DETERMINANTS OF THE PERFORMANCE OF COMMUNITY-BASED PROJECTS: A CASE OF FISH FARMING IN BOMET COUNTY

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A Research Project Report Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Arts in Project Planning and Management of the University of Nairobi

2019

DECLARATION

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

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This research project has been submitted for examination with my approval as a university supervisor.

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DEDICATION

I dedicate this work to my loving parents Mr. & Mrs Sigei who inspired me to attain my academic potential. To my sister Ninet, my brothers, Gideon, Jared and Collins for their patience and unfailing support, lastly to my cousin Edith for her encouragement. My sincere gratitude and May God bless you all.

ACKNOWLEDGEMENT

I wish to acknowledge my supervisor, Kisimbii Johnbosco Mutuku, for the support and guidance through the period of my project writing. His great efforts and constructive criticism shaped this work. I would like to thank my lecturers for their knowledge sharing and patience. I wish to acknowledge the University of Nairobi for the support accorded to me through the Master's Degree course. I would also like to acknowledge my classmates for sharing their knowledge and expertise as well as for their encouragement and support. I am especially grateful to my study partners Kirui Gideon and Dorrington Omondi.

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ABSTRACT

Fish is a popular part of the diet in most countries in the world. It has long been termed 'the poor man's protein'. The overall demand for fish is increasing as populations grow and rising standards of living in urban areas lead to expectations for diets that are richer in animal protein. Fish farming in Kenya was introduced to supplement the food choices of people and to increase the income of the people. This study, therefore, aimed to establish the determinants of the performance of community-based fish farming projects in Bomet County. This study was guided by four objectives; to establish the extent in which economic factors determine performance of community-based fish farming projects, to examine the extent to which skills and knowledge of group leaders determine performance of community-based projects, to establish the extent to which socio-cultural factors determine performance of community-based fish farming projects and to assess the extent to which technological innovation determine the performance of community-based projects. A descriptive survey research design was used to obtain data and to attempt to describe the relationship between the various identified determinants and performance of community-based projects. The study targeted all 403 documented fish farmers, both small and large scale, spread across the County. The study also targeted six ward fishery extension officers and two district fisheries officers. Krejcie and Morgan's sample size calculation was used to get a sample of 170. The research instrument used in collecting primary data was a structured questionnaire while secondary data was collected from books, scholarly journal articles, internet sources, and other relevant literature. Data analysis was done using both descriptive and inferential statistics. The findings were that; technological innovation, socio-cultural factors, economic factors had a significant influence on the performance of fish farming while skills and knowledge of group leaders had low influence. The study concludes that of the three independent variables that had a significant influence on the performance of fish farming, technological innovation had the greatest influence, followed by socio-cultural factors and finally economic factors. The recommendations of the study were that there is a need for the government to step in and help the farmers access subsidized storage facilities and standardized fingerlings. Further, the study recommended that farmers could improve production levels with financial support and increased extensional services. More extension officers should be hired to cater to the shortage of staff. Extension services should be increased to help farmers acquire adequate knowledge and skills for the sustainability of the fish farming project.

Keywords: - Economic factors, skills, and knowledge of leaders, socio-cultural factors, technological innovation.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Aquaculture includes the proliferation and raising of amphibian species in a controlled domain are characterized by the National Aquaculture Act of 1980 (FAO, 2007). Fish farming is among the most seasoned monetary occupations that humanity has been associated with and is done for subsistence and business purposes. As indicated by (FAO, 2007), worldwide fish creation keeps on exceeding total populace development and aquaculture is a quickly developing nourishment generation framework universally, with about 8.8% expansion every year since 1985. In developed nations it is exceptionally marketed while in developing nations it is mostly completed for subsistence purposes, this is on the grounds that about 66% of the labourers in sub-Saharan Africa are centred on sustenance farming. Nonetheless, the greater part of these individuals is small scale farmers who lack access to capital and stable markets for their produce, catching them in a ceaseless cycle of destitution. Because of poverty and a lack of accessible nutritious food, a quarter of the region's population is also undernourished (FAO, 2007).

Globally, the most well-known fish species in fish farming are tilapia, carp, salmon, and catfish. Over each subset of aquaculture, China is by far the biggest producer, giving about 62% of the world's cultivated fish, trailed by Japan, India, Norway, and Vietnam. As of 2016, more than 50% of seafood was produced by aquaculture. Demand continues expanding for fish and fish protein, bringing about overfishing in wild fisheries. Farming carnivorous fish, such as salmon, does not always reduce pressure on wild fisheries since carnivorous farmed fish are usually fed fishmeal and fish oil extracted from wild forage fish. The worldwide returns for fish farming recorded by the FAO in 2008 totalled 33.8 million tons of about $US 60 billion. It is anticipated that by 2030, fish Farming will give nearly 66% of worldwide fish utilization as the catch from wild catch fisheries level off and demand from developing worldwide middle class, particularly in China substantially increase.

Aquaculture was first acquainted with sub-Saharan Africa during the 1950s' with the fundamental point of improving nutrition in rural territories, income generation to help annihilate neediness, broaden activities and lessen harvest disappointments (Hecht, 2006). More than ten million individuals rely upon fisheries as an indispensable enterprising action.
Of Africa's 800 million individuals in, more than 200 million, eat fish regularly. To them, fish is fundamental for their nourishment, giving an average of 22% of the human protein consumption (N.S.P.I.S, 2005). Around four of each five fish cultivated in Africa originates from Egypt as it has the biggest aquaculture industry in the continent, as indicated by the FAO report in 2008. The report further uncovers that Egyptian fish ranches produce more than 650,000 tons of finfish yearly, giving a modest wellspring of protein for the individuals. Nations over sub-Saharan Africa including Angola, Ghana, Mozambique, Nigeria, Uganda, and Tanzania have similarly experienced great development in aquaculture (FAO, 2010). Nevertheless; a few nations like Cameroon, Rwanda, Zimbabwe, Zambia and Madagascar, development has been kept down by tireless bottlenecks, for example, access to great quality feed, seeds, common struggle and market strikes (Macharia et. al, 2000).

Aquaculture in Africa has exhibited its competitiveness by delivering fish that feed low on the food chain. Absence of good quality feed and specialized counsel; poor market foundation and its availability, powerless arrangements that, instead of quicken, obstructs extension to a great extent by underlining focal arranging over private division activity are among the key limitations to more extensive development. Governments are exhibiting expanded help for aquaculture. This is because they have foreseen benefits for aqua-cultural development, for example, nourishment supply and income generation to help in alleviation of hardship (FAO, 2010) Today, after the remodelling of government fish rearing farms and the foundation of research projects to help locate the accepted procedures for pond culture and an escalated preparing program for fisheries augmentation, there has been a restored enthusiasm for fish farming in Kenya.

In Kenya, aquaculture has indicated development since 2009 when the government supported the Economic Stimulus Program (ESP) that prompted increment in fish farming. The ESP which is facilitated by the Ministry of Fisheries Development was presented through the

2009/2010 spending plan to programs to help find the best practices for pond culture and an intensive training program for fisheries extension workers, there has been a renewed interest in fish farming in Kenya. This program planned to help the nation's financial recuperation to the imagined Medium-Term Growth Plan. Under the ESP, enormous ventures were attempted in 27 key sectors of the economy aquaculture being one of them. ESP focused on territories, which had a high population of individuals with little farmlands, mass destitution level with low wages and fluctuating farm efficiency, however with water accessible to continue the program. Subsequently, tilapia cultivating expanded significantly with the development of numerous fishponds particularly in Kenya's Central and Western Provinces. The administration as a team with multilateral and respective advancement accomplices started numerous community-based fish farming ventures and improved their live hoods (N.A.L.E.P, 2006). The Fishery Strategic Plan (2008-2012) shows the primary period of an administration venture intended to make 120,000 fishponds and lift nourishment security through fish farming. Under this program, the government had plans to give access to finances through the KSh1.1 billion upgrade bundle to be directed through youth and women at the local level. The money was to be shared among 140 constituencies, meaning Shs8 million for every county for the development of 200 fishponds (GOK, 2010)

Bomet County offers an accommodating environment for the development and creation of fish species like Nile Tilapia (Oreochromisniloticus), the African Catfish (Clariasgariepinus) and Common carp (Cyprinus Carpio) among others. The Bomet county community is yet to be considered a fish expending society in spite of the fact that they are embracing the way of life gradually, most of the inhabitants get their jobs from farming (Bomet province Government, 2010-2015). Farmers in the County practice smallholder farming and the family is the wellspring of work in the farming creation frameworks. Farming assumes a key occupation in nourishment, business openings and destitution decrease in the nation. The standard diet crops delivered are oats including wheat, maize, millet and sorghum, different harvests developed for subsistence incorporate green grams, beans, cowpeas, and pigeon peas; root crops incorporate yams and sweet potatoes. The farmers depend on rainfall for the most part of their farming activities, which has frustrated numerous farmers because of problematic precipitation described by delayed dry spell promoting crop disappointment. This has made it important for

elective methods for occupation, similar to fish farming, domesticated animals raising, beekeeping (apiculture) and poultry cultivating.

Fish farming in Bomet County started during the 1980s' however on small scale levels whereby the fish farmers did next to nothing in terms of fish management, Mutambuki, 2014). At the point when the government presented fish farming in more than 140 Counties in Kenya under ESP, farmers in Bomet County seized the idea in what vowed to reform fish farming (Otieno, 2011). Fish farming systems in Bomet have been a visit of preliminaries and error over numerous years; since then the farmers have begun to receive better farming techniques after the Government presented ESP, by doing this the farmers are reaping better. Fish farming has improved the lives of the community members through wealth creation, creating work for youth and women through fish trades (ESP, 2009). However, the hurried take-up of fish cultivating in Bomet County under the ESP accompanied many mishaps, including market openness, approach and lawful and institutional systems, absence of access to water, poor human capacities, absence of aptitudes for partners, quality and sufficient fingerling accessibility (National Aquaculture Strategy and Development Plan, 2010-2015). Additionally, the vast majority of the fishponds performed under expectation because of the significant expense of information sources and the absence of specialized mastery (FAO, 2015

1.2 Statement of the Problem

Fish farming has played a major role in employment, economic development of the nation, provision of a nutritious meal for the people and earnings from foreign currency through exports. Many farmers are quickly taking up fish farming as a means of earning extra income for the family. Through EPS introduction in 2009, there has been a renewed interest in aquaculture in Kenya, whereby approximately $283 million was channelled to crucial sectors from 2009 – 2012. About 140 constituencies with small-scale farmers were selected to be the government’s target. 48,000fishponds at a cost of over 15 million US dollars were constructed across the country resulting in the contribution of fish production to the economy to increase enormously.

