



AQUACULTURE ECONOMICS AND MARKETING

Module VIII of 8

AQUACULTURE ECONOMICS AND MARKETING

Module VIII

FOREWORD

The growing demand for fish in Malawi and the Southern African Development Community (SADC) region requires additional efforts by the governments to increase fish production from aquaculture. All Malawi's development policies [Malawi Vision 2063, Malawi Growth and Development Strategy III 2017-2022, National Fisheries and Aquaculture Policy 2016, National Aquaculture Strategic Plan 2021] emphasise the need to promote aquaculture development in order to enhance production from aquaculture to supplement the dwindling capture fisheries production and cannot satisfy the ever increasing demand for fish. The development policies also emphasise the need to pursue sustainable practices and climate smart technologies.

Up until now, there were many reference materials which extensionists from both government and non-governmental organisations have been using to train farmers in aquaculture principles and practice. These manuals, however, were not coherent, often providing conflicting recommendations and were not vetted by the Department of Fisheries under the Ministry of Forestry and Natural Resources as proper training materials for aquaculture. Hence, it is timely that this new aquaculture manual has been developed for use in the aquaculture practice. This manual will become a nationally recognised tool for training in aquaculture practice.

The target users of this aquaculture manual are extensionists from government and non-governmental organisations, fish farmers and trainers of these groups. The manual contains technical information as well as training plans to help the trainers to conduct training in an orderly manner.

The Ministry of Forestry and Natural Resources remains committed to foster the development of aquaculture in the country for nutritional and food security, income generation and job creation.

Yanira Ntupanyama, PhD.
Secretary for Forestry and Natural Resources

PREFACE

This Technical Manual for Trainers on Good Pond Aquaculture Practices has been developed to address the gap that existed when the country did not have a universal, nationally recognised manual as basis for training our extension agents, fish farmers and for use by non-government organisations engaged in the aquaculture sub-sector. This manual will be a reference material for guiding aquaculture practices in Malawi. Accordingly, the manual has been developed to support the implementation of the National Fisheries and Aquaculture Policy 2016 which highlights sustainable aquaculture development as policy priority number 2 and the National Aquaculture Strategy (2021–2029).

There are several challenges that exist in the aquaculture sub-sector that need to be addressed for the benefit of fish farmers and extension workers. The major challenges include: lack of harmonised approaches and information to guide all players in the value chain, inadequate supply and access to inputs i.e. quality fingerlings and feed, unavailability of market structures to aggregate production and measures to increase the resistance of the sector against risks related to climate change.

It is expected that this aquaculture manual will become the necessary tool for all actors along the aquaculture value chain mainly for technical know-how regarding aquaculture production. Where possible, trainers or users may be guided by the aquaculture experts from the Department of Fisheries under the Ministry of Forestry and Natural Resources.

Friday Njaya, PhD.
Director of Fisheries

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The Department also acknowledges the efforts and technical contributions from all the government officers, academicians, technicians and practitioners who took part in the development of this manual. Thanks should also go to the team that finally edited the manual.

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INTRODUCTION

Aquaculture should be considered as a business therefore, economics plays an important role in its survival and development. While technical ability to husband a species is a precondition for its culture, this fails to develop and survive if it is commercially uneconomic. The reasons for economic failure of an aquaculture project may stem from production, technical or cost problems, or from marketing problems.

Aquaculture economics can be considered from several different perspectives. It can be considered from the point of view of an individual aquaculture business, from the perspective of the whole industry or from a national standpoint. Nowadays, aquaculture economics and marketing is a specialised subject, and its whole range cannot be covered in depth in a single chapter such as in this module. Therefore, the purpose of this module is to highlight for non-specialists in economics selected important issues that need consideration in developing aquaculture commercially and in assessing it from a community-wide economic perspective. This module has three chapters and these are on economics, marketing and record keeping. This module has been simplified for all users in the aquaculture industry.

Aim:

The module aims at improving learners' knowledge and understanding in the concepts Economic and Financial Analysis of Aquaculture Businesses, Business Plan Techniques, Marketing and Record keeping.

Overview

This module comprises of three chapters;

Chapter 1: Economics of aquaculture

Chapter 2: Marketing

Chapter 3: Record keeping

Estimated time for the module: 2:30 hours

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Introduction

Economics plays an important role in the survival and development of aquaculture husbandry. Economics is a social science concerned with the efficient use of limited resources to achieve maximum satisfaction of economic. It is concerned with the allocation of scarce resources. Aquaculture economics is about marketing, farm management, finance, accounting and product transportation. Its goal is to increase efficiency, profitability and efficiency of resources use. Profit making is the main purpose of running an aquaculture business and if no profit is being made, the business is commercially uneconomic. The reasons for economic failure of an aquaculture business may stem from production, technical or cost problems, or from marketing problems. Therefore, those who want to have a commercially successful aquaculture enterprise must pay considerable attention to economics, including marketing issues.

Aim

Therefore, the purpose of this chapter is to highlight selected important issues that need consideration in developing an aquaculture business. This will help participants to increase their knowledge and understanding the economic aspects of aquaculture.

Objectives

- Participants know
 - Business plan writing
 - Budget analyses and economies of scale in aquaculture
 - Know the importance of financial Analyses in aquaculture
 - Understand the Cash flow analysis
- Acquired skills
 - Identify costs,
 - Prepare budgets
 - Calculate profits/losses,
 - Calculate break even and gross margins
- Acquired attitudes
 - Calculating income and costs helps in determining whether the busies is making profits or not
- Relevance to fish production
 - Economics in aquaculture plays a critical role in making necessary adjustments to ensure that the business is making profits from its investment
- Chapter Overview: This chapter has one session which is looking at outputs, income, business plan and calculating partial budgets
- Materials: Flip chart paper, markers, study notes, posters, calculator, note books
- Mode of delivery: Lectures and group discussions
- Duration : 60 minutes

1.1 Economics

Profitability is not only influenced by the market but by the costs of production, the latter will depend among other things on the types of techniques available and the costs of inputs used in the production process. For example, costs vary according to whether the business is involved in the hatchery phase, the growing-on phase or both, and whether the culture is performed in artificial enclosures requiring pumping of water or in natural water bodies.

Importance of economics of aquaculture

- It's a basis in decision making of the individual fish farmer and in formulation of aquaculture plans
- Provide a basic understanding of the microeconomic factors which influence farm establishment, production and sales of fish and fish products
- Application of economic principles to a practical setting in fish farming
- Maximum resource allocation to aquaculture
- Production for subsistence and earning livelihood

1.2 Costs of production in aquaculture

• Types of costs of production

The major production costs that aquaculture operations require are buying fish seed, feed and maintaining the fish. The costs of production usually vary with local environment and economic conditions, farm size, species under culture, type of culture system and skill of management. Production costs are typically divided between variable costs and fixed costs.

- **Variable Costs** depend on the level of production and this include things like fish seed [according to the size of your ponds and number of the ponds] , feed [the amount your fish will require to bring them to the market or harvest size] manure, labour
- **Fixed Costs**, costs associated with fixed inputs / assets and do not change with quantity produced. These include Land or property costs; equipment, tools, vehicles; interest charges, salaries, property taxes; licensing fee, depreciations, etc.

1.2.1 Variable Costs of Production

Fish seed, feed, fertilizers, transport and labour are the major variable costs for fish farming. These are in the category of inputs [costs]

Cost of Feed

- They usually reflect the position of the species in the food chain and the intensity of the culture system. Herbivorous species are cheaper to produce than omnivorous and should be cheaper than carnivorous species. The more intensive the culture system the more feed and management will be required
- Cost of feed per unit of output for a given species depends mainly on two elements and these are:
 - [a] Conversion ratios of the feed to flesh [FCR]
 - [b] The unit price of feed
- The cost of feed can be reduced by an improvement in the conversion ratio and /or by lowering the unit price of feed. The FCR can be reduced by eliminating and improving the feed formula. The unit price of feed may be lowered by utilizing locally available materials or by-products for feed ingredients instead of imported feed.
- Feed may be the most expensive cost in raising fish to harvest size. To determine the contribution of the feed to production cost per kilogram of fish, it is necessary to know the following;

- [a] Per kilogram cost of feed
- [b] Market size, or weight you expect to add to the fish from seed to harvest
- [c] Survival rate
- [d] The feed conversion ratio (FCR) – a measure farm
- Survival rate in relation to the amount of feed your fish require is important because you will be feeding fish that may die before they reach harvest size. When this occurs, the overall feed cost per unit of harvestable fish will increase. The pattern that fish mortality takes will be important in determining how feed costs are affected. For instance, if all mortality occurs early, before fish are fed, then the survival rate has little impact on the contribution of feed costs to production.

