills of the individuals involved in community based projects.

4.5.1 Age of the projects

Table 4.10 presents the duration of which the various community based projects have been in operation.

Table 4.10: Age of projects

Age of Projects	Frequency	Percentage
1 to 5 years	40	54
6 to 10 years	26	35
Over 10 years	8	11
Total	74	100

Only 46% of the projects have been in existence for more than 5 years. This implies that the members of the community have only recently started getting involved in community based projects and that most projects are in the growth stage of development.

4.5.2 Management training

Table 4.11 shows the number of group leaders who have attended relevant training on management of fish farming projects.

Table 4.11: Leaders training

Training conducted	Frequency	Percentage
Yes	20	27
No	54	73
Total	74	100

Despite being the ones in control of the projects, most of the leaders had not undertaken any formal training on the management of community based projects and therefore did not possess the required skills. This has a negative impact on the overall performance of the project.

4.5.3 Members training on fish farming

Table 4.12 shows the number of farmers who have attended training on fish farming methods and techniques.

Table 4.12: Project members training

Members training	Frequency	Percentage
Yes	66	89
No	8	11
Total	74	100

89% of the respondents reported availability of farmers training in their projects which they have attended. This goes to show that most of the members are well trained.

4.5.4 Method of training for members

Table 4.13 shows the different training methods used to train the project members.

Table 4.13: Mode of training for members

Mode of training	Frequency	Percentage
Farmers seminars	46	63
Farmers exchange programs	4	5
Through extension officers	20	27
Formal learning in schools	4	5
Total	74	100

The training rolled put to farmers is organized and formal training as the majority of the members reported having been trained through seminars, extension officers and learning in schools.

4.5.5 Frequency of members training

Table 4.14 shows the frequency with which the trainings are carried out.

Table 4.14: Frequency of training for farmers

	Frequency	Percentage
Annually	25	34
Half yearly	39	53
Quarterly	7	9
Monthly	3	4
Total	74	100

There was adequate training conducted with all the members attending training at least once every year. 66% of the members attended training two or more times every year.

4.6 Socio cultural factors

The following sections provide an analysis of the influence of socio cultural factors on community based projects.

4.6.1 Influence of community beliefs on project performance

Table 4.15 presents data on the influence of community preference on a fish diet.

Table 4.15: Community's preference

Fish diet	Frequency	Percentage
Like fish	17	23
Dislike fish	57	77
Total	74	100

77% of the respondents indicated that they dislike consuming fish hence implying that fish consumption is yet to be adopted by majority of the community members as most associate fish diet with the Western part of the country.

4.6.2 Influence of women participation in community based projects

Table 4.16 shows the different roles that women play in community based projects.

Table 4.16: Women participation

	Frequency	Percentage
Provide labour	43	58
Provide market	27	37
Provide finance	4	5
Total	74	100

Women are the key players in the activities of the projects. 95% of the labour and market is provided by the women members of the projects.

4.7 Technological innovations

The following sections highlight the influence of technological innovations on the performance of community based projects.

4.7.1 The fishing method

Table 4.17 presents the different fishing methods used.

Table 4.17: Method of fishing

Method of fishing	Frequency	Percentage
Use of bait	41	55
Use of nets	26	35
Use of traps	7	10
Total	74	100

90% of the farmers use bait and nets as for fishing which are the traditional methods. This goes to show that modern methods of fish farming have not been adopted.

4.7.2 Availability of cooling facilities

Table 4.18 provides information on the availability of cooling facilities for the projects.

Table 4.18: Availability of cooling facilities

Fish cooling plant	Frequency	Percentage
Cooling plant not available	64	86
Cooling plant available	10	14
Total	74	100

Most of the community based projects do not have cooling facilities to store the fish once harvested and therefore have to find market immediately after harvest or incur losses due to the fish going bad.

4.7.3 Method of fish preservation

Table 4.19 presents the different methods used to preserve fish.

Table 4.19: Method of preserving fish

Preservation method	Frequency	Percentage
Salting	40	54
Drying	21	28
Freezing	13	18
Total	74	100

Only 18% of the fish farmers use freezing as a method of preserving the fish. This shows that the traditional methods of preserving fish are what are mainly being used.