However, despite the government's effort to promote aquaculture, the projects did not perform as expected, the freshwater aquaculture sub-sector registered a depressed performance for the second consecutive year, with total fish output dropping by 19.8 per cent from 18.7 tons in the year 2015 to 14.9 tonnes in 2016, and most farmers in Kenya and Bomet County slowly adopted the fish farming projects. Besides, not all fishponds constructed were stocked with the 1000 tilapia fingerlings. The beneficiaries of the project had the responsibility to purchase and install the polythene pond liners. Some of the farmers were not able to meet these requirements by the time the ESP program funding came to close (Musyoka and Mutia, 2016). There are many cases where farmers eventually abandoned their ponds even before the first harvest. Mwamuye et al., (2012) and Munguti et al., (2014) found that most farmers who are still holding on to the venture are yet to realize their returns due to challenges they are faced with. That notwithstanding, very little has been done to establish the status of fish farming in Bomet, and more so the effect of fish farming in the county. It is against this backdrop that this study was conducted to investigate the determinants of the performance of community-based fish farming projects in Bomet County, as well as determine why this initiative on fish farming has suffered from slow adoption and non-sustainability.

According to Shitote et al., (2012), little growth of fish farming projects have been experienced in Western Kenya. About 50% of community-based projects fail after operating for a short while affecting new players and those with already established projects. Therefore, this brings out some urgent need for continued research on the factors likely to be responsible for determining the performance of community-based projects across the country. Though many projects in Kenya are prospective in the invention of more employments, their contribution has clear limits, community-based projects in Kenya as a whole stagnate and sometimes deteriorate in performance leading to collapse Musyoka and Mutia (2016). Given this background, this study is set to bridge the gap in knowledge by trying to find out the determinants of the performance of fish farming projects in Bomet County.

1.3 Purpose of the Study

This purpose of this study was to investigate determinants of the performance of community-based projects in Kenya a case study of fish farming in Bomet County.

1.4 Objectives of the Study

The study was guided by the following objectives;

i. To determine the extent to which economic factors affect the performance of community-based fish farming projects.
ii. To examine the extent to which skills and knowledge of group leaders determine the performance of community-based fish farming projects.
iii. To establish the extent to which socio-cultural factors determine the performance of community-based fish farming projects.
iv. To assess the extent to which technological innovation determine the performance of community-based fish farming projects.

1.5 Research Questions

The study sought to answer the following research questions;

i. To what extent do economic factors determine the performance of community-based fish farming projects?
ii. To what extent do skills and knowledge of group leaders determine the performance of community-based fish farming projects?
iii. To what extent do socio-cultural factors determine the performance of community-based fish farming projects?
iv. To what extent does technological innovation determine the performance of community-based fish farming projects?

1.6 Research Hypothesis

This study tested the following hypothesis at the 0.05 level of significance:

i. H_1: Economic factors significantly influence the performance of community-based fish farming projects.
ii. H_1: Skills and knowledge of group leaders significantly influence the performance of fish farming projects
iii. H_1: Socio-cultural factors significantly influence the performance of fish farming projects

iv. H_1: Technological innovation significantly influences the performance of fish farming projects.

1.7 Significance of the Study

The investigation discoveries could be of significance by assisting stakeholders with understanding the requirement for their coordinated endeavors and frame of mind change to community-based ventures and the need to grasp them.

Community-based projects could be better prepared in understanding variables that impact their exhibition in this way guaranteeing adequacy and proficiency in actualizing community-based projects. The study will ideally contribute to the advancement of fish farming. This exploration gives exercises from farmers endeavoring to make out a living from little scale fish farming with and without help from the government. The exploration will fill in as a reason for which government and other development agencies, will use to settle on educated choices later on how best to help the fish farming industry.

This investigation may likewise help venture partners, particularly experts, customers and extension workers and all others associated with the usage and procedure of fish farming advancement tasks to find out the underlying foundations of non-consumption of fish in many communities. It will, accordingly, help the partners to take up estimates that will relieve the circumstances and end results of poor usage of advancement ventures.

1.8 Limitations of the Study

Time and budget were the major constraints of this study. This was addressed by focusing on fish farmers from the study area who were accessible and limited to the chosen area of study. This led the researcher to sample only a few fish farmers to represent the entire population. Two professional research assistants were involved fish farming projects, including; economic factors, skills, and knowledge of community leaders in the distribution and collection of the questionnaires which saved on the time spent in the field collecting data.

1.9 Delimitations of the Study

The study looked at factors that determine the performance of community-based projects, the specific focus being on fish farming projects in Bomet County. Although other factors are determining the performance of community-based fish framing projects this study was only focused on economic factors, socio-cultural factors, skills and knowledge of group leaders and technological innovations. The study sample was limited to fish farmers, extension workers, and DFOs in the County. The population was sampled to give a representative sample for the study.

1.10 Assumptions of the Study

This study was designed on the premise that project beneficiaries were aware of determinants of community-based, social-cultural factors and technological innovation. The other basic assumption of the study was that respondents answered questions correctly and truthfully and that the study sample provided a good representation of all community-based fish farming projects members and officials in Bomet County implementing community-based fish farming projects. The study relied on information provided by the respondents and the assumption was that they were honest and available for the interview.

1.11 Definition of Significant Terms

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

Economic factors: These are the goods or services available to individuals to enable them to carry out fish farming activities. For instance, finance for startup or expansion of projects.

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.

Socio-cultural aspects: These larger scale forces within cultures and societies affect the thoughts feelings and behaviours of individuals. They include attitudes, culture change, ethnic values, family structure religious practices that may affect fish consumption and farming.

Technological innovation: Improved technologies are expanded and brought into the extensive application of farming, for instance, better fishing nets or modern fish farming techniques through this development.

1.12 Organization of the study

The study is organized in five chapters. Chapter one which is the introduction describes the background of the study, statement of the problem, the purpose of the study, research objectives, research question and definition of terms. Chapter two contains a literature review that consists of determinants of the performance of community-based projects, theories, conceptual framework, research gaps, and summary. Chapter three portrays the research methodology of the study and also shows the sample size of the research. Chapter four displays data analysis and provides an interpretation of the data collected. Chapter five gives the findings of the study, conclusions, and recommendations derived from the study**.**

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter examines the works of literature related to fish farming. Aquaculture development in Kenya is briefly discussed. The chapter also presents empirical studies on economic factors and fish farming, skills, and knowledge of group leaders and fish farming, socio-cultural factors and fish farming and technological innovation and fish farming. Finally, the theoretical framework, conceptual framework, research gap, and summary of the literature review.

2.2 Fish Farming as a Viable Economic Activity

Aquaculture is one of the most growing rapidly growing industries worldwide, it is estimated that aquaculture contributes 47% to total fish production in the world. It is also estimated that due to increase in population another additional 23 million tonnes of fish is needed by the year 2030 in the world. To meet this demand nation will have to turn to aquaculture since natural fish production has almost reached its limit (Brummet& Williams 2014) Aquaculture in Kenya was first introduced in 1890 as sport fishing, then to control mosquitoes, leeches and aquatic weeds in 1920. In 1940 aquaculture was started in Kenya but on a small scale, it was only commercialized after the "eat more fish "initiative by the government. The government also tried to double the production of fish by introducing marine aquaculture but never succeeded (Ruthius, Van Duijiri, Van Rijsinger, Van der Pijil&Rurangwa 2011). Accordingly, in Kenya fisheries development has been very slow due to different obstacles. These factors include lack of proper information on aquaculture development, cultural variations that do not support fish production, uncertainty on returns from the industry; other factors include low investment by Kenyans in the sector, high running costs and lack of access to quality fingerlings. (MOALF, 2015).

According to (Alal, 2012) fish farming in Kenya has great potential; this is because many fish species can be supported due to climatic variations and many parts of the country receive rainfall throughout the year. Despite the potential for fish farming, the sector is still doing poorly. Oloo, (2011) found out that aquaculture farmers are faced with various challenges including access to technical information, predatory animals and lack of support from

government extension services. Mwamuye et al., (2012) also cites inefficient dissemination of technology to farmers as among the key challenges facing aquaculture in Kenya. Gitonga et al., (2004), notes also that little supply of certified quality fish feed and fingerlings have been a longstanding hurdle to the growth of aquaculture in Kenya. Mutambuki, (2014) study in Kitui County established that inadequate training was a major factor affecting competence in the marketing of commercial fish farming under ESP. A better understanding of this factor is important in policy formulation and implementation for successful aquaculture projects. Bomet County is endowed with the necessary natural resource and weather conditions that signify the potential for aquaculture development. There is adequate rainfall, several rivers, wetlands, streams as well as favourable climatic conditions. Despite the projects failing, there is a necessity to conduct a study on the factors that influence fish farming projects in Bomet County.

2.2.1 Economic factors on the performance of Community-based Projects

Swanson and Raja Lahti, (2010) states that one of the major problems of most community-based projects and non-profit extension systems is the unavailability or inadequacy of financial resources to maintain a functional system, let alone to transform these institutions into providing essential extension services for the rural poor. According to Rand, (2012) the main challenge is that many community projects rely too much on external sources of funding, such as government grants that have been cut back in recent years. Donor agencies always dominate as they are providing funds so they make decisions about developmental projects Constantino, (1982

Ward, 2003 argues that most of the community-based projects heavily rely on donor funding as the only source of funds and this leads to a sudden collapse of the programs or organizations when the donor support is withdrawn. Turary, (2002) stated that in a situation where a greater proportion of an organization funding comes from external sources it will affect the long run in case of withdrawal of external funding. This means that any organization that depends solemnly on external funding will not be in a position to finance some of its initiated projects. According to Rand, (2012) non-profits serving low-income communities have an even harder task as they often struggle to raise funds, as few community members have the means to contribute financial support to community projects.