Cost of Seed

- A reliable source of good quality seed at a reasonable price is on one of the most important requirements for aquaculture development in Malawi.
- Expensive fish seed means high cost of production, which is transferred to the customers by higher prices or to the fish farmer in reduced profits
- All aquaculture operations begin with quality seed, and to determine the contribution of fish seed to production cost, you will need to know or estimate the following
 - [a] Purchase price of fish seed (if from own hatchery, the cost of production)
 - [b] Survival rate from seed to market
 - [c] Size of fish you are going to harvest

Labour Cost

- It is another major expense in fish farming
- The labour requirement per unit of pond for small farms is usually higher than for large farms
- Labour requirements are usually higher during pond construction or when setting up fixed costs
- Generally, the larger the pond size (or facility) the greater is the efficiency of land and water utilization, and lower are construction costs.
- The size, shape, depth of the pond and clearing work required will affect the cost of construction
- Economy of construction and efficiency of operation are usually the primary factors in selection and construction

1.2.2 Fixed Costs of Production

These costs associated with fixed inputs / assets and do not change with quantity produced. These include Land or property costs; equipment, tools, vehicles; interest charges, salaries, property taxes; licensing fee, depreciations, etc. A fish farmer has to work out how much his or her investment will cost. He or she needs to know the total cost of production – cost of all inputs used e.g. labour for construction, cost of land etc.

1.2.3 Outputs (income)

A farmer needs to determine how much he/she will get from the investment in terms of income by looking at net changes in profitability – Financial / Income / Profit-Loss Statements which provide a quick picture of the business profitability and finally, run a Cash flow Analysis. NOTE that Profitability is not the same as cash flow as the latter shows liquidity – ability to meet financial obligations.

Items included in the assessment of Net Returns include: Gross Receipts, Variable Costs, and Fixed Costs & Total Costs. Breakeven prices should also be determined including Sensitivity Analysis where one varies important cost items & market prices to assess profitability.

Partial Budgeting is also part of assessing Net Returns – assuming an existing enterprise with some changes by defining a base production scenario and add planned changes. Items include additional revenue, additional costs, reduced revenue, and reduced costs.

1.2.4 Profit calculations

Aquaculture is a high-risk industry, so farmers need to target at least 15% profit margin. In calculating profitability, a farmer needs to know or should differentiate between what are known as Controllable and less controllable factors. Controllable factors include: Management – Stocking size, densities, survival, feeding, water quality, etc. while less controllable factors include: Input costs, input supply and prices.

Profitability is not only influenced by the market but by the costs of production, the latter will depend among other things on the types of techniques available and the costs of inputs used in the production process. For example, costs vary according to whether the business is involved in the hatchery phase, the growing-on phase or both, and whether the culture is performed in artificial enclosures requiring pumping of water or in natural water bodies.

1.3 Preparing a Business Plan

1.3.1 Business plan

A business plan is a detailed written document addressing all the major aspects of the business and it is prepared to provide a guide for entrepreneurs, with a set of goals against which to monitor the business' financial performance. Even if different from a business loan proposal, it constitutes a major portion of the loan application required to convince a financial institution of the viability of the proposed business. A business plan therefore has the business goals, ways to achieve them, and also mentions the timeframe within which you intend to achieve the set goals. A start-up business venture often commits the mistake in sourcing people, the amount of investment needed, profit margin estimation, selecting target customers just to mention a few. Most of these problems can be considerably reduced if you create a proper planned business plan.

Why a Business plan?

- Many prospective and existing fish farmers have difficulty obtaining financing.
- Lenders may not be familiar with aquaculture
- Adequate planning for the business may help avoid mistakes
- Proper planning for the business can also minimize risks associated with the market, production and financing

• How do you draw up a business plan?

The first section of the business plan describes the aquaculture business, including its legal structure, management capacity, borrower's financial history, production system and site. The second section of the business plan includes the marketing plan, which outlines the market opportunities for the aquaculture activities and the marketing strategies to attract clients. Marketing is the management process responsible for identifying and satisfying the needs of consumers in an efficient and profitable manner.

The marketing plan is composed of two sections: the market analysis and the marketing strategy. The marketing plan should identify, among other things: the markets; the distance between markets and fish farms; the markets' accessibility; the transportation costs; the frequency and scheduling of deliveries; the volume and size requirements of the market; the historical prices paid. The third section presents the estimated financing required and the pro-forma financial statements, [income statement, balance sheet and cash flow].

Many aquaculture businesses are not successful and it is critical to understand the most critical factors that determine the success or failure of an aquaculture business. The following should be considered when one plans to start an aquaculture business:

i) Sustainability principles:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. There are five aspects to sustainability in aquaculture: technical, economic, social, environmental and legal. However, sustainability is often only considered from an environmental perspective.

- **Technical sustainability:**

As with any other productive activity, in order to be sustainable aquaculture has to be technically adequate and feasible [technical sustainability]. Specifically, it is necessary for fish farmers to identify the appropriate technologies, either imported or locally produced, and to utilize them properly within the production cycle. Technical feasibility demands that Fish farmers have the necessary knowledge and technical skills to grow a given aquaculture organism.

Production inputs and growing conditions of cultured species are adapted to local conditions. For aquaculture to be sustainable, local technology should be able to produce the necessary production inputs.

- **Economic sustainability**

Aquaculture has to be economically viable [economic sustainability]. Otherwise, fish farmers may decide to focus their efforts on other opportunities. Economic viability requires aquaculture farms to be profitable and competitive over time. Without economic viability, aquaculture can only continue if subsidized. Promoting an aquaculture business that is unable to finance itself may be counterproductive and block the dynamism of the sector.

- **Social sustainability**

Aquaculture should be socially acceptable [social sustainability]. Social acceptability, also known as social licence, refers to the degree to which aquaculture is accepted by local and neighbouring communities, the various interest groups and society as a whole. These attitudes to aquaculture are largely determined by its perceived benefits. To be socially acceptable, aquaculture operations should benefit a broader proportion of society, including women and young people, rather than a small elite.

- **Environmental sustainability**

Aquaculture has to be respectful of the environment [environmental sustainability]. Environmental integrity requires that negative impacts be mitigated, thereby enabling farmers to continue production at the same site over time. Inherent to the very definition of sustainable development, aquaculture activities should maximize benefits from the use of resources without compromising those of future generations [intergenerational equity].

- **Legal sustainability**

To enable the development and growth of the sector, aquaculture has to be governed by adequate, clear and stable laws and regulations [legal sustainability]. Laws and regulations in which the rights and obligations of each actor are clearly defined reassure entrepreneurs. Stability is necessary to give investors the time to adapt, and adopt laws and regulations. Frequent changes are not conducive to investment and create a climate of mistrust among investors

When planning in commercial aquaculture, the following are also a recommendation:

- An understanding of the basic principles of production economics,
- The pricing of aquaculture products,
- Basic record-keeping
- Financial statements for commercial aquaculture namely, enterprise budget, income statement, balance sheet and cash flow in addition to the business plan

1.3.2 General business plan format

Any business plan should effectively express your ideas and be able to convince others of the viability of your business idea even in your absence. According to Cole (2004) and Dwivedy (2011), the contents of a general Business Plan are as follows:

- a. Cover Page**
- b. Table of Contents**
- c. Executive Summary**

This gives a summary of the project; what it's about, its aims, where it is to be, how much to set up and run, when it will 'deliver'

- d. Business Description**

Explains the sector in which the business exists and type of the business registration. It also defines the possible risks.

- e. Business Vision**

The vision statement details what the business future looks like if the mission is achieved.

- f. Business Mission Statement**

It helps clarify what type of business one is undertaking, their goals and objectives. It also defines the values on which the business goals are based. Ultimately, the mission statement should indicate what the business will do for the customers, employees and business owners.

- g. Brief Profile of the Business**

This is a professional introduction of the business and aims to inform the reader about the business products and services.

- h. The site**

It gives the location, total coverage, general features, climate conditions and the relevant socio-economic or political features. The description of the site will also detail how the site is suited for the intended purpose

- i. Proposed facilities and equipment**

These should not be too technical, but detailed enough to include key issues such as facilities and suitability for the purpose, equipment, plan of specific site and description of works. If in aquaculture, the plan this should also indicate if there are other farms in the area of the same type. Where construction is required, full verified bill of quantities for construction and equipment should be attached.