4.8 Performance of community based projects

Table 4.20 presents the responses to the likert scale questions given to the respondents:

Table 4.20: Likert scale questions

	Mean	Standard Deviation
Banks charges high rate of interest hinder project financing	3.00	0.05
Financial management affect performance of C.B.P.	4.12	0.18
Funding affect performance of C.B.P.	3.91	1.21
Project Managers in this area have adequate management training	1.71	2.00
The training has assisted in the running of C.B.P	3.60	1.01
Management skills affects the level of performance of C.B.P.	4.50	0.02
Fish eating culture influence fish markets	4.33	0.98
Land ownership influences fish farming projects	3.01	1.25
Community orientation affects fish farming projects	3.11	0.54
Fish Market is readily available in Nyeri county	2.02	1.22
Outdated and inadequate infrastructures affect the level of performance of C.B.P.	3.98	0.85
Ineffective storage methods affect the performance of C.B.P	3.75	1.30

Respondents indicated that management skills affect the level of performance of Community based projects (4.5 mean score), fish eating cultures influences fish market (4.33 mean score), financial management affects the community projects (4.12 mean score), outdated and inadequate infrastructures affect the level of performance of community projects (3.98 mean score), ineffective storage methods affect fish production in Community Projects (3.75 mean score), majority of the respondents disagreed that Fish Market is readily available in Nyeri county (2.02 mean score).

4.9 Inferential statistics on performance of community based projects

The study used inferential statistics in trying to reach conclusions that extend beyond the immediate data alone. Inferential statistics were used to infer from the sample data what the population might think or to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance in this study. The study correlated variables using the Pearson correlation analysis to determine the relationship between the variables.

Table 4.21: Correlation of variables

		Performance of community based projects	Economic factors	Knowledge and skills of group leaders	Social cultural factors	Technological innovation
Performance of community based projects	Pearson correlation	1.00	.618 *	.870 *	.714	.742
	Sig.(2 tailed)	.05	.000	.020	.016	.000
Economic factors	Pearson correlation	.611	1.00	.467	.651*	.584
	Sig.(2 tailed)	.004		.058	.062	.004
Knowledge and skills of group leaders	Pearson correlation	.625 *	.425	1.00	.581 *	.794
	Sig.(2 tailed)	.002	.003		.001	.002
Sociocultural factors	Pearson correlation	.835	.723	.521	1.00	.457
	Sig.(2 tailed)	.000	.006	.005	.004	.001
Technological innovation	Pearson correlation	.731	.547	.833	.462	1.00
	Sig(2 tailed)	.007	.02	.006	.000	

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

From the above correlation table all the variables have a relationship with each other at 0.05 significance level. We can therefore derive that funding, knowledge and skills, socio cultural factors and technological innovations all have a positive relationship with performance of community based projects.

4.10 Summary

This chapter has presented the findings obtained from analysis of the data from the respondents and provided an interpretation in line with the study objectives.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMENDATIONS

5.1 Introduction

This chapter presents the summary of key findings of the research and then discusses these findings against literature. The chapter then offers a conclusion before giving recommendations and also suggests areas of further research.

5.2 Summary of findings

The following sections present the summary of findings for each study objective.

5.2.1 Influence of economic factors

Majority of the community based projects implemented are small scale projects. Funding of these projects is mainly done through member contributions with limited input from the government and donors. This poses a challenge as most of the members face financial challenges due to their financial status and are therefore not able to provide the required level of funding. Lack of sufficient funding leads to slow growth and reduced profitability of the projects, which, in most cases, has resulted in stalling of the projects.

5.2.2 Influence of knowledge and skills

There is adequate training done for the project members. All the members who attend training do so at least once a year with majority of them being trained more than once every year. These trainings are done through seminars, exchange programs, extension officers and formal learning sessions. The project leaders are however not adequately trained with majority of them reporting not having attended project management training. This presents a challenge to the performance of the community based projects as those charged with the responsibility of leadership and guidance do not have the necessary skills to effectively manage them.

The project members and leaders however lack adequate on the job experience and skills as most of the projects were found to have been in operation for one to five years and were therefore still in the growth stage.