Most developing economies including Kenya are characterized by consistent low per capita income. There is also low saving and very few aspiring entrepreneurs in this economy. Owing to its prominence the Kenyan government in the 2009/2010 financial year under the ESP introduced commercial fish farming in Kenya in 140 constituencies. Each constituency benefited with funds for 200 fish ponds, 15 kilograms of fertilizer and 1000 fingerlings. Mwangi et al (2008) observed that in Kenya the government support towards aquaculture extension services was inadequate and mostly led to poor performance at all levels from pond preparation, stocking, harvesting to marketing. Ngugi et al (2007) had observed similar causes of the poor performance of aquaculture in Kenya. However, the two studies did not indicate the significance level of the influence of funding level on the performance of aquaculture in Kenya. It is estimated that above 37% of small farming ventures in rural and urban centres in Kenya fail to grow and many times collapse primarily due to lack of grants or credit facilities. For these reasons, it is imperative to set up mechanisms for enabling small farming ventures to attain necessary funding to enhance the economy (Kenya Economic survey, 2012). The availability of funds for fish farmers could consequently improve access to other resources. Low levels of funding translate to low technological support within the industry which hinders an adequate amount of production of fish, subsequently leading to sales and profits decline.

The small fish farming projects in Kenya fall precisely in a perfectly competitive market structure. The prices are solemnly determined by the forces of supply and demand which means that all sellers conform to an analogous price level margin. The suppliers simply settle for the price at which the commodity or service is already being offered in the industry. Any farmer that is aggressive enough to increase the price is likely to lose market share because the buyer can freely and comfortably switch to the competitor (Lumpkin & Marvel, 2010)**.** The decreasing fish stocks in rivers and oceans across the world due to global warming and environmental pollution have severely affected fish supplies. As supply is unable to keep pace with the demand of an exploding African population, fish has continued to attract higher prices in our markets. According to FAO, fish farming currently accounts for more than 30 per cent of global fish supply; of which Africa as a whole contributes less than 2 per cent. However, looking at the fishing communities, they have remained poor although they are involved in an important trade.

Markets are non-competitive and therefore, there is high exploitation of fish farmers in terms of prices.

2.2.2 Skills and Knowledge on the performance of Community-based fish farming Projects

Adult education development in developed countries in recent years has focused on strengthening vocational training to meet the needs of skill development across all occupational strata in the global economy (Belanger & Tudjman, 1997). A study by Singus and Manus (2014) on factors affecting pond farming in Papua New Guinea showed that inadequate skills and knowledge were the main impediments to sustainable aquaculture farming. A study by Abiona, Fakoya, Apantaku, Alegeleye, Ajayi, Obasa and Arowolo, 2012), contended that a major limitation to the fish sector development is the absence of systems to spread existing research information and knowledge. They further argued that for a farmer to improve productivity in the farm, regular monitoring and maintenance of fish ponds, examining water quality, pond hygiene, and fish observation requires prior adequate training to keep updated with current aquaculture technological practices.

Third world countries in Africa falls short of sufficient entrepreneur training coupled with the education necessary for launching and successfully operating businesses (Bolton & Thompson, 2011). In starting a fish farming business, a new farmer needs to have a comprehensive scope of business managerial skills to succeed in turbulence and a competitive market environment. Heather (2010) asserts that management remains a process of having things done via an agency or community geared to fulfilling and attaining the purpose for which the business does exist, several individuals venture into business with deficient business managing skills in certain important fields such as Finance, Marketing, Economics, Entrepreneurship or even Accounts. Even though they are eager in making money, it is worth to have clear objectives put in place. In Kenya the level of knowledge and skills possessed by fish farmers is very low, management capability has been largely affected by inadequate training in business. Approximately 67% of small businesses fail during the initial few years of operation. As a result, people lose hope as the chances of success gradually turn to be minimal. Several rural and urban enterprises in Kenya are devoid of people with business managing skills needed to operate the firms effectively and efficiently (Munoz, 2010). One of the major limitation when it comes to the

growth and development of small and medium venture enterprises in Kenya and Africa at large is the lack of fundamental managing skills in business as well as entrepreneurial knowledge. Training institutions have failed in the provision of sufficient training which has adversely affected community projects' survival, profitability, and growth (Munoz, 2010).

Relevant project managing skills contribute a lot to the progress of the minor project ventures. The owners and employee's management and financial skills necessary for coping with appropriate business strategies, capabilities, and experiences that may be used in their farms remain crucial factors that influence the growth of the projects. These capabilities can make the project be able to respond to various macro and micro environmental challenges through continued performance improvements surveillance thus enabling the community project to remain relevant (Macharia, 2007) Lack of marketing facilities and skills is another anticipated problem faced by the farmers. Farmers sell their fish at the Village and Urban local markets but require alternative marketing outlets. The latter is required as fish production is increased. A key factor to marketing is the post-harvest handling and storage of fresh fish which require particular attention. This would be a necessary facility to handle larger quantities of fish as production increases.

It has been noted that fish farming ventures in Kenya, are initiated with little or no feasibility and business plan formulated. Moreover, individuals prepare a business plan for the sole purpose of obtaining business money instead of serving as a plan for making the business succeed in its operations. Although various fish farmers in the country have some skills, they are not up to standards and fail to emphasize aspects such as finance, people management, accounting, marketing, and administration in general as well as public rapport. This makes entrepreneurs unable to handle crucial business matters (Wanjohi, 2010).

2.2.3 Socio-cultural Factors on the Performance of Community-based Projects

Although society and culture are not directly included in the daily operations of projects, they indirectly appear as key elements in shaping how the project is managed, from what goods are produced and how they will be sold, to the establishment of managerial and operational patterns and the determination of the success or failure of the project. Trehan and Trehan, (2009) state

that the socio-cultural environment is important for community-based projects; this is because various socio-cultural factors significantly affect economic activity as well as the performance of community-based projects. The key socio-cultural factors that have a major impact on the performance of community-based projects include Culture, Religion, Level of education, Customer preferences, the attitude of the society towards new goods and services.

According to Vasudeva, (2007), the main elements of culture that may have an impact on the operation of community-based projects include attitude and beliefs whereby in every community there are norms of behaviour based on attitudes and beliefs that constitute a part of its culture. Attitudes and beliefs vary from country to country. CBOs face a different set of attitudes and beliefs of the culture in each community separately, and it influences all aspects of human behaviour, providing organization and directions to a society and its individuals. Identifying the difference in attitudes and beliefs among various countries helps the stakeholders and managers more easily understand people's behaviour.

(Brummett, et al., 2010). Onzere (2013) argued that fish farming acceptability by the community was a major challenge and recommended that sufficient community support was necessary for the sustainability of aquaculture farming. The report further stated that consumer perceptions and preferences were the main factors that affected the demand for fish. Most interviewees stated that they were not ready to abandon livestock farming for aquaculture farming since their culture could not allow.

Research findings by Kathambi, (2013) in Meru County, found out that the majority of respondents were males which were about 55.6% while females formed 44.4% of the respondents. This meant that more males formed CDF staff managing the ESP projects. Also, Esther and Kangiri, (2016) found that the majority of the individuals in the management of the projects were males comprising of 97.7% of the respondents while 2.3% were females in their study in Kiambu County. This showed that fish farming projects are predominantly controlled by men. This study is set to uncover the possible gaps in how socio-cultural factors which include gender influence fish farming projects in the study area.

2.2.4 Technological Innovation on the Performance of Community-based Projects

There are new modern technologies that have been introduced today, the challenge is transferring this new knowledge to farmers, the hindrances include but not limited to, the production unit, attitudes towards institutions and authorities, levels of education and traditional knowledge.

The long-term ability of fishers to adapt to changes in the fishery as a result of development or management will also depend on the skills and education which they command. In many parts of the developing world and Kenya, fishing communities are consistently among the people with the lowest levels of education. What is more, their skills are extremely specific to the fishing profession. This can move out of fishing very difficult, from an assessment of educational levels and skills within stakeholder communities affected by changes in fisheries, managers, and decision-makers can determine what forms of education or training might be required as part of development packages**.**

The Indigenous technological understanding in aquaculture predominantly related to farm inputs has been developed by the farmers themselves, based on their experiences. Farmer's innovation is based on their indigenous knowledge. The indigenous knowledge is the accumulated knowledge, skills & technology of the local farmer derived from the interaction with the ecosystem. The knowledge has been inherited from generation to generation this knowledge radically changed the use of fertilizers and devised some unique right-hand thumb rule for disease diagnosis and treatment without the costly methods. Where traditional resource knowledge of this kind is still intact, agencies intervening in resource use in the area can make use of it to explain the goals of interventions in terms that are readily understood by local people. If this step is ignored, passing new knowledge in technology and innovation to the local fishermen will prove to be hard. The traditional knowledge is still very important but due to the pressures of commercial exploitation, it has led to the sidelining of traditional practices and knowledge of resource management for the sake of increased production and modernity.

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 the 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). Farmers are encouraged to invest in technology which provides an early return through improved productivity. Modern techniques include sea pens, tanks, pumping systems, computerized feeding mechanisms, in-pond raceway systems, workboats, and automated vaccinating equipment**.** Technologies like this could replace less efficient production systems currently in use, revolutionizing aquaculture in Africa within a short period. Costs in investment per unit output will 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).

2.3 Theoretical Framework

This study will be based on three theories; resource dependence theory, stakeholder theory, systems, and governance theory.

2.3.1 Resource Dependence Theory (RDT)

Developed by Pfeffer and Salancik, (1978) the Resource Dependence Theory (RDT) is based upon how external resources of organizations affect the behaviour of the organization. The theory is based upon the following tenets: Organizations are dependent on resources, these resources ultimately originate from the environment of organizations, the environment to a considerable extent contains other organizations, the resources one organization needs are thus

often in the hand of other organizations, resources are a basis of power, legally independent organizations can, therefore, be dependent on each other (Pfeffer and Salancik, 1978). According to this theory, an organization depends on resources for their survival; therefore, for any organization to achieve sustainability, resources are indispensable (Pfeffer, 2005). For community-based projects to achieve sustainability, resources are important. These resources will come in the form of financial resources; therefore, there is a need to involve all the stakeholders in the project for sustainability, other resources are human and land. This theory addresses research question one which seeks to unpack the influence of economic factors on the performance of the community-based projects, the theory will explain the important role that economic factors play as part of the overall system that makes up CBPs.