- j. Risks**

This section should indicate results of risk analysis undertaken, or simply the possible risks of the business. Aquaculture is a high risk operation; the plan must make investors aware of this and demonstrate the

necessary precautions to be taken to avert or reduce the occurrence of such risk. Some typical risks in an aquaculture enterprise include: pollution, diseases, theft, predation, flooding, increased input costs

k. Economic benefits of the proposed project

This should give estimates of the change in economic activity in the community as a result of the business's existence. These may include job creation and increased incomes. With an aquaculture business it may also result in increased access to fish protein herein resulting in improved nutrition.

l. Marketing Plan

This gives information on the industry production statistics and trends. The plan should also indicate the long term price trends according to the different players in the marketing channel.

m. Production/Operating Plan

The production plan details the business operational aspects. These include the general principles and daily operations. In aquaculture it may bring out aspects of the planned harvesting and stocking policies in relation to the market objectives. The aquaculture production plan should also detail growth rates assumed and the justification. The availability of required inputs such as fry/ fingerlings, feed and whether these have been secured or commitments made should be clearly described.

n. Organization and Management Plan

This part of the business plan gives information on the organization structure of the business herein showing how the roles, coordination and supervision help achieve the business goals.

o. Financial Plan

It must clearly indicate the technical assumptions forming the basis of the financial assessments. The assumptions must be realistic and backed by real industry experience

p. Security

The business security should be detailed here showing available assets which financiers are able to lend against. This part of the plan should indicate which if the assets are already used for another purpose such as mortgage. Valuation of those assets should be attached with their insurance where appropriate.

1.3.3 Simple Business Plan

We have to remember that a business plan is a structured and systematic outline of your idea and the information needed to transform the idea into an enterprise. For example in aquaculture, it is a document that convincingly demonstrates that the aquaculture business can sell enough of its fingerlings/fish to make a satisfactory profit and be attractive to potential financiers. A business plan takes into account all the key factors to be considered before starting an enterprise. Below is an outline of a simple business plan

Background

Name	Location	Period of Farm Business Plan e.g 2021/2022

Vision

Goal

Fish Production

Fish species	Number of ponds and size	Number fish stocked	Total Output (kg)

Technical feasibility

Technical production factors	Good or not good	Notes/Comments

Physical Resources and Inputs

Resources/Inputs	Quantity	Source of Supply

Labor Requirements and Availability

Enterprise Activity	Month	Total labor required for activity	Amount for Hired Labor
Pond construction	October		
Fish stocking	November		
Total			

Market Plan

Target Market	Expected Yield (kgs)	Marketing Costs (Mk)	Expected Price (Mk)

Profitability

a. Income

Species	Quantity (kgs)	Price per Unit (Mk)	Expected Price (Mk)
Total Expected Income			

b. Variable Costs

Resources/Inputs/Labour	Quantity needed	Cost per Unit (Mk)	Total Costs (Mk)
Expected Enterprise profit			

a. Income

Species	Quantity (kgs)	Price per Unit (Mk)	Total Value (Mk)
Total Expected Income			

Resources/Inputs/Labour	Quantity needed	Cost per Unit (Mk)	Total Costs (Mk)
Expected Enterprise profit			

Whole Farm Profit

	Pond 1	Pond 2	Total Expected Enterprise Profit
Expected Enterprise Profit			
Less Fixed Costs			
Total Fixed Costs			
Whole Farm Profit			

Cash Availability

Cash need	Cash available	Source

1.3.4 Cash inflow and outflows

a. Cash inflow

Cash inflow	Production Period						Total
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	
Total Cash							

b. Cash Outflows (Cash going out/Expenses)

Cash inflow	Production Period						Total
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	
Total expenses							
Net cash flow							
Cumulative cash flow							

Resources/Inputs/Labour	Quantity needed	Cost per Unit (Mk)	Total Costs (Mk)
Expected Enterprise profit			

Risks

Risks	How to handle to risks

1.4 Business Planning Techniques

Planning is thinking and organizing activities to achieve desired goals within the specified period. It involves the formulation of goals, strategies to achieve them and monitoring methodologies using various business planning techniques. Business planning techniques therefore are tools and methods that used in effective business planning that result in profitable business systems. Using these techniques, a business is able to map out strategies for resource utilization, monitoring and future thinking. Some of the key business techniques are:

1.4.1 Costing

Costing is the process of calculating how much you have spent to produce a product or offer a service, before you can price that product or service at a profit. Record keeping of all business transactions forms the basis for effective costing.

Knowing costs will enable business promoters to:

- Set a price that allows profit maximization
- Identify the highest production costs and devise strategies to minimize them
- Avoid over or under-pricing the product out of competition
- Determine the gross marketing margin and net margin

1.4.2 Budgeting

A budget is simply a plan to coordinate the flow of resources in and out of the business to achieve a given set of objectives. An enterprise budget is used to calculate business costs; incomes and predicting the profits over a specified period of time e.g., fish production operation during one growing season.

Steps in estimating a complete budget

- Determine what can be produced
- Determine the area and number of fingerlings
- Determine the price of fingerlings/fry
- Estimate the total yield at end of growing season
- Estimate the selling price of fish
- Estimate the cost of labour, machinery and equipment that may be used on the farm
- Estimate other fixed costs such as depreciation and repairs

Based on the above critical financial information can then be attained and the following are indicated as the major components of an enterprise budget

a. Gross Income/Total Returns [GI/TR]

This is given by the total value of the fish sold and is calculated as the total fish production as a factor of the expected output price.

$$GI = \text{Price} \times \text{Total Yield}$$

However, its calculation should also include

- Cash and credit sales
- Value of amount consumed on the farm
- Value of the amount given away
- Value of amount used for in-kind payment

b. Variable Costs

Variable Costs are the cash expenses directly related to production. These costs vary with the scale of production or farm size. Examples of variable costs at a fish farm are costs of:

- Fry or fingerlings
- Feed
- Fertilizer
- Electricity/fuel
- Hapas
- Packaging plastics/containers
- Transportation
- Maintenance costs of machinery and tools
- Variable labour- man hours/day
- Wages in cash and kind

c. Fixed Costs

Fixed Costs are incurred regardless of whether or not production occurs. Fixed costs are items that can be used in more than one production cycle and these include costs of:

- Items that can be used in more than one production cycle
- Land and equipment
- Construction
- Salaries for permanent staff and owner
- Telephone, postage and office accessories
- Travelling
- Legal/auditing/technical assistance
- Insurance and depreciation

d. Total Costs

This is the sum of Variable and Fixed Costs.

$$TC = \text{Fixed Cost} + \text{Variable Cost}$$

e. Net Returns / Net Farm Income

This is the difference between Gross income and Total Costs.

$$\text{Net Farm Income} = TR - TC$$

$$\text{Net Farm Income} = TR - [TVC + FC]$$

f. Gross margin

This is the difference between total sales revenue and cost of goods sold divided by total revenue, expressed as a percentage. The higher the percentage the more the business retains from each sale to service other costs and debts. A negative gross margin implies that there is not enough money for the business to carry out

its planned production as well as service its other costs. It may also mean the other costs are much higher than the business is able to sustain.

$$\text{Gross margin} = [\text{Gross Income (GI)} - \text{TVC}] / \text{TVC}$$

1.4.3 Break even analysis

Allows the manager to determine the production or income at which all costs are covered.

Bradley and Patton (2002), suggest that the break-even analysis provides businesses with targets to cover costs and make profit. The following are the key break even formulas:

Breakeven Cost = Cost per unit production/yield (how many) per unit of production

$$\text{TC} = \text{TVC} + \text{TFC} =$$

The break-even price is the price at which total expenses are equal to total income. In a fish farming business the break-even price is expressed in Kwacha [Mk] per unit weight [kg]. Given below is an example for an aquaculture enterprise

1.4.4 Sample Aquaculture Enterprise Budget for Medium Scale Operation

Item	Quantity	Price [Cost]/unit [Mk]	Value [Cost] Mk
Fixed Cost [Pond] B			
Gross receipt [fish Sales]			
Variable Costs			
Seed			
Feed			
Manure			
Labour			
Harvesting Labor			
Transport to market			
Miscellaneous cost			
Total variable cost [A]			

Fixed cost [B] =

Gross margin = TR – A =

TC = TVC + TFC =

Production =

BEP =

This can be calculated to cover:

i. Variable expenses

Total variable expenses [Mk]/total fish produced [kg]

ii. Total expenses:

Total expenses [Mk]/total fish produced [kg]

- The Break-even Yield [BEY] above total cost [TC] is defined as production or yield that result in gross income being equal to total costs. This is calculated as follows:
$$\text{BEY above TC} = \text{Total costs} / \text{price per unit}$$
- Break even yield [BEY] above Total Variable Cost [TVC] is defined as production or yield that results in Total Gross Income being equal to Total Variable Costs. This is calculated as follows:
 - $\text{BEY above TVC} = \text{Total variable costs} / \text{price per unit}$
 - Income per Unit Area
$$\text{Income} = \text{Net Income [Mk]} / \text{Total area of pond [ha] or Cage [m3] or tank [m3]}$$