5.2.3 Influence of socio cultural factors

Majority of the members of the community do not like eating fish. This may be linked to the cultural background where fish consumption is associated with the Western region of the country. This has affected the performance of these projects as there is limited local market for the fish once harvested.

5.2.4 Influence of technological innovations

Majority of the community based projects are still using the traditional methods of fish farming, harvesting and preservation. There has been very minimal technological innovation made in this area. Lack of technology has led to reduced output as well as wastages and losses since the fish harvest cannot be stored for extended periods that would have enabled the fish farmers market their produce at a later date or transport it to other areas for sale.

5.3 Discussion

The following section discusses the findings of this study and relates these to other research previously done on the same.

5.3.1 Influence of economic factors

The study established that the performance of the community based projects was affected by the availability of funding as the main source of funding for the projects was member contributions which was limited and often faced with various challenges like high interest rates on bank loans. This reduced the level of performance of these community based projects. The findings concur with Gichira and Dickson (1997) who found out that among the most recurring problem mentioned by entrepreneurs was lack of finances to run the projects. Several reports indicated that the sub-sector received low funding from both the government and the private sector. Where funds were given, continuous flow lacked and that generally affected the daily activities of the projects. However, Harper (1995) in his study pointed out that while lack of capital was a major setback for community based projects, a lot of resources were held up in unproductive assets or even misappropriation by the management. This was mainly in the procurement process and poor recording of transactions carried out on a daily basis.

5.3.2 Influence of knowledge and skills

There appeared to be a disconnect between the training conducted for the leaders and that of the members. The members were adequately trained as majority of them attended training at least once a year. The project leaders on the other hand were not trained on project management and therefore lacked the skills and knowledge to effectively run the project. This concurs with Turner & Müller (2005) who indicated that the literature on project success factors has largely ignored the impact of the project manager, and his or her leadership style and competence, on project success.

5.3.3 Influence of socio cultural factors

The performance of the community based projects is affected by the cultural background and beliefs of the community. Fish consumption is still yet to be fully embraced by the community as this is mainly associated with the communities from the Western side of the country.

Mbugua (2002) and Gongera (2004) in their studies identified project adaptability to the community norms as an important pre-requisite for success and agreed that community ownership and adequate support are required for sustainability.

This then suggest the need for the community to incorporate fish consumption into its diet in order to increase the local market of the projects and improve their profitability.

5.3.4 Influence of technological innovations

Most of the community based projects were found to be using the traditional methods of fish farming and had not adopted the advanced methods brought about by the change in technology. This behavior led to waste and low profitability. This contradicts Worby (2001) who argued that farmers should invest in technology which provides an early return via improved productivity. He gave some examples of modern techniques such sea pens, tanks, pumping systems, computerised feeding mechanisms, work boats and automated vaccinating equipment.

5.4 Conclusion

Despite the farmers being adequately trained and therefore possessing the required skills and knowledge to successfully run the projects, the performance of community based projects is still negatively affected by a number of key factors. These negative factors include lack of adequate

funding to sustain the projects and the low market for the produce at the local level arising from the non-fish eating culture of the involved community. The factors also include lack of advanced technology for farming, harvesting and preserving the fish which causes wastage as well as lack of proper training for the leaders to effectively manage the projects.

5.5 Recommendations

The following are the recommendations of the study:

- 1 The Government of Kenya should get more involved in the community based fish farming projects by investing more in terms of funding as well as providing advanced equipment.
- 2 The project leaders should identify relevant project management trainings in order to give fish farming managers gain adequate skills to effectively manage their projects.
- 3 The project leaders should also develop marketing strategies to ensure that their produce has markets beyond their borders. Proper marketing may also inform the community of the advantages of consuming fish and hence increase local production and resultant consumption.
- 4 Donors should invest more funds in the community based projects and also introduce fish farming technology that has been found effective elsewhere.

5.6 Suggestions for further study

The following are suggestions on areas for further study:

- 1 Influence of culture on the performance of community based projects.
- 2 Factors affecting the performance of community based fish farming projects in non-traditional fish consuming areas.