2.3.2 Systems Theory and Governance

Bertalanffy, (1962) developed the Systems theory as a theory of emergency - actions and outcomes at the collective level emerge from the actions and interactions of the individuals that make up the collective. He further pointed out that the systems theory of governance provides an analytical framework for viewing an organization in general through synergy and interdependence. Hartman, (2010) also observes that all organizations consist of processing inputs and outputs with internal and external systems and subsystems which help provide a functional overview of any organization. CBPs need a functional system to manage their projects well. Kuhn, (1974) states that systems need to be controlled, this is because failure in one system leads to failure in another. CBPs need good leadership systems to ensure there are transparency and accountability. This theory views an organization as a social system consisting of individuals who cooperate within a formal framework, drawing resources, people, and finances to produce products. Good governance of resources in the CBPs by leaders who have skills and knowledge on how to run projects and lead a community will ensure efficient and effective management of their projects and other resources for maximum outputs. This theory addresses research questions one and two where one seeks to unpack how economic factors, skills, and knowledge of group leaders influence the performance of community-based projects. The theory will explain the important role that both skills/knowledge of group leaders play an important part in the overall system that makes up CBP.

2.4 Conceptual Framework:

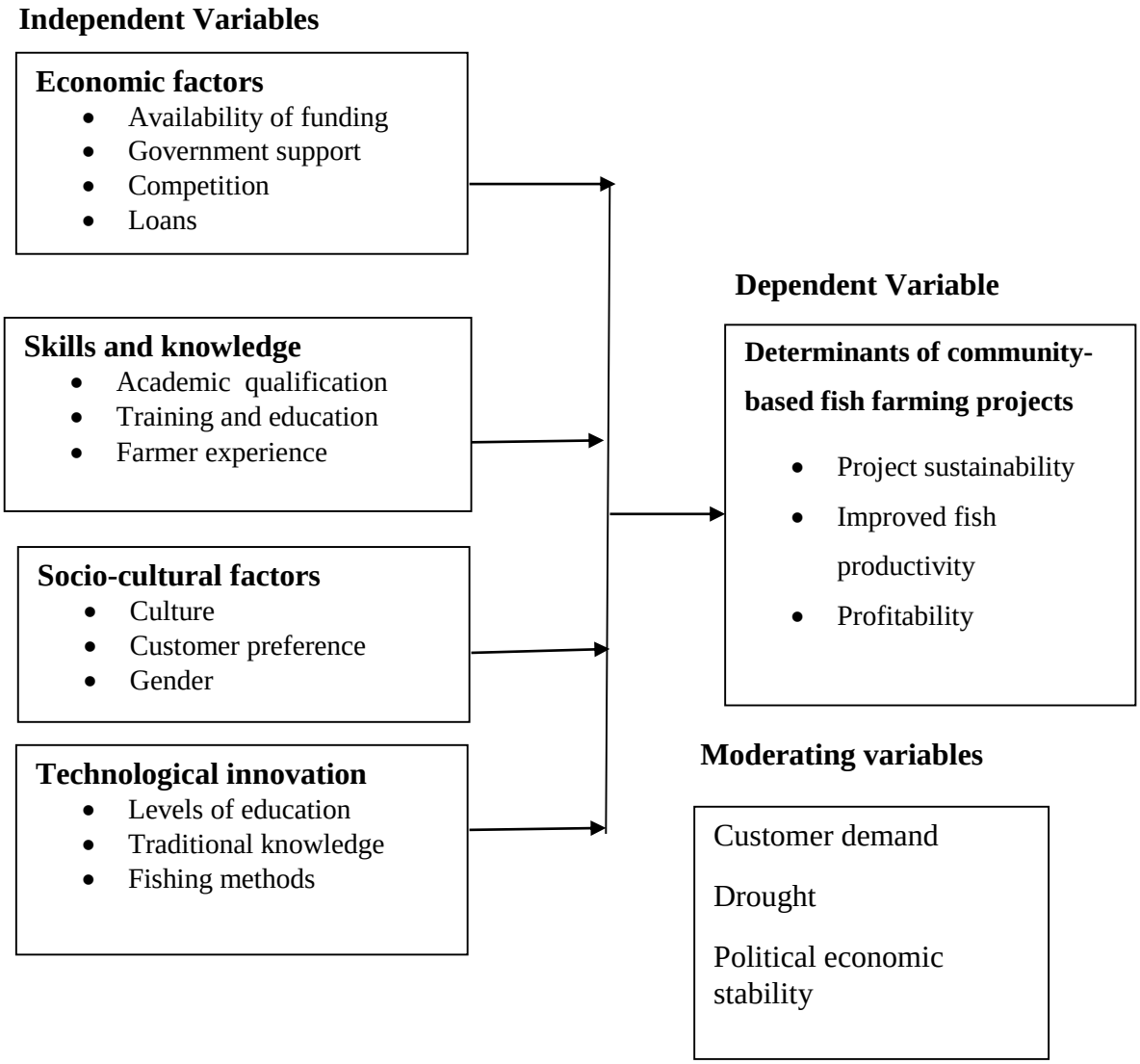

Figure 1: Conceptual Framework

The conceptual framework helps to illustrate the relationships between the independent variables and the dependent variable. The study is guided by the objectives as identified and defined by the continuous arrows in the conceptual framework. The above framework shows the relationship between the four independent variables which are; economic factors, skills, and knowledge of leaders, socio-cultural factors and technology and innovation.

2.5 Knowledge Gaps

The literature review shows that aquaculture has a huge potential for growth in Kenya. However, fish farming is still practised at low levels and alarmingly declining in fish producing areas. Idachaba, (2005) study looks at how the effect of various government interventions on development projects of rural areas in Nigeria. The study revealed that because the government was directly involved through the provision of funds the project stopped once the funds stopped. The study does not examine the role of other economic factors that influence community-based projects. In another study by Padilla, Staple Foote, and Morganti, (2012) looks at how factors such as; ineffective boards, absence of strategic planning activities, poor recording practices, lack of necessary policies and procedures hinder community-based projects. The study does not examine the role of skills and knowledge of leaders in community-based projects. Similarly, Chinsman (2002) in a measure of rural development projects found that in assessing rural development projects, three independent programs. The study does not examine the role of skills and knowledge of leaders in community-based projects.

Similarly, Chinsman (2002) in a measure of rural development projects found that in assessing rural development projects, three independent programs became one single entity with the components of community empowerment, rural health, and sustainable agriculture. The study does not provide a critical analysis of socio-cultural factors on the determinants of fish farming development projects. This study, therefore, was carried out to fill this gap by looking at the economic factors, skill, and knowledge of leaders, socio-cultural factors and technological innovation determining community-based projects with a case of fish farming in Bomet County. Became one single entity with the components of community empowerment, rural health, and sustainable agriculture. The study does not provide a critical analysis of socio-cultural factors on the determinants of fish farming development projects. This study, therefore, was carried out to fill this gap by looking at the economic factors, skill, and knowledge of leaders, socio-cultural factors and technological innovation determining community-based projects with a case of fish farming in Bomet County.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design, target population, sampling procedure and methods of data collection, validity and reliability, data collection instruments, data collection procedure, the operationalization of variables table and objectives understudy and methods of data analysis and ethical considerations.

3.2 Research Design

This examination embraced a descriptive research design to evaluate the determinants of performance of community-based fish farming ventures in Bomet County. Descriptive survey design explored study factors, for example, economic factors, skills, and knowledge of group leaders, socio-cultural factors and technological innovation determine fish farming projects in Bomet County. Through this structure, it was conceivable to build up the connection between study factors and study issues (Kothari, 2004). This is because the examination configuration gave a chance to get some information about their discernments, frames of mind, practices, and qualities in regards to the exploration theme. Furthermore, it is additionally a successful vehicle to gather information from tests speaking to huge populaces (Orodho, 2003).

3.3 Target Population

As indicated by (Mugenda and Mugenda, 2003), the objective populace is the whole arrangement of units for which the study information is to be utilized to make deductions. The researcher considered farmers whose fishponds are still functional and those who have abandoned their fishponds. This study targeted all 403 documented fish farmers, both small and large scale, spread across Bomet County. The study also targeted 6 ward fishery extension officers and two district fisheries officers.

3.4 Sample and Sampling Procedure

The probability sampling strategy was applied to choose the sample. Probability sampling guarantees that each unit of the populace gets an opportunity to be chosen in the sample that can be precisely decided. The sample size of the fish farmers in this examination was 170, It

was resolved dependent on the Krejcie and Morgan's example size table (Krejcie and Morgan, 1970). The is sample size is shown in Table 3.1

Table 3.1: Target Population

Category	Target Population	Sample Size	Percentage
Fish farmers	403	162	95
	34	6	3
	6	2	2
Total	**443**	**170**	**100**

3.5 Data Collection

The study utilized both primary and secondary information. Primary data was gathered utilizing questionnaires. This is in accordance with Sherri (2010), who noticed that a questionnaire is a significant research apparatus in a social-economic review. The survey questionnaire was organized with both open-ended and closed inquiries, every respondent was permitted to fill just a single questionnaire and the respondents were given a time of four days after which the researcher gathered the filled survey. Secondary information was obtained from records of the Bomet County fisheries division and perusing the service distributed reports, pamphlets, diaries, and articles.

3.5.1 Piloting of the research instruments

A pilot study is an exercise done to test whether the research instrument will produce similar and valid results. Before using a questionnaire, it is always advisable to conduct a pilot study (Kothari, 2004). Piloting is necessary for establishing whether there are errors or weaknesses in the research instruments so that they can be corrected and standardized before the main study (Dooley, 2007). The study selected a pilot group of 20 fish farmers and 2 extension officers not selected for the actual study using purposive sampling technique. A pilot sample in survey research must be 10% of the target group (Connelly, 2008).