1.4.5 Partial Budgeting

- Assumes a existing enterprise with some changes
- Define a base production scenario and add planned changes
- Items include additional revenue, additional costs, reduced revenue, and reduced costs
- Determine net changes in profitability
- Financial / Income / Profit-Loss Statements
- Provides a quick picture of business profitability
- Cash flow Analysis
- Profitability is not the same as cash flow
- Shows liquidity – ability to meet financial obligations

1.4.6 Economic Measures

- Net Returns – Snap shot assessment of revenue vs costs
- Budgeting
- Income Statement
- Sensitivity Analysis
- Cash Flow Measures
- Net Present Value [NPV] – measures future returns in today's \$s
- Payback Period [PP] – measures time to recover initial investment
- Return on Investment [ROI] – measures gains over costs
- Internal Rate of Return [IRR] – measures timing of returns vs costs

Table 2: Cost benefit analysis of table size fish in a Small Scale Production

Small Scale Operation									
									Total Cost
Pond size	1000m ²								
Parameters									
Construction cost	400,000.00								400,000.00
Grow out period (months)	1	2	3	4	5	6	7		
Seed (Mk30.00/piece)	6,000								180,000.00
Feed input/pond	54	108	216	350	418	550	740		
Manure chicken (kg)	400	200	200	200	200	200	200		
Cost of Manure (Mk10/kg)	4,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00		16,000.00
Cost of feed at K25,000/50kg bag	27,000	54,000	108,000	175,500	209,000	275,000	370,000		1,218,000.00
Labour (1 worker at K20,000/month	20,000	20,000	20,000	20,000	20,000	20,000	20,000		140,000.00
Total Cost									1,954,000.00
Total biomass(kgs)	720								
Revenues (Sold at K2,700.00 /kg)	720								1,800,000.00
Gross Income									1,800,000.00
Total Profit (Mk)									(154,000.00)

Source: Mzuzu Fisheries

Table 3: Cost benefit analysis of table size fish in a Medium Scale Production

Medium Scale Operation									
Pond size	5,000m ²								
Parameters									
Construction cost	2,500,000.00								2,500,000.00
Grow out period	7								
Seed (Mk30.00/piece)	30,000								900,000.00
Chicken manure (kg)	2000	1000	1000	1000	1000	1000	1000	1000	
Cost of Manure (Mk10/Kg)	20,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	80,000.00
Total feed	5854								
Feed input/month	270	540	1080	1214	1300	1450	1545		
Cost of feed at Mk25,000/50kg bag	135,000	270,000	540,000	607,000	650,000	725,000	772,500		3,699,500.00
Labour(2 workers at K20,000.00 each)	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00		280,000.00
Total Cost									7,459,500.00
Total biomass(kgs)	3,600								
Revenues (sold at K2,500.00/kg)	3,600								9,000,000.00
Gross Income									9,000,000.00
Total profit (Mk)									1,540,000.00

Source: Mzuzu Fisheries

Item	Quantity	Price (Cost)/unit (Mk)	Value (Cost) Mk
Fixed Cost (Pond)			
Gross receipt (fish Sales)	720	2500	1,800,00.00
Variable Costs			
Seed	6000	30	180,000.00
Feed	2436	540	3,699, 500.00
Manure	8000	10	80,000.00
Labour	2	40000	280,000.00
Harvesting Labor	6	2000	12,000.00
Transport to market	1	10,000	10,000.00
Miscellaneous cost			10,000.00
Total variable cost (A)			4,271,500.00

Table 4: Cost benefit analysis of table size fish in a Medium Scale Production

Large Scale Operation								
Pond size	10,000m ²							
Parameters								
Construction cost	4,500,000							4,500,000.00
Grow out period	7							
Seed(K30.00 per piece)	60,000							1,800,000.00
Chicken manure (Kg)	4,000	2,000	2,000	2,000	2,000	2,000	2,000	
Cost of manure (10MK/Kg)	40,000	20,000	20,000	20,000	20,000	20,000	20,000	160,000.00
Total feed (kgs)	13125							
Feed input/per kg/month	540	1080	1,700	2000	2480	2,600	2725	
Cost of feed at K25,000/50kg bag	270,000	540,000	850,000	1,000,000	1,240,000	1,300,000	1,362,500	6,562,500.00
Labour(3 workers at K20,000 each/month	60,000	60,000	60,000	60,000	60,000	60,000	60,000	420,000.00
Total Cost								13,442,500.00
Total biomass(kgs)	7,200							
Revenues(sold at K2,500.00 /kg)	7,200							18,000,000.00
Gross Income								
Total Profit								4,557,500.00

Source: Mzuzu Fisheries

Table 5 Fixed and operation costs for three different levels of operation

Component	Cost of Production Percentage			
	Small Scale	Medium Scale	Large Scale	Remark
Pond construction [First Cycle]	20	33.5	33.5	2nd Cycle profits
Seed	9.2	12.1	13.4	
Feed	62.3	49.6	48.8	
Manure	0.9	1.1	1.1	
Labour force	7.2	3.8	3.1	

Summary

The chapter has looked at economics as regards aquaculture. It has been seen that economics plays an important role in the survival and development of aquaculture husbandry. It is concerned with the efficient use and allocation of limited resources to achieve maximum satisfaction of economic. Aquaculture economics is about marketing, farm management, finance, accounting and product transportation. Its goal is to increase efficiency, profitability and efficiency of resources use.

As profit making is the main purpose of running an aquaculture business, Costs of production in aquaculture. The costs of production usually vary with local environment and economic conditions, farm size, species under culture, type of culture system and skill of management. Production costs are typically divided between variable costs and fixed costs.

Variable Costs depend on the level of production and this include things like fish seed [according to the size of your ponds and number of the ponds], feed [the amount your fish will require to bring them to the market or harvest size] manure, labour. Fixed Costs, costs associated with fixed inputs/assets and do not change with quantity produced. These include Land or property costs; equipment, tools, vehicles; interest charges, salaries, property taxes; licensing fee, depreciations amongst others.

A business plan which is a detailed written document addressing all the major aspects of the business and it is prepared to provide a guide for entrepreneurs, with a set of goals against has been presented. A business plan has goals, ways to achieve them, and the timeframe within which you intend to achieve the set goals. A start-up business venture often commits the mistake in sourcing people, the amount of investment needed, profit margin estimation, selecting target customers just to mention a few. Most of these problems can be considerably reduced if a proper business plan is available.

Business planning techniques which are tools and methods that used in effective business planning that result in profitable business systems has been presented. Using these techniques, a business is able to map out strategies for resource utilization, monitoring and future thinking. Some of the key business techniques are costing, budgeting; gross Income/Total Returns [GI/TR], Variable Costs, Fixed Costs, Total Costs, net Returns / Net Farm Income and gross margin.

Introduction

Marketing of fish involves all the activities in the flow of fish or fish products from the farmer to the consumers. There are certain characteristics and elements that are common with the marketing of fish products which demand peculiar skills to be done. Unlike fish from the capture fisheries (wild), marketing of fish raised in aquaculture (ponds, tanks, cages etc.) can be controlled because the farmer needs to have a schedule regarding when he/she wants to harvest fish and how much? That is the reason that despite the high demand for fish in Malawi, the marketability of fish products from aquaculture still remains an important constraint consequently impeding the development of aquaculture sector.

Most local farmers are poorly equipped with knowledge to identify potential solutions to problems in marketing their fish such as poor prices, lack of transport, lack of ready market, and high post-harvest losses. The purpose of this chapter therefore, is to help farmers acquire market skills, techniques and ways of obtaining marketing information and how to appropriately use it.

Aim

The aim of this chapter is to improve participants' knowledge and understanding on the basics of marketing and the concept of marketing in fish farming. Help them to acquire market skills, techniques and ways of obtaining marketing information and how to appropriately use it.

Objectives

- Participants know
 - The concept of marketing
 - Know how to calculate gross margins
 - important aquaculture parameters to be recorded
- Acquired skills
 - Designing forms for record keeping
 - Fish pricing skills
 - Calculating break even
- Acquired attitudes
 - Record keeping is essential for a fish farm operations
- Relevance to fish production
 - Practicing aquaculture will lead to more incomes to fish farmers and those in the value chain whilst promoting food and nutrition security in Malawi.
- Chapter Overview: This chapter has one session which is sub divided looking at importance of aquaculture in Malawi and its history, status of aquaculture in Malawi and its nutritional importance in the country
- Materials: Flip chart paper, markers, study notes, posters
- Mode of delivery: Lectures, group discussions, practical
- Duration : 40 minutes

2.1 Concept of marketing

Marketing is the process of finding out what your customers need and want, when they need them and then working out a way to profitably meeting those needs and wants. A Successful marketing involves development of a complete plan that is cohesive and meshes seamlessly with a number of factors. A successful business must identify which specific set of customers the business is seeking to attract and what that group of customers wants to buy. Moreover, the business must find a way to meet those customers' wants and needs better than any other business. The price charged needs to match the customers' expectations in such a way that they believe they receive enough value to justify what they pay for the product.