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APPENDICES

Appendix I: Introduction Letter

To whom it may concern

Dear Sir/Madam,

Re: Request for participation in a research study

I am Linda Norega Onzere, an MA Project Planning and Management student at Nairobi University. I am currently undertaking a research on **“Factors influencing performance of community based fish farming projects in Nyeri County.”**

I would be grateful if you could spare some time from your busy schedule and participate in providing the required information. All the information provided will be used purely for academic purposes only and will be treated with utmost confidentiality. Kindly contact me in case of any queries or clarification on any of the questions.

Thank you for your cooperation.

Yours faithfully,

Linda Onzere.

Appendix II: Questionnaire

The information supplied was purely and exclusively used for academic purpose and was treated with a lot of confidentiality. Kindly feel your cooperation highly appreciated.

Instructions: Fill in the gaps/ tick appropriately

SECTION A

Background information

- i. Indicate your gender
 - a) Male
 - b) Female
- ii. Category
 - a) Project manager
 - b) D.F.O
 - c) Beneficiary/ farmer
- iii. Your age bracket (years)
 - a) 20-29
 - b) 30-39
 - c) 40-49
 - d) 50 & above
- iv. Level of education
 - a) Primary
 - b) Secondary
 - c) College
 - d) University

SECTION B

i. Financial resources

1. What are your sources of funding?
 - a) Members contributions
 - b) Loans from banks
 - c) Donor agencies
 - d) Government
 - e) others
2. Within what range is your project's capital?
 - a) Below 10,000
 - b) 10,000-25,000
 - c) 25,000- 50,000
 - d) 50,000-100,000
 - e) above 100,000
3. What are the challenges faced in acquiring funds?

.....
.....
.....

4. In your own opinion, how else has funding affected the level of performance of C.B.P. on fish farming?

.....
.....
.....

ii. Skills and knowledge

1. How old is your project?

- a) 1-5 years b) 6-10 years c) Over 10 years

2. i) Are managers ever taken for any management training?

- a) Yes b) No

ii) If yes in (i) above, how often?

- a) Annually b) Half yearly c) Quarterly d) Monthly

3. Do you possess any training/skills on management of community based fish farming projects?

- a) Yes b) No

4. i) Do the project members undergo training?

- a) Yes b) No

ii) If yes in (i) above, how often?

- a) Monthly b) Quarterly c) Half yearly d) Yearly

5. What are the training methods used in community projects

.....
.....
.....

iii. Socio-cultural factors

- 1. Do community orientations affect the fish market?
a) Yes b) No

- 2. How are the community beliefs about fish diet in this region?
a) Like fish b) Dislike fish

- 3. In your own opinion, can marketing of fish be increased?
a) Yes b) No

- 4. Does increase in population result in increased demand for fish produce?
a) Yes b) No

- 5. What are the effects of involvement of women in fish farming projects?
a) Increased production b) Increased consumption
c) Increased finance

iv. Technological innovations

- 1. Does your group have cold rooms to store fish once harvested?
a) Yes b) No

- 2. If no how do you preserve them?
a) Salting b) Smoking c) Drying

3. What fishing method is used in your project?
.....
.....
.....

SECTION C

The following are likert scale statements that relate to factors affecting performance of community based fish farming projects. Using scale 1-5 where 1- strongly disagree and 5- strongly agree indicate the extent to which you agree or disagree with it.

ID – Indifferent SD – Strongly disagree D – Disagree A – agree SA – Strongly agree

Financial resources	SD	D	ID	A	SA
Banks charges high rate of interest					
Repayment period is manageable					
The rate of funding is inadequate					
Financial management affect performance of C.B.P.					
Funding affect performance of C.B.P.					
Skills and knowledge	SD	D	ID	A	SA
Managers have adequate management training					
The training has assisted in the running of C.B.P					
Management skills affects the level of performance of C.B.P.					
Inexperience of managers affects performance of C.B.P					
There is competent team in C.B.P management					
Socio cultural factors	SD	D	ID	A	SA
Fish eating culture influence fish farming practices					
Land ownership influences fish farming projects					
Family orientation affects fish farming projects					
Ethnic background affect fish farming					
Technology Innovations	SD	D	ID	A	SA
Market is readily available always					
Outdated and inadequate infrastructures affect the level of performance of C.B.P.					
Ineffective storage methods affect the performance of C.B.P					
Inadequate marketing information has impacted on the overall performance of C.B.P					