3.5.2 Validity of the Research Instrument

Validity alludes to the degree to which an instrument can quantify what it is purported to gauge. Data ought to not exclusively be solid yet additionally true and precise. In the event that assessment is extensive, it is additionally solid (Joppe 2000). The substance of legitimacy of the data collection instrument was resolved by examining the study instrument with the research

specialists' and the supervisor. The significant remarks, amendments, proposals given by the research specialists aided in the approval of the instrument.

3.5.3 Reliability of the Research Instrument

Reliability is the level of consistency (Mugenda and Mugenda, 1999). A pilot study was directed by the researcher managing the questionnaires for 20 fish farmers in the County. From this pilot study, the researcher had the option to distinguish addresses that required altering and those with ambiguities. The last questionnaire was then printed and dispatched to the field for information assortment with the assistance of two research associates.

3.6 Data Collection Procedure

After consent was given by the University of Nairobi to collect data, the researcher with two research assistants travelled to Bomet County for data collection. The research assistants were taken through training to clearly understand the research instruments, the purpose of the study and ethics of research. The researcher and research assistants administered the questionnaires to the respondents through self-administration survey approach who were required to fill them and hand over the completed questionnaires. Assurance was given to the respondents that the information obtained will be treated with utmost confidentiality; the researcher hoped this dispelled any fear in disseminating pertinent information.

3.7 Data Analysis Techniques

As per Mugenda and Mugenda (2003), data analysis is the process of providing meaning to crude data acquired from the surveys. The overview information was utilized to look at the different study determinants. Every one of the questionnaires was numbered and the reactions in the survey altered and coded. The coded data from the questionnaire was fed into the computer utilizing SPSS, which offers broad information taking care of capacities and various factual examination strategies that dissect little to enormous informational indexes to empower both illustrative and inferential measurements like regression analysis (SPSS, 2002)

3.8 Ethical Issues

The researcher carefully clung to proficient morals over the span of the whole time frame from gathering data to reporting and recommendations. Moral issues identified were examined,

research subjects and research process were observed. The investigation was endorsed by the University of Nairobi, educated verbal assent was gotten from all the study subjects and privacy guaranteed by not recording the personality of respondents and names of their SHGs on response sheets. Data was given to members about the reason and importance of the investigation. Participation was intentional and research assistants were adaptable to administer the questionnaire at a time and place that was helpful for the respondents to guarantee that the respondents are genuinely free of tension. The data acquired was utilized only for the proposed scholarly purposes and the advantage of the readers and every one of the partners in CBP practice.

3.9 Operational Definition of Variables

The operational definition is drawn to guarantee predictable data assortment that disposes of vagueness. To operationalize the questionnaire on determinants of the performance of community-based fish farming ventures in Bomet County each basic variable was explained as showed in Table 3.2 below. Pertinent inquiries on every key issue were created and showed against each measurement

Table 3: Operational Definition of Variables

Objective	Variable	Indicator(s)	Measurement	Scale	Data collecting method	Data Analysis
To establish how economic factors determine the performance of community-based fish farming in Bomet County	**Independent Variable** Economic Factors	-Availability of finance -Members contribution -Favourable	-Sources of finance available -Current fish prices -Cost of production	Ordinal	Questionnaire	Descriptive statistics
To evaluate the skills and knowledge determinants on the performance of fish farming in Bomet County	**Independent Variable** Skills and knowledge	Academic qualifications -Worker experience -Field extension Services	-Academic qualifications -Previous experiences in fish farming -Fish farming training	Ordinal	Questionnaire	Descriptive statistics
To Determine the soc cultural determinants on the performance of fish farming in Bomet County	Independent Variable Socio cultural Factors	-Religious practices -Ethnic background -Fish consumption	-Stable food for the region -Fish-eating habits -Participation of women	Ordinal Ordinal	Questionnaire	Descriptive statistics
To evaluate technology and Innovation determinants on Community-based fish farming in Bomet County.	**Independent variable** Technology Innovation	-Farm machinery -Improved farming methods	-Integrated farming -Availability of fish preservation -Preferred fishing methods	Ordinal	Questionnaire	Descriptive statistics
Performance of community-based fish farming projects	**Dependent variable** Performance of community-based projects	-Economic factors, skills and knowledge, social-cultural factors and Technological innovation	-Project sustainability -Improved fish productivity -Profitability	Ordinal	Questionnaire	Descriptive statistics

CHAPTER FOUR

PRESENTATION OF FINDINGS, ANALYSIS, AND INTERPRETATION

4.1 Introduction

This section examines the questionnaire response, distribution, statistic data of respondents, impact of economic factors on fish farming, skills, and knowledge of leaders on the performance of fish farming, socio-cultural factors on performance fish farming and technological innovation on fish farming in Bomet County.

4.2 Response distribution

As per Mugenda and Mugenda, A.G. (1999), a response rate of over 50% is sufficient, 60% is great and over 70% is excellent for analysis and reporting. Out of 170 questionnaires dispersed to the fish farmers in Bomet County, 150 were returned making 88.2% return rate.

4.3 Demographic Information

This section recorded the fish farmer's general data. General data investigated included sex, age, level of training, years in fish farming, method of fish, number of ponds, size of ponds, largest harvest and income every year.

4.3.1 Gender of respondents

The farmers indicated their gender on the questionnaires in order to determine the involvement of the two genders in fish farming. The respondents indicated their gender in relation to either female or male and their profile is shown in table 4.1.

Table 4.1: **Gender profile of farmers**

Distribution of Respondents by Gender

Gender	Frequency	Percentage
Male	90	60
Female	60	40
Total	**150**	**100%**

4.3.2 Age Category

The respondents were requested to indicate their age. The findings were as shown in Table 4.2.

Table 4.2: Age category

Age	Frequency	Percentage
20-29 years	56	37
30-39 years	27	18
40-49 years	32	21
50-60 years	25	17
Above 60 years	10	7
Total	**150**	**100%**

From the chart and table above, majority of the respondents were aged between 20 and 29 years representing 37% of the respondents.30-39 years representing 18%, 40-49 years representing 21%, 50-59 years representing 17% and those above 60 years of age represented 7% of the respondents. This shows that the respondents were well distributed in terms of their ages.

4.3.3 Level of education

Table 4.3: Level of education

Education level	Frequency	Percentage
Primary level	40	28.6
Secondary level	49	35.2
Tertiary level	26	18.7
University level	25	17.6
Total	**150**	**100%**

The research sought to determine the respondent's highest level of education achieved. The findings showed that the majority of the respondents were literate with at least 35% having a secondary level of education certificate, 28% with a primary level certificate, 18.7% held training certificates whereas 17.6% of the respondents indicated that they held university certificate and above.

4.3.4 Respondents years of experience in the fish farming sector

The farmers were requested to state how many years they were involved in fish farming**.** This was important in order to ascertain their level of expertise in the fish farming sector. Table 4.4 shows the outcome**.**

Table 4.4: Farmer's number of years in fish farming.

Duration	**Frequency**	**Percentage**
0- 4years	44	29
5-9 years	87	58
Above 9 years	19	13
Total	**150**	**100%**

The study revealed that a high number of farmers (58%) had practised fish farming for 5-9 years. Second were those who had been in the industry for 0-4 years at (29%) and the least are those who have been in the sector for the above 9 years (13%). Those involved in the sector for less than four years were in a position to embrace new technologies of fish farming as compared to those with nine years and above. Those with a lot of experience were used to their way of farming and would be less reluctant to embrace new technologies of fish farming.

4.3.5 Respondents mode of fish farming

The farmers were asked to state the mode of fish farming they practised. This was important in order to know the amount of time allocated to the projects in the fish farming sector.

Table 4.5: Depicts the Findings

Mode of farming	**Frequency**	**percentage**
Part-time	129	86
Full-time	21	14
Total	**150**	**100%**

The study findings depicted that most farmers practised fish farming as a part-time venture (86%) whereas only a few were involved full-time (14%). This shows that most of the fish farmers run part-time fish projects and thus not fully involved.

4.3.6 Respondents number of ponds

The farmers were asked to indicate the number of ponds they owned. This knowledge was useful in the determination of the production levels of the ponds. Table 4.6 depicts the outcome.

Table 4.6: Respondent number of ponds.

Respondent no of ponds	Frequency	Percentage
1 pond	64	42.67
2 Ponds	47	0.61
3 Ponds	23	15.33
4 Ponds	13	8.67
5 Ponds	3	2
6 Ponds	16	10.67
Total	**150**	**100%**

The analysis showed that the highest percentage of farmers owned one pond (42. 67%).those with five ponds were at a percentage of (2%). Those with six ponds and more were 16 with a percentage of (10.67%). This portrays that many farmers practised small scale fish farming.

4.3.7 Respondents size of the pond

The farmers were asked to state the size of their fish ponds. The outcome is shown in table 4.7.

Table 4.7: Respondents pond size.

Size of ponds (m2)	Frequency	Percentage
0-500	97	64.67
501-1000	28	18.67
1001-1500	21	14
1501-2000	4	2.67
Total	**150**	**100%**

Table 4.7 depicts that most farmers owned fish ponds with an average size of 50-400 square meters (64.67%). Those with large ponds ranging between one thousand one hundred and one to one thousand eight hundred square meters (1101-1800) were very few (4%). This means that most of them have small ponds thus production is based on the stocking rate. It affects productivity and profitability ratios. Production rates will also establish whether there is optimal usage of the ponds as per the recommended stocking rate.

4.3.8 Respondents average yearly harvest.

The respondents had to indicate their average yearly harvest. Table 4.8 depicts the outcome.

Table 4.8: Respondents average yearly harvests.

Average yearly harvest(kg)	Frequency	Percentage
0-200	98	65.33
201-400	26	17.33
401-600	10	6.67
601-800	16	10.67
Total	**150**	**100%**

Table 4.8 shows that a great number of 65.33% of farmers harvested below a hundred kilograms yearly. Farmers who harvested five hundred kilograms and above were the least with a percentage of 10.67%. Most of the farmers had low production rates due to the constraints of the cost of production and poor maintenance.

4.3.9 Respondents yearly earnings

The respondents were required to indicate the number of earnings they got on a yearly basis. This would help determine the profitability ratios of the fish project. Table 4.9 portrays the outcome.

Table 4.9: Respondent yearly earnings.