2.1.1 Fish harvesting and marketing

As we are dealing with fish, a farmer is expected to harvest and market fish. Under the proper culture management, improved quality fry and complete balanced diet, the average weight of tilapia reach to 200 – 250 g within 3 – 4 months. Other fish if stocked along with tilapia, reach to 600 – 1000 g on average. At this stage fish should be marketed according to the market demand after complete or partial harvest. However, selling live fish in local market gives higher profit.



Fig 2.1 Planning an a aquaculture business for profitability

Fresh fish is a highly perishable commodity and its mode of marketing may not be the same as other products. The following important elements in the marketing of fish from aquaculture are vital: Planning for harvesting and marketing of fish, marketing channels of fish products, marketing agents of fish products, market driving factors of fish products, market infrastructure and physical facilities etc.

Marketing of fish involves all the activities in the flow of fish or fish products from the farmer to the consumers. There are certain characteristics and elements that are common with the marketing of fish products which demand peculiar skills to be done. Unlike fish from the capture fisheries [wild], marketing of fish raised in aquaculture [ponds, tanks, hapas etc.] can be controlled because the farmer needs to have a schedule regarding when he/she wants to harvest fish and how much? That is the reason that despite the high demand for fish in Malawi, the marketability of fish products from aquaculture still remains an important constraint consequently impeding the development of aquaculture sector.

Most local farmers are poorly equipped with knowledge to identify potential solutions to problems in marketing their fish such as poor prices, lack of transport, lack of ready market, and high post-harvest losses. Harvesting methods are very much dependent on the rearing techniques and the design of the farm. When thinning of

stock during the culture period is involved or when multiple stocking and harvesting is practiced, it is necessary to use gill or seine nets. Fish caught by gill netting are likely to be bruised and may lose some scales.

2.1.2 Importance of marketing fish and fish products

The marketing of fish is important in the following ways:

- It is a means of earning income for the farmer. Marketing makes it possible for a farmer or marketer to recover the money spent on both fixed and floating capital during the production or purchasing process.
- Marketing of fish prevents excess fish production by locating and transporting them from area of surplus to the area of shortage. This process encourages farmers to sustain and expand their production as much as they can.
- As a producer [farmer], you are able to know the taste and preference of the consumers about the fish to produce or purchase for sale. During marketing, one can research into the types of fish highly preferred by the consumers to embark on the specie.
- Marketing helps to determine the forms in which fish should be processed, stored, sorted, graded and sold to consumers.
- Through packaging [value addition], fish becomes attractive and appetizing to consumer to enhance sale.
- Marketing of fish creates employment opportunities for the many people.

2.1.3 Marketing surveys

It is important for a farmer to carry a detailed market survey or research even before embarking on the actual production of fish. Market surveys are influential in understanding where to test new products or services. Market surveys provide marketers a platform to analyze the scope of success of upcoming products and make changes in strategizing the product according to the feedback they receive. Understanding the market demand will enable a fish farmer or processor to plan production processes such as harvesting, packaging, storage, transportation and delivery. For example, a farmer whose market requires smaller fish [150g] will then reduce their production cycle to meet the customer needs. On the other hand, one who supplies fillets will have to maintain a larger production cycle to ensure they grow fish to larger sizes [$\geq 500\text{g}$] that are good enough for filleting.

Marketing research is the systematic and objective search for, and analysis of, information relevant to the identification and solution of any problem in the field of marketing.” It can be concerned with any of a variety of aspects of the market: the product, sales, buyer behaviour, promotion, distribution, pricing, packaging, etc.

- **Importance of market research [survey]**
- Can identify how customers and potential customers might view your business and identify gaps in customer expectations.
- Having good market intelligence helps to minimise risks when making key business decisions.
- Serves marketing management by providing information which is relevant to decision making.
- Helps to reduce the uncertainty surrounding the decisions to be made. In order to do so effectively, marketing research has to be systematic, objective and analytical.

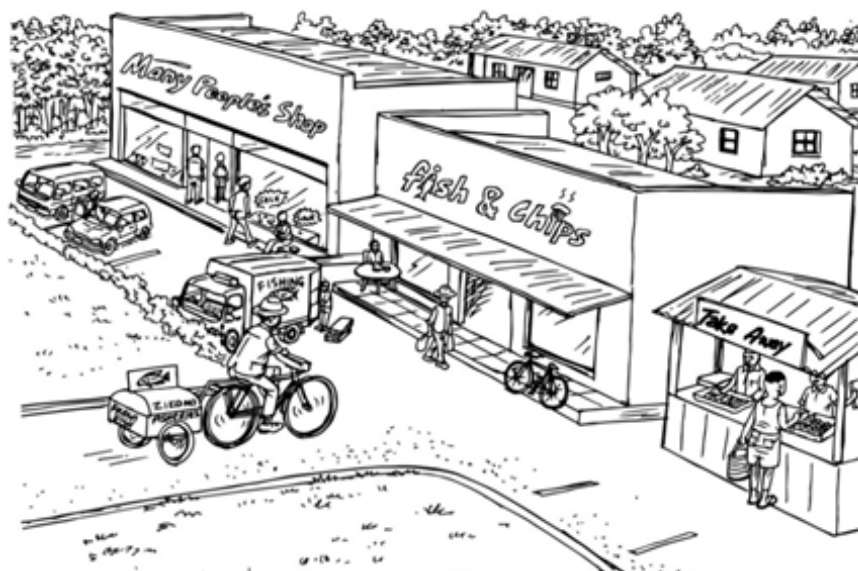


Fig 2.2 Market research helps in knowing your customers

2.1.4 Pricing of aquaculture products

Pricing a product is a lengthy decision that will likely require periodic adjustments to reflect new market environments. The lowest price to charge would be equal to your cost per Kwacha, including both fixed and variable costs. The highest price would be what one or two customers could be talked into paying. In reality, the appropriate price to charge is probably somewhere in the middle of the range. In competitive markets, prices are determined by the interaction between supply and demand. When determining the price of aquaculture products, farmers have to cover the costs of production at the very least, aimed to generate a profit and, at the same time, set a price which consumers are willing to pay. Consumers' willingness to pay can be investigated through market analysis.



Fig 2.3 Planning is crucial in marketing



Fig 2.4 Fish harvesting must be planned

In addition, the calculation of break-even prices can provide useful information for the setting of prices. Given the quantity of fish harvested, the break-even price above total cost (BPTC) is the price at which fish farmers should sell their fish without making any profit. It is calculated by dividing total costs (TC) by the total quantity of fish harvested (Q), as shown in Equation.

Given consumers' willingness to pay, as long as the price of aquaculture products is higher than the BPTC, the business will be able to generate profits.

The following factors should be considered when establishing a product's price: i) How will the product be positioned in the food fish market? [ii] Who are the customers? What are they accustomed to paying? Are they individual consumers, up-scale restaurants, or food wholesalers [iii] what species and prices are competitors offering? [iv] What is the quality perceptions and uniqueness, if any, are associated with the chosen species or culture method?

2.1.5 Advertising

Like for any other commodity, advertising and pricing are inseparable and putting a price on your product is not as simple as you might think. Once a product and price have been chosen, a promotional strategy needs to be developed. Promotion is a way to attract customers. The form of promotion you choose will depend on the scale of your operation, available resources, availability of the product, and geographic location of the operation. In addition to public advertising, it is important to consider on-site product promotion, both visual and verbal. Remember to include the non-price attributes of the product that will help develop repeat customers.

2.1.6 Marketing channels of fish and fish products

Marketing channels refer to means or outlet through which fish products pass from the farmers to the final consumers. How the flow is organized is highly dependent on the market demand and the available players. The marketing channel can be as short as being direct from producer to consumer or may include several interconnected wholesalers, distributors, agents and retailers and this can include:

i) **Local Market:** This is a place near home of the farmers where sellers and buyers. In this place, the fish farmers have contact with buyers who sometimes come to their farm to bid for their products. The buyers save fish farmers the stress of transportation but puts them at a disadvantage in bargaining unless they have good knowledge of the current price in the market. The farmers may have a nice chance of obtaining full value of his fish products in an organized local market where many buyers and other farmers are present with adequate information of the current market prices.