Earnings per year (KShs)	Frequency	Percentage
Below-10000	47	31.33
30001-40000	72	48
40001-50000	16	10.67
50001 –above	15	10
Total	**150**	**100%**

The study revealed that the respondents who earned below Kshs5000.00 had the highest frequency of 47 (31.33%) while those that earned above 50,003.00 had the least frequency of 15 (10%). This portrays that many farmers make very little money from the fish farming business yearly. This is due to poor management of the ponds and the high cost of production that has led to the abandonment of most of the ponds.

4.4 Economic factors and the performance of fish farming.

The first objective endeavoured to determine the economic factors on fish farming performance in Bomet County. The respondents were asked whether economic factors determined the performance of fish farming. They indicated their response as depicted in table 4.10

Table 4.10: Response on whether economic factors determine the performance of fish farming in Bomet County.

Do economic factors determine fish farming performance?	Frequency	Percentage
No	9	6
Yes	141	94
Total	**150**	**100**

Table 4.10 depicts most of the farmers, 141 (94%) were on the affirmative to the fact that economic factors affected the performance of fish farming. The remaining 9 (6%) said it did not affect the performance of fish farming.

Table 4.11: The mean response score on the extent of economic factors on fish farming performance in Bomet County

Economic factors indicators	Mean	Std. Deviation
NGO grants	1.1067	.30972
Government support	2.4533	1.09659
Competition	2.8054	1.11911
Credit access	3.4600	1.26719
Availability of funding	3.5267	1.19673
Personal savings	3.6067	1.31024

Key: Std =Standard

Mean score Key: =>1.0 (No Extent), =>2 (Low Extent), =>3 (Moderate Extent), =>4 (High Extent) and =>5 (Very high Extent).

The first objective endeavoured to investigate the economic factors determining the performance of fish farming in Bomet County. The respondents were asked whether economic factors determined the performance of fish farming. The findings from Table 4.11 show that credit access moderately affected fish farming performance. The availability of Personal savings to fish farmers had the highest influence on the performance of fish farming with a mean of 3.6. The least influence was from Non-Governmental organizations (NGOs) with a mean of 1.106.

Respondents' mean score on the level of economic factors had a positive contribution towards fish farming where personal savings had the highest score of 3.61. NGOs' access was a problem and had the least score of 1.106. Access to NGOs had the least score as the farmers were not aware of any organizations that supported fish farming projects. Personal savings scored the highest which show that most farmers depend on personal saving to run a successful fish farming project and some had other sources of income apart from farming.

The Economic Stimulus Programme (ESP) of 2011 which was meant to stimulate economic development countrywide led many farmers in the area to join fish farming. The program was meant to provide employment and job opportunities for the masses and also address food security. However, some members had self-sponsored ponds. The government-sponsored ESP gave most of the farmers a boost since it catered for pond construction and the initial supply of fingerlings. Since the initiation of the first stage, there has been no other support from the national government. This is one of the reasons why most of the ponds have stagnated or declined in production. Accessibility to NGOs support was also lacking in Bomet County. This portrayed that farmers were having problems obtaining credit from the bank and other institution to venture profitably into fish farming.

An interview conducted on the fishery extension officer of Sotik Ward revealed that the farmers had formed Self-help groups (SHGs) with a minimum of 12 farmers each. County government should use the groups as a platform to provide access to affordable loans and subsidized fish

feeds. By joining groups, it will be easy for the farmers to access loans, grants, subsidies and any other form of supply for their fish projects. Ugwumba (2011) established that “a majority of aquaculture farmers (53%) joined cooperative movements to increase their chances of accessing credits, quality fingerlings and feeds.” Individual farmers had a difficult time accessing credit and more importantly getting them on time. Kalinda, Shute, and Filson (2013) study on the accessibility of credit by Zambian farmers states that farmers are highly limited in their quest to access credit services from commercial banks.

The constraints in the study area, therefore, are linked to a lack of startup capital and inaccessibility to credit for the farmers. FAO (2006) also pointed out that the provision of credit is known to fuel household and national economic development". With access to credit, many fish farmers have a great potential of growing and playing a part in building the country economically. Fish farming has a huge potential in most of Kenya’s rural agricultural areas. With the decentralization of governments and improved technology, access to services can easily be availed to the farmers. Another study that collaborates with these findings stated that "The inadequacy in the provision of extension services has been a major challenge to the development of fish farming in Kenya. This situation results from a lack of resources and technical staff (GoK, 2010). Additionally, these challenges are met by inadequate entrepreneurship skills by the farmers and lack of credit. It is, therefore, imperative that the government makes a point of providing sufficient funds and credit accessibility to fish farmers especially those living in remote areas and with limited financial capability.

4.5 Skills and knowledge of group leaders on the performance of fish farming.

The second objective endeavoured to determine the influence of Knowledge and Skills on fish farming performance in Bomet County. The respondents were asked whether leaders Knowledge and Skills influenced the performance of fish farming.

They indicated their response as depicted in table 4.12.

Table 4.12: Response on whether leaders' Knowledge and Skills determine the performance of fish farming in Bomet County.

Does the knowledge and skills of group leaders determine fish farming performance?	Frequency	Percentage
No	22	14.67
Yes	128	85.33
Total	150	100%

Table 4.13 depicts most of the farmers, 128 (85.33%) agreed to the fact that knowledge and skills affected the performance of fish farming. The remaining 22 (14.67%) said it did not affect the performance of fish farming.

Table 4.13: The mean response score on the extent of leaders' knowledge and skill determine fish farming performance in Bomet County.

Knowledge and skill indicators	Mean	Std. Deviation
Academic qualification	2.8967	1.09751
On-farm training	3.0933	1.08897
Seminars/workshops	2.6533	.89732
Farmer experience	3.5667	1.23384
Extension Services	2.9533	.93648
Management	1.8800	1.21468

Mean score Key: =>1.0 (No Extent), =>2 (Low Extent), =>3 (Moderate Extent), =>4 (High Extent) and=>5 (Very high Extent).

From the findings, knowledge, and skill determined the performance of fish farming positively. The mean score ranged between 2.8 to 3.6 with an exception of management which scored the lowest with a mean score of 1.8. This points to the fact that most of the farmers are reluctant to

adapt to new management systems whereas some feared that the maintenance costs would be too high to manage. Farmer experience had the highest influence on the performance of fish farming with a mean of 3.56. The academic qualification attained by the farmer had a low influence with a mean score of 2.8. A great number of the leaders had attained primary and secondary education with a few with college and university levels. This insinuates that the knowledge and skills obtained by the farmers over time as a result of experience played a major part in the performance of fish farming.

In an interview conducted to the field extension officers, field days were organized for the farmers yearly and group meetings were organized monthly. Information also obtained from the interview indicated that extension services were carried out based on demand. Most respondents, however, said that they lacked adequate training to carry out sustainable fish farming projects. These results concur with Singas and Manus, (2014), that lack of knowledge and skills was among the problems facing fish farming projects. This could be the reason why many farmers are not performing well.

Information obtained from the interviews also revealed that Extension services were of a significant positive influence on fish farming performance. Farmers provided with extension services performed well as compared to those who were not. Extension services were carried out on a small scale to the farmers based on a request to the fishery extension officers. Extension programs to the farmers were therefore inadequate because there were few extension officers with a large coverage area which put a strain on their service delivery. Most of the operational fish ponds were owned by farmers who had attained the knowledge and skills on a large part from experience, which is farming for more than four years. These findings collaborate with Ngugi (2007) who reported that poor government funding to aquaculture extension staff was a major factor affecting the performance of fish farming. The level of significance of the factors was however not indicated. Mwangi (2015) in his study report also pointed out that inadequate technical service due to a limited number of government extension officers was the main impediment to aquaculture success in Kenya.

A study by Ogello pointed out that despite tremendous assets and extraordinary potential, the incorporated domesticated fish farming has failed to take off because of social and monetary difficulties. Incorporated domesticated animals fish aquaculture is kept to remote areas by a couple of poor farmers with little information, whose work largely is unreported even in national aquaculture insights, (Ogello 2013). Most rural areas in Kenya are remote and dominated by poor fish farmers who cannot afford to sustain their projects without financial or material support.

4.6 Socio-cultural factors on the performance of fish farming.

The third objective endeavoured to determine the determinants of Socio-cultural Cultural factors on fish farming performance in Bomet County. The respondents were asked if Socio-Cultural factors affected the performance of fish farming. Table 4.14 indicates their response.

Table 4.24: Response on whether Socio-Cultural factors determine the performance of fish farming in Bomet County.

Do farmer cultural factors influence fish farming performance?	Frequency	Percentage
Yes	25	16.7
No	125	83.3
Total	**150**	**100**

Table 4.14 depicts a large number of respondents at a frequency of 125 (83.3%) agreed to the fact that Socio-cultural factors influence the performance of fish farming. 25 (16.7%) however disagreed.

Table 4.35: The mean response score on the extent of the influence of socio-cultural factors on fish farming in Bomet County.

Indicators	**Mean**	Standard deviation
Religious beliefs	1.0600	.23828
Income control	2.4200	1.30188
Family structure	2.7067	1.67711
Customer preference	2.8333	1.55186
Feeding habits	2.9667	1.01939
Gender	3.1333	1.28839
Culture	3.2800	1.53754
Attitudes and perception	4.3302	1.101134

Mean score Key: =>1.0 (No Extent), =>2 (Low Extent), =>3 (Moderate Extent), =>4 (High Extent) and =>5 (Very high Extent).

The findings from Table 4.15 agree with Mwamuye et al. (2012) when he saw that social factors caused the failure of a significant number of the subsistence fish culture ventures bolstered through USAID programs in Guatemala and Panama. The mean score ranged from 2.4 to 4.3, which are above average except religious practices, which had a mean score of 1.06, which is below average. This indicates that all the other factors including attitudes and perception, income control, family structure, fish farming preference, and feeding habits positively contributed to the performance of fish farming. Religious factors had no significant effect on fish farming performance.

Ngugi, Bowman, and Omolo(2017) states that pond based fish farming has great potential in Kenya especially the Nile perch and African catfish but despite this potential, aquaculture farming is yet to be fully explored. Fish consumption is determined by the acceptance of fish farming as an activity by the community and the feeding habits of the people. Fish farming is yet to be fully embraced by most farmers. Attitudes and perceptions of the farmers did affect fish farming though not significantly. Family structure positively contributed to the performance of fish farming and so did income control. Generally, there is a low preference for the farming of fish in the area.