Fig 2.5 Fish marketing

ii) **Commodity Exchange Market:** In this case, fish products traded on are never seen in the market. Through this marketing channel, buying and selling takes place by mail or telephone call. This exchange

market provides means of insurance for farmers and middlemen against risks and uncertainties. Farmers producing fish in Malawi are scattered in remote villages while consumers are in semi-urban and urban areas. This produce has to reach consumers for its final use and consumption. A market channel or channel of distribution is therefore defined as a path traced in the direct or indirect transfer of title of a product as it moves from a producer to an ultimate consumer or industrial user. Thus, a channel of distribution of a product is the route taken by the ownership of goods as they move from the producer to the consumer or industrial user.

iii] Commission Agents and Brokers: These are specialists in buying and selling fish products for marketers and taking charge of the products on their behalf. They are sustained in the occupation by being paid a certain percentage of the price obtained from the purchase or sale. This is not common in Malawi but will certainly become indispensable as production of fish from aquaculture increases. Services of Commission agents and Brokers enable the buyer or seller to have intimate information of the supply of fish products, requirements and prices in various markets. Sometimes, they buy fish products from the farmers and sell to the marketing boards or experts.

iv] Exporters: These are people who buy fish products from commission agents or commercial fish farmers and send products to other countries for sale. They buy fish products in large quantity and send them to buyers or consumers in other countries where scarcity exist for them to make their profit. The exporters are intermediate between countries of abundance and scarcity thereby saving farmers the situation of glut and the consumers that of high cost and starvation.

2.2 The 7 P's of marketing

For a farmer to constantly satisfy the customers' needs and wants and make a profit requires the following key marketing considerations:

i. Product: What is my product or service, who is buying it?

Understanding the right product required would allow the entrepreneur to provide the kind of fish [fingerling, table size fish, smoked, frozen, smoked, fillet, or fish powder] that is needed by customers.

ii. Price: What prices will I charge for my product?

Understanding the market will allow business to be setting prices that the majority of the customers are willing to pay. If the market prefers table size fish that is being sold at Mk500 in the community one can produce table size fish as well but price it at Mk450 as long as it is above the breakeven price to attract a larger market and reduce the risks of post-harvest losses.

iii. Place: Where is my trading place and how will I get my products/services to my customers?

Researching the place will allow for distribution of the products/services in such a way that they are placed where the majority of your target customers can easily reach them. If most of the market is the nearby community, access to the farm is easy and the business is well publicized, a fish farmer may decide to do all sales just from the Farm gate, herein reducing transportation costs as well.

iv. Promotion: How will I promote my product to attract customers?

This will help effectively and efficiently inform and attract target customers. The list that follows highlights some ways or means through which one can inform and attract customers for their aquaculture business:

- Exhibitions
- Word of mouth
- Posters
- Local radio adverts
- Social media
- Community meetings
- Business associations

v. Procurement: Where do I procure raw materials at a minimum cost to maximize profits?

A thorough investigation of available input suppliers such as fish feed producers with respect to the business site will ensure producing at a cost that can make a profit.

vi. People: Have I employed people with the correct skills and competencies?

Knowing this will ensure the use of competent and experienced people, because they are the most important resource in any given company even for marketing activities. An aquaculture business owner should employ at least one individual-preferably farm manager with fish farming expertise or at least have them trained. This training will add value to the enterprise with the supervisor training the rest with the knowledge gained.

vii. Process: Are my systems efficient and effective?

The farming procedure and production plan should be designed with customers in mind and understood by all workers at the farm. This will ensure effectiveness and efficiency

2.3 Record-Keeping for Enterprise and Partial Budgets

Records are fundamental to the development of enterprise and partial budgets. For an enterprise budget, records must be maintained on yields, typically in kg/m² or kg/ha for ponds and kg or kg/m³ for tank systems,. Sales records must be maintained. Records of purchase of supplies, including fingerlings, feed, fuel, and repairs and maintenance are necessary. Labor records must be maintained, divided into salaried personnel and hourly workers. Benefits provided to salaried personnel must be itemized. This may include use of pickup truck for personal use, housing provided on the farm, or other benefits. Hourly workers need to be itemized by full-time seasonal or part-time workers. It is best, if possible, to maintain records of the hours of use of machinery. This is particularly useful for tractors and aerators. Purchase and sale of equipment as well as service records need to be maintained.

2.4 Profitability Measures that can be obtained from the Enterprise Budget

The most important measure of profitability from the enterprise budget is net returns. Net returns are calculated by subtracting total costs from total revenue. An intermediate measure is to calculate income above variable costs by subtracting total variable costs from gross revenue. Also referred to as gross margins, income above variable costs provide a measure of whether the business can continue to operate in the short run. For long-term profitability, net returns that account for fixed costs must be calculated.

Net returns, if not calculated properly, may not be comparable across enterprise budgets. Net returns represent the earnings of the resources used in the production process. However, there are many different types of farm businesses and business structures, and net returns can be used to indicate which costs have and have not been subtracted out.

The reporting convention used is to report “net returns to” whatever resources have not been subtracted out.

For example, if the owner's labor and management costs have not been subtracted out, net returns should then be reported as "net returns to owner's labor and management." The value of the owner's management [opportunity cost of management] is difficult to estimate and is often omitted from the enterprise budget. If the budget has no cost for land, then net returns should be identified as "net returns to land." Few budgets account for risk and, thus, net returns should be expressed as "net returns to risk."

To calculate economic profit, the costs of all resources used in the production process must be accounted for. To do so, opportunity costs, or the value of what that resource would earn if used for something else, should be charged for all resources used. This measure of economic profit is different from accounting profit, as determined by the income statement. Opportunity costs of land can be charged at the value of cash rent or the value of an acre times the opportunity cost of the owner's capital. Some individuals wish to include a measure of the return on long-term investment in enterprise budgets. An enterprise budget is not the best means to estimate a return on investment. However, a simple indicator is the rate of return on the average investment.

To calculate the rate of return on the average investment, the estimated net returns are divided by the sum of the non-depreciable investment items and half of the depreciable investment items, and multiplied by 100. The value of the depreciable items is cut in half because it loses value [depreciates] over time through use, age, and obsolescence. Because the enterprise budget reflects a single point in time, it is not possible to calculate the long-term return on investment and, hence, an "average" return on investment is used, if necessary, to provide a generalized view of the return.

2.5 Marketing Challenges

Marketing challenges of starting a new aquaculture business often are greater than the production challenges and ultimately more important. Successful aquaculture businesses are managed and owned by individuals who spend as much time exploring marketing options and trends as they do working on production efficiencies. There are a number of overarching trends and challenges that prospective aquaculture business owners should consider. In some areas, there are some fish which are caught from the wild; these can cause marketing challenges for farmed fish.

Many of these species have existing markets, demand and time they arrive on the market. Preferences for wild-caught fish as compared to farmed fish must therefore be considered. Care must be taken to understand these preferences in the market targeted for the business's product. As farmed product becomes available in the market, it frequently must compete with wild-caught product that is already well established in the market. However, the cost of producing farmed fish, especially in the early years of startup businesses, requires a price that often is higher than that of wild-caught fish. To establish a new product in the market often requires differentiating it from wild caught and other similar products to capture a price that will cover production costs.

To address this challenge, the marketing plan must lay out an effective promotion and advertising plan. Even the smallest-scale aquaculture farms must have a plan to spread the word about their products. Promotion is away to transmit information about the attributes of the product, the price, and why the consumer should purchase it. Appropriate and effective market channels must be developed. Is the farmer planning to transport all the fish produced to the various markets? The amount of time needed to transport fish to markets must be determined and adequate personnel included in the business plan. The length of round trips that can be undertaken feasibly can be an important factor.

Summary

Aquaculture businesses should be entered into only after considerable thought and analysis. Greater capital, more intensive labor, and high levels of management are required to be successful in aquaculture regardless whether the business is large or small. Comprehensive business and marketing planning is necessary. Marketing is the process of finding out what your customers need and want and when. A Successful marketing involves development of a complete plan that is cohesive and meshes seamlessly with a number of factors. The business must find a way to meet those customers' wants and needs better than any other business. The price charged needs to match the customers' expectations in such a way that they believe they receive enough value to justify what they pay for the product.

It is important to market fish and fish products as it is a means of earning income for the farmer. Marketing makes it possible for a farmer or marketer to recover the money spent on both fixed and floating capital during the production or purchasing process. Marketing of fish prevents excess fish production by locating and transporting them from area of surplus to the area of shortage. Marketing of fish creates employment opportunities for the many people.

For a farmer to constantly satisfy the customers' needs and wants and make a profit requires to follow the key marketing considerations which includes the product or service, price, place, promotion, procurement, people and process.

Records are fundamental to the development of enterprise and partial budgets. For an enterprise budget, records must be maintained on yields, typically in kg/m² or kg/ha for ponds and kg or kg/m³ for tank systems,. Sales records must be maintained. Records of purchase of supplies, including fingerlings, feed, fuel, and repairs and maintenance are necessary.

Profits have to be calculated at all times as the most important measure of profitability from the enterprise budget is net returns. Net returns are calculated by subtracting total costs from total revenue. An intermediate measure is to calculate income above variable costs by subtracting total variable costs from gross revenue. Also referred to as gross margins, income above variable costs provide a measure of whether the business can continue to operate in the short run. For long-term profitability, net returns that account for fixed costs must be calculated.

Marketing challenges of starting a new aquaculture business often are greater than the production challenges and ultimately more important. Successful aquaculture businesses are managed and owned by individuals who spend as much time exploring marketing options and trends as they do working on production efficiencies. There are a number of overarching trends and challenges that prospective aquaculture business owners should consider. In some areas, there are some fish which are caught from the wild; these can cause marketing challenges for farmed fish. A fish farmer has therefore to find ways of selling his or her fish products at a profit.

Introduction

Analysis of any aquaculture enterprise (financial or biological), requires sound and up to date information (records). In aquaculture, farm records are the most reliable form of information one can use. Poor record keeping is probably one of the major reasons entrepreneurs fail. A recent case study of record keeping has been demonstrated in outbreak of EUS where fish farmers recorded their experiences on the outbreak of the virus like in the case of Mchinji fish ponds and hence helping to inform future interventions. Investors who operate without records are likely to make wrong decisions due to lack of information of what is happening in their farms. Fish farmers and hatchery operators are therefore required to keep accurate records for all of their farm operations.

Aim

The aim of this chapter is to improve participants' knowledge and understanding on the importance of record keeping and different types of records for a profitable aquaculture enterprise. Participants will also acquire and add skills on how to design their own data capturing forms and how to record their information

Objectives

- Participants know
 - The importance of record keeping in farm operations
 - How to keep records in tabular form;
 - How to learn from the past through record keeping
 - important aquaculture parameters to be recorded
- Acquired skills
 - Designing forms for record keeping
 - Filling necessary information in record templates
- Acquired attitudes
 - Record keeping is essential for a fish farm operations
- Relevance to fish production
 - Records inform the fish farmer whether profits are being made or not. The government is able to make new policies on how to advance aquaculture and how to address the challenges fish farmers are facing
- Chapter Overview: This chapter has one session looks at the importance of records in an aquaculture business, types of records that can be kept, how to design own record templates and how to use them.
- Materials: Flip chart paper, markers, study notes, posters
- Mode of delivery: Lectures, group discussions, practical
- Duration: 40 minutes

3.1 Overview of records and record keeping

3.1.1 What is a Record?

Record is information that has been systematically and carefully collected and appropriately stored for intended use. To be able to run any business successfully, carefully thought out, properly collected and kept records are a must. For the purpose of keeping track and decision making in any business, comprehensive and well-kept records must be kept. Just as in any other enterprise, properly collected and kept records are important in fish farming enterprises. As long as one indulges in commercial fish production, record keeping is an unavoidable activity and it is a continuous process in fish farming because circumstances on the farm change continuously, on a daily basis.



Fig 3.1 Writing farm record

Accurate, detailed and complete records can help the fish farmer or hatchery operator to:

- Demonstrate if changes in management are improving or harming the fish's performance and know the farms' economic returns
 - Determine profitability of various techniques of production or systems
 - Compare the efficiency of using inputs, such as land, labour and capital, with that of alternative production activities
 - Help the investor in improving the efficiency of farm's operations
 - Be used to preserve institutional memory of the enterprise for future reference.
 - Provide control over the business and improve the management and efficiency of the farm.
 - Provide a basis for farm credit and financing.
 - Provide information for government programs.
 - Provide information for tax purposes.
- Good records will, for example;
- Be useful in projection of expected production
 - Be useful in determining the amount of inputs requirements for specific ponds at various stages of production
 - Be useful in determining the expected harvesting time
 - Determine the financial health of the enterprise

3.1.2 Maintaining records

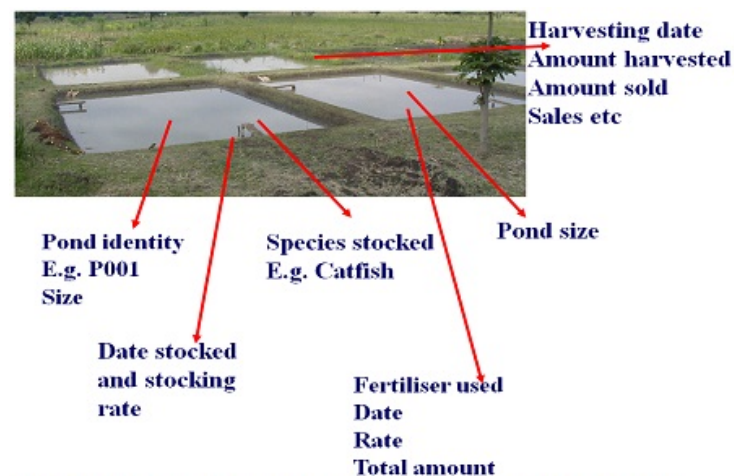
To verify the success or failure of running any business, record keeping is very important. Necessary record keeping in fish culture not only helps in economic analyses, it also provides future direction for the improvement of culture management. Therefore, from the very beginning to the end of the entire culture period, records on the following aspects should be maintained –

- Physical parameters of the pond
- Water depth
- Description of the activities during pond preparation and the expenses
- Fish seed collection, transport, stocking and the expenses
- Number of fish seed stocked
- Information on fertilizer application, kinds, weight and expenses
- Information on feed application, kinds, weight and expenses
- Sampling information
- Harvest quantity of fish, prawn, income etc.

There is no set rule for record keeping. Recording necessary information exactly is more important than the way of recording. Fish farmers can record necessary information by any method according to his/her own advantages. SCISA-BD project use a notebook for record keeping. Besides, by keeping records on the listed aspects, fish farmers can easily maintain breakdown of cost benefit in fish culture.

3.1.3 Some important aquaculture records include:

- Capital investment costs e.g. cost of constructing ponds, hatchery etc.
- Total area under culture
- Individual pond identity
- Individual pond treatments
- Stocking densities and time of stocking
- Species stocked
- Kinds, quantities and cost of inputs used
- Pond productions in amounts and values
- Other productions and values
- Daily occurrences



Some important parameters in aquaculture records (Mbugua H.M)

Fig 3.2 what to record from a fish pond

The farm manual record book remains the old stand-by for farm record keeping due to its ease of use. There are many forms of farm records, but most simply list the input and output of the farm operation both in physical [kilograms, tonne] and monetary terms. Farm records can be broadly classified into two kinds: daily and annual [seasonal]. It is important to keep farm records as simple as possible but to record all necessary details in order that the performance of the farm operation can be fully evaluated.

3.2 Aquaculture records:

3.2.1 Some of the aquaculture records;

- i. Fish farming biological management records
- ii. Financial management records include:
- iii. Purchase of inputs
- iv. Sales records
- v. Salary records
- vi. Inventory of equipment
- vii. Records on payment of rents and hire of equipment, machinery, services etc.
- viii. Occurrence book

It is very important for individual farmers to clearly know what they need to record and the intended use of this. This will assist them in preparing the most effective way of capturing the needed information.

3.2.2 Other records to consider include:

- Salary / wages records
- Farm inventory records
- Records on payment of rents and hire of equipment, machinery, services etc
- Pond sampling records



Fig 3.3 Fish Records



Fig 3.4 labour Records



Fig 3.5 Inputs Records

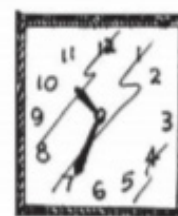


Fig 3.6 Own labour



Fig 3.7 Harvested fish Records



Fig 3.8 Transport costs



Fig 3.9 Fish sales

3.2.3 Classification of aquaculture records

Aquaculture records can be classified into:

- i) Daily records kept for input usage like feeds, fertilisers, labour and daily occurrence
- ii) Occasional record which are kept for events that do not happen on daily basis. Such records would

include:

- Specific pond production [Quantity and values] by species
- Costs of acquisition of inputs
- Cost incurred in new constructions or repairs
- Salaries [both in cash and in kind]

NOTE that records should:

- Be easy to complete
- Be easy to update
- Not be time consuming
- Have information not to be re-written several times, in several forms or transferred more than once

3.3 Templates of Record keeping

3.3.1 Types of daily records kept on an aquaculture farm:

i. Farm Expense or Input Records

There are two kinds of expenses or inputs – variable and fixed. Due to their various uses in financial analysis, separate records should be kept of variable, fixed, and labour expenses or inputs. Variable expenses or inputs are those that vary with the level of production, such as fish seed, feed, labour, chemicals, fuel, electricity, and water. Each expense or input item should be described in as much detail as possible. For example, stocked species and size, type of feed, or equipment repair. Each item used, its amount, its unit cost, and its total cost should be recorded.