An interview conducted on the Ndanai extension officer revealed that most of the farmers preferred poultry, sheep and cattle farming and considered fish farming an expensive and demanding enterprise and shied away from it. In his report, Onzere (2013) reported that fish farming acceptability by the community was a major challenge and recommended that community sufficient support was necessary for sustainable aquaculture farming. There were no religious beliefs or practices that prevented fish consumption or farming. Due to changing feeding habits, more people were encouraged to embrace fish farming to meet the high fish demand in the market.

The interview further revealed that most of the income from fish farming is controlled by men; this is because men own land. Pond management and feeding are mostly left to children and women. For a large family structure, availability of labour would be ready but it did not necessarily influence fish farming performance. A large number of farmers had to hire labour for pond maintenance practices. Changes in the family structures in Kenya especially in rural areas may negatively affect fish farming in Kenya including Bomet County. This can be attributed to the reduced number of children in a family, increased single parenting and rural to urban migration.

The society's attitudes and perceptions towards fish farming are changing for the better. Feeding habits have also changed owing to the mixed culture of communities in Bomet County and the demand for food. This could have a positive impact on the preference to fish farming which is still quite low as most members of the community prefer other livestock farming to fish farming projects.

4.7 Technological innovation on the performance of fish farming.

The fourth objective was to determine how technological innovation determines the performance of fish farming in Bomet County. The respondents were asked whether technological innovation determined the performance of fish farming. They had to indicate whether or not it determined the performance. The outcome is tabulated in Table 4.1.6.

Table 4.4: Response from farmers on technological innovation on fish farming performance in Bomet County.

Does technological innovation determine fish farming performance?	Frequency	Percentage
No	4	2.67
Yes	146	97.33
Total	**150**	**100**

From table 4.1.6 most farmers agreed that technological innovation determined the performance of fish farming in Bomet County. This is represented by 146 (97.33%) of the respondents. 4(2.67%) of the respondents disagreed.

Table 4.5: The mean response score on the extent of the determinants of technological innovation on fish farming.

Indicators	Mean	Standard deviation
Farming methods	3.9333	1.13910
Accessibility to water	1.9133	1.23667
Fishing methods	2.5733	1.07658
New technology	2.8533	1.08727
Method of fish preservation	3.0533	.94256
Availability of cooling facilities	3.1800	.98816
Level of education	3.2533	1.06530
Traditional knowledge	3.5067	1.25931
Ineffective storage facilities	4.0134	1.11124

Mean score results depict that the mean scores of all variables were between 2.5 to 4.0, indicating that the extent of influence of these indicators is between moderate to a high extent. Respondents' mean score on the method of preservation had a negative contribution towards fish farming whereas fishing methods did not affect most of the farmers. Ineffective storage facilities had the highest score at a mean of 4.01 followed by farming methods at a mean of 3.93. It is therefore imperative that effective storage facilities be subsidized and farmers aided in the initial investment to address these challenges. Based on findings from the study, fishing

methods had a moderate effect on fish farming performance. Nonetheless, other factors like the method of fish preservation, farming methods, and ineffective storage facilities were of major concern. Accessibility to the water supply was not so much of a problem to most of the farmers since their ponds were situated along the river bed thus dependent on river water and groundwater supply (in swampy areas). The problem now arises during droughts when water levels decrease and in cases of floods, which sweep away most of the fish.

New technology had a low contribution to the performance of fish farming at a mean of 2.8. This is because the change of technology is very slow and some of the farmers were not ready to adopt them. This derails the fish farming activity among the farmers. The interview report also depicts that adaptation to new technologies in Bomet County was hampered by the hesitation of farmers to adopt new technologies on a preference of sticking to what they were already used to. The hesitations ware caused by the high cost of investment capital, which includes pumping of water, filtration and the high level of management. The new technologies included RAS (recirculating aquaculture system), aquaponics system and hanging ponds in greenhouses. The interview further pointed out that most of the respondents had not even heard of the new methods hence had no options to choose from. These findings echo Chi & Yamada's findings that "They have not yet seen the demonstration or not understood or they were worried of low yield and also Old behaviour of cultivation practices embedded in farmers for long periods, were not persuaded to use new technology" (Chi & Yamada 2002).

Agbamu (2000) reported that the clamours for higher productivity in fish farming can be achieved by coming up with improved technology and to properly organize sufficient extension services. This is when the impact of technology can have desired effects on fish farmers. Adaptation and the use of technology can be efficient in promoting fish farming if extension officers help the farmers understand the advantages and constraints of fish farming. Organization of enough extensional services, seminars and training workshops and on-farm training is essential in promoting fish farming in most rural areas in Kenya.

An interview conducted with the Ndanai fishery extension officer revealed that there was a major problem with abandoned ponds. Most of the farmers were unable to maintain their ponds

leading to infestation by weeds and other animals thus reducing the productivity levels. Poor pond maintenance also led to a decrease in production levels of the ponds, which subsequently led to a reduction in their income levels. The interview further pointed out that during the rainy season; farmers in areas prone to flooding were discouraged from stocking fish. This is because most ponds were constructed without buffers such that floodwater infiltrated the ponds causing temperature fluctuations. It also discouraged phytoplankton growth on which fish feed. These environmental challenges discouraged most farmers from replenishing their stocks during the rainy season for the fear of losing the stocks to floods.

Flood water also exposes the fish to diseases and the danger of death due to exposure to agricultural chemicals. Helfrich (2009) stated that pollution could cause oxygen depletion by killing phytoplankton, rooted aquatic plants or both. Pollution contaminates the fish and makes them unhealthy to eat. High levels of Ammonia lead to pollution and infestation by parasites subsequently causing the death of fish. A large number of fish are also swept away leading to low count and eventually a drop in the production. This result agrees with the findings of Carballo (2008) when he reported sites for fish farming should only be where the water of the needed quality and volume is available at the time needed for operating the farm. Preference should be given to sites where gravity water supply to the farm is possible. These challenges have led to the abandonment of some ponds owing to maintenance costs and inadequate skills on how to maintain them. The high cost of fish preservation facilities was also another factor that influenced fish farming performance. A large number of the farmers had resorted to using local methods of preservation since they found the commercial ones a bit on the expensive side. This finding corroborates the report of Brummet and Rana (2010) who argued that the cost of preservation is estimated to be 40-70% of total production costs". If storage is costly then mot farmer gets losses because fish is highly perishable.

Installation of buffers to prevent floodwater from getting into the pond and fencing for security has also proved to be a very expensive venture for most farmers. Most of the ponds are located on farms close to the river but the homesteads are a distance away. This makes it hard to keep away thieves who in a large part contribute to decreasing levels of production. It, therefore, necessitates good fencing and sometimes to employ a guard to keep guard. Based on data

collected through the interview, the County government is in the process of establishing hatcheries to provide fingerlings to the farmers. Cold storage facilities are also to put in place to prevent postharvest losses incurred by farmers as they look for suitable markets. Subsidized fingerlings and fish feeds will also be available to the farmers. Finances for the startup of most of the fishponds in the study area were given by the government through the Economic Stimulus Programme in all parts of the country. It is recommended that government assistance on fish farmers be affected to reduce the cost of feeds, storage, and fingerlings. It is also important to carry out Monitoring and Evaluation to identify problems and tackle them in time. This will boost production levels of fish in Bomet County and Kenya in general.

4.8. Inferential statistics on the determinants of community-based fish farming projects

On the determinants of fish farming performance, the inferential analysis was used. This was to establish whether there was a significant relationship between the economic factors, skill and knowledge, socio-cultural factors and technological innovation and performance of fish farming (dependent variable). The results were presented showing their level of significance.

4.8.1 Multiple Linear Regression Model for Fish Farming Performance

Inferential statistics were used to determine the level of influence of each independent variable (socio-economic factor) on the performance of fish farming. The multiple linear regression model was used in the analysis and the results were shown for each. It was important for the researcher to establish which of the socio-economic determinants had a significant influence on the performance of fish farming.

The multiple linear regression model was used because it depicts the influence of each independent variable to the dependent variable thus determining the relationship between the two. The computing of the data was done using the Statistical Package for Social sciences (SPSS) version 21.

The regression model was as follows:

$Y=\beta0+\beta1F1+\beta2F2+\beta3F3+\beta4F4+ e$

Where:

Y= performance of fish farming

F1= Economic factors

F2= Knowledge and skills

F3= Socio-cultural factors

F4= Technological Innovation

β1, β2, β3, β4 = coefficients to the independent variables

β0= Intercept term

e= error term

Y=1.792+0.189X1-0.072X2+0.098X3+0.143X4+Ɛ. Where: Constant **(β0)**, Technological innovation**(X1)**, Knowledge and skill**(X2)**, Economic factors **(X3)**, Socio-cultural factors **(X4)**

Table 4.6: Findings on the significance of determinants of performance of fish farming.

	Unstandardized Coefficients		**Standardized Coefficients T**		**Sig.**
Performance Of community based projects	**B**	**Std. Error**		**Beta**	
Constant (βO)	**1.792**	**.285**	**6.282**		**.000**
Technological innovation(X1)	**.189**	**.058**	**.326**	**3.255**	**.001**
Knowledge and skill(X2)	**-.072**	**.055**	**-.103**	**-1.310**	**.192**
Economic factors (X3)	**.098**	**.047**	**.192**	**2.070**	**.040**
Socio-cultural factors (X4)	**.143**	**.052**	**.213**	**2.738**	**.007**

The model had the following results: βo =1.792, β1 =0.189, β2= -0.072, β3= 0.098 and β4=0.143 as shown in table 4.1.8 above. At 5% (0.05) level of significance; Economic factors, Technological innovation, and Socio-cultural factors were statistically significant since the p-values were less than (<0.05). Knowledge and Skill were not significant with p-value being higher than 0.05.

These results imply that economic factors, Technological innovation, and Socio-cultural factors had a significant influence on the performance of fish farming whereas Knowledge and skills

of group leaders had no significant influence on the performance of fish farming with p-value being higher than 0.05.

The determinants were ranked based on their level of influence on the performance of fish farming from the highest to the lowest.

Table 4.7: Ranking in significance level of determinants of the performance of fish farming.

Performance of community-based projects	Level of Significance
Technological innovation	**0.001**
Socio-cultural factors	**0.007**
Economic factors	**0.040**
Knowledge and skill of leaders	**0.192**

From table 4.1.9, it was evident that technological innovation had the highest influence on the performance of fish farming in Bomet County at a significance of 0.01. This was followed by Socio-cultural, which accounted for a 0.007 level of significance. The third was Economic factors at 0.040 and lastly Knowledge and skill of leaders' factors at 0.192 level of significance.

CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter entails the findings to the research study, the discussion of the findings, conclusions made from the findings, contribution to the body of knowledge, recommendations, and suggestions for further research.

5.2 Summary study findings

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

5.2.1 Influence of economic factors

The first objective investigated the influence of economic factors on the performance of fish farming in Bomet County. Discussed were access to national government grants and credits, access to county government funds, access to bank loans and micro-finance institutions, access to co-operatives and associations, access to non-governmental grants and credits, availability of personal savings and support from friend's family. The majority of the community-based projects implemented are small scale projects. Funding for 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 lead to slow growth, and reduced profitability of the projects, which, in most cases, has resulted in the failure of the projects.

5.2.2 Influence of knowledge and skills

The second objective intended to determine the influence of group leaders' knowledge and skills on fish farming performance in Bomet County. To find out how knowledge and skills factors had influenced the performance of fish farming. Knowledge and Skill indicators were: level of formal education, experience, extension services, and fish farming seminars and workshops, and on-farm training. From the study, all the knowledge and skills factors contributed positively to the performance of the fish farming sector. The study shows that there is adequate training done for the project members. All the members who attend training do so at least once a year

with the majority of them being trained more than once every year. These training are done through seminars, exchange programs, extension officers and formal learning sessions. The project leaders are however not adequately trained with a 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.

5.2.3 Influence of socio-cultural factors

The third objective determined the influence of socio-cultural factors on fish farming performance in Bomet County. These factors included attitudes and perceptions, preference to fish farming, feeding habits, and religious beliefs/practices. The socio-cultural factors affected the performance of fish farming with an exception to the religious beliefs and practices which had little influence on fish farming. The 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 a limited local market for the fish once harvested.

5.2.4 Influence of technological innovations

The fourth objective involved examining the influence of technological innovation on the performance of fish farming in Bomet County**.** The 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 to market their produce at a later date or transport it to other areas for sale.

5.3 Discussion of Findings

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 were 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 daily.

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 the 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 suggests the need for the community to incorporate fish consumption into its diet 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 behaviour 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 as sea pens, tanks, and pumping systems, computerized feeding mechanisms, workboats, and automated vaccinating equipment.

5.4 Determinants of fish farming performance.

The study found out that fish farming performance (dependent variable) was greatly influenced by the independent variables, which are economic factors, knowledge, and skills of group leaders, socio-cultural factors, and technological innovation. The order of influence was economic factors, knowledge, and skills of group leaders, technological innovation in the order of highest to lowest. Socio-cultural factors had the least influence on the performance of fish farming.

5.5 Conclusion

Based on the outcomes of this study, these conclusions were made;

It was established that a lack of adequate funding to sustain the projects played a major role in boosting fish farming performance. Access to credit was constrained to most farmers leaving those with personal savings and access to bank loans to dominate the enterprise. This led to stalling of most ponds. Credit facilities should be readily accessible to farmers since knowledge and skills without financial assistance would not be of much impact.

Knowledge and skills of group leaders greatly influenced the adoption of new farming techniques in fish farming. In some areas, however, the farmers lacked the necessary skills of balancing fish feeds and maintaining fish ponds. With such knowledge, they can be able to balance and use locally available feeds that are easily accessible and affordable. Extension services were equally influential in the performance of fish farming. As much as extension services positively influenced fish farming, the services were few and strained in some areas.

This proved that adequate knowledge and skills are lacking in the study area. The county government should, therefore, make a point of employing more extension officers owing to public demand.

Socio-cultural factors also influenced fish farming. There was a slow uptake of fish farming due to farmer's preferences for other livestock sectors. Their attitudes were also changing towards farming and income control seemed to play a major role. Cost of production was also high for most farmers.

Technological innovation also influenced fish farming, lack of advanced technology for farming, harvesting and preserving the fish which causes wastage. The cost of fish preservation equipment was high and fraud from unscrupulous people who sold low-quality equipment was rampant. The county government should ensure that the farmers can easily access equipment at an affordable price and from standardized and trusted suppliers.

5.6 Recommendations

Based on conclusions made from the study, these recommendations were made which the researcher believes will help improve fish farming production.

The following are the recommendations of the study:

i. 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.
ii. Extension services by agricultural service support are needed by farmers and a follow up to be carried out regularly. More extension officers should be employed by the county government to assist in the dissemination of knowledge and skills in fish farming. This will also help farmers in the adaptation of new farming technologies that will improve production rates and also ensure food security.
iii. Community involvement ought to be embraced before a project is launched of the nature that proper monitoring and evaluation is done. Training seminars should be tailored to match such needs as pertains feasibility of the studies

iv. County and national governments to intervene in the provision of market and subsidized feeds and standardized fingerlings in proportionate quantities.

v. The project leaders should also develop marketing strategies to ensure that their product 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.

vi. Donors should invest more funds in the community-based projects and also introduce fish farming technology that has been found effective elsewhere.

5.7 Suggested areas for further research.

The following are suggestions on areas for further study:

i. A study on factors affecting the sustainability of small scale fish production in non-fishing communities should be investigated.

ii. A study on the influence of pests, predators and diseases on the production in fish farming.

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APPENDICES

APPENDIX I: INTRODUCTION LETTER

Naomi Chebet

C/O University of Nairobi,

P.O Box, 19247-00100

Nairobi, Kenya

Dear Sir/Madam

RE: REQUEST FOR PARTICIPATION IN A RESEARCH STUDY

I'm a student at the University of Nairobi currently undertaking a Master of Arts in Project Planning and Management. I have successfully completed my course work and as part of the university requirements, I am supposed to undertake a research study.

My research will focus on the "**Determinants of the performance of community-based projects: A case of fish farming in Bomet County"**. I would like to request your participation in this questionnaire. The information obtained will be treated with the utmost confidentiality.

Your co-operation will be appreciated.

Yours faithfully,

Naomi Chebet

APPENDIX II: QUESTIONNAIRE

I am a student at the University of Nairobi undertaking a Master of Arts degree in project planning and management. This questionnaire is meant to gather information about the determinants of performance of fish farming in Bomet County. The information provided will be confidential and only be used for academic research purposes only.

Section A:

Demographic factors

1. Indicate your gender:

   Male ☐

   Female ☐

2. Indicate your age Bracket

   Less than

   25-34 ☐

   35-44 ☐

   45-54 ☐

   55-64 ☐

   Above 64 ☐

3. Years in fish farming

   0-4 years ☐

   5-9 years ☐

4. Fish farming mode

   Full time ☐

   Part-time ☐

5. Number of Ponds owned by farmer……

6. Size of fish pond in meters square (M2)

   ……

7. Last harvest of a pond in kilograms (Kgs)

   ……

8. Average earnings per pond in shillings (Ksh)…….

   In 2 months

   ……

   In 6 months

   ……

   In 1 year

   ……

Section B: Economic factors and fish farming

1. Do economic factors influence the performance of fish farming?

YES ☐

NO ☐

2. On a scale of 1-5, indicate the extent to which the following knowledge and skill factors influence fish farming performance. Where No extent=1, Low extent=2, Moderate extend=3, High extent=4, Very high extent=5 (use a tick√)

INDICATOR	No extent=1	Low extent=2	Moderate extend=3	High extent=4	Very high extent=5
Access to national government grants and credits					
Access to County government grants					
Access to bank loans/micro-finance institutions					
Access to farmer co-operatives and associations					
Availability of personal savings					
Support from friends and relatives					
NGO (non-governmental organization) grants					

Section C: Knowledge, skills and fish farming

1. Indicate your highest formal education level

Primary ☐

Secondary ☐

College ☐

University ☐

2. Does knowledge and skills of farmer's influence fish farming?

YES ☐

NO ☐

3. On a scale of 1-5, indicate the extent to which the following knowledge and skill factors influence fish farming performance. Where No extent=1, Low extent=2, Moderate extend=3, High extent=4, Very high extent=5 (use a tick√)

INDICATOR	No extent=1	Low extent=2	Moderate extend=3	High extent=4	Very high extent=5
Level of formal education attained by the farmer.					
Farmer experience in fish farming.					
On-farm training					
Fish farming seminars					
Extension services					

Section D: Socio-Cultural factors and fish farming

1. Do Socio-cultural factors influence fish farming?

YES ☐

NO ☐

2. Indicate the extent to which the following socio-cultural factors influence fish farming performance.

   Where No extent=1, Low extent=2, Moderate extend=3, High extent=4, Very high extent=5 (use a tick√)

INDICATOR	No extent=1	Low extent=2	Moderate extend=3	High extent=4	Very high extent=5
Attitudes/consumer perceptions					
Family structure					
Preference to fish farming					
Income control					
Feeding habits					
Religious practices					

Section E: Technological innovation and fish farming.

1. Does technological innovation influence the performance of fish farming?

YES ☐

NO ☐

2. Use a Tick (√) to indicate the extent to which technological innovation influences fish farming.

INDICATOR	No extent=1	Low extent=2	Moderate extend=3	High extent=4	Very high extent=5
Farming methods					
Accessibility to water					
Fishing methods					
New technology					
Method of fish preservation					
Availability of cooling facilities					
Level of education					
Traditional knowledge					
Ineffective storage facilities					

Section F: Performance of fish farming.

1. Indicate the extent to which the following factors influence fish farming performance. Use a tick to mark the appropriate box. (√)

INDICATOR	No extent=1	Low extent=2	Moderate extend=3	High extent=4	Very high extent=5
Economic factors					
Knowledge and skills of leaders					
Socio-Cultural factors					
Technological innovation					