Table 1.3 Sample Daily Record of Variable Inputs

Date	Pond no.	Item	Kind	Qty.	Unit cost	Total cost

Fixed expenses or inputs are those that do not change with the level of farming activity, such as land rent, tax, insurance, docking charge, salary of employees, and depreciation of fixed assets. Fixed costs are usually payable on an annual, quarterly or monthly basis and should be recorded separately

Table 3.28 Sample Daily Record of Fixed Inputs

Date	Item	Monthly cost	Annual	Remarks

Labour records provide management with an understanding of the type of labour employed, type of work performed, wages paid and hours worked.

Table 3.3 Sample Daily Record of Labour Input

Date	Pond no.	Economic activity	Type of labour	Man hours	Wage rate	Total labour cost

ii. Loan and Credit Account Records

If the farmer obtains a loan or credit for the aquaculture enterprise, a separate record should be kept for each loan. This record should include a statement of the amount of the loan, the purpose of the loan, the source of the loan, the outstanding amount, the payment schedule, and the interest payment.

Sample Record of Loans:

- Date borrowed
- Amount borrowed
- Source of loan
- Purpose of loan
- Pond number or lease used for
- Loan increment
- Terms of loan
- o Length
- o Interest rate

iii. Record of Fixed Assets

A list of fixed assets of the farm [ponds, bags, boat, buildings, nets, machinery] with their initial or current costs and their estimated year of economic life is required to calculate depreciation. If the fixed assets are shared between different enterprises, an appropriate proportion of their use in each enterprise should be calculated before determining depreciation.

Table 3.4 Inventory of Assets

Pond no.	Acquisition cost	Market value	Salvage value	Depreciable balance	Estimated economic life	Proportion used for aquaculture

iv. Inventory of Aquaculture Product

When continuous stocking and harvesting is practiced, the change [increase or decrease] in the number and value of inventory should be calculated. Therefore, a record of beginning and ending inventory is necessary.

Table 3.5 Beginning and Ending Inventory of Product

Pond no.	Date	Species	Type of stock	Weight/Numbers	Unit price	Value
Beginning inventory						
Ending inventory						
Change in inventory						

v. Farm Receipt or Output Records

The intent of these records is to provide management with an accurate list of products sold. As each lease or pond is harvested, the following items should be recorded – date of harvest, species harvested, amount harvested, price received per unit, and the disposition of the product. Gross revenue of the production should include the cash and credit sales of the products and the imputed values of the quantities consumed on the farm.

Table 3.6 Sample Record of Output

d no.	e	harveste d	harveste d				consumed or given away		payment		value of productio n
				Qt y	Unit pric e	Valu e	Qt y	Valu e	Qt y	Valu e	

vi. Lease or Pond Utilization Schedule

If a farm has a number of leases or ponds and/or multiple species in production, records should be kept of the use of each lease or pond. This includes date stocked; species stocked, and expected harvest date.

vii. Capital Transactions

Records should be kept of the purchase and sale of equipment, capital purchases and sales, and the purchase and sale of breeding stock. In addition to the above records, feed, oxygen and water quality records should be kept. Accurate information is the foundation upon which useful and correct farm, production and financial analysis is performed. While keeping records requires additional effort and time on the aquaculturist's part, the information is critical for the successful farm operation. Records developed by management are the initial starting point for enterprise budget and other financial management analysis.

3.4 Level of record keeping

How much and how comprehensive kept records are, is dependent on:

- Level of investment; Complex investments require complex records
- Motivation of investor; Serious investors will have more comprehensive records
- Level of aquaculture management: Intensive operations will have more complex records as compared to semi intensive operations
- Skills of the investor [Or manager]. Well trained managers will keep better records
- As the management levels rises, culture systems become more complex and so is the record keeping.

This is the reason the farmer must think very carefully of what he needs to record.

3.4.1 More types of Records

Table 3.7 Pond management records

Pond no.						
Date	Type of input	Rate of usage	Total usage	Unit cost	Total cost	Remarks

Table 3.8 Stocking records

Date	Pond identity	Size (m ²)	Species	Source	Stocking rate	Average Weight	Total number /weight	Unit cost	Total cost

Table 3.9 Harvesting records

Pond No.	Date			Amount sold			Amount consumed on farm		Amount given away		Payment in kind		Total value of produce
		Species harvested	Quantity harvested Kg	Quantity Kg	Unit Price MK/Kg	Total value MK	Quantity Kg	Value MK	Quantity Kg	Value MK	Quantity Kg	Value MK	

Table 3.10 Cash flow records

Cash inflow				Cash outflow			
Date	Source	Amount	Comments	Date	Source	Amount	Comments

Each of the following record keeping templates presents detailed suggestions on how to organize and use records to monitor and evaluate farm performance relevant to the activity taking place. Management decisions made from detailed farm records will be more effective and have greater positive results over time if based on detailed historical performance records of the farm business.

Table 3.911 Pond/Tank Construction and Routine Pond Maintenance Record Keeping Templates

Construction of Ponds/Tanks					
Date	Size of Pond or Tank	Labour - Man Days	Cash Received (MWK)	Cost (MWK)	Comments

Note: Comments can include Pond or Tank number, other observations worthy noting which will be beneficial in future. On size, indicate length, width, depth

Table 3.12 Pond liming records

Liming of Ponds					
Application Date	Pond/Tank #	Application Rate (Kg/100m ²)	Quantity Applied (Kgs)	Cost (MWK)	Comments

Recorder: _____

Table 3.13 Pond fertilization records

Pond Fertilization					
Application Date	Pond/Tank #	Application Rate (Kg/100m ²)	Quantity Applied (Kgs)	Cost (MWK)	Comments

Recorder:

Table 3.14 Pond maintenance records

Maintenance								
Description of Maintenance or Repairs								
Date	Cut grass on dikes	Ponds Weed removal	Mud Removal	Canal clearing	Dike Rebuilding	Others (specify)	Labour Man Days	Cost (MWK)

Table 3.16 Fish mortality records

Fish Mortalities						
Date	Pond/Tank #	Number of Fish	Size (Weight, Length)	Number Replaced	Cost (MWK)	Comments

Recorder:_____

Table 3.17 Fish harvesting for home consumption

Harvesting for Home Consumption					
Date	Pond/Tank #	Weight (kgs) or Pieces	Average Weight (g)	Estimated Income	Comments

Recorder:_____

Table 3.18 Fish harvesting for sale

Harvesting for Home Consumption					
Date	Pond/Tank #	Weight (kgs) or Pieces	Average Weight (g)	Estimated Income	Comments

3.5 Advantages of Record Keeping

The importance of record keeping in aquaculture includes the following:

- Source of information by which one can make daily management decisions.
- Means of evaluating performance and making future decisions
- Ways of monitoring impact of management changes on fish production
- Also help monitor irregularities such as theft and predation
- Helps to know the farm structures [ponds, tanks] and equipment [nets, wheelbarrows, buckets] you have.
- Records helps in calculating depreciation costs
- Fish management: Helps in knowing source of your fish, age, growth, when they were stocked, feeding, water quantity and quality in ponds, cages or tanks.
- They guide on when to harvest fish and even restock, manure your ponds and quantities required.
- Helps to follow temperature patterns and other daily observations like rains. All these helps in achieving good yields at the end of the production cycle
- Helps to know the personnel involved in activities and easy to make trace in case a follow up is needed on anything.


Summary

Record is information that has been systematically and carefully collected and appropriately stored for intended use. To be able to run any business successfully, carefully thought out, properly collected and kept records are a must. For the purpose of keeping track and decision making in any business, comprehensive and well-kept records must be kept. Just as in any other enterprise, properly collected and kept records are important in fish farming enterprises. As long as one indulges in commercial fish production, record keeping is an unavoidable activity and it is a continuous process in fish farming because circumstances on the farm change continuously, on a daily basis.

There are many forms of farm records, but most simply list the input and output of the farm operation both in physical and monetary terms. Farm records can be broadly classified into two kinds: daily and annual [seasonal]. It is important to keep farm records as simple as possible but to record all necessary details in order that the performance of the farm operation can be fully evaluated.

Farm records are important in so many ways as they are

- Source of information by which one can make daily management decisions.
- Ways of monitoring impact of management changes on fish production
- Records helps in calculating depreciation costs
- Fish management: Helps in knowing source of your fish, age, growth, when they were stocked, feeding, water quantity and quality in ponds, cages or tanks.
- They guide on when to harvest fish and even restock, manure your ponds and quantities required.



AQUACULTURE ECONOMICS AND MARKETING

Module VIII of 8